NEW YORK UNIVERSITY SCHOOL OF MEDICINE

Phase II Report of the Academic Excellence Commission

Appendices

December 16, 2008

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1) Minutes/ Other

Appendix #

2) Literature & Literature Summary

Appendix 1A

AEC Meeting Minutes

MEETING DATE: Thursday, November 29, 2007
Start time: 5:45pm
Adjourned: 7:00 pm

Commission members present: Mark Adelman, Anil Lalwani, Claudio Basilico, Peter Shamamian, Georgeann McGuinness, David Levy, James Salzer, Robert Schneider, Joseph Zuckerman

Ex-Officio Commission members present:
Steven Abramson, Karen Brewer, Heather Campbell, David Church, Niketa Sheth

Commission members not present: Sylvia Formenti, Doreen Addrizzo-Harris, Mark Philips

Academic Excellence Meeting MINUTES:

- Follow up discussion on extramural salary coverage reaffirming the proposed metric of 60% extramural salary based on the NIH cap.
- Salary coverage analysis indicated the average extramural salary coverage would rise to the proposed metric of 60% if faculty with equal to or less than 20% extramural salary coverage were excluded.

The majority of the meeting was spent discussing the incentive metrics:

- General comments
  - Incentives are meant for those that perform well above the metrics
  - Virginia Commonwealth University 2007 Survey Analysis Report shows information on what other SOM are using as incentive methods
  - Incentive similar to current policy for Skirball can create stability and is advantageous with re-investment into the lab.
  - Incentives should apply to all departments
  - Discretionary fund incentives allow for more flexibility for the use of funds by faculty member/or department

- Compensation X, Y, Z Model was raised by Dr. Lalwani, as an example of what is done at UCSD

Recommended Incentive Possibilities:

X + Y + Z

X: Institutional Base Salary

Other institutions tie this to either:
a) A percent of a AAMC benchmark, or
b) Fixed amount

Y: Productivity Component- Based on productivity standards

Z: Incentive / Bonus for exceptional performance

Incentive Option:	*Awarded To:*
a) Bonus	a) Faculty
b) Discretionary Fund	b) Department
c) Housing	* Fixed Amount for each grant, exceeding grant,
d) Recognition	2/3 faculty / 1/3 department
e) Sabbatical	

* None of the options above are mutually exclusive

- Incentive can be allocated to the department, separately
- X, Y, Z creates an institutional salary that is productivity based with the opportunity for a bonus based on exceptional performance.
- Using productivity bonuses vs. raising salary avoids some of the potential future challenges of reducing institutional salary should performance decrease.
- The committee discussed a number of options related to dollar amounts, threshold for receiving a bonus, and % allocation between the individual and department; but did not make specific incentive recommendations.
- Discussion of base salary as zero, which allows for no "floor"

The Commission Members ended meeting with a brief discussion around faculty forum and Retreat information.

Next Steps: Next Meeting- Thursday December 6th, 5:00-6:30pm

MEETING DATE: Thursday, February 7, 2008
Start time: 5:00 pm
Adjourned: 6:45 pm

Commission members present: Mark Adelman, Doreen Addrizzo-Harris, Claudio Basilico, Anil Lalwani, Sylvia Formenti, Georgeann McGuinness, David Levy, Mark Philips, Peter Shamamian, Robert Schneider, James Salzer

Ex-Officio Commission members present:
Steven Abramson, Karen Brewer, Heather Campbell, Niketa Sheth

Commission members not present: David Church (ex-officio), Joseph Zuckerman

Academic Excellence Meeting MINUTES:

- Robert Schneider reviewed agenda for the meeting. He opened with an update on Phase I - process of implementation. Members were reminded to send additional edits to the co-chairs, as a final version has not been approved by the Dean yet.

Members discussed Phase I Recommendations:

- General comments
  - Members heard concerns from faculty members regarding difficulty in meeting the expectation to reach 50% by the end of the fiscal year. The concern was the potential difficulties faced by faculty members currently less than 20% extramurally funded.
  - Silvia Formenti suggested that with the Phase I recommendations, faculty will try harder and will be more motivated.
  - Members had questions regarding how metrics will be implemented.
  - Robert Schneider reminded members that Phase I recommendations will be re-visited again in one years' time.
  - Update on Faculty Council's concerns around Phase I, mainly about implementation and consequences. Members discussed the objectives of AEC, and that implementation/consequences are not for them to determine.

Robert Schneider reviewed overview of Phase II expectations. Opens for Phase II Discussion:

- General comments
  - Challenges with clinical productivity - members will need comparator literature and will need to discuss further.
  - Base salary literature & comparator data needs to be re-distributed and re-reviewed by members.
  - Members request to have Annette Johnson and Nancy Sanchez attend Base Salary discussion to better understand legal and benefit implications.

Next Steps:

- Re-review base salary literature before next week's meeting
- Next Meeting: February 14th 5PM, Location: TBD

MEETING DATE: Thursday, February 14, 2008
Start time: 5:00PM
Adjourned: 6:40 PM

Commission members present: Mark Adelman, Doreen Addrizzo-Harris, Claudio Basilico, Anil Lalwani, Sylvia Formenti, Georgeann McGuinness, David Levy, Mark Philips, Peter Shamamian, Robert Schneider, James Salzer, Joseph Zuckerman

Ex-Officio Commission members present:
Karen Brewer, Heather Campbell, David Church, Niketa Sheth

Ex-Officio Commission members not present: Steven Abramson

Academic Excellence Meeting MINUTES:

- Robert Schneider reviewed agenda and updated members on Phase I status.
- Phase II: Base Salary Discussion began with Robert Schneider summarizing the publications and recent meetings around base salary. Several key findings from the Virginia Commonwealth University Survey and AAMC publication were emphasized. Bob introduced various models on the "Base Salary Continuum" handout. He opened the discussion to hear members' views.

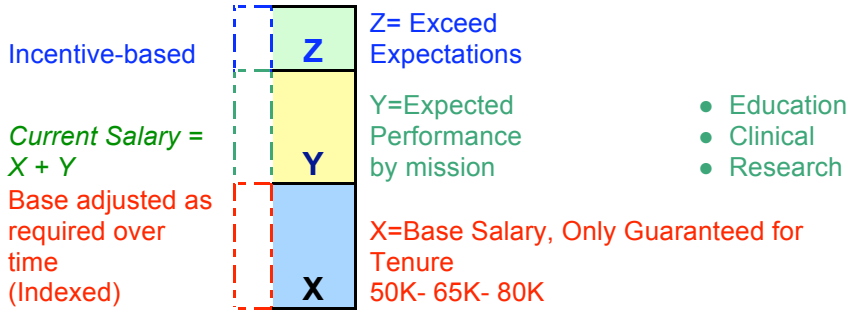
Base salary Discussion included:

- Regional SOMs comparisons are important.
- Agreement that base salary would apply to tenured and non- tenured faculty.
- Agreement to have Annette speak regarding any legal issues and what defines "for cause". For now, should focus on getting consensus on what base should be/ how it should be determined.
- When recruiting new faculty, the AAMC 75% ile plus a 15% NYC adjustment is used as a starting point for total compensation.
- XYZ model discussed. "X" defined as base salary/ tenure salary and "Y" as productivity based X + Y= Total Salary. An additional "Z" would be incentive- based.
- Purpose of the base (X) was discussed:
  - Base salary should be set low enough to encourage faculty to be productive or choose to leave.
  - Also should encourage keeping faculty that are productive & should reflect level of respect.
- Joe Zuckerman reminded others of his 2004 Tenure Committee efforts and conclusions that were considered "generous", given the circumstances with two year period of no change and the high number of faculty members that were grandfathered. He did suggest using the X, Y, Z model, however with "X" determined by academic rank.

- Anil Lalwani recommended to focus on "X" and keep it simple. The same "X" should apply equally to clinical and basic science faculty with Y allowing for salary differentiation by specialty & productivity.
- David Levy suggests not focusing on small differences in numbers from regional SOMs, as recruits will not make decisions on this basis.
- Silvia Formenti and others raised for consideration and discussion: 1) method of determining "X" (e.g. AAMC target, Fixed Amount) 2) glide path 3) floor, if any.
- NYU policy for "full time service", obligation as full time faculty [SEE NYU Faculty Handbook Excerpts at end of minutes].

Commission members came to a consensus on a base salary or "X" component within an X, Y, Z model:

- "X" is the "base salary" for all faculty, *but only guaranteed for tenured faculty.*
- **X = 50K- Assistant ; 65K- Associate; 80K- Professor**
- X is not guaranteed if faculty are not fulfilling their full time service obligations as defined in the NYU Faculty Handbook.
- X is the same for basic science and clinical faculty.



Next Steps:

- Next Meeting: February 28th 2008; 5PM, Rusk 227
- Data Request: Reach out to personal contacts at regional SOMs learn more about their base salary model.

Excerpts From NYU Faculty Handbook

1) Teaching Assignments

Full-time members of the faculty, professional research staff, and administration are in principle available for duty during and they are paid for the entire academic year, September 1 of a given year and ending August 31 of the succeeding year. In practice, the period of active service to be rendered within

the academic year is determined by the administrative heads of the various units according to University policy in terms of the objectives of the program concerned and the functions to be performed.

As regards full-time faculty members, long-standing University policy normally limits regular teaching assignments to the usual fall and spring terms (approximately early September to mid-May) or equivalent. The summer months are generally expected to be spent partly in scholarly activity for professional growth and partly in rest and recreation. Assignments outside of the usual pattern as a part of the regular teaching load are normally made only as the result of a specific agreement with an individual faculty member. In the School of Medicine and the College of Dentistry, the teaching assignments are September through August and September through July, respectively.

Full-time teaching loads are determined administratively under guidelines approved by the Office of the Provost for a particular school or department. No additional compensation by reason of teaching overload may be paid to a full-time faculty member during the period of a regular teaching assignment, except in emergency circumstances duly approved in advance by the Office of the Provost. As an exception, teaching in the School of Continuing and Professional Studies or in a regularly established off-campus program for additional compensation to the extent of one course per semester (in addition to a faculty member's regular assignment) will be permitted with the approval of the dean of the school in which the teacher's principal services are rendered, but such arrangements are subject to review and renewed approval from year to year. Exceptions for additional compensation by reason of teaching overload may also be made for teaching in the Gallatin School of Individualized Study and in experimental programs.

A full-time faculty member whose regular teaching assignments are limited to the fall and spring terms (approximately early September to mid-May) may accept teaching assignments at times outside his or her regular schedule (e.g., during the summer) at New York University or elsewhere, provided such additional undertakings do not unduly interfere with the teacher's efficiency and serviceability to the department and do not preclude taking a reasonable vacation. Summer teaching assignments at New York University are normally made to full-time faculty members only with the consent of the teacher concerned.

2) Restriction on Outside Employment

As a matter of University policy, full-time members of the faculty are required to teach only at New York University during the period of their regular teaching assignments (normally from September through May, or in the School of Medicine and the College of Dentistry, from September through August and September through July, respectively). Teaching service at other institutions during such period may not be rendered except in the most unusual circumstances and must be duly approved by the appropriate dean and by the Office of the Provost.

Assignments to full-time members of the faculty, professional research staff, and administration are made on the assumption of full-time service to the University. Full-time faculty members are expected to devote their major energies to teaching, research, student counseling, and related activities at New York University. This implies a limit on outside activities, particularly those that involve the rendering of service for extra compensation.

Since individual energies and capacities vary greatly, it is difficult to prescribe any exact measure for such limitation. In general, however, full-time members of the faculty will be expected to limit their outside activities for which compensation is received to not more than one day per week during the periods of their regular teaching assignments.

As a matter of courtesy, faculty members are expected to inform their departmental chairpersons and deans of the general nature and extent of any such continuing commitments.

It is the responsibility of departmental chairpersons or heads and of the deans of the various school s to protect the interest of the University in the full-time service of its full-time faculty, professional research and library staffs, and administration.

MEETING DATE: Thursday, February 28, 2008
Start time: 5:00PM
Adjourned: 6:30 PM

Commission members present: Doreen Addrizzo-Harris, Sylvia Formenti, Georgeann McGuinness, Mark Philips, Peter Shamamian, Robert Schneider, Joseph Zuckerman

Ex-Officio Commission members present:
Steven Abramson, Karen Brewer, Heather Campbell, David Church, Niketa Sheth

Commission members not present: Mark Adelman, Claudio Basilico, Anil Lalwani, David Levy, James Salzer

Academic Excellence Meeting MINUTES:

- Robert Schneider reviewed agenda. He requested Mark Philips to share some draft analysis around publications.
- Mark discussed how NIH rank is be higher for those SOM that are stronger in clinical research, given the large amount of grants specifically for clinical /translational research efforts. Mark introduced several slides. The first analysis was a comparison of overall publications against other schools in total and SOMs. Another analysis graphed the ratio of publications in BS & Clinical in top journals across special SOMS. The last analysis was an internal comparison of BS & Clinical among top journal publications. Karen Brewer offered to follow up on this analysis with more specific and comparable data across the board.
- Robert Schneider opened the discussion on clinical productivity and introduced several brief findings from clinical productivity publications. Members would receive more publications to read, and would discuss further at next meeting.
- David Church introduced and reviewed "Determining Clinical Productivity" chart which illustrated examples of clinical faculty with varying levels of clinical effort relative to education and research effort.
  Clinical Productivity Discussion included:
  - WRVUs clarified: 1) Relative value units used to measure clinical productivity based on work effort (e.g. surgical procedure > office visit). 2) Nationally accepted stats by specialty 3) Used widely by SOMs to complement revenues and cash which can be biased by payer mixed and collections efficacy.
  - Mark Philips expressed concern that the proposed productivity. metrics may oversimplify, pro-rating questioned.
  - Joe Zuckerman suggested using metrics outlined in graph and confirming support from the institution for different faculty type e.g., #2 & #3.
  - Members disagree with current the level of support from institution.

- Silvia Formenti suggested department chairs should be held. accountable and need to play a role in changing the culture
- Steve Abramson recommended that members consider "what we are missing" in terms of incentivizing the type of faculty we wish to attract and cultivate. He discussed clinical leaders who want to pursue clinical/translational research and building effort towards such programs.
- Joe Zuckerman summarized that members agree on where NYUSOM currently stands, but needs to decide where "we want to be" with the use of metrics.
- Members came to agreement that it should be the departments' responsibility, with support and endorsement from the institution.
- Bob Schneider discussed the importance of providing a general model for departments, with consideration that each department is different.
- Silvia Formenti introduced handout "Radiation Oncology-Academic Productivity Scale".
    - Due to her variable and incentive compensation structure, she found that faculty are more loyal to the academic pursuits of the departments.
    - Her department model encouraged other ways to communicate "credibility" aside from $, through award recognition, etc.
- Steve Abramson reinforces the importance of FGP and the excess revenues generated for investment and academic pursuits.
- Members discussed using an idea of revenue sharing, as in University of Pennsylvania model.
- Enabling excellence involves creating a partnership and opening a pathway with clinical research and translational research.
- The value of enrolling individuals for clinical trials should be encouraged and valued as part of clinical effort.
- Currently NYUSOM has many type #1 faculty and not enough room to develop type #2 & #3.
- Important to create opportunities for young faculty to be cultivated.

Commission members agreed that the Radiation Oncology model and Examples of Clinical Faculty graph would be useful in building recommendations for clinical productivity. Clinical departments should set a clinical productivity model best fitting for their specific department. Clinical productivity standards would be further discussed at the next meeting.

Next Steps:

- Next Meeting: March 13th 2008; 5PM, Rusk 227
- Data Request: Co-chairs plan to send out publications/literature around clinical productivity

MEETING DATE: Thursday, March 27, 2008
Start time: 5:00PM
Adjourned: 6:30 PM

Commission members present: Doreen Addrizzo-Harris, Sylvia Formenti, Georgeann McGuinness, Mark Philips, Peter Shamamian, Robert Schneider, Joseph Zuckerman

Ex-Officio Commission members present:
Steven Abramson, Karen Brewer, Heather Campbell, David Church, Niketa Sheth

Commission members not present: Mark Adelman, Claudio Basilico, Anil Lalwani, David Levy, James Salzer

Academic Excellence Meeting MINUTES:

- Steven Abramson updated members on a faculty lunch earlier in the week.
- Robert Schneider reviewed agenda and encouraged members to come to some conclusion and wrap up the Phase II discussion within the next few meetings.

Clinical Productivity Discussion included:

- Bob Schneider discussed the importance of providing a general model for departments, with consideration that each department will specifically design a detailed model fits best with their department.
- Senior leadership support is needed to enforce a set of metrics for clinical productivity.
- Steve Abramson reinforced thinking about defining what type of physician we want and what they should look like, given our role to be productive in admin, education, research and clinical practice.
- Defining this model would then serve as a recruitment framework; departments would need to develop academic plans around this model.
- Members expressed concern re: large private practice faculty and how to engage and incentivize them. Literature shows the difficulty in developing standards for private practice faculty.
- Members agreed that school should incentivize new hires to join FGP. Overall, members recommended putting together metrics that would move NYUMC in another direction, with more FGP.
- Model should use incentives to greatly encourage academic clinicians vs. private practice faculty. Committee should revise the aspects that current system that discourages faculty to move in this path.
- Generally, Tisch needs to improve quality of clinical care practice; with better communication and organization.
- Members recommended engaging private practice faculty with reaching requirements. School should utilize them to educate medical students, with more one-on-one time with a private practice clinician.
- Members agreed that the dean should begin reaching out to private practice faculty to explain the disconnect and encourage involvement in

teaching and other areas. Asking private practice faculty to be more inclusive without being punitive is the goal.
    - Issue of required faculty appointment for faculty admitting rights further discussed. Members agreed that policy should be changed. Challenges include competition of resources and space.
    - Anil Lalwani disagreed with separating faculty appointment and faculty admitting rights. He advised that it's the one way to leverage the faculty within the department. Without it, department's leverage would not be there.
    - Institution should review what areas within FGP is needed, and control the number of private practice faculty within those specialties.

Next Steps:

- Next Meeting: April 10th 2008; 5PM, Rusk 227
- Data Request: Re-review clinical productivity literature; total publication & impact factor.

MEETING DATE: Thursday, April 10, 2008
Start time: 5:00PM
Adjourned: 6:45 PM

Commission members present: Mark Adelman, Claudio Basilico, Sylvia Formenti, Anil Lalwani, David Levy, Georgeann McGuinness, Mark Philips, James Salzer, Peter Shamamian, Robert Schneider, Joseph Zuckerman

Ex-Officio Commission members present:
Steven Abramson, Karen Brewer, Heather Campbell, David Church, Niketa Sheth

Commission members not present: Doreen Addrizzo-Harris

Academic Excellence Meeting MINUTES:

- Bob Schneider reviewed agenda. He requested Karen Brewer to review preliminary publication analysis with members.
- Karen Brewer discussed preliminary publication analysis. She presented three sets of analysis which included: ISI Essential Science Indicators (Comparator of Number of Papers and Citations by Rank for SOMs), Number of Publication in PubMed from 1997-2007 From Top Impact Factor Journals in Biomedicine and Top 100 titles by Impact Factor in Biology and Medicine 2007.
- Members requested to see publication analysis: 1) Based on ranking of citations 2) Capturing #1 SOM & other top SOMs off NIH/ US News Ranking 3) Comparator analysis of departments at NYU to other SOMs departments with respect to funding, e.g. total grants per departments.
- Data is not available to satisfy some member requests, e.g. for benchmark comparisons, publications by tenure & level for comparator institutions.
- Members agree that publication analysis would serve as one indicator of how well clinical departments are doing, where they rank and how they fall short.
- Bob Schneider reviewed objectives and literature review summary highlights

Clinical Productivity Discussion included:

  - Members agreed at last meeting that chairs should be responsible in developing a model that best fits for their department, and would also be held accountable. Commission would provide models they can use to make specific to their department.
  - Departments should be required to develop departmental plan within one year or less and review with senior leadership.
  - Steve Abramson asked "how do we define research faculty in clinical departments?" Members agreed that faculty would need to have 50% or more effort in research, when filtering data.
  - Recognition that NYUSOM has many types of clinical faculty. Clinical productivity standards should not "squeeze" the academic

physicians by discouraging them, when the same physicians witness voluntary clinical faculty benefiting financially from NYU affiliation with more of the academic "burden" they are subject to.

- Joe Zuckerman suggested departments should move toward rewarding productive members vs. penalizing unproductive faculty. Rewarding by: Volume/ RVUs/ Other areas TBD.
- Silvia Formenti recommended idea of voluntary clinical faculty signing into a deal where they don't control the entire revenue, in order to acknowledge the need to support the academic missions of the NYUMC.
- Challenge we face in staying competitive with NY salaries and private practice, with consideration of how the SOMs in NYC deal with different market that is specific to NYC, with costs & opportunities.
- Recognition that every department needs flexibility. One department may want to focus on having "triple threats" whereas another may find it more successful to have more single mission focused faculty.
- Departments should compare current year's stats with next year and decide how they plan to improve, whether it may be through publications or volume.
- In order to acknowledge the patient revenue contributions of the voluntary faculty (as well as their other voluntary education contributions) while also supporting financially the academic pursuits of the clinical departments, the hospital should support departments via funds transfer. It was noted that this already occurs to some extent, although not directly tied to academic pursuits, given the current hospital support to the SOM. The amount of hospital support is projected to grow in the future.
- Agreement to encourage FGP in new faculty.
- Bob Schneider discussed importance of including metrics in report along with other recommendations and related challenges around clinical productivity.

Next Steps:

- Members should send co-chairs possible models and metrics. Bob will compile and review. Further discussion at next meeting.
- Next Meeting: March 13th 2008; 5PM, Rusk 227

ACADEMIC EXCELLENCE COMMISSION
AGENDA
April 24, 2008

1. **Ensuring academic excellence in the Clinical Departments: Recommendations for Phase II Report**
   - *See page 2*

2. **Review Productivity Model**
   - *See handout*
   -

3. **Review Chair Specific Models**
   - *Pending*

4. **Next Steps**
   - *Incentives*

Reminder:
Next Meeting will be Thursday, May 8 / 5pm Radiology Conference Room (Rusk 227)

DRAFT

Recommendations for Inclusion in Phase II Report

- **Chair Discretion:** Each clinical department chair must develop a department/specialty specific productivity model in support of academic excellence that incorporates quantifiable clinical measures (e.g., revenues/cash, WRVUs, others pending data availability) and other measures of academic clinical excellence (e.g., scholarly activity, clinical trial enrollment). Chairs must ensure there is a supportive environment for pursuing academic excellence consistent with productivity standards by mission.

- **Incentive based:** The department models need to be incentive based enabling faculty to benefit from exceptional performance while substantively addressing challenges of poor performance.

- **Timing:** Similar to the phased implemenation of the research metrics, Chairs will have time to develop their productivity model over the next 6 months, review with the Dean by the end of CY 2008, and implement January, 2009.

- **Cultivate from Within:** Given the importance of, but difficulty in recruiting (and affording) exceptional academic clinicians that bridge research and patient care effectively in pursuit of academic excellence, funding that enables "protected time" (e.g., seed/pilot grant funding) should be made available to support fellows and/or junior faculty. Funding sources likely to vary depending on department (e.g., excess clinical revenues, philanthropy, NYUMC operating).

- **Aligning Private Practitioners:** NYUMC benefits from the private practictioners' clinical contributions and volunteerism to NYUMC. The private practitioners also benefit from affiliation with NYUMC as a leading academic medical center. When the private practitioners benefit from the NYU affiliation without substantively supporting the academic goals of the institution either financially or thru participation in research and education, full time faculty can feel unduly burdened. Private practitioners should be formerly asked to contribute financially to NYUMC in order to help generate the funds necessary to ensure full time faculty have the time and resources available to support effort across all missions. By ensuring the academic excellence of the institution, all will benefit. The means to solicit these funds remains to be determined. Ideas include a credentialing fee (i.e., mandatory) and/or more developed philanthropic campaigns in collaboration with Development (e.g., "Friends and Faculty" campaign).

- **Quality of Patient Care:** Quality of patient care is critical to a world class academic medical center and should be considered and managed as an institutional priority that is recognized and supported by this Commission but considered outside the charge of this Commission.

MEETING DATE: Thursday, April 24, 2008
Start time: 5:00PM
Adjourned: 6:45 PM

Commission members present: Doreen Addrizzo-Harris, Claudio Basilico, Sylvia Formenti, David Levy, Georgeann McGuinness, Mark Philips, Robert Schneider, Joseph Zuckerman

Ex-Officio Commission members present:
Karen Brewer, Heather Campbell, David Church, Niketa Sheth

Commission members not present: Mark Adelman, Anil Lalwani, James Salzer, Peter Shamamian, Steven Abramson (Ex-Officio)

Academic Excellence Meeting MINUTES:

- Bob Schneider reviewed the agenda, several department models and draft topics to include within report.
- David Church reviewed, "measuring clinical productivity" chart and preliminary clinical faculty effort data.
- In clinical faculty effort data discussion, data indicated a drop of average research effort from 41% to 17% between faculty that have 21-30% clinical effort to those that have 31-40% clinical effort.

Clinical Productivity Discussion included:

  - Clinical productivity metrics should not deter faculty to stay at NYUSOM. Already challenged because faculty members could make more $ outside academic setting.
  - This institution, more than others, has created a split between the wet lab science and practice of medicine.
  - Key challenges of private practitioners:
    - Compliance with care pathways
    - Low clinical trail enrollment
    - Quality improvement & Quality Assurance
    - Perception of full time faculty
  - Currently the private practice faculty are not very involved in NYUSOM's academic academic endeavor. Our clinical enterprise is private practice driven, and therefore we have more difficulty addressing clinical productivity metrics than other SOMs.
  - However, revenues from the private practice faculty must feed the academic mission of NYUSOM.
  - Suggestion to introduce mandatory fee for credentialing.
  - Suggestion to include recommendation to separate admitting privileges and faculty appointment, where a faculty appointment is not required to admit a patient; this would be problematic with some clinical

departments that use the faculty appointment as an incentive to attract voluntary faculty.

- Issue with current system is that each type of clinician (100% clinical effort or 50% research- 50% clinical) is charged the same amount for overhead expenses instead of it being pro-rated by clinical effort. . Suggestion to address issue of structural inefficiency per person/ and adjust it based on % effort. Chair involvement in this issue vary.
- Recommendation by the committee for each department chair to develop a clinical productivity model- to achieve their goals, consistent with NYUMC's stated priorities. .
- Recommendation to formalize hospital support toward specific academically supported areas (e.g. programs, fellows).
- Bob Schneider concluded that co-chairs will include discussion points in the report; recommendations will reflect NYUSOM clinical enterprise as it currently stands and the challenges involved.

Next Steps:

- Co-Chairs will draft clinical productivity recommendations and will send to members for comments/review.
- Next Meeting: May 22 2008; 5:15PM, Pathology Library Meeting Room

MEETING DATE: Thursday, May 22, 2008
Start time: 5:00PM
Adjourned: 6:45 PM

Commission members present: Doreen Addrizzo-Harris, Claudio Basilico, Sylvia Formenti, Anil Lalwani, Georgeann McGuinness, Mark Philips, James Salzer, Peter Shamamian, Robert Schneider

Ex-Officio Commission members present:
Steven Abramson, Karen Brewer, Niketa Sheth

Commission members not present: Mark Adelman, David Levy, Joseph Zuckerman, Karen Brewer(Ex-Officio), David Church (Ex-Officio), Heather Campbell (Ex-Officio)

Academic Excellence Meeting MINUTES:

- Doreen discussed her involvement with another committee and their efforts in quality care issues, quality measurement and what needs to be reported. She agreed to give co-chairs a summary to include as part of report.
- Robert Schneider asked members to give feedback from draft outline.

Clinical Productivity Discussion included:

- Currently, recommendations appear to be harder on FGP faculty. Model should make FGP option all "carrots" with more incentives to join FGP vs. FPO or private practice.
- Quality insurance in the hospital would naturally encourage increase in quality of care over time.
- We should increase our review of ICU and ancillary faculty.
- Members agreed on the idea of school putting more dollars in the hands of the department chiefs/directors to build resources.
- Hospitalists should be full time physicians, paid for by the school.
- Two areas: Clinical Productivity- we do well. Research productivity- we are underproductive in clinical research.
- Research declared clinical researchers should be held to the same standards and metrics as other researchers.
- Recruitment is need for stronger clinical researcher & translational researchers.
- Members discussed if school should give incentives to those faculty who make more patient referrals to clinical trials or penalties to those that do not.
- FGPs and FPOs must be equalized as much as it is possible from taxes to salaries.
- Members defined "clinical research" and how it should work. If one person has 30% effort in research, the chair would get some wager for that % effort, like a course director would.

- Members agreed that NYUSOM's model is unique from other SOMs, and it must change.
- Steve Abramson suggested that the entire report section of clinical productivity should not focus on private practice challenges. Instead, one portion of that section should highlight what the members discussed, that the private practice component is a detriment to the SOM in its current model.
- Silvia Formenti suggested that peer review be required as it is within basic science. This would "instill more accountability and quality knowledge".

Next Steps:

- Members will re-review clinical productivity recommendation outline and additional comments to co-chairs.
- Next Meeting: June 6 2008, Pathology Library Meeting Room

MEETING DATE: Thursday, June 6, 2008
Start time: 5:00PM
Adjourned: 6:45 PM

Commission members present: Doreen Addrizzo-Harris, Claudio Basilico, Sylvia Formenti, David Levy, Georgeann McGuinness, Mark Philips, James Salzer, Robert Schneider, Peter Shamamian

Ex-Officio Commission members present:
Steve Abramson, Karen Brewer, David Church, Niketa Sheth

Commission members not present: Mark Adelman, Anil Lalwani, Joseph Zuckerman

Academic Excellence Meeting MINUTES:

- Steve Abramson updated members of the challenges in de-linking faculty appointment from admitting privileges. He reminded the committee that if this issue is to be addressed, the SOM needs to take a serious look at the how to deal with the associated challenges, including: 1) Creating dual citizens 2) competition for resources 3) competing for blocked time
- Bob Schneider reviewed the agenda and updated members on the timeline in drafting the report & other changes and re-modeling to dollar density recommendation.
- Bob Schneider opened the incentive discussion by referencing the framework handout and other outside findings from Virginia Commonwealth publication.

Suggested Recommendations:

- Incentive qualification should not just put value to revenue, but also publications and contribution to overall institution goals.
- Steve Abramson recommended determining *1) the superior level, to be eligible for an incentive and 2) types of incentives*. This should be decided separately for basic science faculty, clinical faculty, and other faculty that are 50/50 in effort. Members generally agreed to take this approach.
- Claudio Basilico suggested that basic science faculty should qualify for an incentive through productivity, prestige and recognized as a good teacher.
- Superior level or qualifications of incentives would also include: overall grants, PPG grants-indicating collaboration, other methods of collaborations with the square, building programs, translational research, overall overhead, & use of dollar density metric.
- Several members recommended measuring superior performance by using the standard deviation of grant funding (or other metrics) compared to others within NYUSOM. This takes into account for issues of currently low NIH grant funding. Others thought this would be difficult to implement and monitor.

- Members agreed that incentives should encourage collaborative behavior. Recommendation to those with PPG grant, a weighted amount/ % of indirect is given back as discretionary funding.
- Members agreed to create a) menu with types of incentives and b) combinations of expectations required to receive them.
- Types of incentives would include:
    - Discretionary Funding and/or choice of salary bonus
    - % of indirect back as discretionary funding
    - Supplement towards housing
    - Clinical Researcher would value:
        - protected time
        - access to data managment
        - resources & facilities
        - recognition
    - Basic Science Faculty would value:
        - protected time
        - return on indirects towards new equipment or lab tech
        - salary bonus

Additional Observations

- NYUSOM needs more cores on the clinical side. Faculty need a place to go and learn how to do clinical protocol, etc. More cores will breed the type of faculty we are looking for. Steve Abramson emphasized looking into CTSI and how the related objectives include cores. He recommended that the important topic be addressed as an infrastructure objective, not as incentives.
- Steve Abramson reviewed the objectives to the committee regarding incentives. He reminded members that the committee established floor metrics, and that the incentive discussion should be defining what is superior to be valued as an incentive both in 1) basic science faculty 2) clinical faculty 3) other (e.g. mixed efforts in both basic and clinical). Without determining the incentives separately, we would be over –simplifying a heterogeneous faculty group.
- Currently NYU does not provide any incentive for physician scientists to attend in Tisch hospital. This should be encouraged more through incentives.
- Incentives should make it attractive to participate in collaborative behavior, translational research & PPG grants. More collaboration is needed with the university (e.g. basic science depts downtown).
- Doreen Addrizzo-Harris suggested that our list of 'types of incentives' should be over inclusive to motivate faculty on different levels. Overall, this would encourage faculty to stay committed to NYUSOM & would appeal to new recruits as well.
- Silvia Formenti suggested that the group discuss the accountability of the chairs. The success of the faculty should be the responsibility of the chairs. Chairs may also receive an incentive by discretionary dollars split between department chair & faculty member.

Next Steps: Next Meeting: June 19 2008; 5:00PM, Rusk 227

MEETING DATE: Thursday, November 5, 2008
Start time: 5:00PM
Adjourned: 6:35 PM

Commission members present: Doreen Addrizzo-Harris, Sylvia Formenti, Georgeann McGuinness (sent comments), Mark Adelman, Anil Lalwani, Joseph Zuckerman, Robert Schneider, Peter Shamamian

Ex-Officio Commission members present:
Steve Abramson, Niketa Sheth

Academic Excellence Meeting MINUTES:

Suggested Recommendations:

- Silvia Formenti recommended putting the responsibility on the chairs, with growth metrics that each chairman would define.
- Bob Schneider discussed encouraging the newly formed departmental excellence committee in creating departmental metrics.
- Doreen Addrizzo- Harris suggested each division and department should have a committee, perhaps with one member outside of the department. The committee could build a strategic plan & growth agenda for the department. Many chairs are looking for input and the committee could serve this purpose.
- Bob Schneider discussed putting the narrative in a chart or model format to better illustrate the metrics.
- The report should emphasize a goal to increase FGP practice over time. It should not be read as a statement to decrease or eliminate non- FGP.
- Anil Lalwani discussed the need for financial solvency. In addition, publications, teaching, educational papers etc are important.
- Steve Abramson suggested looking at Doreen as an example: where 30%+ of projected time is needed to do clinical research. A model is need to allow for protected time for clinical researchers.
- As education is discussed in the report, clinical faculty should be held responsible for: publications, education hours, tracking their tenure, etc.
- Mark suggested putting a balanced budget defines the obligations of the full-time compensated faculty.
- Joe Zuckerman suggested creating revenue generating sources. Faculty could choose to do rounds or give their contribution of dollars to their department. Faculty would have to contribute some financial support in a way they choose.
- Steve discussed the importance of addressing full- time affiliated faculty, who put all of their time at Bellevue. Bellevue has strength, yet the school should begin to develop opportunities at Tisch hospital, with our faculty working at Tisch as well.
- Steve emphasized that the portfolio should be created and put on at a department/division level.

- The report should highlight that diversity in the types of faculty as a ‘plus’. There would be greater uniformity at the next level.
- Joe wrote out the groups suggestions in a graph model identifying clinical excellence, with each phenotype outlined.
- The research section would include publications, grant dollars, etc.
- Bob Schneider captured the member’s recommendations on the graph model for the report.

Next Steps:

- Bob Schneider will revise the draft Phase II report and include the graph model. He will then send around to members for a final revisions, edits and comments.

Appendix 1B

Incentives Framework Summary

INCENTIVES
Potential Framework for Discussion:

I. Define "Superior Performance" not just "above average performance" at the individual metric level

- At what level above metrics should one qualify for potential incentives?
- Consistent with the Dean's original charge to the committee and discussion with Nancy Sanchez.

II. Identify incentive that align with NYULMC priorities and would need to achieved in addition to the superior performance metrics

- Group benchmarks: department, program or mission driven
- Participation within PPGs, integration within Strategic Clinical Areas, curriculum development, etc.

III. Types of Incentives

- Discretionary funding, compensation, sabbatical, etc.
- Focus on specific types not the formulas (e.g., x% of Indirect above y threshold) but rather leave that to subsequent analysis as to what's financially feasible given the complexity and magnitude of resources involved.

IV. Other Key Principles for discussion

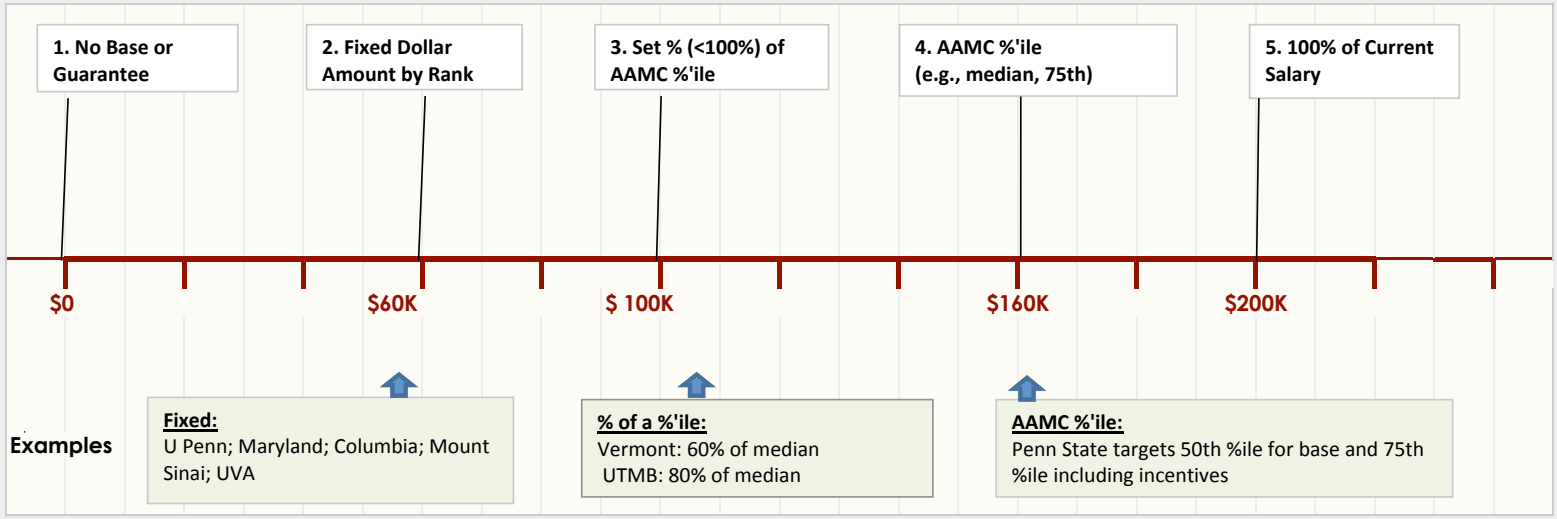
- Incentives must be substantive that truly incentivize behavior.
- Incentives dependent on availability of funds
- Performance must be pro-rated relative to mission effort, e.g., one can't be rewarded on exceeding research metrics while ignoring education commitments/expectations.

Appendix 1C

Base Salary Continuum Chart

Base Salary Continuum -- For Discussion

Example: Basic Science Professor with Salary of $200K



Appendix 1D

April 24th Agenda
&
Draft Recommendations for Discussion

ACADEMIC EXCELLENCE COMMISSION
AGENDA
April 24, 2008

1. **Ensuring academic excellence in the Clinical Departments: Recommendations for Phase II Report**
   - *See page 2*

2. **Review Productivity Model**
   - *See handout*
   -

3. **Review Chair Specific Models**
   - *Pending*

4. **Next Steps**
   - *Incentives*

Reminder:
Next Meeting will be Thursday, May 8 / 5pm Radiology Conference Room (Rusk 227)

DRAFT

Recommendations for Inclusion in Phase II Report

- **Chair Discretion:** Each clinical department chair must develop a department/specialty specific productivity model in support of academic excellence that incorporates quantifiable clinical measures (e.g., revenues/cash, WRVUs, others pending data availability) and other measures of academic clinical excellence (e.g., scholarly activity, clinical trial enrollment). Chairs must ensure there is a supportive environment for pursuing academic excellence consistent with productivity standards by mission.

- **Incentive based:** The department models need to be incentive based enabling faculty to benefit from exceptional performance while substantively addressing challenges of poor performance.

- **Timing:** Similar to the phased implemenation of the research metrics, Chairs will have time to develop their productivity model over the next 6 months, review with the Dean by the end of CY 2008, and implement January, 2009.

- **Cultivate from Within:** Given the importance of, but difficulty in recruiting (and affording) exceptional academic clinicians that bridge research and patient care effectively in pursuit of academic excellence, funding that enables "protected time" (e.g., seed/pilot grant funding) should be made available to support fellows and/or junior faculty. Funding sources likely to vary depending on department (e.g., excess clinical revenues, philanthropy, NYUMC operating).

- **Aligning Private Practitioners:** NYUMC benefits from the private practictioners' clinical contributions and volunteerism to NYUMC. The private practitioners also benefit from affiliation with NYUMC as a leading academic medical center. When the private practitioners benefit from the NYU affiliation without substantively supporting the academic goals of the institution either financially or thru participation in research and education, full time faculty can feel unduly burdened. Private practitioners should be formerly asked to contribute financially to NYUMC in order to help generate the funds necessary to ensure full time faculty have the time and resources available to support effort across all missions. By ensuring the academic excellence of the institution, all will benefit. The means to solicit these funds remains to be determined. Ideas include a credentialing fee (i.e., mandatory) and/or more developed philanthropic campaigns in collaboration with Development (e.g., "Friends and Faculty" campaign).

- **Quality of Patient Care:** Quality of patient care is critical to a world class academic medical center and should be considered and managed as an institutional priority that is recognized and supported by this Commission but considered outside the charge of this Commission.

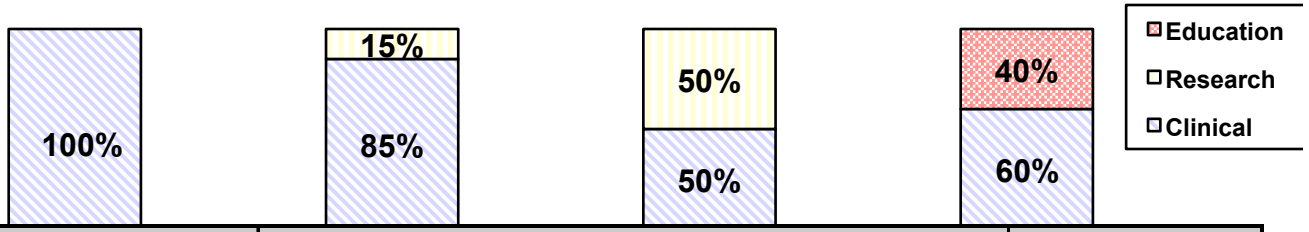
Appendix 1E

Measuring Clinical Productivity Chart

Determining Clinical Productivity
Examples of NYUMC Full Time Clinical Faculty with Salary of $250K

Example: Will Vary By Specialty

1. 0 FTE
Median Salary = $250,000
* WRVU = 5,000
* Revenues = $500,000
** Source: 75%ile Sullivan & Cotter*



Faculty Type		1. Full-time Clinician	2. Clinical/ Translational Researcher		3. Clinician Educator
Proposed Productivity Metrics	**Clinical (Industry Stats)**	• 1.0 FTE • WRVU= 5,000 • Revenue= $500K	• .85 FTE • WRVU= 4,250 • Revenue= $425K	• .50 FTE • WRVU= 2,500 • Revenue= $250K	• .60 FTE • WRVU= 3,000 • Revenue= $300K
	Research	*NA*	• .15 FTE • 60% Salary Coverage (NIH Cap: $191,300K)= $17,217 • Dollar Density: Likely NA if no lab	• .50 FTE • 60% Salary Coverage (NIH Cap: $191,300K)= $57,390 • Dollar Density= $450/sf	*NA*
	Education	• Artman	• Artman	• Artman	• .40 FTE • Clerkship Director
Academic Excellence: Add'l Metrics as data becomes available		1) Quality outcomes 2) Active participation in academics, e.g., integrating patients in research trials, epidemiology studies, tissue banking and other ongoing research projects.	1) Quality outcomes 2) # of clinical trials 3) # of patients enrolled/ % accrued 4) Scholarly activity, e.g., publications, citations	1) Quality outcomes 2) Clinical & research metrics 3) Scholarly activity, e.g., publications, citations	1) Quality outcomes 2) Scholarly activity, e.g., publications, citations
Clinical Productivity Incentives		1) Bonus Compensation	1) Bonus Compensation 2) Increase in Protected Time 3) Administrative Support, e.g., research nurse, data managers 4) tbd		1) Bonus Compensation 2) Protected Time

Appendix 1F

Radiation Oncology- Academic Productivity Scale

Radiation Oncology—Academic Productivity Scale

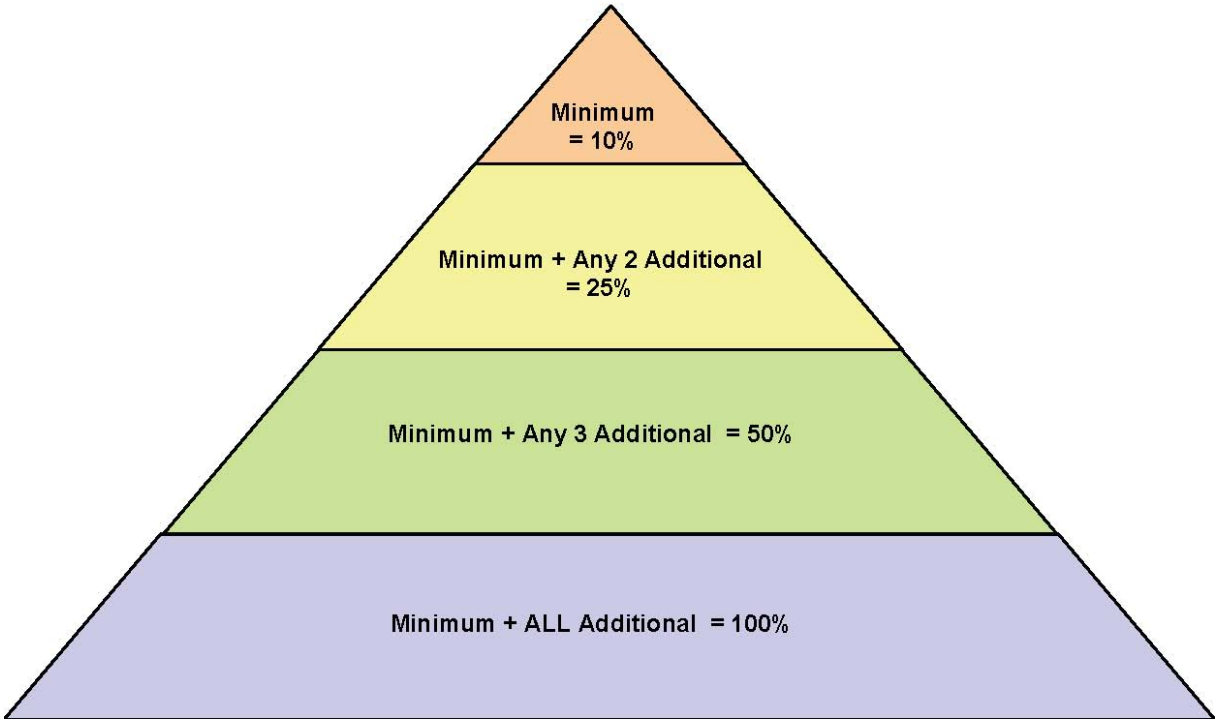
Variable and Incentive Compensation

Minimum Requirements:

1) *Excess Receipts*—must generate sufficient revenue to cover salary and expenses.
2) *Lectures/Teaching Conferences*—must be a speaker of at least one lecture outside the department and regular attendance/participation to NYU department conferences.
3) *Clinical Trials Accrual*

Additional Academic Incentives: (Must also meet Minimum above)

1) *Co-Authorship Manuscript*—must be peer reviewed and published during the academic year.
2) *First/Last Author of a manuscript*—must be peer-reviewed and published during the academic year.
3) *P.I. of Active Grant/Contract*—at least 10% of base salary needs to be supported by the award of grant.
4) *P.I. 2nd Grant* or *Grant Co-Investigator* or *Academic Award Recipient*—at least 10% of base salary needs to be supported by the award of grant.
5) *P.I. of a least One Open Investigator-Initiated Protocol.*



INCENTIVE PLAN

Appendix 1G

Phase II Expectations Summary

PHASE II EXPECTATIONS

1) Base Salary

2) Clinical Productivity Standards. The second phase of the AEC report will provide specific recommendations for the clinical enterprise and clinical productivity standards. In this ongoing effort, there are a number of crucial issues under assessment by the AEC. These include but are not limited to the following elements.

- What is an academic clinical investigator, a full time and part time clinician?
- How do we protect the time of clinical investigator and enable their development? What models can we use?
- How do extramural salary support and research space metrics apply to clinical faculty?
- How are current clinical salary and research standards consistent with the NYUSM research standards and what will be the impact of projected changes?
- Can a goal of academic excellence in clinical and translational medical research be achieved in the matrix of faculty group practices and private practices at NYUSM? How should or can it be changed? What are the consequences of change?
- Can the FGPs accommodate greater expansion and protection of academic clinical investigators? How can this be enacted?

3) Incentives and Rewards for Surpassing Productivity Expectations

Discussion and analysis is ongoing regarding incentives and rewards for faculty that surpass recommended benchmarks and metrics. These will be provided in the Phase II Report.

4) Performance Evaluation Process

Appendix 2A

Academic Clinical Productivity & Incentive Plans Literature Summary

Academic Clinical Productivity and Incentive Plans

Summary of the literature

1. Academic clinical productivity metrics, benchmarking and incentive plans for academic achievement in clinical departments have become quite common in the past 10 years. Most plans need to balance what are generally considered a common set of four missions in clinical departments:

- Clinical services
- Teaching (medical students, residents, fellows)
- Academic Research: advancing new techniques, treatments and quality of care
- Administration: quite burdensome and time consuming, needs to be rewarded

2. Variety of ways to promote and reward academic productivity, but the following features in common:

- Reward academic productivity through extra compensation based on obtaining research grants, publishing peer reviewed papers and abstracts, participating in clinical trials. Measurement of academic success is left to the departments and can vary widely. Programs have avoided establishing a common quantitative set of benchmarks that reach across clinical departments, such as number of grants, papers.
- To avoid benchmarking only number of patient visits or procedures (a measure of revenue but not quality of care), some programs consider patient outcomes in the formula to raise overall quality of care. This is viewed as an incentive to participate in the academic endeavor to achieve higher levels of successful outcomes. However, this approach has not been objectively studied.
- Many programs place from 10-20% of the individual compensation of physicians at risk (withheld). 80% of the regional average salary is guaranteed. The 10-20% at risk must be earned through a variety of academic endeavors which vary from department to department, but have in common teaching, research, publishing, and involvement in clinical trials.
- Departments are given the freedom to develop their own plans but generally must meet the same or similar metrics. Plans vary from simple tracking of clinical academic activity to more complicated plans that include amount and type of teaching, type of clinical activity (investigator-initiated protocols, cooperative group protocols, etc), extramural funding and type of grant support, publications and type of publications, national and international recognition, research activities and type of research activity.

3. Most programs recognize, as have we, that there are primarily 4-5 types of clinical faculty that need to be accommodated in an academic clinical productivity plan:

- Physician-scientist track (up to 80% research, 20% clinical, tenure eligible). Major effort is research and teaching.
- Clinician-educator track (80% clinical, 20% teaching/research, not tenure eligible). For faculty whose major effort is clinical service with some teaching.
- Basic scientist track (100% research, tenure eligible). For physicians that entirely perform research and teach.

- Research scientist track (100% research, not tenure eligible). For research faculty.
- Clinician track (100% clinical service, no teaching, not tenure eligible). For faculty who contribute entirely to patient service *within departments*.

Note: More than 80% of appointments in academic clinical programs are in the physician-scientist and clinical-educator tracks at leading academic medical institutions.

Also note that programs do not typically include in the clinician track, practitioners that practice from outside the department.

4. Impact of academic productivity and incentive programs.
    - Surprisingly, the majority of publications report that these programs *increase* clinician satisfaction, motivate clinical programs, found few negative impacts, did not negatively affect retention of faculty, increased extramural funding and *increased* patient revenues.
    - Many programs used a 12-28 month glide path (12 months was the average), although some were longer. A shorter glide path than 12 months was detrimental. Fewer than half of programs reported the need to establish departmental committees to implement the programs.
    - Ratings of faculty from residents and fellows improved.
    - Majority of faculty had no problem meeting expectations in clinical productivity and often exceeded it. In this setting, RVUs could be used as "currency" and re-"allocated or spent" to buy time for academic endeavors.
    - One limitation in the productivity standards is that they often measure volume and not quality (RVUs measure procedures and time spent).

5. Some institutions that have developed productivity and incentive plans have satellite clinical programs, which are not generally academic. However, in order to successfully develop these types of satellites, there needs to be a strong academic hub.

References:

Abouleish AE, Apfelbaum JL, et al. The Prevalence and Characteristics of Incentive Plans for Clinical Productivity Among Academic Anesthesiology Programs. Anesth Analg 2005, 100:493-501.

Albritton AT, Miller MD, et al. Using Relative Value Units to Measure Faculty Clinical Productivity. J Gen Intern Med. 1997, 12:715-717.

Andreae MC, Blad K, Cabana MD. Physician Compensation Programs In Academic Medical Centers. Health Care Manage Rev. 2006, 31:251-258.

Bhagwat JG, Ondategui-Parra S, et al. Motivation and Compensation in Academic Radiology. JACR 2004:7:493-495.

Bluth, EI, An Incentive System for Radiologists in an Academic Environment. J. American College Radiol. 4:332-334.

Bowman MA, Rubinstein, AH and Levine, AS Clinical Revenue Investment in Biomedical Research. JAMA 2007, 297:2521-2524.

Brandt TL, Romme CR, et al. A Novel Incentive System for Faculty in an Academic Medical Center. Ann Intern Med. 200, 137:738-743.

Emery SE, Gregory C. Physician Incentives for Acedemic Productivity: an Analysis of Orthopaedic Department Compensation Strategies. J Bone Joint Surg Am. 2006, 88:2049-2056.

Kennedy, DW, Johnston, E and Ethan, A. Aligning Academic and Clinical Missions Through an Integrated Funds-Flow Allocation Process. Academic Medicine 2007, 82:1171-1177.

Kratz RD, Mets B. Finding An Incentive Plan That Actually Works. Acad. Med. 2005, 56:54-57.

Miller RD. Academic Anesthesia Faculty Salaries: Incentives Availability, and Productivity.Anesth Analg 2005, 100:487-489.

Tarquinio GT, Dittus RS, et al. Effects of Performance-based Compensation and Faculty Track on the Clinical Activity, Research Portfolio, and Teaching Mission of a Large Academic Department of Medicine. Acad. Med. 2003, 78:690-701.

Warner JJ, Herndon JH, Cole BJ. An Academic Compensation Plan for an Orthopaedic Department. Clin Orthop Rel Research. 2007, 457:64-72.

Willis DR, Kelton GM, et al. An Incentive Compensation System That Rewards Individual and Corporate Productivity. Fam Med 2004, 36:270-278.

Appendix 2B

Aligning Academic and Clinical Missions Through An integrated Funds- Flow Allocation Process, Academic Medicine: 2008

Full Text

Wolters Kluwer Health | Lippincott Williams & Wilkins

ACADEMIC MEDICINE
Journal of the Association of American Medical Colleges

Preceded by: Journal of Medical Education (ISSN: 0022-2577)

Aligning Academic and Clinical Missions Through an Integrated Funds-Flow Allocation Process

Author(s): Kennedy, David W. MD; Johnston, Elizabeth MBA; Arnold, Ethan MPH

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Publication Type: [The Clinical Enterprise]

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Full Text (PDF) 93 K

Abstract

Although much has been written about implementing mission-based management tools to help facilitate managing the primary academic missions at academic medical centers, there is surprisingly little written on standardized methodologies to align financial support across the academic and clinical missions. However, professional fee reimbursement has not kept pace with costs, and this, combined with potential decreases in research funding associated with the reductions in National Institutes of Health funding, creates additional financial challenges for academic clinical departments that do not share in technical fee reimbursement. As an integrated academic health system, the University of Pennsylvania School of Medicine and Health System recently took the opportunity to broadly restructure funds-flow opportunities, so as to help align the strategic goals across all of the clinical department activities.

At the University of Pennsylvania (Penn) School of Medicine and Health System, as at many academic medical centers (AMCs), funding for the academic and clinical missions of clinical departments was traditionally based, in significant part, more on historical precedent than on a rationally defined allocation of resources. The funds-flow project, initiated in 2004, restructured the distribution of institutional funds across all the missions of the clinical departments, so as to provide clearly defined support for teaching, research and administrative duties, as well as rationally based clinical support and incentives for strategic clinical and research growth. In this article, the authors present the principles, process, and results of this undertaking. The framework may provide a basis for rationalization of financial support at other integrated academic medical

institutions.

Clinical departments at academic institutions have a threefold mission: in addition to conducting research and providing clinical care, they are involved in medical student, resident, and fellow teaching. Although there has been a significant movement towards mission-based budgeting in AMCs, what has been published to date on this topic has been aimed towards developing accountability for the research and teaching missions.[1-3] The importance of tracking both teaching effort and outcomes and of providing defined funds for teaching has been well documented in an era when time pressures are significant and clinical reimbursement is tight.[4,5] Additionally, external research funding frequently only provides a portion of the financial support required for the overall departmental research mission. Indeed it has been estimated that 12% to 13% of an institution's total research costs are borne by the institution.[6] If the appropriate proportion of these costs are not reimbursed at the departmental level, and incentives are not provided to increase research funding, there is a real risk of decreased research effort in an environment with limited fungible resources.

There has been less published previously with regard to rationalizing funds flow across both clinical and academic missions. However, in many AMCs the departments do not own the facilities or the equipment utilized in their practices, and thus may not receive the technical fees associated with tests and procedures performed in their medical practice. Conversely, in private practice such technical fees have assumed an ever-increasing part of practice revenue, becoming progressively more essential for keeping practices financially sound in an era of increasingly restrained physician professional payments. Spahlinger et al [7] reported improved financial performance in the University of Michigan Cancer Center after a realignment of financial incentives, which included departments receiving at least a portion of associated technical charges. The importance of aligning the goals of the institution with the clinical practice plan was identified by Cohen and Fox [8] as a factor in the success of a merger between two large AMCs. The process of realigning institutional goals and AMC missions at Penn, described herein, was a broader, rationally based initiative to redistribute income to support the tripartite missions in a more clearly defined fashion.

Clinical departments in AMCs typically receive institutional budgetary support for their unfunded or underfunded missions. Such institutional support may be provided in the context of salary lines, subsidized rent, clinical service line support, faculty recruitment, or faculty retention negotiations. As reported by Mallon,[6] such funding may be approached in different ways either as a result of cap-in-hand approach from a department chair or faculty member to the dean or as part of a *planned giving* model. At Penn, as at many other AMCs, this type of support was traditionally provided both from the dean's office and from the medical center on the basis of private negotiations. Once negotiated and initiated, it became expected for continued departmental support, even, in some situations, after the original rationale for such support may have changed or may have no longer been applicable. The budgetary support agreements at Penn were not public, and to some extent they were more dependent on the negotiating ability of a particular chair or faculty member than on the basis of a solid strategic or fiscal rationale. In this article we discuss the process, principles, and metrics used to develop a new model of support for the clinical departments at Penn, and the results of this model's implementation.

Institutional Background

The Penn School of Medicine and Health System constitute an integrated AMC which reports to the dean of the school of medicine/executive vice president of the university. The health system includes three Penn-owned academic acute care hospitals, several affiliated hospitals, a primary health care network, a nursing home, hospice, and home care. Eighteen clinical departments within the school of medicine house 1,350 full-time faculty, and the chairs of these departments also serve as clinical chiefs for the overall health system. All full-time clinical faculty belong to the faculty practice plan (Clinical Practices of the University of Pennsylvania, or CPUP) and the CPUP leadership reports both to the dean of the school of medicine and the CEO of the health system. Although the dean's tax at Penn is low (2% of net clinical revenue), limiting the dean's ability to directly readjust departmental revenue with school of medicine funds, total institutional overhead for Penn's clinical departments is benchmarked with other faculty practice plans. As a result, at Penn overall fiscal responsibility for the research, teaching, and clinical missions of the 18 clinical departments is coordinated under CPUP, and departmental financial support is achieved primarily through health system funds. Total revenue for the school of medicine and health system is $3.0 billion (FY2006). The clinical departments' revenue from clinical operations was $367 million for FY2006, with an additional $300 million in clinical department-sponsored research.

In 1999, in the face of serious financial problems, the university began to explore the option of spinning off the health system as a joint venture with a for-profit health care entity. The university eventually backed away from this course, largely because of strong pressure from the medical school faculty, but also in part because of difficulty in defining the most

appropriate organizational relationship of CPUP to both the school of medicine and the proposed new health system entity. With a subsequent decision to maintain the health system as a subsidiary of the university, the health system underwent significant restructuring to address the financial problems. Penn's current dean, Arthur Rubenstein, was recruited in 2001, and was given overriding authority for both the school of medicine and the health system. A new overarching governing board, Penn Medicine, was also created. With a carefully crafted strategic plan and improving operating margins, the school of medicine and the health system together embarked in a major reinvestment in the AMC's missions, paying down its debt and initiating a major building plan financed almost entirely by operating margin and philanthropy. In FY2006, the health system significantly increased its support to both the school of medicine and the university and posted a margin of 6.6%.

In the late 1990s, in the face of Penn's impending financial crisis and with the necessity for increased fiscal control, individual departments' access to their own fund balances had been frozen. Although this improved expenditure control, the lack of access to department fund balances removed a significant incentive for department profitability. By 2004, some departments had grown large fund balances (up to $100 million), whereas other departments had developed negative fund balances (up to -$40 million). Although such variances had developed in part on the basis of differing levels of fiscal management within the departments, they had also developed in significant part as a result of very favorable global billing arrangements and high levels of hospital pass through for services to some of the hospital-based departments, where such payment patterns had continued in lieu of market-based reimbursement practices more typical in other departments and other institutions.

By early 2004, several clinical departments had significantly negative budgets, large accumulated negative fund balances, and little incentive for fiscal improvement. On the other hand, some departments with traditionally strong funding had large faculty and staff components with reduced productivity on a per-faculty basis. Additionally, chairs were both uncertain about the fairness of, or the rationale for, institutional support and were quick to attribute either their negative budgets, or the financial success of other departments, to the variability and unknown nature of such support. Because CPUP is responsible for the fiscal aspects of all of the missions of the clinical departments, after obtaining the agreement of the dean and health system CEO, we undertook an initiative to rationalize all aspects of financial support provided to each of the clinical departments with the goals of making the support logical and open across all departments. Consistent with an aim of prioritizing the academic mission, we made a decision to sequence the funds- flow so that the funding for teaching would be addressed first, followed by that for the research mission, and then clinical support.

Funds-Flow Reallocation Principles

Our founding principles for the funds-flow reallocation initiative were that the methodology be transparent, rational, and mutually accepted by the chairs, and that the overall level of support to the departments should not increase in the absence of either increased clinical volume, increased external research funding, or clinical incentive opportunities which would be beneficial to both the health system and the department. The principle of not increasing support in the absence of one of these criteria was considered an essential prerequisite to the reform process if the possibility of opening the flood gates of additional claims for support was to be avoided. On the other hand, as we explain later, a significant increase in support to the clinical departments did in fact occur by the end of this process, in large part on the basis of increases in case volume, increased case-mix index, and mutually beneficial incentive opportunities, but also in part because some rational additional areas of valid support were identified. We clearly anticipated that the allocation of funds among departments might have the potential to change significantly, with some departments seeing increases in support and others encountering decreased support.

As an initial step in the funds-flow reallocation process, we worked with the clinical practice finance committee to develop an agreement that departments with positive fund balances would perform a one-time transfer of sufficient funds to the departments with negative fund balances to eliminate all fund-balance deficits and, after negotiation and refinement, this proposal was unanimously accepted by the chairs. The fund transfers were based on a sliding scale of fundbalance taxation, with each department retaining 80% of its first $1 million but with the retention decreasing in steps to 17.8% after the first $5 million in fund balance. In return for these contributions, the departments with positive fund balances gained budgeted access of up to 20% of their fund balances in any given year, assuming that they had made budget in the prior year.

In parallel with the fundbalance reallocation, we worked with a committee of chairs and school of medicine leadership to develop appropriate faculty expectations for clinical productivity and to develop expectations for clinical time commitments. The portion of teaching that was performed purely within the standard clinical environment was defined as clinical time, and productivity was benchmarked according to Faculty Practice Solutions Center (FPSC) data for specialty. The FPSC is a joint

University HealthSystem Consortium/Association of American Medical Colleges endeavor, which pools data from participating AMCs to provide productivity benchmarks by specialty. The committee called for standardized four-hour clinical sessions and overall productivity at the FPSC 65th percentile for overall departmental clinical time. At the same time, we also worked with Penn's clinical practice executive committee to develop defined clinic time expectations with variation based on faculty track, external funding salary support, and administrative and teaching commitments. These recommendations were accepted by the chairs.

Funds-Flow Reallocation Process

To lead the process, we developed a committee consisting of five clinical chairs, the vice dean for professional services, the executive director for CPUP, the vice dean for administration, and representatives from the hospitals and health system finance. The committee met one or two times per month for a period of approximately 12 months. Because of the sensitivity of issues involved, it was agreed that the deliberations would remain confidential, but that effective, clear communication of the progress was essential. The evolving recommendations were reported at regular intervals to the clinical practice executive committee and to all the chairs, as well as to school of medicine and health system leadership. Principles for the funds-flow reallocation were further refined and endorsed by all clinical chairs as an initial step in the overall process (Table 1).

Table 1

Principles of Funds-Flow Reallocation Defined in 2004 by Department Chairs at Penn Medicine, Philadelphia, Pennsylvania

Principle	Actions taken to achieve principles
Align with Penn Medicine strategic plan	• Promote partnership based on a shared commitment to vision, mission, and values • Comply with all regulations
Be fair and transparent	• Foster open dialogue and full disclosure of all relevant information • Rely on data and fact-based information in making decisions — Realize that data informs decision making but cannot replace it • Use consistent categories, practices, and policies • Future funds flow will include clear articulation of the specific purpose of the funds, quantitative and/or qualitative performance expectations, as well as duration of support
Match revenue with expenses	• Be based on a rational, value-based model, matching services and benefits to financial arrangements
Provide appropriate incentives	• Appropriate incentives (upside and downside) will be put in place to encourage — *Achieving* system growth objectives and goals — *Exceeding* system growth objectives and goals • Expectations for individual faculty productivity must be tied to compensation and communicated at least annually • Funds flow should provide some opportunity for gain sharing related to future margin growth
Measure and monitor over time	• Establish clear measures of performance for ongoing monitoring

Table 1 **Principles of Funds-Flow Reallocation Defined in 2004 by Department Chairs at Penn Medicine, Philadelphia, Pennsylvania**

Teaching support

On the basis of the agreed-on founding principles, the committee recommended support should be provided to the departments for didactic and small-group medical student teaching, for faculty time spent supervising residents and medical students, and for departmental administrative support for teaching programs. Medical student teaching had been previously

tracked on a database allowing allocation of "teaching RVUs" according to actual hours of teaching. Teaching support was also provided for course directors and for other teaching administrative duties. Funds for resident supervisors were allocated on the basis of the number of residents within a department and the average faculty salaries for the department, using a ratio of resident supervisors to residents of 1:6 in the cognitive specialties and 1:10 in the procedural specialties. Program director support was based on the number of residents within a program and adjusted on specialty-specific Accreditation Council for Graduate Medical Education requirements. In the absence of specialty-specific requirements, programs with 0 to 15 residents received 0.125 FTE of GME program director support, and this increased in gradations up to 1.0 FTE for programs with more than 75.

Research support

The committee recommended that three categories of research support be provided to the departments: academic development funds, indirect cost sharing, and salary coverage incentive payments. As previously, academic development funds would be provided by the dean's office for specific academic development projects within departments, such as strategic research start-up packages for research scientist recruitments. The committee recommended that all such support be time-limited (typical maximum support is three years). They also recommended a new program of sharing indirect cost recovery with the department. Under this proposal, funds equivalent to 16.5% of indirect cost recovery dollars would be provided to the departments. The committee also called for financial support for the departments in order to provide compensation for some unfunded academic time. Departmental support was provided at a level equivalent to 12.5% of salary for tenure-track faculty, and 7.5% of clinician educator faculty up to the National Institutes of Health (NIH) cap. For departments with salaries above the NIH cap, additional support could be provided up to 30% of total funded departmental research. As with teaching support, the committee recommended the funds developed for research be provided at the departmental level rather than directed to an individual faculty member, so as to provide a departmental incentive to increase peer-reviewed funding, while at the same time allowing chair discretion as to how the funds are expended within a department.

Clinical support

Financial support of the clinical mission was defined in several categories: new program start-up/new recruit, purchased services, programmatic support and incentive payments, and pass-through payer contracts (Table 2).

Table 2
Categories for the Clinical Component of Funds-Flow along with Their Definitions and Methodology/Guidelines at Penn Medicine, Philadelphia, Pennsylvania

Category	Definitions	Methodology/guideline
New program start-up/new recruit	• Support for new clinical faculty • Support expected to be eliminated over time (e.g., seed support) • Where some amount of ongoing support will be required after the initial start-up phase, this should be identified to the extent possible up front	• Cash guarantee agreed to up front based on projected profit and loss (P&L) for new recruit • Intent to eliminate seed support over time (e.g., three years)
Purchased services	• Support for services provided by faculty for administrative, regulatory purposes, or directorships • Hospital purchases clinical time to offer/provide clinical service	• 25% of chair's salary, benefits, malpractice • (Faculty effort) salary/benefits and malpractice
Programmatic support	• Support from hospital for clinical programs which health system deems important and practices loose money (assumes practice has efficient operations) • Support expected to continue as long as there are no changes in market conditions	• Cash guarantee agreed to up front based on projected P&L service/dept • Dept/service will receive support, given they are at the 65th percentile and infrastructure rates (aka overhead) below established cap
Incentive payment	• Gain sharing around financial improvement (e.g., sharing new margin from new volume)	• Targeted to areas of strategic importance and/or ability to significantly contribute to the system's bottom line
Pass thru/payor contracts	• Third-party contract payments where global payment is received by system and then allocated to hospital and physician practices	• Negotiated on the basis of contract

Table 2 **Categories for the Clinical Component of Funds-Flow along with Their Definitions and Methodology/Guidelines at Penn Medicine, Philadelphia, Pennsylvania**

New program/new recruit funding is a cash guarantee agreed to by the hospitals on the basis of profit and loss projections for the program or recruit; it is provided to the department rather than the individual and is typically limited to a maximum of three years. Templates were developed for new-hire support; they included defined time periods for clinical practice ramp-up and identified appropriate costs, while capping departmental overhead costs by specialty.

Twenty-five percent of each chair's effort, as well as other faculty time for health system or school of medicine

administrative duties, directorships, or regulatory positions, are purchased services. Purchased services include salary, benefits, and malpractice.

Clinical programmatic support was defined in conjunction with the hospitals. Such support was targeted according to the overall importance of clinical programs, which, even when performing at the expected clinical productivity levels (65% FPSC) and with mutually agreed overhead/infrastructure rates, were not expected to break even. The committee recommended that appropriate mutually agreed-on expectations be established between the hospitals and practices and that these arrangements be reviewed in relation to market conditions every other year.

In certain areas, incentive payments for departmental, divisional, or programmatic growth were developed. Such incentives involved revenue-sharing agreements between the hospitals and the clinical departments based on new operating margins.

Some third-party contracts had been negotiated as a global fee or with a global health system reimbursement perspective. In these cases, an appropriate fund pass-through would be continued on the basis of market equitability and clinical volume.

Communication and implementation

All chairs accepted the preliminary principles of the funds-flow reallocation, and the chairs were kept informed of the process through formal communication channels as the more-detailed definitions of support were defined for each of the clinical department missions. The foundations for appropriate support were discussed with the chairs and modified where appropriate on the basis of consensus. Although the potential impact of proposed changes was modeled during the process, these figures were not discussed until the process was completed. Following identification of the different clinical funds-flow categories, there was careful discussion between the hospitals and each department to develop a mutual understanding regarding the clinical funds flow provided in each category as well as the expectations including short-term and strategic goals.

After the chairs and the health system leadership defined and accepted the final principles of the entire funds-flow reallocation, one-on-one meetings were held with the leadership of each department to review the individual departmental impact of the proposed changes. In situations where the reallocation resulted in a significant negative impact to a department, leadership attempted to identify potential areas where incentives which would be beneficial to both the department and the health system could be developed. Where incentives could not be implemented, transitional payments were negotiated so as to allow the departments with decreased funding to take appropriate measures to readjust to the new level of funding. At the end of the process, departments were given one year to model the changes into their respective budgets, and a transition support plan was developed in which significant reductions in support were planned.

Outcomes of the Funds-Flow Reallocation Process

Overall, whereas annual total funding for the clinical departments from the health system and school of medicine increased 30.8% from $121 million to $158.6 million between FY2005 and FY2007, school of medicine funding to the clinical departments decreased 25% from $12 million to $9 million. The largest component of the increase in total funding was associated with new hires and additional programmatic support for clinical program strategic growth; however, other factors in the increase were inflationary increases on the teaching, research, and clinical purchased services programs, new academic development funds, and increased third-party pass through associated with additional volume on global contracts.

In terms of the mission-specific funding, support designated for teaching increased from $7.6 million to $23.9 million, and funds designated for research support increased from $11.1 million to $33.0 million, on annual funded research-budgeted expenditures within the clinical departments of $300 million. On the other hand, funds designated for clinical support remained essentially stable (Figure 1).

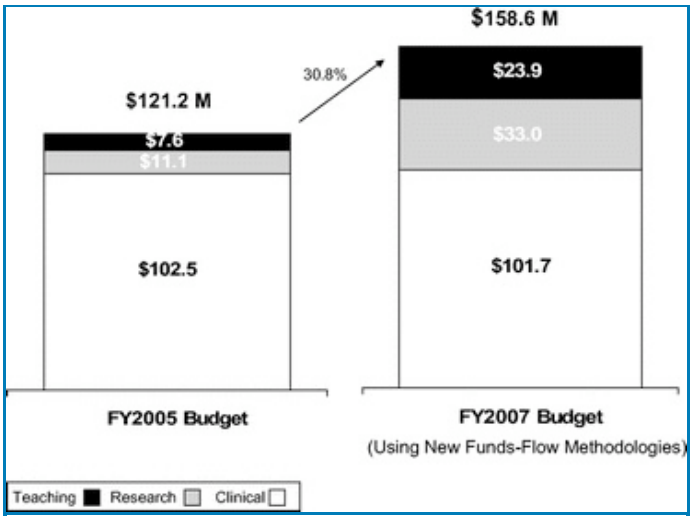

Figure 1 Clinical department support (funds-flow) by mission as budgeted for FY2005 compared with FY2007 after reallocating funds flow within Penn Medicine, Philadelphia, Pennsylvania.

At the departmental level, there was significant variation in the impact of the introduction of this mission-based support methodology (Figure 2). Whereas in some departments there was little change in funds-flow support, there were significant financial gains in some departments; the largest gains were in Medicine ($12.9 million) and radiation oncology ($6.6 million). The largest funds-flow reductions occurred in emergency medicine ($2.1 million) and pathology ($2.0 million).

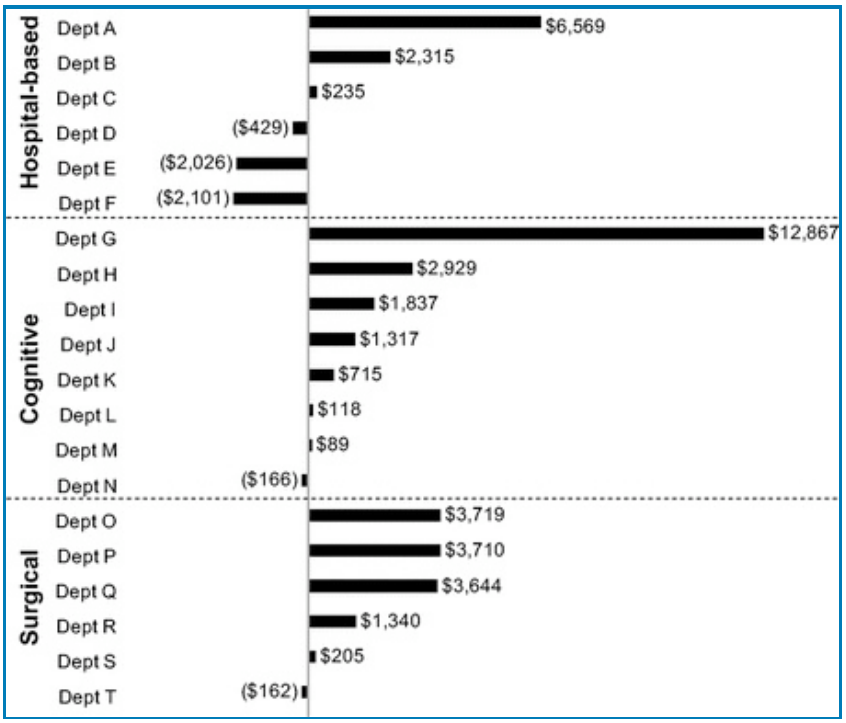

Figure 2 Funds-flow in thousands by department for FY2005 compared with FY2007 after reallocating funds flow within Penn Medicine, Philadelphia, Pennsylvania.

Overall, there has been progressive and sustained improvement in the financial position of the clinical departments during the past three years, with significant additional improvement in the fiscal year that is currently closing (FY2007). In FY2004, the clinical departments had a decrease in net assets of $34 million, and for FY2007 a gain in net assets of $1.3 million is budgeted. This financial improvement is significantly attributable to the increased support provided under the funds-flow process. However, the development of clearly identified lines of support with defined expectations was an important step in the process, as were the abilities to restore confidence in the equitability of the financial support process, to align incentives

with the strategic goals of the health system and school of medicine, to define financial support for the different missions, as well as to restore rewards for profitability at the departmental level.

Discussion

The funds-flow process undertaken at Penn over the past few years has rationalized the flow of institutional funds to the clinical departments on the basis of mission and alignment with the overall strategic plan of the institution. The ability to provide fair and transparent institutional support for each of the missions on the basis of well-defined and broadly accepted principles aligned with the overall strategic plan has aided in providing appropriate incentives for the varied missions and in improving the overall financial performance of the clinical practices. Except in the case of faculty with major administrative teaching roles, the funds are provided to the department and are not earmarked at the faculty level. It thus remains the chair's role to identify the best use for these funds within the departmental setting. The research incentives provided through the funds-flow process should provide additional incentives to encourage pursuit of external funding opportunities. In the future, the vice dean for education will participate in the departmental budget process so that clearly-defined objectives are linked to the funds provided for teaching. At this point in time, teaching outcome measures have not been directly linked to the funds flow for teaching, although as identified by others, this does remain a possibility at a future point in time.[9,10] The ratio of funds provided for teaching ($24 million) compared with those provided for research ($33 million) is different from that reported previously from other institutions.[2] However, this may be distorted by the research-intensive nature of Penn, or by the fact that some other institutions already pass a portion of the F&A dollars back to the departments and consider this outside the discretionary funds-flow process.

The funds provided for the support of clinical care delivery are now clearly categorized and identified. Funds are provided for new program start-up and for new recruits, and a template devised for cost allocation with a preagreed departmental overhead should frame and ease future negotiations. Purchased services are also clearly defined and should be identified with job descriptions. Such proportional FTE funding also implies input into the annual evaluation for that faculty member. Having established productivity expectations for clinical time and expected clinical time commitments for different faculty tracks and differing levels of external funding eases the identification of where programmatic support is required. This, combined with incentive payments, should help to ensure that areas of strategic importance continue to be developed.

Conclusion

The integrated nature of our health system and school enabled a rebalancing of the problem of the increasing gap between professional and technical/hospital reimbursement, consistent with the academic missions of teaching, research, and clinical care. The connection also made it possible to align the clinical goals with those for the health system. Defining the funds-flow clearly to support the different missions of the clinical departments and making the reallocation process open and based on principles that are both accepted and fair has significant advantages in terms of realigning strategic goals. On the basis of our experience, this process seems to be a significant factor in overall improvements, both financially and in terms of productivity, within the clinical practices. In order to maintain chair flexibility and autonomy, the majority of funds are allocated at the department level rather than being earmarked for specific faculty. Since funds-flow may be based more on historical precedent and individual negotiations at academic medical institutions, it seems that a broad reevaluation such as the one performed at Penn might be helpful at other AMCs.

References

1 Sloan TB, Kaye CI, Allen WR, et al. Implementing a simpler approach to mission-based planning in a medical school. Acad Med. 2005;80:994–1004. **Ovid Full Text** | **Bibliographic Links** | [Context Link]

2 Ridley GT, Skochelak SE, Farrell PM. Mission aligned management and allocation: a successfully implemented model of mission-based budgeting. Acad Med. 2002;77:124–129. **Ovid Full Text** | **Bibliographic Links** | [Context Link]

3 Watson RT, Romrell LJ. Mission-based budgeting: removing a graveyard. Acad Med. 1999;74:627–640. **Ovid Full Text** | **Bibliographic Links** | [Context Link]

4 Mallon WT, Jones RF, Mallon WT, Jones RF. How do medical schools use measurement systems to track faculty activity and productivity in teaching? Acad Med. 2002;77:115–123. **Ovid Full Text** | **Bibliographic Links** | [Context Link]

5 Sites S, Vansaghi L, Pingleton S, Cox G, Paolo A. Aligning compensation with education: design and implementation of the educational value unit (EVU) system in an academic internal medicine department. Acad Med. 2005;80(12):1100–1106.

[Context Link]

6 Mallon WT. The financial management of research centers and institutes at U.S. medical schools: findings from six institutions. Acad Med. 2006;81:513-519. **Ovid Full Text** | **Bibliographic Links** | [Context Link]

7 Spahlinger DA, Pai CW, Waldinger MB, et al. New organizational and funds flow models for an academic cancer center. Acad Med. 2004;79:623-627. [Context Link]

8 Cohen JR, Fox S. Developing a new faculty practice plan with a model for funds flow between the hospital and the plan. Acad Med. 2003;78:119-124. [Context Link]

9 Nutter DO, Bond JS, Coller BS, et al. Measuring faculty effort and contributions in medical education. Acad Med. 2000;75:199-207. **Bibliographic Links** | [Context Link]

10 Scheid DC, Hamm RM, Crawford SA. Measuring academic production—caveat inventor. Acad Med. 2000;75:993-995. **Ovid Full Text** | **Bibliographic Links** | [Context Link]

Appendix 2C

Survey Analysis Report: Virginia Commonwealth University: 2007

Survey Analysis:
Report on Faculty Compensation Policies and Practices in Basic Science Departments

September 2007

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Introduction

The AAMC has periodically conducted surveys of U.S. medical schools to learn more about clinical and basic science faculty tenure and promotion policies. The most recent survey was conducted in 2005 and reported in an article authored by S. Bunton and W. Mallon in the March 2007 issue of *Academic Medicine*. An earlier study was conducted by the AAMC in 2002 and the results were published in an article authored by M. Liu and W. Mallon in the March 2004 issue of *Academic Medicine*. The 2007 Academic Medicine article says that: *"For many years, tenure typically was thought to guarantee the full salary of medical school faculty, and the ability of the medical school to reduce salaries or eliminate positions was extremely constrained. Over time, however, medical schools have been forced to align their faculty employment policies and practices with the economic realities of their environment."*

The table below shows the results of the three most recent AAMC surveys among U.S. medical schools. The responses indicate that the percentage of basic science faculty having a specific financial guarantee with tenure has dropped overall since the 1999 survey but climbed slightly between the 2002 and the 2005 surveys. More importantly, the percentage of basic science faculty having the total institutional salary as the financial guarantee has declined appreciably since the 2002 survey while the percentage limiting the financial guarantee to a base salary has continued increase.

BASIC SCIENCE FACULTY	Number (%) of medical schools		
	1999	2002	2005
Tenure has a specific financial guarantee	**74 (62%)**	**59 (49%)**	**62 (52%)**
Total Institutional Salary	46 (39%)	25 (22%)	8 (13%)
Base Salary	21 (18%)	26 (21%)	36 (58%)
Fixed Dollar Amount	3 (3%)	3 (3%)	5 (8%)
Amount referenced to a standard	4 (3%)	4 (4%)	13 (21%)
Tenure does not carry a financial guarantee	**29 (24%)**	**37 (31%)**	**42 (35%)**
Financial guarantee not clearly defined & other	**16 (13%)**	**24 (20%)**	**15 (13%)**
TOTAL	**119 (100%)**	**120 (100%)**	**119 (100%)**

Source: *Academic Medicine* - March 2004 and March 2007

As Mallon and Liu observed in the March 2004 article, *"Schools have defined the financial guarantee of tenure as less than total institutional salary for a number of reasons. The most important is medical schools want to limit their financial liabilities."*

Also of note is that there appears to be a movement towards more clearly defining the financial guarantees associated with tenure as evidenced by the significant drop in the number of medical schools reporting the absence of a clearly defined tenure financial guarantee between the 2002 and 2005 AAMC surveys. In 2002, 24 (20%) reported the lack of a clearly defined financial guarantee. This number declined to 12 (10%) in the 2004 survey. Interestingly, Mallon and Liu predicted this trend in the March 2004 article.

The VCU Experience

Prior to 2003, basic science faculty in the Virginia Commonwealth University (VCU) School of Medicine did not have a clearly defined financial guarantee associated with tenure. By default and institutional practice, the *de facto* financial guarantee was the total institutional salary. This unwritten "policy" significantly hampered the ability of the medical school to cope with the severe budget crisis in Virginia in the 2001-2003 period when the school's state general

fund support was reduced by 25% in 2-year period.

In 2003, the VCU Board of Visitors approved a new salary plan for the basic science faculty that was similar in may respects to the "X+Y+Z" plan that had been in effect for the clinical faculty since the early 1990's. For the first time, the new salary plan clearly defined the financial guarantee for basic science tenured faculty by establishing a base salary. To avoid the potential legal issues of imposing a new base salary structure on existing tenured faculty, the initial base salary for existing faculty was defined as their current total institutional salary. In addition, the new policy did not establish specific defined base salaries or ranges of base salaries for new faculty. Instead, the policy allowed department chairs and the dean flexibility in setting a base salary for new faculty. In hindsight, this was a mistake since it resulted in considerable variability in base salaries for faculty hired after 2003.

Most importantly, the new basic science faculty salary plan created a new so-called variable salary component that would allow faculty to receive additional salary based on defined performance measures but not add to the base salary. In addition, the salary plan allowed for, but did not require, base salaries to increase on an annual basis. The variable salary component had no ceiling but was naturally constrained by the availability of funds in a department. The variable salary component would be in effect for a one-year period with no assurances that it would be renewed in subsequent years.

In the period from 2003 to 2006, the variable salary plan has undergone major refinements. Departments are required to have an approved variable salary plan that recognizes the tripartite missions of the medical school and incorporates performance criteria in teaching, research and scholarly activity, and service in each department's plan.

As is common for many public institutions, Virginia appropriates additional educational and general funds for faculty merit salary increases. These increases are typically expressed as an average percent increase. Although the salary increases are to be based on "merit", many faculty believe that they are entitled to the overall average salary increase on their base salary. Since the state only supports a portion of the basic science faculty salary increase, departments must rely on non-state fund sources for a large portion of the base salary increase (i.e., the remainder funded by grants, gifts and endowments, etc.). Thus, since base salary increases represent a permanent financial obligation for tenured faculty, the more departments increase base salaries, the more they must rely on often tenuous sources of support such as grants and contracts.

In the past several years, basic science department chairs have been strongly encouraged to limit any recommended increases in base salaries and rely instead on the more flexible and non-permanent variable salary. For the FY 2006-2007 year, the state appropriated a 4% average merit increase for faculty. The average base salaries for basic science faculty increased 3.8%, slightly below the appropriated increase. Departments applied the variable salary for many faculty, but the variable salary represents a relatively small portion of the total combined base and variable (total) salary for faculty.

Ongoing concerns about the long-term financial implications of continuously rising base salaries coupled with persistent reluctance of department chairs to limit base salary increases prompted the dean to request that a more information regarding the basic science salary plans and policies at other medical schools.

In reviewing the literature and informally surveying several other medical schools, it was

determined that aside from the periodic AAMC surveys regarding tenure and promotion policies for basic science faculty and a recent AAMC survey regarding bonus and incentive plans for basic sciences faculty, practically no information had been collected, analyzed and reported to shed light on the overall salary structures for basic science faculty at U.S. medical schools.

As a result, the VCU School of Medicine decided to conduct a survey of the 125 accredited U.S. medical schools in order to gather data on salary structures for the tenured and tenure-eligible basic science faculty.

The Survey Instrument

The survey instrument was developed by Amy Sebring, Assistant Dean for Finance and Administration with assistance from Bill Gleason, Senior Associate Dean for Finance and Administration. The survey instrument went through a number of iterations and was reviewed by William Mallon (AAMC) and the VCU basic science department chairs in order to obtain comments and suggestions.

The survey consisted of 24 questions divided into six sections. Each section focused on a different aspect of salary structures. The six sections of the survey were:

1. Base Salaries or Salary Guarantees
2. Additional Salary Supplements (excluding bonuses)
3. External Support
4. Bonuses
5. Additional Information
6. Faculty Characteristics

The survey was administered using a web-based survey tool called *Inquisite*. The target audience was the principal business officers (PBOs) at all 125 U.S. medical schools. The PBOs were initially contacted via email in November 2006 and asked to complete the survey. Several follow-up emails were sent in December 2007, and responses were accepted through early January 2007. In order to maintain confidentiality when requested, survey respondents were given the option to complete the survey but not reveal the institution's name to other respondents.

Survey Reponses

1. Response rate

Of the 125 medical schools surveyed, a total of 67 responses were received. Of those, four were from schools that had each submitted two responses. Each institution was contacted to request clarification of conflicting responses. For the four schools submitting two responses, the response from the individual who was not initially contacted via email was discarded except for one case. In the remaining case, neither response was from the individual initially contacted, so we retained and analyzed the response submitted by the individual whose position title more closely matched those of other respondents. One of the 67 submissions did not include identifying information and was excluded from the analysis. Thus, responses were submitted from **62 schools** for a **response rate of 49.6%**.

2. Survey Issues: Lack of consensus around definitions

There were several indications that the definitions around salary structure as applied to basic science research faculty are more fluid than fixed.

a) Coding open-ended questions: The process of coding open-ended questions proved challenging. For example, when the respondent indicated that their school has a base salary or salary guarantee for tenured and tenure-eligible faculty, the survey asked respondents to identify which criteria are used to determine the base salary or salary guarantee. For some questions, up to eight

codes were created in order to capture the variation in responses across institutions.

b) Analysis of response discrepancies: The two separate surveys submitted by four schools were analyzed for consistency. In each case, there were discrepancies between the two responses on major issues, e.g. whether or not the salary structure included a fixed base salary. We contacted each school in order to clarify discrepancies, but the initial finding suggests that there is a significant lack of structure and consensus around understanding issues related to salary structure.

Additional discrepancies within single institutional responses were also common. For example, although twenty respondents indicated that performance supplements are included in the institutional base salary for federally sponsored grants and contracts, 12 respondents indicated that it was not and 3 did not know the answer. Since by the survey's definition, performance supplements should be considered part of the institutional base salary, these responses suggested a lack of consistency between our interpretation of the questions, and those of the respondents.

In order to clarify some of the discrepancies among other responses, the respondents were contacted. Thirty-four (34) of the 63 responding medical schools were contacted for clarification of responses. Six (6) respondents provided additional information and clarification.

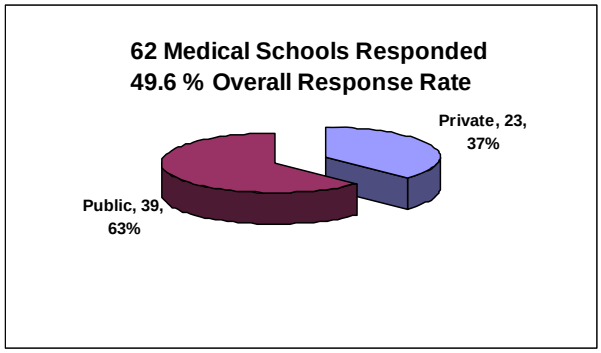
3. Respondent Characteristics

Responding institutions were categorized according to affiliation, region, NIH ranking, and faculty size.

a) Affiliation: Private versus Public Medical Schools

The survey respondents represent a favorable mix of public and private medical schools. Thirty-nine (63%) of the respondents were from public medical schools, and 23 (37%) were from private medical schools.

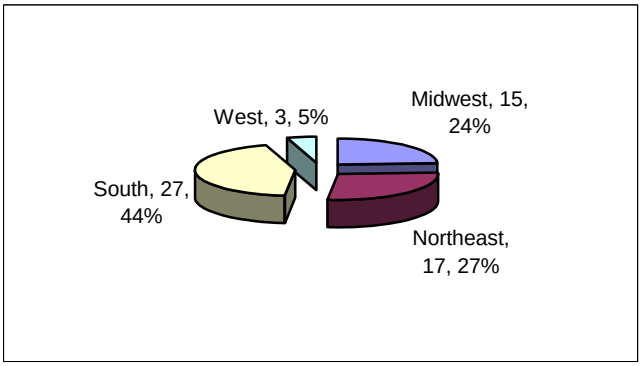
Figure 1



b) Region

When categorized by region, the largest number of respondents (44%) are located in the south while 27% are in the northeast and 24% in the midwest. The poorest response came from medical schools in the west (5%).

Figure 2



c) NIH Ranking

The respondents were also categorized according to their NIH ranking. There is a fairly normal distribution among the responding medical schools with 37% of respondents ranked in the top third (1-42) and 37% ranked in the middle third (43-85). Twenty-six percent (26%) are ranked in the lowest third (86-125).

Table 1

NIH Ranking	# of Respondents	Percent
Low Ranking (86-125)	16	26%
Middle Ranking (43-85)	23	37%
High Ranking (1-42)	23	37%
Total	62	100%

d) Faculty Size (full-time basic science faculty)

Among the 44 (71%) respondents who reported the number of full-time basic science faculty, the responses were grouped into three relatively equal categories based on the overall distribution.

Table 2

Faculty Size	# of Respondents	Percent
Small (80 or less)	14	32%
Midsize (81 - 159)	17	39%
Large (160 - 400)	13	30%
Total	44	100%

The most prevalent group of respondents (39%) represented midsize institutions with 81 to 159 full-time faculty while 32% of the respondents have less than 80 full-time faculty. The largest institutions are also well-represented in among the respondents with 29% reporting 160 or more full-time faculty.

Survey Findings and Analysis

Section I: Base Salary/Salary Guarantee

The first section of the survey focused on whether the tenured and tenure-eligible basic science faculty have a base salary or a guaranteed salary. For purposes of this survey, *base salary* is defined as the minimum salary paid to a tenured or tenure eligible faculty member. This salary cannot be reduced as long as the tenured or tenure-eligible faculty member is employed at the medical school.

Overall, **85% or 53 medical schools** reported that they **provide a base salary or salary guarantee**. Respondents reporting that faculty have a base salary or salary guarantee were asked to provide the criteria used to establish the salary (open-ended question). Schools could identify multiple criteria. These **criteria** were coded into major categories in order to provide frequency distributions. The codes were created in a "check all that apply" format since several respondents included multiple criteria and are presented below in order of prevalence.

Table 3

Criteria	# of Respondents	Percent
Academic rank/Time in rank	49	91%
Specialty/Discipline	21	39%
AAMC or other benchmark	17	31%
Individual faculty qualifications	15	28%
Market	13	24%
Negotiation	6	11%
Faculty union	1	2%

Note: Based on 53 respondents reporting a base salary or salary guarantee.

Below are examples of some of the most common responses.

Rank:

- "All faculty in the medical school all have the same "base" by rank: $66,000 for assistant professors, $84,000 for associate professors, $110,000 for full professors."

AAMC benchmark:

- "For basic science department tenure track faculty, our compensation is set at 75% of the 50th percentile of the AAMC salary survey."
- "The 20th percentile of AAMC salary scale is guaranteed by specialty by rank."
- "Base salaries are tied to a percentage of the most recently published AAMC Southern Region Public medical school mean salaries (fixed contractual component). Assistant Professors receive 90% of the mean, Associate Professors and Professors receive 75% of the mean."
- "Base Salary – in most cases the faculty are at the AAMC 50% for academic rank and department Tenure

Salary Guarantee – 50% of the AAMC 50% as of 2002-2003 by Academic Rank and Department."

- "The base level of compensation, guaranteed with tenure, should not exceed 60% of the median for the national AAMC salary level for each academic rank."
- "Negotiated AAMC national data – 50th percentile; Primarily, we use our own salary data, what's appropriate given current salaries."
- "At Penn State's College of Medicine, we use the AAMC survey tables #4, #11, #18 and #25 only. No other salary surveys are recognized for setting faculty salaries. We try to target the 50th percentile for base salary and the 75th percentile including incentives."
- "The salary that we allow our departments to offer new hires is the 60th percentile of the AAMC based on rank and specialty. We use the data for all schools public and private and the national level data. On a case by case basis we will allow starting salary to go as high as the 75th percentile but only for a "superstar." These salaries are the "negotiated" salaries. They include a base and a variable productivity based component. The base salary is set by the university each year and is the minimum level you may pay a faculty member over 9 months and still call them full time. The difference between the base and the total negotiated salary is called the variable salary and is based on productivity. The base also becomes the tenured salary once a faculty member becomes tenured."

Negotiation:

- "Academic rank in general, but market driven specifically. There is no standard amount; each is negotiated individually."

The responses from the public institutions were compared to those of private institutions to determine whether there were any differences in the use of a base salary or salary guarantee based on affiliation.

A greater percentage of public (92%) than private (74%) institutions provide a base salary guarantee.

Table 4

Base Salary or Salary Guarantee by Affiliation	# of Respondents	Percent
Private medical schools	**23**	**100%**
Provide guarantee	17	74%
Do not provide guarantee	6	26%
Public medical schools	**39**	**100%**
Provide guarantee	36	92%
Do not provide guarantee	3	8%
Total	**62**	**100%**

As suggested by one respondent in a follow-up phone conversation, "We're more flexible as a private school, not locked into a rigid salary structure."

When analyzed from the perspective of the respondents NIH ranking (FFY2005), a larger percentage of the low ranking medical schools reported that they provide a base salary or salary guarantee compared to 87% of the middle ranking medical schools and 78% of the highest ranking medical schools.

Table 5

Base Salary or Salary Guarantee by NIH Ranking	# of Respondents	Percent
Low Ranking (86-125)	**16**	**100%**
Provide guarantee	15	94%
Do not provide guarantee	1	6%
Middle Ranking (43-85)	**23**	**100%**
Provide guarantee	20	87%
Do not provide guarantee	3	13%
High Ranking (1-42)	**23**	**100%**
Provide guarantee	18	78%
Do not provide guarantee	5	22%
Total	**62**	**100%**

For respondents who reported a base or guaranteed salary, the survey asked if the base salary or salary guarantee for tenured and tenure-eligible faculty was fixed such that it could not change over time. Forty-five **(85%)**

of the 53 respondents who indicated a base or guaranteed salary reported that the base salary or salary guarantee is **not fixed but could change** over time. Eight (8) respondents reported that the base salary or salary guarantee is fixed. More public (19%) than private (6%) institutions indicated that the base salary or salary guarantee is fixed.

Table 6

Base Salary or Salary Guarantee is Fixed	# of Respondents	Percent
Private medical schools	**17**	**100%**
Fixed Base or Guarantee	1	6%
Not Fixed	16	94%
Public medical schools	**36**	**100%**
Fixed Base or Guarantee	7	19%
Not Fixed	29	81%
Total	**53**	**100%**

NIH rank appears to have little significance in terms of providing a fixed base salary or salary guarantee.

Table 7

Fixed Base Salary or Salary Guarantee by NIH Ranking	# of Respondents	Percent
Low Ranking (86-125)	**15**	**100%**
Fixed Base or Guarantee	2	13%
Not Fixed	13	87%
Middle Ranking (43-85)	**20**	**100%**
Fixed Base or Guarantee	3	15%
Not Fixed	17	85%
High Ranking (1-42)	**18**	**100%**
Fixed Base or Guarantee	3	17%
Not Fixed	15	83%
Total	**53**	**100%**

Respondents reporting that the base salary or salary guarantee can change over time were asked to describe which factors influence the changes (open-ended question). Schools could identify multiple criteria. These **criteria** were coded into major categories in order to provide frequency distributions. **Criteria** for **changes to the base salary** were coded in a "check all that apply" format and are presented below in order of prevalence.

Table 8

Criteria	# of Respondents	Percent
Annual or periodic adjustments	30	65%
Promotion and tenure	30	65%
Merit/Performance/Chair recommendation	27	59%
Cost-of-Living adjusments	19	41%
Changes in benchmarks	11	24%
Additional duties	4	9%
State-mandated increases	3	7%
External funding requirements	3	7%
Bonuses	2	4%
Faculty union	1	2%

Note: Based on 45 respondents reporting that the base salary or salary guarantee can change over time.

It should be noted that although two of the respondents indicated bonuses among the criteria for a change in base or guaranteed salary, bonus payments are not typically part of the base salary.

Although most respondents did not provide specific details regarding changes in the base or salary guarantee, two respondents did offer a more detailed explanation:

- "If faculty member does not bring in 75% of salary (from research grants) within 3 years, it (the salary) can be reduced."
- "Basic science faculty are expected to have extramural funding support for a minimum of 65% of their base salaries. If extramural support falls below the floor of 65%, base salary may be reduced. If extramural support is available above 65%, base salary may be increased. Faculty may also be eligible for an 'administrative add-on' to base salary if they perform a significant administrative function, e.g. shared facility director; this add-on would be removed if the administrative role ended."

Salary Guarantee for Tenured faculty - Perhaps the most important question in this section of the survey asked respondents if the base salary or annual salary guarantee represents the medical school's only financial

obligation for tenured faculty. Of the 53 who reported having base salaries or salary guarantees, 32 (**60%)** of the respondents indicated that the base salary was the **institution's only financial obligation**. Twenty (38%) indicated that the base salary was not the institution's only financial obligation. One institution did not respond to the question.

Among the schools reporting a base salary or salary guarantee for tenured faculty, 76% of the private medical schools reported that the base/annual salary guarantee represents the institution's only financial obligation to tenured faculty compared to 53% of the public medical schools.

Table 9

Tenured faculty Base Salary or Salary Guarantee by Affiliation	# of Respondents	Percent
Private medical schools	**17**	**100%**
Represents tenure guarantee	13	76%
Not a tenure financial guarantee	3	18%
Did not respond	1	6%
Public medical schools	**36**	**100%**
Represents tenure guarantee	19	53%
Not a tenure financial guarantee	17	47%
Total	**53**	**100%**

Section II: Additional Salary Supplements

This section of the survey attempted to determine to what extent tenured and tenure-eligible basic science faculty members have the opportunity to earn **additional salary for their performance** (not including bonuses, across-the-board salary increases, cost-of-living adjustments, or other adjustments not tied to individual performance). The questions were structured to learn more about so-called "variable" salaries or salary supplements that are not typically part of a faculty member's base or guaranteed salary. It is fairly common for clinical faculty to have a variable salary component (often referred to as the "Y" component in X+Y+Z salary plans). However, previous studies of basic science faculty have not addressed this area.

Fifty-two percent (52%) or 32 of the 62 survey respondents reported that faculty members did have the opportunity earn additional salary based on performance. Forty-four percent (44%) or 27 respondents indicated that faculty did not have this opportunity. Two respondents reported that they did not know the answer to the question, and one did not respond.

Table 10

Performance-Based Salary Supplements	# of Respondents	Percent
Yes - provide supplements	32	52%
No - do not provide supplements	27	44%
Did not know/did not respond	**3**	5%
Total	**62**	**100%**

A significantly greater percentage of public medical school (64%) faculty are eligible for performance-based supplements compared to 30% of the private medical schools.

Table 11

Performance-Based Salary Supplements	# of Respondents	Percent
Private medical schools	**23**	**100%**
Yes - provide supplements	7	30%
No - do not provide supplements	14	61%
Did not know/did not respond	2	9%
Public medical schools	**39**	**100%**
Yes - provide supplements	25	64%
No - do not provide supplements	13	33%
Did not know/did not respond	1	3%
Total	**62**	**100%**

Respondents were asked whether the amount earned as a **performance salary supplement can change** over time. Ninety-one percent (91%) or 29 of the 32 respondents reporting an opportunity for such supplements indicated that the additional salary supplement can increase OR decrease over time. Two respondents indicated that the additional salary supplement is rolled into the faculty member's base salary, and one did not respond.

Of the 29 who indicated that performance salary supplements can change up or down, 20 or 69% of respondents indicated that there are

caps or floors on how much a performance salary supplement can change in a given year.

Table 12

Performance-based Salary Supplements Can Change	# of Respondents	Percent
Caps or floors	20	69%
No caps or floors	8	28%
Added to base salary	1	3%
Total Respondents	**29**	**100%**

Note: Based on 29 respondents reporting that salary supplements can change over time.

Eight (27%) indicated that there were **no floors or caps**. Some respondents provided additional information. For example three respondents indicated that there were floors on supplements, seven reported that there were caps, and four that there were both caps and floors. Examples of the responses are presented below:

Cap:

- "Salaries are generally limited to no more than 125% of the AAMC mean."

- "Supplement Requirements: Receipt of the Supplement will be based on fulfilling the job description for research intensive faculty attached to this plan. It specifically includes objective expectations for teaching effort and research funding.

  - Supplement can be awarded in partial amounts up to the full 30%.
  - If Supplement levels of research and /or teaching are not met, a one year grace period will be given to the faculty member to recover to the Supplement levels.
  - Once Supplement levels of research and teaching are not met for a second consecutive year, Supplement eligibility will be averaged over the four previous years on a rolling basis to prevent abrupt penalty for a temporary interruption in funding or teaching.
  - Supplement to be paid for any given year will be included in the contract salary for that year."

Floor:

- "The supplemental component cannot drop more than 8.3% in any one year. After three years of reductions, which would then total 25%, no further salary reductions can occur as this would then impact the base compensation which cannot be reduced."

- "Limited to 10% reduction per year down to tenure-base level. No practical limit on increases."

Both Caps and Floors:

- By union contract, the faculty are eligible for a supplement if some portion of their salary is charged to grants. The individual faculty member can receive anywhere from $0 to $15,000 in any given year, depending on the facts.

- The amount of the incentive or supplement is based upon a percentage of base salary, which is an upper cap. The lower cap is zero in any given year no matter what was received in the past.

The thirty-two (32) respondents who reported that performance supplements were allowed were asked to indicate the length of time the **institution is obligated** to pay a performance supplement once it was awarded. Sixty-three percent (63%) or 20 of the 32 respondents reported that the school's obligation was limited to one year. Another seven respondents (22%) indicated that the obligation was for multiple years, four respondents provided other responses, and one failed to respond to the question.

Table 13

Performance-based Salary Supplements: Time Obligation	# of Respondents	Percent
Limited to One Year	20	63%
Multiple Years	7	22%
Other responses/No response	5	16%
Total Respondents	**32**	**100%**

Respondents were asked the **percentage of total salary that performance supplements represent**. Of the 30 schools responding to this question, **83% reported that supplements ranged from up to 10% to up to 30%**. Only 5 schools (17%) indicated that performance supplements represented more than 30% of the total salary.

Table 14

Salary Supplements - Percent of Total Salary	# of Respondents	Percent
Up to 10% of total salary	9	30%
Up to 20% of total salary	7	23%
Up to 30% of total salary	9	30%
Up to 40% of total salary	2	7%
Up to 50% of total salary	2	7%
More than 50% of total salary	1	3%
Total Respondents	**30**	**100%**

Note: 2 of the 32 did not respond to this question.

Respondents were asked whether the **performance supplement** was included in a faculty member's **Institutional Base Salary (IBS)** for purposes of federally-sponsored grants and contracts. Twenty (63%) of the 32 respondents whose institutions offered a performance supplement reported that performance supplements are included in the institutional base salary. Twelve respondents (37%) indicated that it was not included. It is somewhat surprising that a large number of schools do not include the performance-based supplement in the IBS.

Administrative Salary Supplements - Of the 62 responding institutions, 60 or 97% reported that faculty can receive **administrative supplements.** Eighty-eight percent (88%) or 53 of the 60 respondents allowing administrative supplements reported that the administrative supplement **ends once the faculty member is relieved of administrative duties**. Four respondents indicated that the length of administrative supplements is negotiated; one respondent reported that the supplements are phased-out over time, and one reported that there can be exceptions to the policy that supplements end when duties subside. (One did not respond to the question.)

Thirty-six (60%) of respondents indicated that administrative supplements are included in **Institutional Base Salary (IBS)** for federally-sponsored grants and contracts purposes. Nineteen (32%) indicated that administrative supplements are not included in the IBS, and five respondents did not know the answer.

Section III: External Support

Three-fourths (74%) of respondents (46) reported that their basic science faculty are **expected to generate a portion of their salary through external sponsored research funding.** Fifteen medical schools (24%) reported that faculty are not expected to secure external funding, and one did not respond.

Some respondents provided additional information about external support expectations. Thirty (30) respondents reported the percentage of total salary expected to be supported through sponsored programs awards. Of the thirty respondents who specified a percentage, 12 reported expectations of between 55-75%, 10 reported a 50% expectation, and 8 reported 20-40% of salary from external support as the expected amount.

Table 15

Expectation to Generate a Portion of Total Salary by External Funding	# of Respondents	Percent
Expected to Generate a Portion	**46**	**74%**
20% to 40% of total salary	8	13%
50% of total salary	10	16%
55% to 75% of total salary	12	19%
Other	16	26%
Not expected to generate	15	24%
Did not respond	1	2%
Total Respondents	**62**	**100%**

Seven indicated that expectations of external support **vary by department**; five reported

expectations within specific **timeframes**; eight indicated that **all faculty** were expected to secure external funding, six indicated that **not all faculty** were expected to do so, one that **full-time and adjunct faculty** were expected to; finally, six respondents indicated that their institutions were **considering** implementing formal expectations for external support.

Public and private medical schools reported similar expectations for faculty to generate extramural support. Seventy-eight percent (78%) of the private medical schools and 72% of the public medical schools indicated that faculty are expected, to varying degrees, to generate a portion of their salary from sponsored programs grants and contracts.

Table 16

Expectation to Generate a Portion of Total Salary by External Funding	# of Respondents	Percent
Private medical schools	**23**	**96%**
Yes -expected to generate $	18	78%
No - not expected	4	17%
Did not respond	1	
Public medical schools	**39**	**100%**
Yes -expected to generate $	28	72%
No - not expected	11	28%
Total Respondents	**62**	**100%**

The survey produced inconclusive results for external salary support expectations based on NIH ranking. Intuitively, one would expect higher ranked medical schools to have a higher expectation for faculty to generate a larger portion of salary from sponsored programs. However, 61% of those with high NIH rankings did not provide the salary support expectation percentage in their survey responses. Of those who did report the data, a greater percentage of those with high rankings (33%) than those with middle (8%) or low (22%) rankings reported an expectation of 70% or more of salary to be covered by sponsored research.

Table 17

External Salary Support by NIH Ranking	# of Respondents	Percent
Low Ranking (86-125)	**16**	**100%**
50% or less	6	38%
51% - 69%	3	19%
70% - 100%	2	13%
Did not respond/did not know	5	31%
Middle Ranking (43-85)	**23**	**100%**
50% or less	8	35%
51% - 69%	3	13%
70% - 100%	1	4%
Did not respond/did not know	11	48%
High Ranking (1-42)	**23**	**100%**
50% or less	6	26%
51% - 69%	0	0%
70% - 100%	3	13%
Did not respond/did not know	14	61%
Total	**62**	**100%**

Section IV: Bonuses

This section of the survey focused on bonus or incentive payments to basic science faculty. The survey questions explored the opportunity for bonus payments, the frequency of payments, the criteria used to determine bonuses and what dollar or other limitations are placed on bonus payments.

Thirty-five (35) or 56% of respondents reported that faculty can receive **performance-based bonuses**. Twenty-five (25) or 40% indicated that faculty could not receive a bonus. One school did not know, and one school did not respond to this question.

Table 18

Bonus Payments	# of Respondents	Percent
Faculty can receive a bonus	**35**	**56%**
Faculty not eligible for bonus	**25**	**40%**
Do not know	**1**	**2%**
Did not respond	**1**	**2%**
Total Respondents	**62**	**100%**

Unfortunately, the survey responses were not consistent among the respondents for the survey questions related to the frequency, criteria and other policies for bonus awards. For example, 17 schools that reported that their faculty could not receive bonuses also reported that the bonuses were awarded as a specific dollar amount. Despite follow-up attempts

with the respondents who answered the bonus section questions inconsistently, no further information was provided.

Although 35 of the 62 respondents reported that faculty are eligible for bonus payments, 40 schools responded to the question regarding the frequency of bonus payments (Table 18).

Table 19

Bonus Payments	# of Respondents	Percent
Faculty can receive a bonus	**40**	**65%**
Frequency of Bonus:		
Monthly	3	8%
Quarterly	4	10%
Annually	29	73%
Other	4	10%
Subtotal	40	100%
Faculty not eligible for bonus	**22**	**35%**
Total Respondents	**62**	**100%**

Among the respondents whose faculty can receive bonuses, only three (8%) reported that bonuses were awarded **monthly**; 4 (10%) indicated that they were awarded **quarterly**; and 29 (73%) indicated that they could be awarded **annually**. Four indicated that bonuses were awarded on another frequency. One is awarded semi-annually, one as a "temporary salary increase" for a specific number of months, and one is awarded annually but paid monthly.

Respondents were asked to identify the basis on which bonuses were awarded (more than one basis could be selected). The most frequently cited basis was **research** (86%), followed by **teaching** (61%), and **service** (50%).

Table 20

Basic/Criteria for Bonus Payments	# of Respondents	Percent
Teaching	22	61%
Research	31	86%
Service	18	50%
Other	0	0%

Note: Respondents could select more than one.

Most respondents (69%) indicated that bonuses were awarded as a **specific dollar amount**. Five (8%) indicated that they were awarded as a **percentage of salary**, and 13 (22%) indicated another type of award such as a specific formula or a percentage of external support.

Table 21

Amount of Bonus Payment(s)	# of Respondents	Percent
Specific Dollar Amount	41	69%
Percentage of Salary	5	8%
Other	13	22%
Total	**59**	**100%**

Nineteen (19) respondents or 48% indicated that there was a **maximum bonus amount** or percentage that could be awarded. Fourteen (36%) indicated that there was no maximum. Some included additional information regarding the bonus amount. One reported a maximum of $2,000, one $20,000, and one $50,000. Two reported a maximum of 10%, one 20%, one 25%, and two reported a maximum of 30% of the salary. Four respondents indicated that bonuses were based on performance, and the remaining bases were each identified by one respondent: rank, NIH bonus, department ceiling, and market.

Table 22

Restrictions on Bonus Payments	# of Respondents	Percent
Maximum bonus amount or %	19	48%
No limits on bonus amounts	14	35%
Other	7	18%
Total	**40**	**100%**

Sections V and VI: Additional Information and Faculty Characteristics

a) Compensation Policies: Basic Science versus Clinical Faculty - Twenty-seven (43%) respondents indicated that the **same formal compensation policies apply to basic science and clinical tenured and tenure-eligible faculty** while 25 (40%) indicated that the policies were different and 10 (17%) did not know or did not respond.

One clear difference that did emerge between private and public institutions was in the comparison between **clinical and research faculty**. Specifically, only 18% of private institutions indicated that the same formal compensation policies applied to research and clinical faculty, compared to 58% of public institutions.

b) Faculty Size – (Note: This section of the survey was optional.) As expected, the lower ranked schools tend to have a smaller full-time basic science faculty while the highly ranked schools have large basic science faculties.

Table 23

Basic Science Faculty Size by NIH Ranking	# of Respondents	Percent
Low Ranking (86-125)	**16**	**100%**
Small (up to 80 faculty)	8	50%
Midsize (81-159)	3	19%
Large (160 - 400)	5	31%
Middle Ranking (43-85)	**23**	**100%**
Small (up to 80 faculty)	4	17%
Midsize (81-159)	9	39%
Large (160 - 400)	3	13%
Did not report	7	30%
High Ranking (1-42)	**23**	**100%**
Small (up to 80 faculty)	2	9%
Midsize (81-159)	5	22%
Large (160 - 400)	10	43%
Did not report	6	26%
Total	**62**	**100%**

About 30% of respondents in each NIH grouping failed to provide data on their faculty size. Of those providing these data, 50% of those with a low NIH ranking, 17% with a medium ranking, and 9% with a high ranking reported a full-time basic science faculty of 80 or fewer. Five percent of those with a low NIH ranking, 13% with medium, and 43% with a high ranking reported a large full-time basic science faculty (160 – 400).

SUMMARY

The primary intent of the survey was to collect and disseminate information regarding compensation plans for tenured and tenure-eligible basic science faculty at U.S. medical schools. While previous surveys conducted by the AAMC in 2002 and 2005 focused on financial obligations for tenured basic science faculty and bonus (incentive) plans for basic science faculty, the authors are not aware of any surveys of medical schools that addressed other aspects of compensation plans for basic science faculty. More specifically, the survey conducted by the Virginia Commonwealth University School of Medicine during the winter 2006-2007 attempted to collect information regarding the various structures and components of salary and incentive plans for tenured and tenure-eligible basic science faculty. Many medical schools have salary and incentive plans for clinical faculty that are commonly referred to as "X+Y+Z" plans where "X" is a base salary, "Y" is a variable salary or salary supplement and "Z" is an incentive payment or bonus. However, little is documented concerning similar type salary and incentive plans for basic science faculty. Since tenure typically provides a financial guarantee and continued employment, there is growing concern among medical schools that they are at greater financial risk if the financial obligation for tenured basic science faculty includes the entire institutional salary. A variable salary component or salary supplement that is not a permanent part of the salary offers a way for medical schools to reward productive faculty without creating future financial risks and obligations.

The survey results show that 52% (32) of the 62 responding medical schools provide the opportunity for tenured and tenure-eligible basic science faculty to earn additional salary supplements based on performance. Interestingly, almost two-thirds (64%) of public medical schools provide salary supplements compared to only 30% of the responding private medical schools. The majority (63%) of those providing a salary supplement limit the supplement to one year, giving them considerable flexibility in managing the financial obligations associated with faculty salaries.

Fifty-three or **85% of the 62 responding medical schools also reported that they provide a base salary or salary guarantee to tenured and tenure-eligible basic science faculty**. The most often cited criteria used to determine the base or salary guarantee included academic rank/time in rank (91%) and specialty/discipline (39%). Only 31% reported using AAMC or other salary benchmarks to determine the base or salary guarantee. In addition, 45 **(85%)** of the 53 respondents who indicated a base or guaranteed salary reported that the base salary or salary guarantee is **not fixed but could change** over time.

In terms of tenured faculty financial obligations, **60%** (32) of the 53 respondents who reported having base salaries or salary guarantees reported that the base salary was the **institution's only financial obligation** for tenured basic science faculty.

Three-fourths (74%) of respondents (46) reported that their basic science faculty are **expected to generate a portion of their salary through external sponsored research funding.** The expectation for salary support from sponsored programs is roughly similar among the private and public medical schools with 78% of the private schools and 72% of the public schools requiring some external support for salaries. Fifteen medical schools (24%) reported that faculty are not expected to secure external funding, and one did not respond.

Thirty-five (35) or **56% of respondents** reported that faculty can receive **performance-based bonuses**. Three-fourths of the respondents (74%) indicated that bonus payments are made on an annual basis. Twenty-five (40%) indicated that faculty could not receive a bonus. One school did not know, and one school did not respond to this question. Unfortunately, the survey responses were not consistent among the respondents for the survey questions related to the frequency, criteria and other policies for bonus awards. In contrast to our survey results, according to an AAMC 2005 survey of medical schools, 85 or 68% of the 125 U.S. medical schools reported that they allow basic science faculty to receive a bonus or incentive payments in addition to regular salary.

The survey results show that there is a strong relationship between faculty size and NIH ranking; 43% the schools with the highest NIH ranking have 160-400 full-time basic science faculty compared to13% of those ranked in the middle.

Although the survey generated some interesting results, it is clear that additional studies need to be conducted especially regarding the variable salary and salary supplement aspects of basic science faculty salary plans. The authors hope that the information obtained from the survey will be informative and useful to medical schools as they consider alternative salary structures for basic science faculty.

Appendix 2D

Physician Incentives for Academic Productivity, JB &JS: 2008

Physician Incentives for Academic Productivity. An Analysis of Orthopaedic Department Compensation Strategies

Sanford E. Emery and Carolyn Gregory
J Bone Joint Surg Am. 2006;88:2049-2056. doi:10.2106/JBJS.E.00243

Physician Incentives for Academic Productivity

An Analysis of Orthopaedic Department Compensation Strategies

By Sanford E. Emery, MD, MBA, and Carolyn Gregory, MBA

Investigation performed at the Weatherhead School of Management, Case Western Reserve University, Cleveland, Ohio, and West Virginia University, Morgantown, West Virginia

Background: Changes in the health-care industry have led to increasing demand for physician-driven clinical volume. This environment has altered the traditional balance among teaching, research, and service responsibilities for faculty in residency training programs. As economic pressures mount and budgets shrink, academic departments are exploring ways of paying faculty that would help to maintain the global mission of the organization. The purpose of this study was to examine the compensation strategy for faculty in academic orthopaedic surgery departments in the United States with a focus on compensation methods for academic productivity.

Methods: Thirty-one academic orthopaedic surgery residency training programs were recruited for the study. Two methods of data collection were used: (1) a survey was mailed electronically to the program chairpersons or the finance directors, and (2) eight program leaders were interviewed to obtain more in-depth information regarding compensation for academic productivity in their organizations.

Results: All thirty-one programs responded to the survey. To compensate faculty for clinical productivity, twenty-two programs used a salary and bonus system, two used salary alone, and the remainder used combined methods. Nineteen departments had a compensation system that included academic productivity, and twelve did not. Of those that compensated for academic work, seven used the chair's decision, six used a point system, one used academic rank alone, and the remainder used a combination of methods. The point systems varied in breadth, focus, and amount of detail.

Conclusions: Most, but not all, departments accounted for academic productivity in their compensation system. Most programs used the chair's discretion to determine academic bonuses, but several departments had developed point systems. There are common themes with regard to this issue, including the importance of the academic mission, the need for clinical revenues, the value of flexibility and transparency, and the importance of culture and leadership.

Dynamic changes in the health-care industry have created a new environment for faculty in orthopaedic and other medical training programs. Caps on the numbers of residents in training programs from a provision of the Balanced Budget Act of 1997 increased the clinical demand on faculty. Compensation for primary care physicians has risen 9% in the last five years, but did so with an increase in productivity of 20%. In the same time-period, subspecialists saw an increase in compensation of 15%, but this required an increase in productivity of 29%[1]. Reimbursement cuts to health-care institutions have resulted in tremendous pressure to fill beds and generate ancillary revenues to remain solvent. As a portion of total medical school revenues, the contribution of clinically derived monies has grown from approximately 12% in 1970 to 1971 to >50% in 2002 to 2003[2]. Much of this need for cash flow lands directly on the drivers for any health-care system—the physicians. Personal, departmental, and institutional needs in this fiscal environment all create pressure to increase clinical productivity.

In academic positions, however, faculty members have other responsibilities such as teaching, research, and service. The need for increasing clinical volume has altered the balance of these traditional faculty duties. As economic pressures mount and budgets shrink, academic departments are exploring ways of paying faculty to help to maintain the global mission of the organization.

The purpose of this study was to examine the compensation strategy for faculty in academic orthopaedic departments in the United States. Although information on overall salary and bonus type of structures was obtained, the focus was on compensation methods for *academic* productivity. This term includes faculty efforts in teaching, research, and

service that are not directly related to patient-care activities.

Materials and Methods

Thirty-one academic orthopaedic residency training programs were recruited for the study (see Appendix). These programs were chosen on the basis of their reputation for academic output. They tended to be larger programs that are active in research, since research is an important part of academic productivity. Geographical distribution also entered into the selection process, as did personal familiarity of the programs by one of us (S.E.E.), which helped to secure participation.

Two methods of data collection were used. In the first, a survey designed by us was mailed electronically to the orthopaedic surgery program chairpersons or, in two cases, the department finance directors. Data were collected from all thirty-one institutions. Questions were asked in a multiple-choice format (see Appendix) with room provided for additional written explanation after most questions. The questions focused on the compensation of faculty for both clinical and academic work, particularly with regard to the structure of clinical and academic bonus pay. The survey results were calculated on a simple percentage basis. In the second method, eight program leaders (seven chairpersons and one finance director) were interviewed by one of us (S.E.E.) in person or by telephone to obtain more in-depth information with regard to compensation for academic productivity in their organizations. Although answers were not recorded verbatim, the same questions were used to guide the interviews so as to maintain consistency in the dialogue.

Results

Thirteen respondents described their relationship to the parent institution as a hospital or an institution-owned (i.e., full-employment) model; eight, as a separate legal entity; and ten, as a multispecialty legal entity. All thirty-one departments were affiliated with a school of medicine. Twenty-one paid a tax to a dean and ten did not. The amount of tax paid to a dean ranged from 2% to 14% (average, 7.4%). Of the twenty-one departments that paid a dean's tax, thirteen said that the dean had the power to further tax department profit to subsidize other departments.

Clinical Productivity

All thirty-one programs responded to the survey, and eight department leaders were interviewed. All programs verbally consented to allow publication of the material. Some requested anonymity with regard to the specifics of their compensation system, so templates are not identified with the institutional source. Twenty-four respondents (77%) agreed or strongly agreed that pressure exists to produce more clinical work at the expense of academic work. Four believed this had been noticed over the last two years, fifteen said five years, and five said ten years. To compensate faculty for *clinical* productivity, twenty-two programs used a salary and bonus system, two used salary alone, and the remainder used combined methods. Base salary was determined by collections in ten departments, the chairperson's decision in two, relative value units[3] in one, academic rank in one, a committee decision in one, a combination of the above in twelve, and by another method in four (Table I). Clinical bonus monies were determined on the basis of a formula in nineteen departments, a chairperson's decision in three, a committee decision in two, a combination of the above in three, another method in one, and three did not respond to this question (Table II). The majority (nineteen) of the clinical bonus methods that included a formula were based on collections, and the remainder used relative value units or other metrics.

TABLE I How Is the Clinical Base Salary Determined?*

	No. of Departments	Percentage
1. Collections	10	33
2. Relative value units	1	3
3. Chair decision	2	6
4. Committee decision	1	3
5. Academic rank	1	3
6. Billings	0	0
7. Combination†	12	39
8. Other	4	13

*A total of thirty-one departments participated in the survey.
†Eleven of the twelve departments indicated a combination of methods 1, 2, or 6.

Academic Productivity

Nineteen departments had a compensation system specific for academic work, and twelve did not. Academic bonuses were used by nine of the thirteen respondents in a full-employment model, three of the eight in separate legal entities, and seven of the ten in multispecialty group entities.

Of the departments that compensated for academic effort, seven distributed bonuses solely on the basis of the chair-

TABLE II How Is the Clinical Bonus Determined?*

	No. of Departments	Percentage
1. Chair decision	3	10
2. By formula	19	61
3. Committee decision	2	6
4. Academic rank	0	0
5. Other	1	3
6. Combination†	3	10
7. No response	3	10

*A total of thirty-one departments participated in the survey.
†All indicated a combination of methods 1 and 2.

person's decision, six used a point system, one used academic rank alone, and the remainder used a combination of methods or other methods (Table III). Seven department leaders had changed their academic compensation system during their tenure, with most changing from "the chairperson's decision" to another method. Of the eight departments utilizing a point system for academic productivity bonuses, six submitted their specific methodology (Figs. 1, 2, and 3 and Appendix). These point systems varied in the breadth as well as the degree of detail in the categories considered. Most allowed for a range of points attributable to specific functions or to more general categories. Of the six templates collected, all gave points for scholarly work (e.g., papers, grants, and presentations), five rewarded teaching effort, five noted service such as committee work, four acknowledged citizenship (such as cooperating with the department and in the operating room as well as taking call on short notice), and two included academic rank.

The departments that used an academic productivity bonus were asked by the survey to indicate the approximate percentage of total compensation that could be attributed to this bonus. The answers ranged from 5% to 25%, with a mean of 12.9% and a median of 12.5%. Seven chairpersons said that academic bonuses were consistently given every year, and six said they were not; six respondents either could not or did not answer this particular question. Of the six programs that did not consistently provide a bonus for academic productivity, five said the decision was based on the profitability of the department as a whole. Approximately half (ten) of the departments allowed chairpersons to receive an academic bonus, and half (nine) did not.

Of the thirteen departments reporting that the dean could take additional tax, eleven had instituted an academic bonus for faculty. Of the eighteen programs with either no dean's tax or restrictions on the dean taking additional funds, only eight had academic bonus plans.

For the twelve programs that had no academic bonus as part of their compensation plan, seven believed that a culture of academic productivity was strong enough in their group so as not to need designated compensation. One chairperson noted perquisites, such as travel expenses, space, and research chair endowments, as another form of academic incentive. Two programs emphasized that academic achievement was taken into consideration in determining salary levels from year to year. Four departments thought that there was a conscious effort of their group or institution to reward only clinical productivity.

TABLE III How Do You Compensate for Academic Productivity?*

	No. of Departments
1. Academic rank	1
2. Chair decision	7
3. Dean's decision	0
4. Point system	6
5. Committee decision	0
6. Combination†	2
7. Other	3

*A total of nineteen departments with a compensation system that included academic productivity responded to this question. †The two departments indicated a combination of methods 1, 2, and 4.

Interviews

Eight program leaders graciously participated in the interview process. These departments were chosen because they represented different strategies for addressing academic productivity, ranging from no system to detailed point structures to abandonment of one method for another. Each discussion took approximately thirty to forty-five minutes. Of these eight programs, five used point systems and three used the chairperson to determine academic bonus pay. Three in-depth interviews are summarized below as case studies.

Case Study 1

The academic compensation plan for this department arose out of a year-long strategic planning process. Prior to the arrival of a new chairman, this department had a compensation system consisting of salary and a bonus based on relative value units and participation in the call schedule. Under the new chairman, the entire faculty had provided input over numerous meetings to help to produce a detailed point system (Fig. 1), the basis of which was proposed by the chairman. The new compensation strategy reflected the vision of an academically productive department.

Of the bonus pool dollars available, approximately 60% were attributable to clinical work and approximately 40%, to academic productivity. The bonus system was based on points assigned for many categories that encompass clinical work, relative value units, subspecialty coverage, research (e.g., publications, grants, and lectureships), teaching, service, and fiscal and administrative responsibilities. There was room for subjectivity on the part of the chairman, as most of these categories had a range of points that can be assigned at the chairman's discretion. This gave the system some flexibility despite its detail. The chairman believed that this was important, as a system that was excessively rigid could be too onerous and more difficult to apply fairly to all faculty members. Tracking of this system was not considered difficult. Some faculty felt the bonus system was unfair in that clinical work was underemphasized, i.e., the bonus pool was weighted too heavily for academic work. The consensus was that it certainly emphasized accountability.

It was evident that in the last two years both the clinical and academic productivity of the department had increased substantially. Whether this was related to the bonus system or to the overall strategic planning process is unclear since they were tightly linked. The chairman felt strongly

Category	Points
Teaching	**≤500**
1. Departmental and institutional teaching lectures	
2. Continuing education programs	
3. Departmental conferences	
4. Resident education and evaluation	
5. Fellow education and evaluation	
6. Student advising	
7. Student research projects	
Research and scholarship	**≤1000**
1. Grants	
a. National Institutes of Health grants	
b. Veterans Affairs grants	
c. Foundation grants	
d. Industry grants	
2. Publications	
a. Peer-reviewed articles	
b. Book chapters	
c. Books edited	
d. Abstracts	
e. Other articles	
3. Journals edited	
4. Presentations	
a. National and international	
b. Regional	
5. Visiting professorships or lectureships	
6. Service/scientific/professional review committees	
7. Leadership positions in scientific and professional organizations	
8. Research award	
Clinical services	**Based on RVUs**
1. Departmental clinical activity	
a. Relative Value Units (RVUs)	
b. Charges and net payments	
c. Outpatient clinic visits	
d. Surgical procedures	
e. Availability for consultation	
f. Indigent patients	
g. Medicare/Medicaid patients	
h. Veterans Affairs services	
2. Outreach services	
a. Outreach clinics	
b. University/college event coverage	
3. Athletic team coverage	
4. On call	
a. Trauma	
b. Day call	
c. Night call, weekends, holidays	
d. Operating-room backup	
5. Service to department	
a. Communications with referring physicians	
b. Efficiency in clinics	
c. Punctuality in operating room and clinics	
d. New clinical programs and incentives	
Administrative and Fiscal Responsibilities	**≤1000**
1. Departmental administrative assignments	
2. Medical center, hospital and college administrative assignments	
3. Industrial expenses	
a. Travel	
b. Medical photography	
c. Books, journals, dues	
d. Other	
4. Efforts to control departmental expenses	
5. Promptness in signing billable paperwork	
6. Participation in hospital and medical center compliance programs	
7. Appropriateness of documentation and current procedural terminology (CPT) coding	
8. Prescreening resident applications	
9. Interviewing resident applicants	
Team player	**≤1000**
Other	**≤2000**

Fig. 1

A representative point system.

that it was necessary to look at the faculty members and their talents and to be realistic as to what they could do and what they liked to do. As with most chairmen, this chair wished there were more funding sources and predicted the future would produce further tightening of funds, perhaps by federal policy changes. The goal of the department was to produce more clinicians with master's degrees as part of their residency training program.

Case Study 2

This department presents an interesting history with regard to academic compensation. For approximately three years, the orthopaedic department had used a point system on a spreadsheet to determine research and education productivity. One year, at a research retreat, the faculty discussed and actually voted to eliminate the point system. They expressed sentiment that it was too rigid and tracking was difficult. They cited the example of a certain faculty member who consistently showed up at 6:30 AM teaching conferences but was really not rewarded for such dedication. The faculty asked the chairman to return to a chairperson decision-making process for the distribution of the academic bonus. Each faculty member had an annual performance review. They completed a form listing their activities in conjunction with their current curriculum vitae. The decision for academic bonus distribution is subjective in that the chairman decides, yet it is based on detailed information of the academic, service, and clinical work of the faculty member.

This department aligned 90% of compensation to clinical productivity and ≤10% for academic productivity. The weighting was based on the reality that dollars come from clinical revenues and emphasis should be placed on clinical work in order to provide monies for the department and institution. For the 10% allocated to the academic mission, emphasis was placed on publications and teaching more so than the other items. One other incentive that was established for academic productivity involved the expense stipend for travel to

Category	Points
Grants	20-50
Papers	10 each
Presentations	3 each
Teaching	≤30
National activities/visibility	≤80
Service	≤30
Residency functions	≤30
Quality Assurance, medical student teaching, compliance	≤30
Citizenship	≤30
	Maximum = 293 if n = 1 for papers/presentations

Fig. 2

A second point system.

meetings. Historically, any meetings were covered by a specified amount of pretax dollars. However, in order to encourage the presentation of papers at meetings, one-half of the specified amount would be available only if the faculty member was involved in the presentation of a paper.

The chairman thought that the current system as described was quite flexible. The faculty was aware of the method used for academic compensation. The chairman was satisfied with the system, and his impression was that the faculty was satisfied as well. He did not feel the change from a point system to a chairperson decision model had had any real effect on the academic output. The greatest value of the 10% academic bonus lay in recognition for those doing important academic work and not in its use as an effective behavior modification tool.

If one thing could be changed, the chairman would consider delineating where and how a separate 5% department tax is used so as to increase the transparency of the system. Currently, half of the academic funding pool was provided by the state and half was provided by the department tax. Looking five to ten years into the future, this chair predicted that revenues would probably get even tighter and monies to provide an incentive for academic productivity would be at risk of disappearing.

Case Study 3

Compared with the other department case studies, this department had no specific compensation for academic productivity. The strategy was to distribute academic tasks, such as fellowship director, coordinator of resident and medical student education, conference organizer, and supervisor of a staff clinic, among the faculty. The goal was to have people contribute to the academic mission in a fashion that played to their individual strengths. Academic goals were set for the individual for the upcoming year. If those goals were not reached or the individual was not a "good citizen," then all of their clinical incentive bonus may not be paid out. This actually had not occurred up to the time of the interview.

Role success was strongly emphasized in this program. As a leader in the department, the chair was responsible for determining what all of the faculty members did best and

Category	Points
Resident/fellow education	≤20
Medical student teaching	≤20
National teaching	≤20
Department committees	≤10
Hospital committees	≤10
Medical foundation committees	≤10
Medical school committees	≤10
Conference participation	
Indications conference	≤30
Grand rounds	≤20
Journal club	≤10
Basic science	≤5
Academic rank	≤6
Years in group	≤4
Research activities	
Funded	≤30
Unfunded	≤15
Publications	≤30
National presentations	≤20
Local presentations	≤10
Society committees	≤5
Society office	≤5
Editorial boards	≤10
Intangibles	≤50
	Maximum = 350

Fig. 3

A third point system.

what they enjoyed the most and then blending this into the mission of the department. The chair believed that when the team wins, everyone should feel part of the team. There also was an effort to remove academic disincentives; for example, this department had unlimited academic travel expenses covered.

Although decisions for the following year's salary depended on the achievement of goals for that prior year, the main driver of academic success was the culture of the organization. There is a strong philosophy in this department to perform as an academic group, and, if there was a need to incentivize academic work specifically, then something was wrong. People who did not fit into this culture of producing research or educational value for the department would tend to leave the group.

For this system to work, leadership played an important role. The leader was charismatic, and there was a presumed desire for approbation. This system, however, relied strongly on the internal motivation of its faculty members. The chair reported that there had been no complaints up to the time of the interview with regard to the compensation strategy. If the chairman could change one thing, it would be to increase money from the medical school to pay for teaching responsibilities. The future is expected to hold a further squeeze on teaching duties and especially on research, given declining revenues and increasing malpractice costs.

Discussion

At issue is how best to structure physician compensation to value and reward contributions fairly and to motivate preferred behaviors. The design of successful compensation arrangements is particularly challenging for academic orthopaedic surgeons given their multiple missions. Historically, many programs paid clinical faculty on the basis of academic rank and tenure; this system is being replaced by productivity-based compensation methods in response to industry pressures[4-6]. Given the fact that compensation arrangements have an impact not only on financial performance but also on group culture and expectations, it is optimal for the pay structure to reinforce the physician and department objectives[7]. This will optimally (or hopefully) reinforce the aligned incentives of the department and the values and vision of the parent institution.

In the development of incentives, the goals and objectives should be matched to specific activities and clear metrics that will be used to measure performance. Expectancy theory indicates that incentives are most effective when employees can clearly see that their extra efforts lead to increased performance and desirable results—this is often termed "line-of-sight." Bonus plan systems that foster the achievement of certain results are best termed rewards. Rewards do not create exceptional performance; they only encourage and reinforce existing actions. Stronger methods that produce performance results above and beyond expectations are true incentives. The target level of bonus incentives should be substantial enough to get the attention of the physician, yet remain within the range of competitive practices and not discourage other desirable behaviors.

Smithson and Koster[8] stated that from management's point of view, incentives can be evaluated according to three attributes: (1) power—the ability to energize behavior, (2) specificity—eliciting a particular behavior, and (3) sustainability—influencing behavior over time. The types of incentives can be broadly classified into economic and noneconomic categories. Economic incentives (i.e., bonus pay) are by far the most powerful means to influence physician behavior. Unless linked to objective performance measures, however, these economic incentives can lack specificity and not produce the desired behavior. They also can be problematic with regard to sustainability, such as when a bonus paid at the end of the year is perceived by the physician to be simply part of the base salary. Noneconomic incentives, such as work content, recognition, and control, are less powerful in nature and are of intermediate specificity, but, if appropriately matched to individual physician preferences, they can offer a high degree of sustainability[8].

Our survey shows that the majority of orthopaedic departments in this study had established bonus systems for clinical work as well as academic productivity. Whereas clinical bonus dollars were determined largely by the formula method, academic incentives were more frequently determined by the chairperson, with point systems seeming to increase in popularity as a second method. This difference between disbursement methods of clinical compared with academic bonuses most likely is related to difficulties inherent in measuring research, teaching, and service productivities compared with pure numeric revenues collected. Point systems attempt to provide more quantitative metrics to some of the intangibles of academic work. We found it interesting that an extremely low percentage of the orthopaedic departments surveyed mentioned academic rank as a factor in bonus determinations.

The use of an academic bonus plan was less common in the departments that were self-described as a separate legal entity. Individual corporations theoretically have more control of their resources but also more responsibility to be profitable; there are perhaps no deep pockets of an institution or multispecialty group to help a department to get through lean periods or to provide investment capital. Thus, a separate legal entity-style of department may want and need to emphasize clinical work and not academic efforts. This was not true across the board, however, as several of these departments stated their reason for not having an academic bonus was because their internal culture was strong enough to succeed both clinically and academically.

We also wondered whether a 'profit at risk' mechanism might induce chairpersons to create academic bonus plans. If the dean can take additional tax monies from a department, then an academic bonus strategy may represent a way to disburse funds to the faculty rather than show a large profit or reserve. However, this assumption would suggest a ceiling on *clinical* bonus monies that could be paid out (causing a chairperson to label extra funds as an academic bonus). We have no

data to support this possible influence on rewarding academic activity. Another confounding factor is the unknown detailed financial relationships of institution-owned departments. Five of these programs did not pay a dean's tax so one might think that profit was not at risk. However, several of these chairpersons noted that all revenues go to the institution, a situation that actually might foster the creation or expansion of academic bonus plans to keep money in their respective departments. Our survey data are not detailed enough to postulate that any given behavior might be based on these different financial relationships.

Because of the inherent complexities of academic departments, including their financial infrastructure, one might think that each organization would be unique. Several common themes, however, became evident after analysis of the survey and interview data.

1. The Importance of the Academic Mission

For these chairmen, the underlying value system emphasized academic productivity and success for the department as a whole. All understood the pressure to increase clinical volume in their institution, yet research, education, and service were critical components of their vision that need attention and resources. It was recognized that not every faculty member would be an academic star, so role fulfillment and goal attainment were stressed. The focus was on academic output as a group, with a strong desire, however, for everyone to contribute in some fashion.

2. Clinical Revenue Is the Primary Driver

Although academic success is a lofty goal, these leaders were well grounded in the reality that clinical revenues drive the department. No one had a money tree, and all of the programs derived most, if not all, of their academic bonus pool funds from the orthopaedic clinical collections. This fundamental truth was the rationale for some chairmen to keep the academic bonus a relatively small percentage (e.g., 10%) of overall compensation.

3. Flexibility

Whether by use of a point system or purely at their discretion, most chairmen emphasized the need for some flexibility for the chairman in distributing academic monies. This conceivably could open the door for criticism from faculty with regard to favoritism or unfairness, but instead it provided the chair with some "wiggle room" to recognize contributions that may not fit neatly into the existing numerical system. In point systems, this flexibility took the form of point ranges to be assigned for a given category or simply a category called "other" that could be awarded at the chair's discretion.

4. Homework

Even without a point system, these particular chairs paid attention to the accomplishments and goal achievement of their faculty for the preceding year. The faculty members completed forms to document research, teaching, and service efforts. The chair used this information in an annual review with the individual faculty members. Regardless of the system, in all of the case studies, the decisions for awarding academic productivity were made on the basis of information and data and the homework done by the chairperson.

5. Transparency

The chairs who were interviewed believed that the faculty was well aware of the specifics of the compensation system. This held true for the academic bonus portion as well. Some, but not all, of the point systems had faculty input into their creation or modification.

6. Fairness

Although each chair interviewed believed that the faculty was happy with the system in place, all acknowledged that there were some complaints from individuals at one time or another. Two of these examples were about the weightings of the point system, but most were related to compensation. It should be noted that no faculty interviews (other than chairpersons) were conducted, so the perceived fairness of the system is subject to the chair's bias. Smithson and Koster[8] wrote that physicians as a sociologic group crave three things: security, self-esteem, and fairness. Any system can fail or cause divisiveness if the faculty believes it to be unfair. Involving the group in creating a method of compensation is ideal. Leadership, trust, and transparency are important factors at work in these systems.

7. Culture and Leadership

These two overarching themes could be applied to all of the programs examined for the case studies. It could be argued that the stronger the culture for academic productivity, the less the need for strong external incentives to foster scholarly and educational effort. Creating the appropriate culture is a complex issue, but on the surface it seems linked to department leadership and the hiring of faculty members with strong internal motivation to pursue academics.

If a program chooses to create an academic bonus pool, the two common methods for distribution are the chairperson's discretion and a point system. Each method has strengths and weaknesses. A chairperson using his or her judgment allows maximal flexibility, which can be very important if cash flow varies from year to year or the department is at risk of losing faculty members to competing institutions. Efforts that are difficult to quantify can be rewarded. Faculty members have different strengths and play different roles in the department, which may best be accommodated by this method. The chairperson maintains maximal power over faculty members with the subjective disbursement of income. The more subjective the system, however, the more open it is to complaints of unfairness or favoritism. With less well-defined goals, the power of incentives is diminished.

In contrast, a point system provides more specific goals or targets, and it can be a powerful motivator if the rewards are high enough. By removing some or all of the subjectivity,

complaints of unfairness are less likely to occur, or at least the chair may believe his or her decisions are more defensible. A point system, however, is subject to criticism regarding its weightings, since the faculty may have different perspectives on that issue. Point systems strengthen external motivators, but they may weaken the internal drivers of academic success and actually disincentivize some individuals. Point systems are difficult to change because altering the measurement factors could potentially harm some faculty. Modifications may also require faculty consensus, which is not always an easy task in physician groups. The more specific point systems may require additional tracking effort and administrative time, although, as described above, information gathering was an important part of either type of system.

In summary, we believe that any system can work well in a given setting, as evidenced by the case studies. Tailoring the method to the abilities, personalities, and internal drive of the faculty members is an important underlying concept. For a highly motivated faculty in a culture that promotes and encourages academic outputs, stronger external incentives may not be necessary. In departments with a broader range of faculty capabilities and interest, specific academic incentive systems may stimulate higher levels of academic achievement for the department as a whole. The question remains whether these academic incentives will actually influence the desired outcome and, if so, at what magnitude. This would have to be validated by examining longitudinal data of stable departments.

It is important to recognize that a faculty compensation plan represents the economic underpinning of a medical school and its faculty groups and is potentially the most important factor in ensuring long-term success at both the department and institutional levels. A greater awareness of existing methods of income distribution, as demonstrated by the templates, may be of some use for leaders of academic departments or perhaps may inspire the creation of new, innovative models of compensation.

Appendix

eA Tables showing the institutions surveyed, the survey instrument, and three other point systems are available with the electronic versions of this article, on our web site at jbjs.org (go to the article citation and click on "Supplementary Material") and on our quarterly CD-ROM (call our subscription department, at 781-449-9780, to order the CD-ROM). ■

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References

1. Berkowitz SM. The development of a successful physician compensation plan. J Ambul Care Manage. 2002;25:10-25.

2. Robinson L, editor. AAMC data book: statistical information related to medical schools and teaching hospitals. Washington, DC: Association of American Medical Colleges; 2005.

3. Hsiao WC, Braun P, Yntema D, Becker ER. Estimating physicians' work for a resource-based relative-value scale. New Engl J Med. 1988;319:835-41.

4. Andreae MC, Freed GL. The rationale for productivity-based physician compensation at academic health centers. J Pediatr. 2003;143:695-6.

5. Willis DR, Kelton GM, Saywell RM Jr, Kiovsky RD. An incentive compensation system that rewards individual and corporate productivity. Fam Med. 2004;36:270-8.

6. Glass KP, Pieper LE, Berlin MF. Incentive-based physician compensation models. J Ambul Care Manage. 1999;22:36-46.

7. Tarquinio GT, Dittus RS, Byrne DW, Kaiser A, Neilson EG. Effects of performance-based compensation and faculty track on the clinical activity, research portfolio, and teaching mission of a large academic department of medicine. Acad Med. 2003;78:690-701.

8. Smithson KW, Koster J. Incentives and the management of physician behavior in health service organizations. J Ambul Care Manage. 1997;20:8-16.

Appendix 2E

Academic, Anesthesia Faculty Salaries: Incentives, Availability and Productivity, International Anesthesia Research Society: 2005

EDITORIALS

Academic Anesthesia Faculty Salaries: Incentives, Availability, and Productivity

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In the United States, financial compensation for academic anesthesiologists has usually been based on rank and/or clinical time. Typically, faculty salaries would increase with seniority and the associated increases in rank (i.e., assistant professor→associate professor→full professor). Since most of the actual financial compensation is derived from clinical activity, a certain clinical expectation (i.e., usually number of days per week in the operating room plus call) would be expected. If a faculty member has research grants, money from the grant may be used to help pay a faculty member's salary and increase his or her nonclinical time. These are the principles by which academic departments have for years compensated their faculty, although there have undoubtedly been many variations.

Over the past 10 to 15 years, many American academic anesthesia departments have increasingly had problems with recruiting and retaining faculty (especially junior faculty), making it difficult to provide clinical coverage for all of the activities usually associated with operating room anesthesia and call. Increasingly, hospital administrators—and even surgeons—have been critical of anesthesia departments' salary structures because they are not based on clinical incentives and/or productivity. In the article published in this month's issue of *Anesthesia & Analgesia*, Abouleish et al. (1) found that of 83 departments, nearly 70% had some type of incentive by which faculty could earn extra money. Abouleish et al. have also attempted to assess the current state of affairs with regard to incentive-based compensation in academic departments and its effectiveness.

A more precise definition of an "incentive" is necessary. One definition might be "the implementation of some measure to stimulate faculty to increased quality and/or quantity of performance." Obviously, incentives come in many forms. Fundamentally, as far as anesthesia departments are concerned, incentives can be divided into those based on availability versus those based on productivity. Examples of availability would be number of days in the operating room, number of calls, and their duration. For example, if one is expected to be in the operating room one particular day, the amount of anesthesia actually delivered would probably vary extensively among faculty members. However, independent of their individual clinical productivity, they would receive the same credit (i.e., 1 day in the operating room). Should one receive the same credit when they are on call, whether or not they actually deliver clinical care? Conversely, another form of an incentive is productivity, which is based on the amount of anesthesia given. Should a faculty member's salary be based on the expected amount of productivity (e.g., amount of clinical work performed) versus availability during which anesthesia may not be given? Studies in our department have determined that when someone is in the same specialty, has the same call, and has the same number of days in the operating room, his or her clinical productivity can vary widely (2). This probably relates to the individual variation in enthusiasm for volunteering for extra cases, seeking relief from their current day's activities, and the vigor with which they pursue other cases when their own are canceled.

Although this author is extremely biased, it is my opinion that only productivity-based incentives actually achieve the goals and aspirations of academic anesthesia departments and medical centers and enhance the anesthesia faculty's relationship with other specialties, such as surgery. In the Abouleish et al. survey, only 17% of the departments used a productivity measure. Nine departments based their approach on charges (financial charges), and the remaining five based it on time that clinical care was actually delivered. One could argue that a system based on charges is inappropriate because of the unevenness of charges for various medical plans and surgical procedures in anesthesia. Using time or quantity of clinical care avoids the inequalities of the compensation

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schemes. This system defines the actual time spent delivering clinical care as the prime basis for incentives. Nevertheless, the majority of departments in the United States clearly do not use such productivity-based compensation. To have an effective clinical productivity incentive, pain clinics and critical care units need to be included in most anesthesia departments. While a specific productivity may be difficult to define in pain clinics and critical care units, a fundamental basic requirement is that the incentive should be based on the actual quantity of clinical care delivered. In other words, clinicians who take care of a larger number of patients should be defined as being more productive than those who take care of fewer patients. Therefore, it is entirely possible (and we do it in our department) to have productivity measures in every clinical activity that exists in anesthesia departments.

The Abouleish et al. study nicely describes the different forms of incentives in academic anesthesia departments. However, to state that a department has incentives is, in itself, not very informative. For example, incentives need to be defined as being based on availability or productivity. Furthermore, are the incentives voluntary? An example of an involuntary incentive would be the department's decision to provide extra compensation for extra call over and above that which was expected by the faculty member from his or her salary alone. An example of a voluntary incentive would be to have a certain amount of call that needs to be provided and for which faculty members can volunteer. The advantage of a voluntary incentive is that it allows faculty members to influence the total compensation they receive.

Productivity-based incentives are dependent on the total amount of clinical care derived. Such an incentive may be based on the amount of money that is generated by the faculty or the amount of clinical productivity based on time, with or without concurrency. Our experience at the University of California, San Francisco, is that the productivity measure (i.e., the amount of time giving anesthesia) is tremendously beneficial in many respects. First, it rewards those who actually give more anesthesia. Second, faculty members tend to want to spend their time actually administering anesthesia instead of, in some cases, trying to avoid it. Knowing that the faculty receive compensation for actually giving anesthesia individually places confidence in the hospital that the anesthesia department has a "hands-on" assessment of clinical efficiency. To be able to tell the hospital administrator that his or her surgical service is difficult to cover for anesthesia because of its inefficiency is powerful. Not only that, but to be able to tell surgeons that their inefficiency or unavailability costs the anesthesia department income is reversing the typical role of surgeons. Likewise, surgeons typically complain when they cannot do cases, and it therefore hurts their productivity and income.

Abouleish et al. state that a likely assumption on the part of hospital administrators is that incentive plans for anesthesiologists would increase the number of surgical cases. I am not sure of the basis for this conclusion. Most certainly, the hospital administrators with whom I have interacted do not have that expectation, since the surgeons are the ones who bring the cases to the hospital. On the other hand, my experience is that hospital administrators are extremely worried about the capability of anesthetizing the available cases in a timely manner. It is common for academic anesthesia departments to be unable to run all of the rooms necessary for surgery because of an inadequate number of faculty.

Abouleish et al. conclude that "academic departments implicitly assign value to nonclinical activities." There are some departments, including ours, to which that conclusion does not apply. Only clinical activities are directly financially rewarded by our productivity system. In fact, an interesting study would be to create financial productivity measures for clinical productivity only and not for education and research. Perhaps extra nonclinical time is the proper incentive for individuals who provide valuable research and education activities. One might argue that if there were no financial incentives for researchers versus clinicians, then research productivity would decrease. About 10 years ago, our department had significant clinical coverage problems because of which our productivity incentive program was established strictly for the clinicians. Since then, we have had a dramatic increase in the number of National Institutes of Health (NIH) grants and total NIH funding. The classic satement (i.e., why don't the researchers come out of their labs to help us out?) are no longer heard. The educational program can be incentivized by extra nonclinical time rather than by direct financial incentives.

There is an inherent tendency to want to maintain the status quo, which, according to Abouleish et al., is exhibited in many departments (i.e., those without productivity-driven plans). Furthermore, even if a new incentive plan is initiated, how should its efficacy be determined? Even if a new productivity plan is compared with the old availability or salary-based plan, other conditions may account for the difference rather than the system itself. This makes it virtually impossible to study in a manner that would warrant publication in a peer-reviewed journal. Faculty members who have a vested interest in the nonincentive-based compensation may demand that the chairperson "prove" the new plan's efficacy; this is difficult to do.

Our experience is overwhelmingly in favor of a clinical productivity incentive plan. It rewards clinical productivity and penalizes availability that is not clinically productive. It also sends a strong message to the administration and surgeons that clinical productivity

is the measure by which the anesthesia department is motivated and financed. This is very powerful when resources are needed. It also allows objective analysis based on data regarding individual productivity and adverse financial impact when the hospital decides to initiate or sustain clinical services that are not busy or efficient. Also, the need for anesthesia departments to provide nonproductive coverage puts appropriate pressure on the hospital for compensation.

Anesthesia departments have decreased personnel expenses when there is a productivity-based incentive plan. When we were entirely salary based, the department was expected to have enough faculty to cover all clinical situations. When the faculty had to work more than their expectations, they complained. When they did not have to work to their commitment, but were available, they were content. We now run our department about 90% of control. Frequently when I hire additional faculty to meet the 100% coverage, faculty will ask me not to do so because it would interfere with their additional income. Finally, although we cannot prove it with objective studies, there seems to be no doubt that having the power to change one's income, especially for junior faculty, is extremely helpful in retaining young clinical faculty.

One might argue that in writing this editorial encouraging the use of clinical productivity methods for compensation in an anesthesia department, I am taking advantage of my role as Editor-in-Chief; I am guilty as charged. My opinions are based on departmental experience, on being a Chair for 21 years, on conversations with other Chairs of excellent anesthesia programs, on analysis of departments in which the Chairs were involuntarily terminated, and on having been a consultant at many academic institutions, either by invitation of the Chair, the medical school, and/or a medical center seeking consultation regarding problems associated with their anesthesia departments. Most frequently, these problems are related to the inability to cover operating rooms. Incentives are increasingly used by companies and universities and even for departmental Chairs. The pressure for anesthetic departments to be incentive based will probably increase. Abouleish et al. have well demonstrated that although many anesthesia departments do use incentives, they rarely use clinical productivity as a measure of financial compensation. Productivity measures reward faculty independent of their rank and enhance individual power. Compensation, such as financial incentives, may help to retain junior faculty and may provide fertile ground for powerful relationships among anesthesiologists, surgeons, and hospital administrators.

References

1. Abouleish AE, Apfelbaum JL, Prough DS, et al. The prevalence and characteristics of incentive plans for clinical productivity among academic anesthesiology programs. Anesth Analg 2005; 100:493–501.
2. Feiner JR, Miller RD, Hickey RF. Productivity versus availability as a measure of faculty clinical responsibility. Anesth Analg 2001;93:313–8.

Appendix 2F

The Prevalence and Characteristics of Incentive Plans, International Anesthesia Research Society: 2005

The Prevalence and Characteristics of Incentive Plans for Clinical Productivity Among Academic Anesthesiology Programs

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Performance-based compensation is encouraged in medical schools to improve faculty productivity. Medical specialties other than anesthesiology have used financial incentives for clinical work. The goal of this study was to determine the prevalence and the types of clinical incentive plans among academic anesthesiology departments. We performed an electronic survey of the members of the Society of Academic Anesthesiology Chairs and the Association of Anesthesiology Program Directors in the spring of 2003. The survey included questions about departmental size, presence of a clinical incentive plan, characteristics of existing incentive plans, primary quantifiers of productivity, and factors used to modify productivity measurements. An incentive plan was considered to be present if the department measured clinical productivity and varied compensation according to the measurements. The plans were grouped by the primary measure used into the following categories: None, Charges, Time, Shift, Late/Call (only late rooms and call), and Other. Eighty-eight (64%) of 138 programs responded to the survey, and 5 were excluded for incomplete data. Of the responding programs, 29% had no system, 30% used a Late/Call system, 20% used a Shift system, 11% used a Charges system, 6% used a Time system, and 3% fit in the Other category. Larger groups (>40 faculty members) had a significantly more frequent prevalence of incentive plans compared with smaller groups (<20 faculty members). Incentives were paid monthly or quarterly in 85% of the groups. In 90% of groups, incentive payments accounted for <25% of total compensation. Adjustments for operating room schedule supervisors, personally performed cases, day surgery preoperative clinics, pain-management services, and critical care services were included in less than half of the programs that reported incentive plans. Call and late room compensation was based on varied formulas. Sixty-nine percent of academic anesthesiology departments did not vary compensation according to clinical activity during regular hours. Most did vary payments on the basis of call and/or late rooms worked. Larger departments were more likely to use clinical incentive plans.

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Performance-based compensation and mission-based management advocate variable compensation based on productivity measurements. In recent years, medical schools have begun using productivity measurements to determine variable faculty compensation for both clinical work and nonclinical activities (e.g., research, education, and administration) (1–4). In contrast to other specialties, in which individual physicians partially control numbers of patient visits or procedures, the productivity of individual anesthesiologists (or anesthesiology groups) is constrained by multiple factors, including surgical duration, operating room (OR) scheduling and utilization, and differences in concurrency (or staffing ratios) (5–9). In addition, academic anesthesiology groups must assign faculty members to cover a range of clinical areas that vary greatly in terms of the hours of clinical care that can be provided or the charges that can be generated per unit of time. Despite these

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obstacles, many anesthesiology departments have implemented, drafted, or are considering incentive plans. The purpose of this study was to determine the prevalence, types, characteristics, and components of incentive plans for clinical productivity among academic anesthesiology programs in 2003.

Methods

In April and May 2003, a survey was sent via e-mail to members of the Society of Academic Anesthesiology Chairs and the Association of Anesthesiology Program Directors (SAAC/AAPD). Follow-up e-mails were sent to respondents to clarify and complete the surveys.

The survey included sections on demographics of the department, types of incentive plans, and structure of plans. Requested demographic information included the numbers of faculty members, residents, certified registered nurse anesthetists, and hospitals where care was provided. For the number of residents, the number of resident positions available in the 2003 National Resident Match Program (Match) was noted for each group (including groups that did not respond) (10). An incentive plan for clinical productivity was considered to be present if 1) clinical productivity was measured and 2) compensation was varied on the basis of the measured productivity. If there was no incentive plan, the respondent was asked if the department was considering a plan and, if so, the reasons for consideration.

For the departments that reported an incentive plan, additional information was collected, including the number of years the plan had been in place and, for those plans in existence <5 yr, whether a previous plan had been replaced and, if so, why the plan had been replaced. Respondents were asked to estimate the percentage of total compensation that was productivity based and variable for a typical clinical faculty member as <5%, 5%–10%, 11%–25%, 26%–50%, or >50%. The intervals for paying clinical incentives and for evaluating the incentive plan were determined as monthly, quarterly, semiannually, or annually. If the department provided anesthesia services in more than one hospital, the respondent was asked if incentives were paid differently for different facilities and, if so, why. Respondents indicated if and what kind of quality measurements were used in the incentive plan. Finally, the existence of an incentive plan for nonclinical work was noted.

Clinical incentive plans were grouped according to the primary measure of productivity in the following categories: Charges, total charges or total ASA units billed; Time, time units or minutes billed; Shift, shifts worked or available; and Other, which includes revenue collected (Table 1). Each respondent was asked to complete only the section of the survey that characterized the primary measure of productivity used in his or her incentive system. Follow-up communications with respondents who initially reported no incentive plan identified a fifth category, subsequently termed Late/Call, as distinct from the Shift category. The Shift category included plans that measured all clinical activity during regular hours, evenings (late rooms), and nights and weekends (call). The Late/Call category included plans that did not quantify shifts worked during regular hours but measured late rooms or calls and paid faculty additional compensation for working at those times. Many departments that originally stated that they had no incentive plan revised their response to indicate that they used a Late/Call system.

For each category of incentive plan, specific data tailored to the primary measure were collected. For the Charges category, the respondent was asked to define the primary unit of measure; to note whether the plan modified the measurements on the basis of concurrency (i.e., staffing ratios), daily OR schedule management (i.e., OR schedule supervisor), mentoring new residents, or assignment to the preoperative day surgery clinic; and to note whether and how the plan measured clinical care provided in remote sites outside the OR, obstetrical suites, pain-management services, or intensive care units. Finally, the respondents were asked to note whether clinical activity in late rooms or on call was given extra credit beyond charges or billed ASA units. The survey allowed for separate treatment of specialty calls (e.g., transplantation, cardiac, pediatric, pain management, and critical care).

Similarly, respondents who reported that they used the Time category were asked to define the primary unit of measure used; to note whether the plan modified the measurement for concurrency (i.e., staffing ratios) or personally performed cases; to note whether and how the plan gave credit for non-time-billable services (specifically, OR schedule supervisor, the preoperative day surgery clinic, turnover time, and base units >6); and to note whether and how the plan incorporated clinical care provided outside the OR (billed with or without time), including remote sites, obstetrical suites, pain-management services, and intensive care units. Finally, the respondents were asked to note whether clinical activity in late rooms or on call was given extra credit beyond the time billed. The survey allowed for separate treatment of specialty calls.

Respondents who reported that they used the Shift category were asked to define the primary unit of measure used; to note whether the plan modified the measurements for personally performed cases; and to note whether and how the plan gave credit for OR schedule supervisor or mentor to new residents. The respondents were asked whether (and how) the assigned value of shifts worked differed by different

Table 1. Categories of Incentive Plans for Clinical Productivity in Academic Anesthesiology Departments

Category	Primary measurement of productivity
No Incentive Plan	Faculty receive a predetermined salary for clinical work
Charges	Plan measures charges billed or total ASA units billed. Includes plans that convert RVUs to ASA units or *vice versa*
Time	Plan measures time billed in either time units or minutes
Shift	Plan measures shifts worked, including regular hours, evenings (late rooms), and nights/weekends (calls). Includes plans that measure hours worked that include both billed time and nonbilled time
Late/Call	Plan measures and compensates only late rooms or call. Includes plans that pay faculty incentives only for extra call
Other	All other incentive plans. Includes plans that use revenue collected from the individual faculty's work to determine incentive payment

An incentive plan for clinical work was defined by measurement of clinical productivity and varying compensation on the basis of these measurements. The primary measurement of productivity was used to categorize the different plans.
ASA = American Society of Anesthesiologists, RVU = relative value unit.

types of surgical services (within the OR) or by location (specifically, day surgery preoperative clinic, remote locations, obstetrical suites, pain-management services, and critical care services). Finally, the respondents were asked to note whether clinical activity in late rooms or on call was given extra credit beyond the shifts worked. The survey permitted separate treatment of specialty calls.

For the Late/Call category, the specific questions related to types of shifts (e.g., late rooms, weekday call, or weekend calls) governing extra pay. For late room incentives, the survey queried how payments were calculated (e.g., hourly wage or guaranteed hours).

For the Others category, no specific questions were asked. Because detailed questions were designed with the primary measure used as a basis, it was not possible to design questions for this category.

Data were analyzed by overall department size, number of hospitals covered, and category of primary measurement. Comparisons were made with Microsoft Excel XP (Microsoft Corp., Redmond, WA) and χ^2 tests. A P value of <0.05 was considered significant.

Results

Of 138 members of SAAC/AAPD, 88 (64%) responded to the survey. Five subsequently were excluded because information was incomplete despite follow-up e-mails. Department sizes ranged from 9 to 129 clinical faculty members, with a mean ± SD of 39.9 ± 25.5 and a median of 33. The mean number of resident positions available for the Match was 10.8 ± 7.0, with a median of 10. The number of certified registered nurse anesthetists ranged from 0 to 205, with a mean of 18.4 ± 31.8 and a median of 10. More than half the departments (55%) provided care in more than one facility.

Table 2 summarizes the percentages of departments that had no incentive plan (29%), only Late/Call plans (30%), or complete plans (41%) and the breakdown of those plans according to group size and the primary measurements used in complete plans. Among departments with fewer than 20 faculty members, only 25% had complete plans. In contrast, among departments with ≥40 faculty members, 55% had complete plans. The number of residents was not apparently associated with the prevalence or type of incentive plans (Table 3). However, among departments with a ratio of total faculty to total residents <3.5 (the median ratio), 11 of 13 departments with complete plans used Shift systems; among departments with a ratio of total faculty to total residents >3.5, 6 of 17 departments with complete plans used Shift systems (Table 4). In either group, >50% of departments had either no incentive plan or Late/Call plans.

Table 2. Prevalence of Types of Clinical Incentives Overall and by Size of Department

			% by Number of faculty		
Category	n	% Total	1–20 (n = 20)	21–40 (n = 32)	>40 (n = 31)
None	24	29%	45%	22%	26%
Late/Call	25	30%	30%	41%	19%
Complete	34	41%	25%	37%	55%
Shift	17	20%	10%	22%	26%
Charges	9	11%	15%	3%	16%
Time	5	6%	0%	6%	10%
Other	3	3%	0%	6%	3%

Incentive plans for clinical productivity were categorized on the basis of primary productivity measurement. Complete incentive systems vary compensation according to work performed both during regular hours and in late rooms and on call. Complete systems are categorized as Shift, Charges, Time, and Other. Late/Call systems vary compensation only for work performed in late rooms and on call. For a description of the categories, see Table 1. Compared with the "1–20" faculty category, both the "21–40" and ">40" groups differed significantly in the percentage of "None."

Although two departments reported incentive plans that had been used for >20 yr (one based on Shifts worked and one on Charges), 64% of the departments had had incentive plans (including Late/Call plans) in place <5 yr, and 40% had been used for <3 yr. The distribution was similar for just those departments with complete plans (58% for <5 yr and 45% for <3 yr).

Table 3. Prevalence of Types of Clinical Incentives by Number of Resident Match Positions

Category	*n*	% Total	% by Number of resident Match positions			
			1–6 (*n* = 22)	7–12 (*n* = 31)	13–18 (*n* = 16)	>19 (*n* = 11)
None or Late/Call	49	59%	73%	55%	47%	54%
Shift	17	20%	13%	13%	47%	27%
Charges	9	11%	9%	16%	7%	0%
Time	5	6%	0%	10%	0%	18%
Other	3	3%	5%	6%	0%	0%

Seventy-three percent of departments with six or fewer resident Match positions did not have full incentive plans for clinical work. Four departments did not participate in the Match.
Resident Match = positions available in the 2003 National Resident Match Program.
For a description of the categories, see Table 1.

Table 4. Prevalence of Types of Clinical Incentives by Faculty/Resident Match Ratio

Category	*n*	% Total	% by Faculty/resident ratio	
			≤3.5 (*n* = 36)	>3.5 (*n* = 43)
None or Late/Call	49	59%	61%	56%
Shift	17	20%	31%	14%
Charges	9	11%	3%	16%
Time	5	6%	3%	9%
Other	3	3%	3%	5%

Resident Match = positions available in the 2003 National Resident Match Program.
A faculty resident Match ratio >3.5 (the median) suggests more faculty than residents (of all years). Four departments did not participate in the Match. For a description of the categories, see Table 1.

Incentive payments represented ≤25% of total compensation in 53 (90%) of groups with incentive plans (i.e., ≤10% of the total compensation in 44% of groups and 11%–25% in 46% of groups). Three of six groups that reported >25% of total compensation used an incentive based on Charges.

Fifty-three percent of departments paid incentive compensation monthly, whereas 32% paid quarterly. Incentive systems were reevaluated annually by 47% of departments and semiannually by 10%, and they were not evaluated on a regular schedule by 32%. Almost all (95%) departments that performed reevaluations used faculty satisfaction to rate incentive plans. In addition, 32% of groups evaluated their programs by using one or more of the following: individual productivity, group productivity, or university/faculty practice plan input.

Of 59 departments with an incentive plan, 46 (78%) provided care at more than 1 facility. Only 14 (23%) departments had different values for work performed in the different facilities. The most frequently cited reason for differently weighting clinical work was that payer mixes varied between facilities (e.g., one facility was an academic medical center, and the other was a community hospital or Veteran's Administration hospital). Additional reasons included different call requirements (e.g., when the other facility was an ambulatory surgical center), and one facility provided the incentive payments for that specific facility.

For the groups responding in the Late/Call category (*n* = 25), 76% paid for late room coverage. Almost all compensated on the basis of an hourly wage and not on charges. Some groups guaranteed a minimum wage for availability (e.g., 1 h). Most (56%) paid for call by using a variable-compensation plan. Smaller percentages paid only for weekend calls (20%) or extra calls (16%).

Fourteen (82%) of 17 groups using the Shift system defined the unit of measure as "clinical days worked" (i.e., if a faculty member worked 1 day in a clinical setting or was on call, that faculty member received credit for a clinical day worked) (6). Of the remaining three groups, two defined the shifts worked by the hours on duty (e.g., an in-hospital call of 16 h was worth twice an 8-h regular shift worked). Finally, one group varied the value depending on the shift worked (i.e., the group developed an individualized point system for which each shift was given a predetermined value). In addition to defining the value of shifts worked, 8 (47%) of the 17 groups provided credit for the OR schedule supervisor (Table 5). A smaller number accounted for personally performed cases (18%) or mentoring new residents (12%). Pain-management services were modified by using charges in only three groups (18%), and the others (72%) did not adjust the clinical day worked. Eight groups (47%) gave extra compensation for working late rooms. A smaller number gave extra credit for in-hospital call (24% for the main OR and 30% for labor and delivery) and out-of-hospital call (24% for specialty OR call, 18% for pain management, and 9% for critical care).

The next most common complete incentive plan was based on Charges (*n* = 9). Gross charges billed were used in six groups. One group modified the charges on the basis of medical direction modifiers used in billing. This group, which was the only group that accounted for differences in concurrent coverage,

Table 5. Details of Clinical Incentive Plans: Modifiers of Primary Measurement

Modifier	% Within category that included modifier		
	Shift worked (n = 17)	Charges (n = 9)	Time (n = 5)
OR schedule supervisor	47%	33%	20%
Personally performed care	18%	11%	40%
Day surgery preoperative clinic	NA[a]	22%	40%
Late rooms	47%	33%	40%
In-hospital call—OR	24%	22%	20%
In-hospital call—labor/delivery	29%	11%	20%
Out-of-hospital specialty OR call	29%	11%	0%[b]
Pain-management call	18%	22%	0%[b]
Critical care call	12%	11%	20[b]
Quality measurements[c]	24%	44%	0%

OR = operating room; NA = not applicable.

After identifying the primary measurement of productivity, respondents completed a section of questions based on the primary measurement. All the sections asked whether the plan provides "extra credit" above the primary measurement for specific activities. For example, in the Charges plan, did the plan provide credit in addition to charges billed for on-call care? Quality measurements were almost all peer evaluations.

[a] For the Shift category, there was no question for preoperative clinic.

[b] Four (80%) of the five groups noted that these calls were not included in their plan.

[c] Almost all quality measurements were based on peer reviews.

credited a faculty member 100% of the charges if the personally performed modifier was used (AA modifier) but discounted charges by 20% if the medical direction modifier was used. Two groups converted all charges to units. One used ASA units billed as its measure and converted all relative value units (RVUs) to ASA units. The other group used RVUs as the primary measurement and converted ASA units billed to RVUs. A smaller percentage (33%) in the Charges category than in the Shift category gave credit beyond billed charges ("extra credit") to the OR schedule supervisor. Seven groups (77%) did not give credit for work performed in the outpatient preoperative evaluation clinic. No group gave extra credit to faculty who worked in obstetrical suites. Similarly, concerning late rooms and call, most groups did not modify billed charges for this work. Three groups (33%) did pay for late rooms, but only two groups gave extra credit for any kind of call (in-hospital OR, in-hospital labor and delivery, out-of-hospital specialty OR call, pain management, or critical care).

Each of the five groups that used Time as the basis for incentive payments used billed time—either time units or actual billed minutes—as the primary unit of productivity. Three of the five groups developed a department-specific formula to convert into a time the value charges or the number of patients seen in pain-management and critical care services. One group gave extra credit beyond time billed to the OR schedule supervisor. Two groups accounted for concurrency differences. Only one group accounted for turnover time, as previously described (11). No group modified time billed in cases with high base units (e.g., seven or more base units). One group modified time billed for work performed in labor and delivery. Forty percent (two groups) gave additional credit for late rooms worked. Concerning call coverage, almost all the groups did not give extra credit, and most did not even include call in their system. For in-hospital OR or obstetric anesthesia call, only one group gave extra credit, and three groups did not include these modifiers in their systems. No group included out-of-hospital specialty OR (e.g., pediatric call), pain management, or critical care call in their systems. Concerning quality of care, 47 (80%) of 59 departments that had clinical incentive plans did not include quality measurements. Of the remainder, all used a form of peer evaluation as the quality measure.

Of the 49 departments with None or Late/Call (i.e., did not have a complete incentive plan), 13 (26%) stated that they were under pressure to implement an incentive plan. All specified that either the medical school (dean or faculty practice plan) or the hospital administration was the source of the pressure. Only one stated that the pressure was also from the department's faculty.

Finally, although specifics of nonclinical incentives were not asked, their existence was noted. Groups that had no incentive plan for clinical care also had no incentive plan for nonclinical work. Of the 59 groups with an incentive plan for clinical work, 27 had an incentive plan for nonclinical work. Groups with a complete plan (Shift, Charges, Time, or Other) had a significantly more frequent prevalence of nonclinical incentives than those with only a Late/Call system (53% versus 36%, respectively).

Discussion

As faculty members of medical schools, academic anesthesiologists may be under pressure to develop incentive plans, especially for clinical care, to be

consistent with the management and compensation plans of other departments. The results of this survey provide a snapshot of information about the status of clinical incentives, the types of measures used, and some of the components of plans among academic anesthesiology departments. Most academic anesthesiology departments have not developed comprehensive incentive plans for clinical care. Only 40% of responding academic departments have a complete incentive plan that includes clinical services during both regular hours and after-hours (late rooms and call). Another 30% of departments provide some additional compensation for clinical services during late rooms or on call. Thirty percent of departments offer no clinical incentive and pay their faculty members a predetermined salary independent of clinical activity.

Although the method of a survey limits the information collected and the conclusions that can be drawn, the results provide important background information for the development and refinement of incentive plans in academic anesthesiology departments. The response rate of 64% for this study was similar to that for a previous survey of SAAC/AAPD concerning financial and management issues (11) and was two to three times more than in national surveys used for benchmarking productivity and compensation (12). Using positions available in the Match as a demographic measurement, we compared responders and nonresponders. The mean ± SD numbers of positions for responders and nonresponders were 11.2 ± 6.0 and 8.2 ± 4.9, respectively (not significant). Although nonresponders included a larger proportion (36%) of smaller departments (fewer than seven positions) than responders, of which only 25% were smaller departments, we doubt that this difference was sufficient to bias our results.

As noted by some of the respondents in the comment section of the survey, clinical incentives have not been shown to increase clinical activity by anesthesiology departments. The prevailing impression is that clinical incentive plans for anesthesiologists can minimally influence overall OR productivity because the clinical productivity of an anesthesiology department is dependent on factors that anesthesiologists do not control, such as OR case scheduling, block allocation, surgical duration, transportation, turnover time, and determination of the number of ORs to staff (6,8,9,13,14). However, one department (of two of our authors) has successfully argued to hospital administration that, as part of the implementation of a clinical incentive plan for anesthesiologists, anesthesiologists should have more control over OR management issues because these issues directly influence overall OR and anesthesiologists' productivity.

As seen in our results, some departments without a clinical incentive plan are being encouraged by hospital or medical school administrators to consider implementing clinical incentive plans. One likely assumption on the part of institutional administrators is that an incentive plan for anesthesiologists will increase the number of surgical cases. It is not clear that incentive plans can generate this effect, although clinical incentive plans have been shown to better align compensation with clinical activity (15). As an example, if covering late rooms is compensated in addition to the base salary, then compensation will increase for faculty who work more late rooms.

Another likely reason for administrative pressure to implement clinical incentive plans is that many of the departments are receiving financial support from the hospital or medical school (11). We identified 51 departments that responded to the present survey and to the previous survey of SAAC/AAPD concerning financial and management issues (Tremper KK, Department of Anesthesiology, University of Michigan, personal communication, 2004). Forty-five (89%) of the 51 departments replied that they receive extradepartmental stipends for staffing costs. When comparing this subset of 51 departments with the entire group of respondents, similar percentages (55% of the 52 departments versus 59% of the entire 83-department cohort) had None or Late/Call, and the same percentage (29%) had no incentive plan for clinical work.

Incentive plans can also influence compensation as total clinical faculty numbers change. If faculty numbers decrease, either overall department productivity goes down (e.g., when ORs are closed), or the remaining faculty increase individual productivity to continue to produce the same overall output (16,17). Compared with a straight-salary system, a clinical incentive system allows compensation to vary. For example, if there are 365 in-hospital calls per year, under a clinical incentive system for call, the compensation per faculty member will increase when the number of faculty members sharing call responsibilities decreases. In a straight-salary system, the compensation would not change. The purpose of the incentive system is to align compensation with clinical activity and not to necessarily increase the overall work performed by a department (i.e., to perform more cases). This study suggests that larger departments perceive a greater need than smaller departments for variable compensation plans. A larger proportion of larger departments had complete or Late/Call incentive plans compared with smaller departments. A possible explanation is that larger groups may have greater difficulties with equitable work distribution because of specialization, multiple facilities, and more faculty members.

The fact that most academic groups do not measure the clinical productivity of individuals is consistent

with private-practice business models. In private-practice anesthesiology groups, the most common method of measuring clinical productivity is a subset of the shifts-worked category. Two thirds of private-practice groups responding to a survey in 2002 by the Anesthesia Administrator Assembly of the Medical Group Management Association (Scott SJ, Brevard Anesthesia Services, Melbourne, FL, and Blough GG, G. Blough Associates, Mobile, AL, personal communication, 2003) used "equal share" compensation plans in which the revenues of groups were split equally among partners regardless of any individual productivity measurement. The equal-share model assumes that all partners work an equal number of shifts and, hence, equally distributes revenue among the partners. Similar to straight-salary systems in academics, the equal-share model does not measure continuing productivity but assumes that the work will be equally distributed. However, in contrast to straight-salary plans, individual compensation will vary depending on a group's overall productivity (overall revenue) and the number of individuals in a group.

As in our survey, the Anesthesia Administrator Assembly survey showed that the larger private-practice groups (>40 providers) used productivity-based compensation more often than the smaller groups (<20 providers). This result is consistent with the assumption that larger groups have more difficulty distributing work equally.

Furthermore, we found the absolute number of residents (via Match positions) was not as important as the ratio of faculty to residents. The implication is that the larger ratio would represent a department that functioned in part as private practice. Although the percentage of departments that had complete clinical incentive plans (Shift, Charges, or Time) did not change, the type of incentive plan was different. In the larger-ratio departments, the prevalence of Charges and Time was significantly more frequent (Table 4).

The purpose of this study was to determine not only the prevalence of clinical incentive plans, but also some of the details. In almost 90% of the groups that offer incentive payments, those payments account for <25% of total compensation. This model contrasts with the equal-share compensation plans most often used in private-practice anesthesiology, in which 100% of compensation is variable and no base salary is used for partners.

These differences in compensation models are not surprising, considering that academic departments not only must provide clinical care, but also must meet educational, research, and administrative commitments. Hence, base salary is partly intended to pay for these types of activities that may not be as easily measured as clinical activities. In this study, only 33% of the groups had an incentive for nonclinical activities. Even with a nonclinical incentive plan, a base salary plus incentive is the predominant model.

Another perspective on the differences between private-practice groups and academic departments is that, although clinical activities represent most revenue-generating activities, academic departments have been hesitant to reflect this fact in incentive plans. Almost 90% of the groups had incentive payments accounting for <25% of total compensation. This suggests that academic departments implicitly assign value to nonclinical activities. In contrast, a clinical incentive plan that highly values daily OR work without assigning implicit or explicit value to nonclinical activities likely encourages faculty to forego nonclinical work in favor of clinical activities. This antiacademic incentive even applies to research grants from the National Institutes of Health, which has a maximum individual compensation level that is well below starting salaries in many academic anesthesiology departments.

Even inclusion of incentives for nonclinical activities may fail to offset the tendency to favor clinical activities. Unlike clinical work, which can be frequently quantified and converted into incentive payments, incentives for academic activities such as publications, presentations, grant applications, and grants received necessarily must encompass a much longer time frame than the monthly or quarterly incentives provided for clinical activities in this survey. Incentive plans may therefore make clinical activities more attractive to faculty, especially junior faculty with a large debt burden.

Our survey results revealed a spectrum of system complexity. The Late/Call systems are simple incentive systems that do not include regular work hours. Faculty can simply choose whether to accept assignment to late rooms or call. In contrast, the other categories also show a spectrum of simple to complex systems. In all categories, most groups did not modify their primary measure for additional factors (Table 5). The only exceptions were the extra value given to the work performed by the OR schedule supervisor and the work performed in late rooms. The day surgery preoperative clinic was included in a large percentage of the Charges and Time systems, apparently in recognition of the value of this nonbillable work.

Because no studies have been performed to determine the efficacy of incentive plans, it is not possible to decide whether a simple or complex plan is better or whether any plan exerts positive effects on revenue or efficiency. Because it is impossible to state from current information which, if any, primary productivity measurement is most effective (6,15), it is also impossible to recommend a specific way to calculate or evaluate a clinical incentive. The most important consideration for a department that is considering

instituting a clinical incentive plan or altering an existing plan is to determine what specific clinical activities require incentives. Any measurement of productivity values and devalues certain clinical services and activities (6). For instance, the Charges model values total billed charges and favors anesthesia care given to fast surgeons and specialty care (high base units) and devalues anesthesia provided in ORs that are poorly utilized, care provided for patients undergoing prolonged surgery, and unbilled services (e.g., day surgery preoperative clinic, OR schedule runner, and mentoring). The Time model values billed time and anesthesia care given to slower surgeons (less turnover time) and devalues specialty care, nonbilled time (turnovers, poor OR utilization, and day surgery preoperative clinic), and obstetric care (in states that use face-to-face time or set limits on time billed). Both the Charges and Time models can be confounded if concurrency or staffing ratios differ among faculty members. In addition, work performed on call may vary depending on utilization. The shifts-worked model values availability and devalues charges or time billed and specialty care. A Shift system is not confounded by differences in concurrency or OR utilization but does require the OR schedule supervisor to manage staffing and equality of work. In Time and Shift systems, specialty anesthesiologists may want credit for cases with high base units. The Late/Call system pays for work performed after hours (late rooms and call). The Late/Call system assumes that regular workday incentives do not influence group productivity and that the base salary provides compensation for that work. As with the Late/Call system, any of the other systems could pay extra beyond the primary measure for late rooms and calls. In contrast to None (straight salary), all four systems increase compensation for faculty when total faculty numbers are decreased, because the same amount of work is accomplished with fewer people.

In contrast to the OR work noted previously, pain-management services and critical care services are difficult to incorporate and equate with OR work. For instance, in the Charges system, if billed charges are used, then all OR care billed with ASA units can be compared. If one faculty member bills twice as much as another faculty member, one can safely assume that the first faculty member billed twice as many ASA units. Even when non-ASA units are included (e.g., line placement), the approximation still can be used. However, the charge structure for pain-management procedures (both evaluation and management and surgical procedures) may not be based on RVUs and may not be easily equated to ASA units. For instance, although one pain-management specialist may bill twice as much as another, one cannot assume that that the first specialist billed twice as many total RVUs or work RVUs, because charges are not well correlated with RVUs. If ASA units are used, then using RVUs becomes more appropriate. In this case, a department must develop a conversion factor to change RVUs to ASA units or *vice versa*, as was done by two of the surveyed groups (18). In the Time system, pain-management and critical care services are not billed by using time for all pain procedures and most critical services. If these services are to be incorporated, then the department must determine time spent on each procedure billed and credit the faculty member the time, as was done by two of the surveyed groups. This conversion can be based on a departmental review and arbitrary values or can be based on time used by the Centers for Medicare and Medicaid Services to estimate work RVUs (19). In the Shift system, pain-management and critical care services are incorporated by giving credit for the shift-worked value for any clinical work. A department may choose to equalize regular hour shifts independently of facility or specialization or can develop different values for each (as done by one department in the study). The value of individual shifts must be established by each department.

As with values for shifts worked, valuing out-of-hospital specialty call is a challenge facing all departments. The results of the study provide few details about how departments have resolved this issue. Some departments add additional credit to working this call (Table 3). However, some departments do not include this type of call in the incentive plan (especially Time) and may deal with it in another way.

For both academic and private-practice anesthesiology groups, the important factor in designing or evaluating an incentive plan is to determine the goals that the department considers essential to success, including nonclinical goals. Even when two departments choose the same primary measure, the details of each incentive system will differ. Some departments may decide that no financial incentive plan is necessary to succeed in meeting their mission.

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References

1. D'Alessandri RM, Albertsen P, Atkinson BF, et al. Measuring contributions to the clinical mission of medical schools and teaching hospitals. Acad Med 2000;75:1231–7.
2. Jones RF, Gold JS. The present and future of appointment, tenure, and compensation policies for medical school clinical faculty. Acad Med 2001;76:993–1004.

3. Tarquinio GT, Dittus RS, Byrne DW, et al. Effects of performance-based compensation and faculty track on the clinical activity, research portfolio, and teaching mission of a large academic department of medicine. Acad Med 2003;78:690–701.
4. Zun LS, Moss D. Bonus/incentive programs to increase physician productivity in academic emergency medicine. Am J Emerg Med 1996;14:334–6.
5. Abouleish AE, Prough DS, Whitten CW, et al. Comparing clinical productivity of anesthesiology groups. Anesthesiology 2002;97:608–15.
6. Abouleish AE, Zornow MH, Levy RS, et al. Measurement of individual clinical productivity in an academic anesthesiology department. Anesthesiology 2000;93:1509–16.
7. Abouleish AE, Prough DS, Zornow MH, et al. Designing meaningful industry metrics for clinical productivity for anesthesiology departments. Anesth Analg 2001;93:309–12.
8. Abouleish AE, Prough DS, Barker SJ, et al. Organizational factors affect comparisons of clinical productivity of academic anesthesiology departments. Anesth Analg 2003;96:802–12.
9. Abouleish AE, Prough DS, Whitten CW, Zornow MH. The effects of surgical case duration and type of surgery on hourly clinical productivity of anesthesiologists. Anesth Analg 2003;97:833–8.
10. Grogono A. NRMP anesthesiology match results for programs 2003 (ranked by state). Available at: http://www.grogono.com/nrmp/index.php. Accessed: April 15, 2004.
11. Tremper KK, Barker SJ, Gelman S, Reeves J. A demographic, service and financial survey of anesthesia training programs in the United States. Anesth Analg 2003;96:1432–46.
12. Medical Group Management Association. Academic practice compensation and production survey for faculty and management: 2002 report based on 2001 data. Englewood, CO: Medical Group Management Association, 2002:17.
13. Dexter F, Macario A. Decrease in case duration required to complete an additional case during regularly scheduled hours in an operating room suite: a computer simulation study. Anesth Analg 1999;88:72–6.
14. Dexter F, Macario A. Changing allocations of operating room time from a system based on historical utilization to one where the aim is to schedule as many surgical cases as possible. Anesth Analg 2002;94:1272–9.
15. Feiner JR, Miller RD, Hickey RF. Productivity versus availability as a measure of faculty clinical responsibility. Anesth Analg 2001;93:313–8.
16. Posner KL, Freund PR. Trends in quality of anesthesia care associated with changing staffing patterns, productivity, and concurrency of case supervision in a teaching hospital. Anesthesiology 1999;91:839–47.
17. Freund PR, Posner KL. Sustained increases in productivity with maintenance of quality in an academic practice. Anesth Analg 2003;96:1104–8.
18. Jablonski VN, Marshall WK. A methodology for calculation of anesthesia relative value units. ASA Newslett 2000;64:19–23.
19. Centers for Medicare and Medicaid Services. Physician time associated with work RVUs used in creating 2002 practice expense relative values. Available at: http://www.cms.hhs.gov/physicians/pfs/resource.asp. Accessed: December 18, 2003.

Appendix 2G

Motivation and Compensation in Academic Radiology, American College of Radiology: 2004

Motivation and Compensation in Academic Radiology

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As radiologists are increasingly faced with the challenges of rising demand for imaging services and staff shortages, the implementation of incentive plans in radiology is gaining importance. A key factor to be considered while developing an incentive plan is the strategic goal of the department. In academic radiology, management should decide whether it will reward research and teaching productivity in addition to clinical productivity. Various models have been suggested for incentive plans based on (1) clinical productivity, (2) multifactor productivity, (3) individual productivity, (4) section productivity, and (5) chair's discretion. Although fiscal rewards are most common, managers should consider other incentives, such as research time, resources for research, vacation time, and recognition awards, because academic radiologists may be motivated by factors other than financial gains.

Key Words: Motivation, incentive schemes in radiology, motivation and compensation

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INTRODUCTION

Motivation has been defined as a desire or need that incites a person to an action directed toward fulfilling it [1].

People are generally most creative when they are driven by interest in, enjoyment of, challenge from, and deep involvement in their work [2]. Thus, motivation is the key to performance improvement. To excel at their jobs, people must be motivated, either from within or by some external factors. However, external factors can serve as stimulators for only those who want to be motivated [3]. To achieve results, managers must create situations in which employees can be inspired from within to perform better and channel their capabilities toward attainable goals.

Today, the implementation of incentive plans in the workplace is increasingly seen in many businesses. These incentives take on various forms, such as bonuses, remuneration for performance, stock options, and so on. A survey of the pay practices of the *Fortune* 1000 reported that between 1987 and 1993, the proportion of companies using individual incentives for at least 20% of their workforces increased from 38% to 50% [4].

This trend is particularly evident in today's health care industry. Increasingly greater numbers of health care providers are implementing incentive plans to maintain their missions. The objective of the present paper is to give an overview of the significance and development of incentive plans in radiology.

IMPORTANCE IN HEALTH CARE AND RADIOLOGY

Over the past few years, the health care environment has continued to undergo a number of revolutionary changes. Health care providers today are faced with the challenges of an aging population, resulting in an increased utilization of services [5-7]. The field of radiology has not escaped these changes. With the advancement of technology, the demand for imaging services has increased over the past few years [6], and examination volumes are expected to rise by 200% over the next decade [8]. Because remuneration comes from clinical work in both private and academic practices [9], academic radiologists must spend more time interpreting images and other clinical practices to maintain their missions. Academic radiologists invest almost as much time in clinical services as private practitioners but receive lesser compensation. As a result, many radiologists are

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leaving academic careers to enter private practice [10]. One study [11] showed that nearly 68% of junior academic radiologists leave academia after an average of 3.28 years to join private practice. The main reasons cited for this were low pay and a lack of academic time. This shortage of radiologists in academic practice has resulted in an increased workload per clinician, further limiting teaching and research activities. In consideration of this phenomenon, it may be relevant to introduce incentive plans in academic radiology departments to recruit and retain faculty members. This will also ensure continued research and teaching activities in the departments.

THE ROLE OF MOTIVATION AND DRAWBACKS OF COMPENSATION PLANS

Motivation is considered to be one of the critical factors in the productivity of physicians. It is believed that the right compensation plan, along with appropriate interventions aimed at educating and empowering workers, can enable an organization to turn its less skilled team members into high performers [12]. Rewarding individual performance is the norm in businesses [13]. One of the arguments for implementing performance-based compensation plans in radiology revolves around the idea of fairness; that is, those who work more should receive more reimbursement [10]. Another belief is that increased remuneration will enhance performance, and individual incentives can help improve performance [4,10,13].

On the other hand, some people believe that when it comes to motivation, too much attention is focused on external rewards, and a physician is less likely to perform better because of threats of pay cuts alone [14]. One study showed that the main factors responsible for motivating physicians in the workplace are the achievement of work well done, personal satisfaction, continuing education, equitable compensation, and respect and appreciation [15,16]. Radiologists who join academic departments seek more than just monetary compensation. For example, some radiologists enjoy the challenges of the cutting-edge and innovative research work that the academic field enables one to conduct, whereas others look forward to teaching. In addition, some radiologists also value the recognition received because of their scientific investigations. Thus, in an academic radiology department, higher pay cannot substitute for a good working environment that promotes teaching and research activities.

Given the size and diversity of academic radiology departments, the implementation of incentive plans becomes difficult. There are differing opinions on whether or not the productivity of a radiologist should be tied to his or her remuneration. Furthermore, incentive plans that reward individual performances may actually undermine teamwork and encourage a short-term focus in radiology [4].

DEVELOPMENT OF AN INCENTIVE PLAN

One of the main factors to be considered while developing an incentive plan for academic radiology is the strategic goals of a department. An incentive plan conveys to employees the behaviors that an organization considers important enough to reward. This in turn reflects on the organization's work culture and ethic, which may serve to motivate or demoralize its employees. Thus, management has to decide on the goals that it seeks to achieve by implementing an incentive plan. It also needs to take into account the cost-effectiveness of implementing such a plan.

Once the goals have been determined, a decision has to be made regarding the various aspects of performance that will be rewarded. It is crucial to involve employees in these decisions. The mission of an academic health center includes research, teaching, and clinical practice [17]. Thus, in academic radiology, management should decide whether it will reward only clinical productivity or include research and teaching productivity. Furthermore, it is essential to define objective methods to measure productivity. These measures must be defined prior to implementing the overall compensation plan. Clinical productivity is generally measured in terms of number of exams or relative value units (nonmonetary units of measure used to express the time, complexity, and cost of performing a given service relative to other procedures) [18-20]. Research productivity may be evaluated in terms of the number of peer-reviewed scientific publications. However, teaching productivity is a lot more difficult to measure. There is no objective measurement method that encompasses all of the components of teaching. Thus, before implementing any compensation plan, academic medical centers will need to define methods for evaluating teaching productivity, subjectively and objectively.

After the aspects of performance that should be rewarded are decided, managers then need to consider the nature and amount of remuneration. Fiscal rewards alone may not have a positive impact on the performance of academic radiologists. In academic settings, it may be worth considering other incentives, such as research time, resources for research, vacation time, and recognition awards.

It is important to remember that incentive plans should focus on developing a strong work culture and promoting teamwork. In addition to endorsing the overall mission, they must take into account employees' needs and aspirations. An incentive plan that ignores the expectations and personal goals of employees will face a lot of opposition without achieving its objective. Fur-

Table 1. Advantages and disadvantages of various incentive plans

Model	Advantages	Disadvantages
Clinical productivity–based system	Clarity of objective: motivate people to increase study volume Simplicity of execution Transparent (number of studies, relative value units, etc.)	Drives performance by fear (undermines values) Disruptive rivalry-based competition Ignores other aspects of practice (teaching, research, etc., if applicable) Questionable fairness; ethical concerns May distort practice patterns (reduction in number of simpler, low–relative value unit examinations)
Multifactor productivity–based system	Promotes traditional values Potential for overall benefit (reputation, fiscal gain, etc.) Reward different talent	Difficult to measure subjective data Conflicts of interests difficult to reconcile (1 hour of teaching, or 1 hour of reading examinations?)
"Tailored" individual system	Tailored to individual aspirations and expectations Promotes individual excellence Directly rewards work that individuals find satisfying	Difficult and complex to implement (especially for larger organizations) Undermines teamwork Tends to be short term focused Reconciliation between specialties and subspecialties difficult
Section-based system	Promotes collective responsibility Enhances organizational performance Can incorporate checks to balance high-margin and low-margin divisions	May increase "rich" vs. "poor" discrepancies Dilutes role of individual excellence Cannot weed out nonperformers
Chief's discretion	Driven by top management Highly flexible, adjustable to changing circumstances Can be directly linked to strategic objectives	Opaque decision making Infinite scope for misuse (relation, connection, political skill) Subjective

thermore, rewards should not be based on factors that are outside the control of employees, because this can demoralize rather than motivate them to improve performance.

KEY MOTIVATORS AND DETERMINANTS OF SUCCESS

Although there are many theories and models to explain motivation [21-23], none is universally accepted. To implement incentive plans in their organizations, managers need to evaluate what motivates their employees in light of these theories. It is known that a key motivator in radiology is the ability to do work that is meaningful and enjoyable [24,25]. Above any monetary gains, academic radiologists value the intellectual challenges and the appreciation by students, peers, and leaders. The abilities to do a good job, to fulfill personal ambitions, and to develop a sense of ownership are more meaningful than sole financial incentives.

Experience in academic radiology has helped identify some of the key factors associated with the success of incentive plans. First, a plan must be aligned with an organization's goals and problems. The rewards must be weighted according to priorities, goals, and values. Second, employees must value the rewards; that is, an incentive plan must allow them to satisfy their personal ambitions. Third, there should be clarity and transparency of expectations by developing a well-defined methodology to determine the performance and hence the reward. In addition, the goals of a compensation plan should be perceived as meaningful and attainable. Finally, it is im-

portant to provide feedback to employees regarding their performance and recommend strategies for improvement.

MODELS FOR INCENTIVE PLANNING

A good compensation scheme should incorporate components of clinical, research, and teaching productivity. Given the diversity of academic radiology departments, a number of models have been suggested as the basis for incentive plans [10,15]. These models are based on different measurement criteria within the hierarchy of an organization and the decision-making system. The bases of these models include (1) clinical productivity, (2) general (multifactor) productivity, (3) the productivity of individuals, (4) the productivity of the section or division, and (5) the chair's discretion. The advantages and disadvantages of each model are summarized in Table 1.

Radiology administrators must remember that the above list of models is not exhaustive. They would need to tailor their own models according to the specific needs and goals of their departments. Furthermore, the particular model adopted must be continuously improved upon after implementation in accordance with the needs of an organization and its employees.

CONCLUSIONS

Given the changes of the health care system, many radiology departments are implementing incentive plans to achieve departmental goals while maintaining operating margins. These incentive plans are aimed to motivate employees to perform better. However, there is no conclusive evidence showing that departments with such plans outperform those without them. Furthermore, there are different opinions regarding the necessity and effectiveness of compensation plans in radiology. However, for administrators who do choose to implement such schemes in their departments, this article provides an overview of the tools for developing them. In devising a compensation plan, administrators must acknowledge that academic radiologists may be motivated by factors other than financial gains. The unique nature of academic medical centers necessitates incorporating research and teaching components in any incentive plan. Finally, to achieve departmental goals while maintaining the academic mission, such an incentive system needs to be regularly monitored and improved.

REFERENCES

1. Glaser R, Glaser C. Managing by design. Reading (MA): Addison-Wesley; 1981.
2. Amabile T. Motivation for creativity in organizations. Harvard Business Rev 1996;January;1-14.
3. Nicholson N. How to motivate your problem people. Harvard Business Rev 2003;January;57-65.
4. Pfeffer J. Six dangerous myths about pay. Harvard Business Rev 1998; May-June:109-119.
5. Dummett H. Rising healthcare costs in the US: where will it end? Available at: http://www.worldmarketsanalysis.com.
6. Hillman BJ, Neiman HL. Radiology 2012: radiology and radiologists a decade hence—a strategic analysis for radiology from the second annual American College of Radiology forum. Radiology 2003;227:9-14.
7. Gunderman RB. Pitfalls in radiology leadership. Acad Radiol 2002;9(5): 557-60.
8. Sachs MA. Diagnostic Imaging. January 2002. SG-2, LLC. 17-24.
9. Neiman HL. Practical business aspects of radiology. Am J Roentgenol 2000;174:1523-8.
10. Willing SJ, Phillips CD. Should pay in radiology be tied to productivity?—the case in favor. Acad Radiol 2004;11(1):69-75.
11. Taljanovic MS, Hunter TB, Krupinski EA, Alcala JN, Fitzpatrick KA, Ovitt TW. Academic radiology: the reasons to stay or leave. Acad Radiol 2003;10(12):1461-8.
12. Katz N. Getting the most out of your team. Harvard Business Rev 2001; September:22.
13. Zehnder E. A simpler way to pay. Harvard Business Rev 2001;April:53-61.
14. Gunderman RB. Take me to your (future) leader. Acad Radiol 2001;8(8): 762-7.
15. Cohen MD, Gunderman RB, Alexander SG. Should pay in radiology be tied to productivity?—the case against. Acad Radiol 2002;9:964-70.
16. Jameson C. Helping people change: the magic of motivation. J Okla Dent Assoc 2003;94(2):16-29.
17. Friedenberg RM. Academic medicine: boom to bust. Radiology 2001; 220:296-8.
18. Eschelman DJ, Sullivan KL, Parker L, Levin DC. The relationship of clinical and academic productivity in a university hospital radiology department. Am J Roentgenol 2000;174:27-31.
19. Sunshine JH, Burkhardt JH. Radiology group's workload in relative value units and factors affecting it. Radiology 2000;214:815-2.
20. Conoley PM. Productivity of radiologists in 1997—estimates based on analysis of resource based relative value units. Am J Roentgenol 2000;175: 591-5.
21. Accel-Team. Employee motivation, the organization and productivity, 2003. Available at: http://www.accel-team.com.
22. Gunderman RB. Understanding and enhancing work performance. Radiology 2003;227:623-6.
23. Collins J. Motivation of radiology residents: an interaction between personal and environmental factors. Acad Radiol 2002;9:451-4.
24. Gunderman RB, Willing SJ. Motivation in radiology: implications for leadership. Radiology 2002;225:1-5.
25. Rantz MJ, Scott J, Porter R. Employee motivation: new perspectives of the age-old challenge of work motivation. Nurs Forum 1996;31(3):29-36.

Appendix 2H

An Incentive Compensation System That Rewards Individual and Corporate Productivity, Family Medicine, 2004

Practice Management

An Incentive Compensation System That Rewards Individual and Corporate Productivity

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Introduction: *An economically mature health care market has led to increased cost competition. Subsequently, a perceived need for productivity-based physician compensation has developed. While some institutions have rewarded individual productivity based on specific facets of academic responsibility, such as teaching, research, and patient care, we chose to develop an incentive compensation system that rewards both individual and group productivity.* Program Development: *We developed a physician incentive compensation system that rewards individual and group productivity by capturing multiple aspects of work activity. Faculty members are given compensation value points for clinical productivity, scholarship activities, teaching activities, service activities, and achievement of the department's goals. The system was implemented in a graduated fashion in the Department of Family Medicine at Indiana University beginning July 1, 2000.* Program Evaluation: *In April 2003, all faculty physicians (n=18) participated in a survey about the compensation system. The majority of faculty view the system as a necessity for the department (72.2%); 35.2% were satisfied with the system overall; 35.3% were neutral; and 27.4% were dissatisfied or not sure of their overall satisfaction.* Conclusions: *A comprehensive physician incentive compensation system incorporating department goals can be designed and implemented in an academic setting.*

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As health care and medical education markets change, medical schools across the country are experiencing a decrease in external funding and increased competition from other health care systems. As a result, many schools have developed systems for quantification of faculty productivity.[1]

At Indiana University, clinical revenue is part of the faculty members' total compensation package. The clinical revenue of the department is directed to a practice plan corporation, which then pays clinical faculty members their practice plan compensation.

The National Physician Fee Schedule relative value units (RVUs) for valuation of clinical care[2] has become a common way to estimate clinical productivity. It does not, however, capture any of the other important activities of academic family medicine faculty. Several authors[3-14] have described systems to quantify faculty activities in the categories of research, administration, patient care, and teaching. However, none of these systems link compensation to whether or not the departmental goals are actually attained, which is something that business literature finds to be important.[15]

In 1999, because of increasing financial constraints, departmental leadership decided that a redistribution of compensation was necessary to make compensation more reflective of faculty productivity. The faculty agreed, believing that aligning individual efforts to achieve departmental success was important and would require strong faculty teamwork. Faculty further believed that a system that inadequately rewarded teamwork would jeopardize organizational success.

Program Development

A committee of departmental faculty members was established in November 1999 from a group of volunteers and appointees. This committee of faculty members from multiple faculty divisions met weekly for more than 1 year to develop the system.

Concepts

The committee believed that a compensation system should be equitable and easy to administer. For the system to serve as a true incentive, a significant portion of

From the Department of Family Medicine, Indiana University.

income must be "at risk." The committee defined "at-risk compensation" as compensation that is completely dependent on the measures of the incentive compensation system. The university would not allow the university salary of the faculty members to be at risk. Further, no university money for teaching, service, or research can be transferred to the practice plan. Instead, practice plan compensation is funded entirely by the clinical revenues of the department. Thus, to have adequate amounts of individual compensation at risk, the committee decided that the entire practice plan compensation would be earned under the new incentive compensation system. The committee realized, however, that the clinical revenues would be funding incentive compensation paid out for other academic activities such as teaching and scholarship. As a result, the committee decided that the total compensation paid out under the new system should be capped at the total amount of practice plan compensation paid the year before, so as not to jeopardize the financial stability of the practice plan. After the committee developed the system goals, the clinical faculty members voted to adopt those goals, as shown in Table 1.

Calculations

Each full-time faculty member has 440 half days of activity time annually. This is calculated as 52 weeks per year, minus 4 weeks for vacations and holidays and 2 weeks for professional development and continuing medical education.

Table 1

Goals for the Indiana University Department of Family Medicine Incentive Compensation System

Goals	*Measure of Evaluation*
(1) Maintain fiscal responsibility to the physician practice plan corporation and the department	Due to financial constraints, the total faculty compensation expense could not be more than the year before system implementation—unable to be measured other than having a zero variance from budget
(2) Capture the value of multiple facets of academic medicine	Faculty survey of perceived agreement with the weighted values for activity type
(3) Allow individual academic freedom	Faculty survey of perceived academic freedom
(4) Provide a productivity incentive for the faculty	Faculty survey of perceived motivation to pick higher weighted activities
(5) Allow for ease in reporting	Survey of faculty who complete the reports themselves

Of the 440 half days each year, 220 are to be spent in revenue-generating activities. Revenue-generating activities include providing direct patient care, precepting patient care delivered by residents, and providing on-call coverage. The other 220 half days are spent in activities that do not generate revenue for the corporation (called non-revenue-generating activities). Faculty members are expected to participate at a minimum level in each non-revenue-generating activity category—including teaching, scholarship, and leadership. The allocation of the 220 non-revenue-generating activities half days is shown in Table 2. "Variable time" is time faculty members can choose to allocate at their own initiative.

The concept behind the time allocation is that each faculty member is given time to perform minimum expectations in each area. The faculty members are then given compensation for how productive they are during that time. To capture this productivity, we followed the relative value scale model set forth by Bardes,[3] in which RVUs = hours x weight. The hours credit and weight for each activity were developed by the committee. The resulting RVUs per activity are presented in Table 3.

The compensation system defines teaching activities as all time spent with learners. Incentive compensation is paid-for activities such as mentoring medical students or delivering didactic lectures to residents. The compensation system rewards faculty members for the generation of scholarly work such as presentations, papers, grants, or book chapters.

The leadership category includes activities such as being the medical director of a clinic or director of a department division. Each leadership role was examined by the committee and given a relative value weight

Table 2

Time Allocation Under the Indiana University Department of Family Medicine Incentive Compensation System*

Revenue-generating activities		220
Non-revenue-generating activities		
Scholarship	22	
Meetings	44	
Administrative	44	
Teaching	22	
"Variable time"	88	
Subtotal non-revenue-generating activity time:		220
	Total time:	440

* by half day of faculty time

and a standard number of hours time commitment. Administrative time allows time for patient care-related administrative activities (such as paperwork), but incentive compensation is not rewarded for these activities beyond the compensation given for patient care.

Categories

The measurement and reward for these individual activities and the corporate activities are captured by a five-category compensation system, named Categories A through E.

Category A captures the productivity of both revenue-generating and non-revenue-generating activities, as determined by the RVU points in Table 3. The dollar amount of compensation per RVU point for this category is set each year by the department chair. The initial dollar amount is based on an expected average RVU points for the faculty members. Table 4 shows a sample calculation of what a faculty physician's annual RVU point calculation for Category A might look like.

Category B is the clinical RVU productivity. This information is taken from the IDX front office management software system.[2] Due to the immaturity of data in our system (IDX was newly implemented) and the need to assess the reliability of the data, each faculty member was given a set dollar amount in Category B for the first 2 years. During the first 2 years, the clinical RVU productivity for faculty members was tracked but not linked to compensation. For the 2003–2004 academic year, the clinical RVU productivity is linked to compensation.

Category C is delivery room work. Since some faculty members of the Department of Family Medicine perform deliveries while other faculty members do not, Category C captures the economic value of that activity. Faculty members who perform deliveries are given a stipend under Category C to compensate them for providing this service. In addition to the stipend, each delivery that the fac-

Table 3

Indiana University Department of Family Medicine Relative Value Scale for Physician Compensation for 2001–2002

For any single activity:
RVU points=relative value x hours credit
As per previous incentive compensation systems[4] using the relative value x hours credit formula, hours credit are assigned by activity. Only activities titled "hour-for-hour reporting" are valuated based on actual hours spent.

Activity	*Relative Value*	*Hours Credit*
Revenue-generating activity		
Clinical		
Direct patient care (DPC)	3	4
Travel clinic	3	4
Sports medicine clinic	3	4
Teaching		
Office precepting	2	4
Specialty clinics (ie, coumadin)	2	4
Inpatient precepting	4	4
Procedure precepting	2	4
Nursing home precepting	3	4
One-on-one teaching (during DPC)	1	4
On call		
Weekend rounding inpatient	4	8
Night call (no additional "comp time" is given)	0.5	12
OB call (covered in stipend)	0	0
Non-revenue-generating activity		
Teaching		
Small-group lecture		
New	0.75	10
Repeat	0.75	4
Large-group lecture		
New	1	10
Repeat	1	4
ICM I or II	3	4
Resident advising	2	1
Medical student advising	2	1
One-on-one teaching (nonclinical setting)	2	1
Scholarship/research		
Grants**		
Grant new, funded, national		
First author	2 x grant formula	200
Other author	Grant formula	100
Grant new, funded, state/local		
First author	2 x grant formula	100
Other author	Grant formula	50
Grant, renewed		
First author	2 x grant formula	20
Other author	Grant formula	10
Grant written/submitted, nonfunded		
First author	0.4	100
Other author	0.4	50

Grant formula
(Grant $ amount x 0.0001)/(# authors +1)/(# authors)
Where the first author gets twice the value of the other authors

(continued on next page)

Table 3

(continued)

Activity	*Relative Value*	*Hours Credit*
Publications		
Manuscript, peer reviewed, prestigious		
First author	1	100
Other author	1	50
Manuscript, peer reviewed		
First author	0.6	100
Other author	0.6	50
Manuscript, non-peer reviewed		
First author	0.2	50
Other author	0.2	25
Presentations (outside Indiana University Department of FM)		
National/state, new	2.5	10
National/state, repeat	1.5	10
Local	1	10
Media	—	—
Other		
Editorial Review Board (book/journal)	0.4	20
Board/committee, chair		
National	0.4	100
State/local	0.4	50
Board/committee, member		
National	0.4	50
State/local	0.2	25
Leadership		
Indiana University School of Medicine		
Admissions Committee	2	4
Curriculum Committee	2	1
Other school committee	2	1
Department		
Department chair	4	4
Vice chair	4	4
Committee		
Chair	2	1
Member	1	1
Faculty meeting	1	1
Division		
Director	4	4
Associate/clinic director	4	4
Hour-for-hour reporting:		
Curriculum development/administration	1	1
Committee		
Chair	2	1
Member	1	1
Recruitment interviews	2	1
Hospital		
Section		
Chief	2	1
Meeting	1	1
Indiana University Medical Group Board of Directors	2	1
Hospital Committee	1	1

**Funded research time and other salary savings time is paid at a rate of: (relative value 3 x hours credit 4) per half day

RVU—relative value unit
ICM—Introduction to Clinical Medicine

ulty member supervises or performs results in additional compensation. Faculty members who do not provide obstetrical care do not receive compensation under Category C.

Category D is the category used at the chair's discretion. This category has the potential to be either a positive or a negative dollar amount. A negative dollar amount could be assessed in this category if a faculty member did not fulfill minimum responsibilities. Each faculty member holds an annual meeting with departmental leadership to determine these requirements.

Category D is funded by two mechanisms. The first mechanism is via a percentage of the compensation plan budget that is set aside annually as the chair's fund. This fund can be distributed at the discretion of the chair. The second mechanism is through any amount remaining from faculty members who have total productivity less than the expected average faculty productivity.

The final category is Category E, the corporate category. This is the category that captures the value of the department's goals and provides incentive for group activity. If the physicians' practice plan corporation meets the departmental goals for the year, then every faculty member receives the same predetermined amount of compensation in Category E. The amount of this category is set by the chair at the beginning of each academic year. The corporate goals are set and voted on by the corporation on an annual basis. Examples of corporate goals set by the practice plan corporation in past years include implementing patient satisfaction surveys at all clinical practice locations and the development of individual strategic scholarship plans for each departmental faculty member.

To provide ease of reporting, we use Microsoft Excel spreadsheets to capture revenue-generating

Table 4

Example of a Category A Calculation

Revenue-generating activities (RGA)**	Year to Date # of Half Days Completed TIME ELEMENT*	Year to Date # of Activities Completed (Not in Half Days) PRODUCTIVITY ELEMENT*	Relative Value	Hours Credit	Total RVU Points
Outpatient clinic	132		3	4	1,584
Nursing home	12		3	4	144
Inpatient care	80		4	4	1,280
Precepting residents	60		2	4	480
Flexible sigmoidoscopy clinic	12		2	4	96
Nasolarygoscopy clinic	12		2	4	96
One-on-one teaching during direct patient care	40	1	4	160	
Weekend/holiday rounding		7	4	8	224
Night call		13	0.5	12	78
RGA SUBTOTAL:		308			4,142
Scholarship*	44		0		0
New national presentations		2	2.5	10	50
Repeat state presentation		2	1.5	10	30
Editorial Review Board		1	0.4	20	8
Second author peer-reviewed manuscript		1	0.6	50	30
SCHOLARSHIP SUBTOTAL:	44				118
Teaching*	44		0		0
New large-group lecture		3	1	10	30
Repeat large-group lecture		6	1	4	24
Resident advising		6	2	1	12
Medical student advising		2	2	1	4
TEACHING SUBTOTAL:	44				70
Meetings*	44		0		0
Curriculum development		40	1	1	40
Hospital section meeting		6	1	1	6
Chair, Department Committee		6	2	1	12
School Committee		12	2	1	24
Department faculty meeting		12	1	1	12
Department committee member		12	1	1	12
MEETINGS SUBTOTAL:					106
Administration	0		0		0
TOTAL	440				4,436

RVU—relative value unit

* When calculating how a faculty member spends the 440 working half days each year, time is allowed for scholarship, teaching, and meetings. Time is set aside in each of these areas for faculty members to complete "productive" activities. However, the time element for each of these three areas is not attributed any relative value. Faculty members eam value in these categories based solely on the activities they perform during the allocated time ("productivity element").

** In this example, the faculty member is using all of his/her variable time in "revenue-generating activities."

activity automatically by linking them to scheduling spreadsheets. Individual faculty members review and validate this report on a monthly basis. They complete an electronic report of their academic time and other nonclinical activities and send that electronic report to the compensation system administrator.

Compensation

On a quarterly basis, each faculty member receives an individual compensation calculation, as shown in Table 5. This report summarizes the total year-to-date compensation package for the individual and calculates an expected annual compensation value extrapolated from the year-to-date data. The quarterly distribution of this report allows faculty members the opportunity to readjust their activity level. The distribution also prevents faculty members from being surprised about their individual overproductivity or underproductivity at the end of the year.

Table 5

Example of a Quarterly Individual Compensation Summary

Faculty Name: xxxxxxxxxxxxx

Current closing date: June 30

Line A	RVU activities				
		RVUs to date	0		
		$/RVU	$x.xx	Annualized Line A	
		Line A compensation to date		compensation:	$0.00
Line B	Clinical productivity				
		Clinical RVUs to date	0.00		
		$/RVU	$0.00	Annualized Line B	
		Line B compensation to date	$0.00	compensation:	$0.00
Line C	Maternity care				
				Yearly maternity care	
		Maternity care stipend to date:	$0.00	stipend:	$0.00
		Deliveries to date	0.00		
		$/delivery	$xxx.xx		
				Delivery compensation	
		Delivery compensation to date	$0.00	to date:	$0.00
Line D	Director discretion				$0.00
Line E	Corporate				
				Corporate only paid	
				if goals met	$0.00
		$xxxx.xx to be paid as 12th check if corporate goals met			
Projected annualized compensation					$0.00
		Current compensation due	$0.00		

Compensation paid to date				
	Usual monthly compensation:			
	Number of months paid to date:	0		
	Monthly compensation paid to date:	$0.00		
	Delivery compensation paid to date:	$0.00		
	Total compensation paid to date:	$0.00		
			Projected annualized	
Reconciliation projections:	Current compensation due:	$0.00	compensation:	$0.00
			Monthly compensation paid	
	Total compensation paid to date:	$0.00	through 11th check	$0.00
			12th check may be $xxxx,	
	Net current reconciliation	$0.00	may be zero	$0.00
			13th check July 31—	
			reconciliation check	$0.00

RVU—relative value unit

Throughout the year, one twelfth of the average expected compensation in categories A and B is distributed monthly for the first 11 months. The Category C stipend is paid out at a rate of one twelfth per month for the first 11 months. Obstetrical delivery compensation is paid out monthly as deliveries occur.

By June 30 each year, the chair determines whether or not the corporate goals were met. If the corporate goals were met, then Category E is paid out during the month of July. A final calculation is performed, by the system administrator, based on June activity submissions. The amount paid out during the previous 11 months is subtracted from the annual compensation due, and the residual is distributed in the month of July.

During development of the compensation system, frequent reports were made to the physician practice plan corporation. At significant stages in development, such as assigning values to activities, the system was taken to the corporation for a vote of support before work continued. On completion of the framework development, the system was approved by a vote of the corporation.

Program Evaluation

Two years after the new incentive compensation was implemented, a faculty survey was performed, and the committee evaluated the system's ability to meet its stated goals. All 18 physician faculty members completed the anonymous satisfaction survey. The survey included questions seeking the faculty's opinion of the value and effect of the RVU system on both the department and the individual. Most responses were based on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree" and included a "not sure" option. The survey was submitted to an external (nondepartmental) statistical analyst who compiled the data and distributed aggregate results to the committee.

Overall Satisfaction

The majority of physician faculty members (72.2%) reported that they view the incentive compensation system as a necessity for the department, as reported in Table 6. One third (35.3%) of the 17 faculty responding to the question reported that they were satisfied overall with the incentive compensation system that we are using. Another one third (35.3%) reported that they were neutral, and 29.4% reported that they were dissatisfied with the incentive compensation system. Seven of the 18 respondents (38.9%) answered "yes" to the question about the incentive compensation system being a personal nuisance. Six of those seven also viewed incentive compensation, in general, as not helpful in the health care industry.

Meeting Goals

The first goal of the compensation incentive system was to maintain fiscal responsibility to the physician practice plan corporation and the department. At the initiation of the new compensation system, the corporation asked that the total practice plan compensation for all physicians not exceed the total amount distributed the year before. The total practice plan compensation for all physicians has remained within budget since its implementation. The new compensation system has redistributed that compensation in an objective manner as guided by the new system (Figure 1).

The second goal was to capture the value of multiple facets of academic medicine. The relative weighting of activity value allows the opportunity for faculty members to excel in multiple areas. Sixteen of the faculty who responded (88.9%) agreed with the committee's assignments of weighted values for clinical activities, 29.4% agreed with the scholarship weightings, 35.3% agreed with the weightings for teaching activities, and 35.3% agreed with the leadership weightings (Table 6).

The third goal was to allow academic freedom. The system allows faculty members the flexibility to choose what activities they wish to pursue within the framework of the system. Table 6 illustrates that nine respon-

Table 6

Physician Compensation System Evaluation Responses (n=18)

	#	%
Compensation system is a necessity for the department.		
Yes	13	72.2
No	5	27.8
How satisfied are you with the RVU system that we are using?*		
Strongly satisfied	3	17.6
Satisfied	3	17.6
Neutral	6	35.3
Dissatisfied	4	23.5
Strongly dissatisfied	1	3.9
In general, incentive compensation is helpful to the health care industry.		
Strongly agree	1	5.6
Agree	11	61.1
Neutral	2	11.1
Disagree	3	16.7
Strongly disagree	1	5.6
The compensation system is a personal nuisance.		
Yes	7	38.9
No	11	61.1
What is your perception of the RVU weightings for each category?		
Clinical activities*		
Overvalued (5)	7	41.1
(4)	9	52.9
Just right (3)	1	5.9
(2)	0	0.0
Undervalued (1)	0	0.0
Scholarship activities**		
Overvalued (5)	2	13.3
(4)	3	20.0
Just right (3)	6	40.0
(2)	4	26.7
Undervalued (1)	0	0.0
Teaching activities**		
Overvalued (5)	3	20.0
(4)	3	20.0
Just right (3)	7	46.7
(2)	1	0.7
Undervalued (1)	1	0.7
Leadership activities**		
Overvalued (5)	0	0.0
(4)	6	40.0
Just right (3)	6	40.0
(2)	1	6.7
Undervalued (1)	2	13.3

(continued on next page)

Table 6

(continued)

	#	%
In general, the compensation system promotes individual freedom.***		
Strongly agree	2	14.3
Agree	3	21.4
Neutral	1	7.1
Disagree	5	35.7
Strongly disagree	3	21.4
When choosing how to spend my work time, I consider the RVU system value for that activity compared to other activities.*		
Strongly agree	2	11.8
Agree	9	52.9
Neutral	3	17.6
Disagree	2	11.8
Strongly disagree	1	5.9
The monthly submissions are easy to report.*		
Strongly agree	4	23.5
Agree	6	35.3
Neutral	3	17.6
Disagree	3	17.6
Strongly disagree	1	5.9

RVU—relative value unit

* Indicates one missing response
** Indicates three missing responses
*** Indicates four missing responses

dents (52.9%) disagreed that the system promotes their individual freedom, which supports the committee's perception that this component of the system has not been adequately implemented.

The final goal of the system was to allow for ease of reporting faculty activity and to provide a productivity incentive to the faculty. Two thirds (64.7%) of the faculty responding reported that they consider the compensation system value of one activity compared to another when they choose how to spend their work time (Table 6). Two faculty members report that they use their assistant to submit the reports. When those two faculty are excluded, 10 (66.6%) of those responding agree that the monthly submissions are easy to complete (Table 6). The one faculty member who disagreed that the submissions are easy to complete was also one of the four who reported being uncomfortable with using Microsoft Excel. One faculty member commented that now when a scheduled responsibility is cancelled, there is a financial consequence to that cancellation and that it is much easier to find another faculty member to trade or cover scheduled activities. The medical director of the residency program has reported significant improvement in faculty willingness to fill the call schedule.

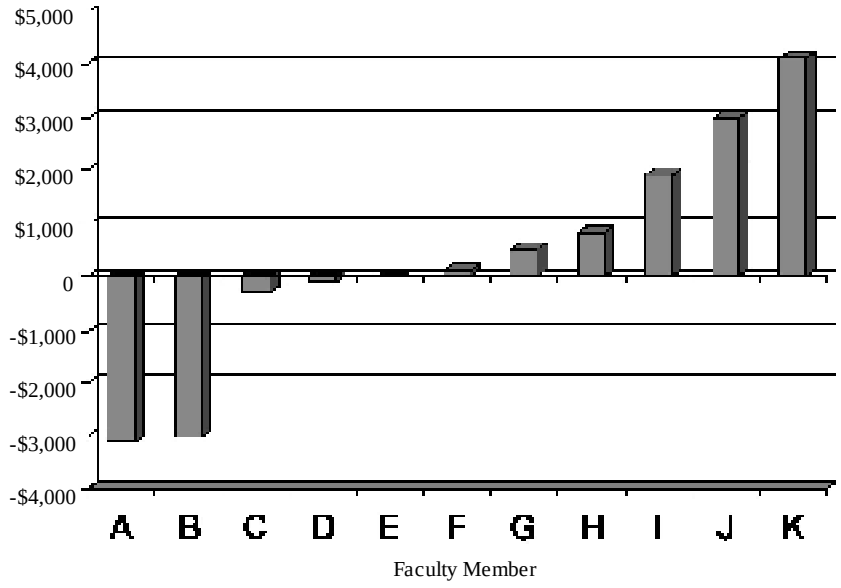
Discussion

We have demonstrated that an incentive compensation system that incorporates departmental goals can be implemented in academic family medicine. The majority of physician faculty members of the department perceived a need for an incentive compensation system. The system we have designed has fair acceptance; however, it is imperative that we evaluate the reasons why five faculty members are dissatisfied with the system.

Limited financial and physician manpower resources appear to have influenced our successful system implementation. The chair can still direct faculty time and resources on an individual and contractual basis. However, because of a shortage of faculty members brought about by financial constraints, this individual freedom has not been able to be fully utilized. For some of

Figure 1

Difference in Faculty Compensation in 2001 Compared to 2000



The figure is a graphical representation of the difference in faculty compensation between the 2 years, ie, one faculty member made $3,000 less in 2001 than in 2000, and another faculty member made $4,000 more in 2001 than in 2000.

the faculty members in the residency division, their variable time is used to cover additional residency teaching activities. The real benefit of the system in this instance is its ability to identify exactly where physician manpower is needed. Finding mechanisms to restore variable time for all faculty members may be essential to promote individual freedom, something that is deemed important to professional career satisfaction. Additionally, generating a financial cushion, so that not every physician member of the department is held to one half of the revenue-generating activities, is important for both individual and academic freedom.

One of the main limitations of this system is that it rewards only quantity of work done, rather than both quantity and quality. To provide proper incentive to faculty, the system must be adapted to incorporate quality of work in addition to quantity. The other limitation of the system is that the incoming revenue streams to the department cannot be directly linked to the incentive compensation program. An additional, but less significant, limitation is that not all activities are captured by the system. For example, one faculty member is the director of one of nine new core curriculum areas for the entire school of medicine. At the time the compensation system was developed, these nine curricular areas did not exist. As a result, the compensation system does not yet capture this activity. This is an example of why the committee must continually evaluate new and unique activities that the faculty report.

An additional benefit to the department from the system was noted as well—providing an effective monitor of the activities of the most valuable departmental resource, its physicians. The department is now able to document every half day of activity for all of the clinical faculty members and can demonstrate the work effort in clinical, scholarship, and teaching activities to the dean. A second unexpected benefit of the incentive compensation system is that the residency program wanted to increase the number of outpatient preceptors in resident continuity clinics. Using the data from this system, the department was able to obtain an exact number of half-day preceptor sessions that would be needed to provide the additional staffing. Lastly, it serves as a valuable strategic planning tool for the department by providing concrete information about how physician time is allocated to each activity.

We are currently in the process of evaluating factors that are related to faculty dissatisfaction with the incentive compensation system. In the future, we would like to evaluate the effect of the new system on corporate success. Eventually, we plan to expand the system to cover the entire department so that all clinical and nonclinical faculty members are incorporated into the incentive compensation system.

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References

1. Jones RF, Mallon WT. How do medical schools use measurement systems to track faculty activity and productivity in teaching? Acad Med 2002;7:115-23.
2. Centers for Medicare and Medicaid Services, Washington, DC. National physician fee schedule relative value units. http://cms.hhs.gov/providers/pufdownload/default.asp#pfsrelative. Accessed October 1, 2002.
3. Bardes CL, Hayes JG, Falcone DJ, et al. Measuring teaching: a relative value scale in teaching. Teach Learn Med 1998;10(1):40-3.
4. Hilton C, Fisher W, Lopez A, Sanders C. A relative value-based system for calculating faculty productivity in teaching, research, administration, and patient care. Acad Med 1997;72(9):787-93.
5. Andreae M, Freed G. A new paradigm in academic health centers: productivity-based physician compensation. Med Group Manage J 2001;48(3):44-54.
6. Andreae MC, Freed GL. Using a productivity-based physician compensation program at an academic health center: a case study. Acad Med 2002;77(9):894-9.
7. Brandt TL, Romme CR, LaRusso NF, Lindor KD. A novel incentive system for faculty in an academic medical center. Ann Intern Med 2002; 137(9):738-43.
8. Cohen JR, Fox S. Developing a new faculty practice plan with a model for funds flow between the hospital and the plan. Acad Med 2003;78(2):119-24.
9. O'Brodovich H, Pleinys R, Laxer R, Tallett S, Rosenblum N, Sass-Kortsak C. Evaluation of a peer-reviewed career development and compensation program for physicians at an academic health science center. Pediatrics 2003;111(1):26-31.
10. Glass KP, Pieper LE, Berlin MF. Incentive-based physician compensation models. Journal of Ambulatory Care Management 1999;22(3):36-46.
11. Johnston MAC, Gifford RH. A model for distributing teaching funds to faculty. Acad Med 1996;71:138-40.
12. Scheid DC, Hamm RM, Crawford SA. Measuring academic production. Fam Med 2002;34(1):34-44.
13. Sussman AJ, Fairchild DG, Coblyn J, Brennan TA. Primary care compensation at an academic medical center: a model for the mixed-payer environment. Acad Med 2001;76(7):693-9.
14. Yeh MM, Cahill DF. Quantifying physician teaching productivity using clinical relative value units. J Gen Intern Med 1999;14:617-21.
15. Liccione WJ. Effective goal setting: a prerequisite for compensation plans with incentive value. Compensation and Benefits Management 1997;13(7):19.

Appendix 2I

Effects of Performance-based Compensation and Faculty Track Academic Medicine: 2003

Effects of Performance-based Compensation and Faculty Track on the Clinical Activity, Research Portfolio, and Teaching Mission of a Large Academic Department of Medicine

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ABSTRACT

Purpose. Academic departments of medicine must compete effectively for extramural research support and access to patients while preserving their teaching mission. There is not much literature describing plausible mechanisms for ensuring success. The authors describe the design, implementation, and testing of a performance-based compensation plan in a department of medicine that is closely linked to the faculty appointment track.

Method. Over a three-year period, the changes this plan effected in research portfolio, clinical enterprise, and faculty satisfaction as well as the teaching perceptions of students and housestaff were measured.

Results. The compound annual growth rate (CAGR) for clinical work grew 40% faster after plan implementation. Federal funding increased at a CAGR that was 170% greater than before. The department halved its award rankings at the National Institutes of Health and faculty satisfaction improved compared with the former method of compensation. Faculty who better understood the plan were more satisfied with the conversion. High measures of teaching quality were maintained by faculty with no apparent change in satisfaction among students or housestaff.

Conclusions. This performance-based compensation plan with its emphasis on the objectives of career orientation and faculty track assignment strengthened the opportunity to grow both clinical productivity and the funded research portfolio.

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Academic departments of medicine must compete for compensation in a dynamic marketplace to recruit and retain the best faculty. There is no denying the pool of funds for which departments compete has been increasingly constrained by a variety of new economic pressures.[1–3] Grants and contracts combined with clinical revenues have traditionally been the largest sources of faculty support in academic medical centers, providing nearly 70% of all funding in fiscal year 2000.[1] Not all medical school departments, however, have been able to realize steady growth from these revenue streams.[1] The struggle for institutional philanthropy coupled with the reduction in federal programs to support facility costs or graduate medical education has also resulted in an even greater demand for finding new reve-

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nue to cover rising expenses.[4] Furthermore, the ability to cost-share is increasingly limited by the opportunity cost of money, restricted allocations, and the expectation that unrestricted funds will produce a return on investment.

These pressures have become a powerful influence on migrating faculty compensation from non–performance-based to performance-based measures,[5] where the distinction is the difference between paying for time spent versus work done. Historically, time-spent models of compensation in clinical departments have been financed through some permutation of practice collections, income from grants or contracts, a hospital's medical directorships, or earnings from a university endowment, and such models often rely on routine cost-of-living adjustments to raise salaries without regard to external measures of performance.

Converting faculty compensation to performance-based measures is not easy. Medical schools are diverse organizations that represent many autonomous subcultures with different perceptions of reality.[6,7] One issue faculty often raise is the concern that any change that challenges their time will negatively influence a culture that places high value on thinking, discovery, and teaching new learners.[8] The department of medicine began planning the transition to performance-based compensation in 1998 in an effort to ensure solvency, future growth, and intellectual equanimity. The plan was fully implemented in fiscal year 2000 (FY00). Changes in research awards and clinical activity allowed us to compare the three-year period of historical compensation (FY97–FY99) with the first three years of performance-based compensation (FY00–FY02). We felt it was important to implement and quickly evaluate its effects on clinical activity, research portfolio, teaching, salary, and faculty satisfaction.

Background

Over the course of this study, 338 full-time faculty in the department of medicine (DOM) were appointed to 12 clinical divisions recognized by the Vanderbilt School of Medicine (VUSM). Faculty practiced in The Vanderbilt Clinic, Vanderbilt University Hospital, and the Nashville Veterans Administration Hospital (on campus), as well as at selected nursing homes and off-site clinics in our medical service area.

Faculty Appointment Tracks

Beginning in 1998, faculty appointments at VUSM were broadened and faculty in the DOM were placed into any of five new tracks, each reflecting a different career pathway: (1) physician–scientist track (80% research–20% clinical; tenure) for faculty with major efforts in research and teaching; (2) clinician–educator track (80% clinical–20% research; non-tenure) for faculty with major efforts in clinical service and teaching; (3) basic scientist track (100% research; tenure) for non-physician faculty devoted primarily to research and teaching; (4) Research scientist track (100% research; non-tenure) for faculty who primarily support the research mission; and (5) medical center clinician track (100% clinical; non-tenure) for faculty who contribute to the department's service mission by focusing nearly all effort on patient care.[9] More than 80% of appointments in the DOM were in either the physician–scientist or the clinician–educator track[9] at the levels of instructor, assistant professor, associate professor, or professor.[10]

The Performance-based Compensation Plan

The department's leadership undertook a 12-month process in 1998 to develop a performance-based compensation plan. In addition to requiring that the plan be financially neutral to VUSM, five broad objectives emerged during its development. The plan needed to: (1) provide faculty with career objectives appropriate for each appointment track; (2) expand the clinical enterprise so that faculty had the practice opportunities they desired; (3) remunerate faculty for work performed regardless of type of patient insurance or practice location; (4) sufficiently increase the annual rate of growth of the research portfolio so the DOM could eventually become a top-ten National Institutes of Health (NIH) grant recipient; and (5) maintain faculty excellence in teaching medical students, residents, and fellows.

General Features

The proposed plan was designed to conform to VUSM's physician–scientist and clinician–educator definitions. The concentrated focus on faculty career choice was a central and, perhaps, unique component of the plan that helped establish the concept of benchmark expectations for each track.[11,12] During the development phase, benchmark salaries were identified for each division based on surveys of 16 peer institutions that had been conducted independently by outside consultants. Relative-value-unit (RVU) benchmarks were next determined for each specialty in a division using Medical Group Management Association (MGMA) Academic RVU data or interpolations from other sources in consultation with the division chiefs.[13] Once benchmark salaries and benchmark RVUs were determined for faculty across the DOM, a dollar value for each benchmark RVU ($/RVU) was calculated for each specialty by dividing benchmark salary by benchmark RVUs. For example, an annual benchmark salary of $120,000 and an annual total RVU benchmark of 6,000 equates to a $/RVU of $20; each benchmark

salary and corresponding RVU benchmark equilibrated to a single $/RVU for all faculty in that specialty regardless of rank, tenure, track, or any other academic designation. Contract clinical work that did not have an RVU value was converted into RVUs using the $/RVU for each specialty division. For example, if the $/RVU was $20 and the net annual receipts for a nursing home medical directorship was $20,000, this was equated to 1,000 RVUs.

Administrative Stipends and Teaching Support

Additional RVU credits were available to faculty with important administrative responsibilities within the DOM such as division compliance expert (DCE), course director, or fellowship program director. Each faculty member also received an academic RVU adjustment unique to either the clinician–educator or the physician–scientist track: the track adjustment for clinician–educators provided 20% of their clinical RVU benchmark up front for support of their academic life as teachers and scholars. Similarly, the track adjustment for physician–scientists provided 80% of the clinical RVU benchmark to reflect the track's focus on research and teaching.

Plan Administration

Each division was responsible for adhering to its annual budget, and because the plan depended on faculty effort, its operation was reviewed periodically by the department's Faculty Compensation Advisory Committee. A database was created to identify each faculty member with his or her benchmark salary, benchmark RVUs, generated clinical RVUs, work converted into RVUs, academic track adjustment, and research support. Earned RVUs throughout the fiscal year were compared with benchmark RVUs, and work as a percentage of benchmark was determined for each clinician–educator and physician–scientist. The difference between the percentage of RVU benchmark attained and 100% was represented to individual faculty as effort available to generate additional compensated work. Faculty could track their RVU production on their private Web sites. Division chiefs, medical center clinicians, and full-time (8/8ths) VA physicians were not included in the plan.

Clinician–Educator Track

In FY00, clinician–educators received base salaries at the level that had existed in the year prior to implementation with the opportunity to earn quarterly productivity adjustments (QPAs). QPAs were payments to faculty when quarterly productivity exceeded the amount of work sufficient to generate base salary. For example, if a clinician–educator produced 250 RVUs over and above the number of RVUs required to cover his or her base salary during a quarter, a $5,000 QPA was paid (250 RVUs × $20.00 $/RVU). Ten percent of the QPA was held until fourth-quarter QPAs were paid to maintain adequate cash flow. For FY01 and FY02, base salaries paid monthly were set at 95% of the gross salary earned during the preceding year. Gross salary in all years was equal to the amount of RVU production rewarded through the combination of base salary and QPAs. Clinician–educators who worked above the clinical benchmark were paid 100% of $/RVU for RVUs up to the benchmark, and 80% of $/RVU for over-benchmark RVUs, to acknowledge that teaching and other scholarly work was also of value to their career track.

In all years of the plan, research bonuses were available to full-time clinician–educators who received salary from research grants and maintained an 80% level of clinical productivity relevant to the total RVU benchmark. The research bonus was determined by the amount of a clinician–educator's salary funded by research grants up to a maximum of 10% of the NIH capitation rate in effect for the period that the bonus was paid. For example, if 10% of an annual salary of $120,000 was funded by grants, a clinician–educator could receive a $12,000 annual research bonus. To qualify for a research bonus, effort on grants was required to remain constant for one year, after which research bonuses were paid semiannually from nonfederal funds.

Physician–Scientist Track

Physician–scientists received an annual base salary and under certain conditions could also qualify for a research bonus. In the first year of the plan, base salaries were set at the same level as the prior year plus an increase determined by meeting objective criteria. For physician–scientists who funded their base salaries up to 80% of the NIH's capitated rate, base salary increased by an amount determined by the VUSM at the beginning of each new fiscal year. Physician–scientists who funded less than 80% of their base salaries but who had submitted a new major grant application during the prior 12 months were also given the VUSM-recommended increase in base salary. If, however, a physician–scientist did not fund 80% of his or her base salary and had not submitted a new major grant application during the prior 12 months, the VUSM-recommended increase would begin at the point during the subsequent fiscal year when a major grant application had been submitted. Major grants were defined as those grants that had a minimum three-year term, involved 15% faculty effort, and generated indirect cost recovery funds to VUSM.

Physician–scientist faculty were also eligible for a research bonus once clinical RVU benchmark criteria were

Table 1

Performance-based Compensation Method for Determining Research Bonus Percentage Points for Physician–Scientists' Grant Activities, Department of Medicine, Vanderbilt University School of Medicine

Qualification	Bonus Calculation
Minimum research bonus scale for physician–scientist and basic science faculty	
Grants and gifts ≥ 65% of your academic base salary or 65% of the NIH salary cap:	In lieu of percentage points, this threshold pays a flat $1,000
Grants and gifts ≥ 75% of your academic base salary or 75% of the NIH salary cap:	In lieu of percentage points, this threshold pays a flat $2,000 research bonus
Grants / gifts cover 80% of your salary or 80% of the NIH cap:	3% of salary or $4,000 as research bonus, whichever is greater
Grants / gifts cover 85% of your salary or 85% of the NIH cap:	5% of salary or $5,500 as research bonus, whichever is greater
Point research bonus scale for physician–scientists, basic science, and research–scientist faculty	
Grants and gifts ≥ 80% of your academic base salary or 80% of the NIH salary cap:	Three percentage points
Grants and gifts ≥ 85% of your academic base salary or 85% of the NIH salary cap:	Five percentage points
PI on Federal PPG/Center grant, for each year of the award with direct expenditures of ≥ $80,000:	Six percentage points
PI on Federal training grant, for each year of the award with direct expenditures of ≥ $80,000:	One percentage point
PI on RO1, for each year of the award with direct expenditures of ≥ $80,000:	Four percentage points
Subproject in federal PPG/Center grant, for each year of the award with direct expenditures of ≥ $80,000:	Two percentage points
PI on any sponsored research that awards the university full federal indirect rate, for each year of the award with direct expenditures of ≥ $80,000:	Two percentage points
CIDA, EI or RCDA:	Two percentage points
PI on any federal project paying full indirect rate (excluding PPG/Center grants/training grants) with direct expenditures in any year ≥ $250,000:	One percentage point in addition to any percentage points above
Any federal project paying full indirect rate (excluding PPG/Center grants/training grants) with direct expenditures in any year ≥ $500,000:	Two percentage points in addition to any percentage points above

achieved. In the first years of the plan's implementation, the clinical benchmark criterion of 20% was considered met when physician–scientists earned 15% of their benchmark RVUs. The lack of financial incentives to work above the clinical benchmark encouraged faculty in the physician–scientist track to maintain their focus on research productivity. The method for determining the amount of research bonus percentage points applicable to various physician–scientists' grant activities is described in Table 1. Research bonuses did not increase base salaries in subsequent years, and the sources of semiannual research bonuses were nonfederal funds.

Method

Clinical Activity

Clinical activity was analyzed from year-end financial records for FY96–FY02. Clinical measures used in this analysis were total gross collections and total RVUs generated by clinician–educators and medical center clinicians, normalized for faculty size. Comparisons of these faculty collections were made for the periods in which the previous compensation plan was functioning (FY97–FY99) and the periods in which the new performance-based compensation plan was implemented (FY00–FY02).

We measured clinical work in terms used by most insurance carriers, the resource-based relative value scale,[14] by identifying and aggregating total RVUs produced per clinician–educator and medical center clinician. The mean number of RVUs and the percentage of change in RVUs per

clinician–educator or medical center clinician during FY97–FY99 were compared with those of the first three years of the new performance-based plan, FY00–FY02. To eliminate annual variation in RVU values, all RVU data were restated to values in effect in February 2001. For all years, we used RVU tables for Tennessee-adjusted, facility-based clinic, total RVUs. We used total RVUs because external benchmarks were more commonly reported as total RVUs at the point of the plan's implementation. Today, benchmarks are commonly reported as work rather than total RVUs and would be just as easy to implement. Finally, to identify mean salary changes and QPA payments for clinician–educators, including base salaries, QPAs, and research bonuses, the compound annual growth rate of change was identified from FY96 to FY02. Similar salary data were identified for medical center clinicians.

Research Portfolio

Research data were obtained from NIH records and VUSM databases. Total NIH funding awarded to physician–scientist principal investigators in the DOM was identified for FY96–FY02. To normalize physician–scientists' and VUSM's funding data for faculty size, the number of principal investigators employed each fiscal year was divided by the amount of awards for that same fiscal year to determine funding per faculty member. A review of changes to annual NIH dollars for the DOM and VUSM was performed on September 30 for FY96–FY01 (FY02 dollars and rankings were not available from the NIH at the time of this writing).

For FY96–FY02, research funding as "other federal funding" and "nonfederal funding" for all physician–scientists in the DOM was allocated by source and the percentage of change was longitudinally compared pre- and post-implementation of the plan. "Other federal funding" included all Funding from non-NIH sources such as the Agency for Healthcare Research and Quality, the National Aeronautics and Space Administration, the National Science Foundation, the Department of Veterans Affairs, and National Institutes of Health subcontracts from other institutions. "'Nonfederal funding" included awards from foundations and industry. None of the funding categories included gift, endowment, or internal academic development support. Consistent with mean salary data presented for clinician–educators and medical center clinicians, salary per physician–scientist was reported as a compound annual growth rate (CAGR) from FY96 to FY02. Physician–scientist salary data included their base salaries earned in a fiscal year plus research bonuses earned for that same fiscal year.

Faculty Satisfaction and Teaching Evaluations

Three versions of a satisfaction survey instrument were developed for clinician–educators, physician–scientists, and division chiefs who were employed during the time of both old and new compensation plans. Respondents were asked to mark their answers using a Likert scale.

Survey responses were recorded in December 2001 by a third party and matched to the respondent's tenure, age, length of service, QPA, and frequency of research bonuses. At that point, all identifiers were deleted from the database. A chi-square test or Fisher's exact test was used to assess categorical comparisons. Differences between group means for continuous measurements were tested by a two-tailed Student *t*-test and checked by the Mann–Whitney test. Before–after comparisons were analyzed with the paired *t*-test and checked with the Wilcoxon signed-rank test; $p < .05$ was considered statistically significant. The survey instrument was given a waiver by the VUSM Institutional Review Board.

Anonymous student and housestaff teaching evaluations of faculty were recorded in a Web-enabled database beginning in October 1999. Although there are many questions in the evaluation, we included in this report data from three questions regarding faculty punctuality, enthusiasm, and effectiveness as a teacher for all years through June, FY2002. The highest possible score was 4.0. The VUSM Institutional Review Board waived disclosure of this information.

Results

Clinical Activity

The change in clinician–educators' mean collections between FY96 and FY02 (see Figure 1A) was 90.2%, or a total CAGR of 11.3%. For FY97–FY99, the CAGR for clinician–educators' mean collections was 7.9%. For FY00–FY02, the first three fiscal years the plan was operable, the CAGR for mean clinician–educators' collections was 14.9%. From FY96 to FY02, collections changed per medical center clinicians by 18.9%, or a CAGR of 2.9%. The CAGR for FY97–FY99 was 3.3%, and the CAGR for FY00–FY02 was 2.6%. We estimate 8.6% of the improvement in collections during FY00–FY02 for all groups was attributable to improved performance by the billing office or better payer contracts.

Mean RVUs for clinician–educators in FY96 were 4,755, compared with 8,286 in FY02 (see Figure 1B), a 74.3% change, or a CAGR of 9.70%. For FY97–FY99, the CAGR change for mean RVUs per clinician–educator was 8.1%. Comparatively, for FY00–FY02, the mean number of RVUs per clinician–educator grew by a CAGR of 11.3%. For medical center clinicians, the mean RVUs in FY96 were 6,368, and in FY02 they were 6,296, indicating a change of −1.1% or CAGR

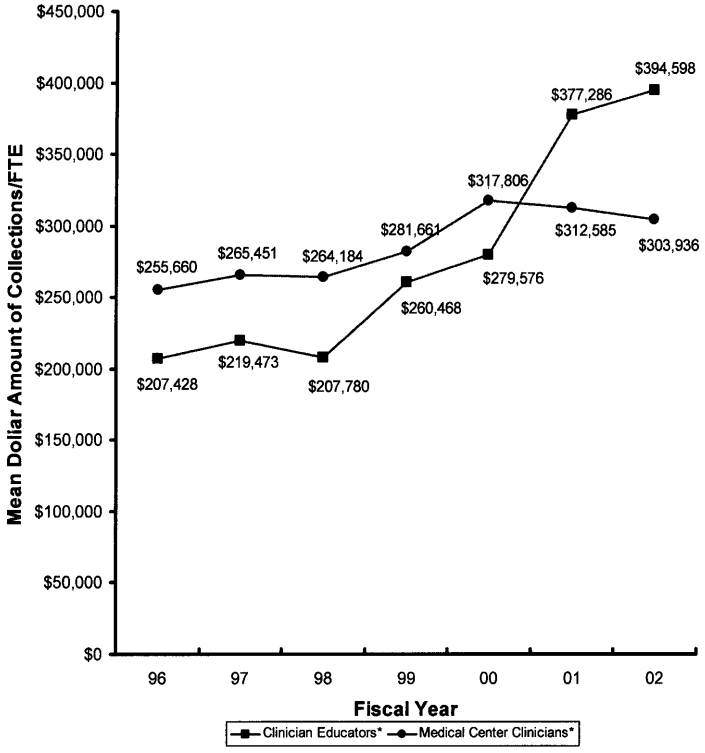

Figure 1A. Trends of mean collections for Department of Medicine clinician–educators and medical center clinicians at Vanderbilt University School of Medicine, 1996–2002 based on FY96–FY97 Medipac billing system and FY98–FY02 Epic billing system data.

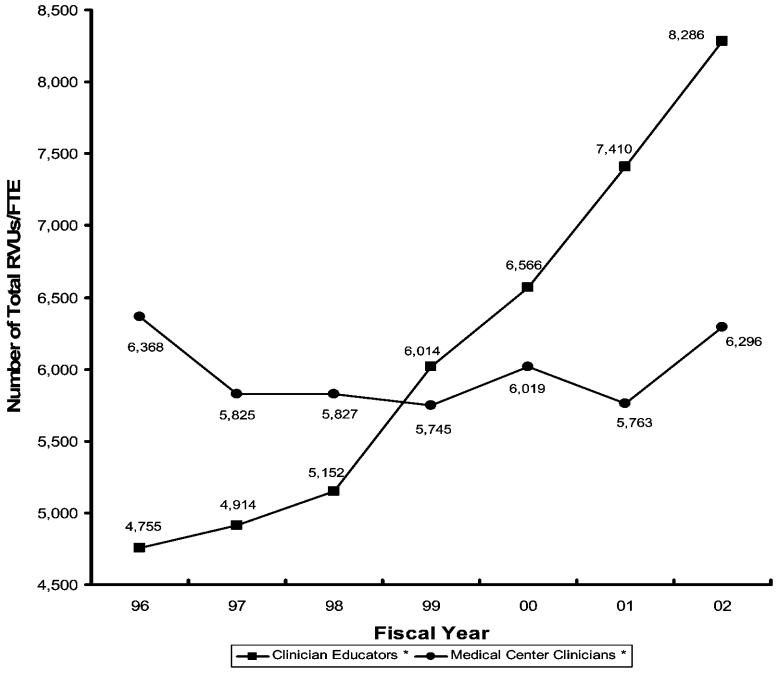

Figure 1B. Mean relative value units (RVUs) for Department of Medicine clinician–educators and medical center clinicians at Vanderbilt University School of Medicine, 1996–2002, based on FY96–FY97 Medipac CPT codes and FY98–FY02 Epic CPT codes from the 2001 Tennessee Regionally Adjusted Hospital Based Clinic RVU Table.

of −0.2%. For FY97–FY99, mean RVUs per medical center clinicians changed at a CAGR of −3.4%, and for FY00–FY02 the CAGR was 3.1%.

From FY96 through FY02, mean salaries per clinician–educator grew at a 7.8% CAGR. During the same time period, mean medical center clinician's salaries grew at a CAGR of 1.7%. In FY00, 66.7% of clinician–educators received a QPA, compared with 71.4% in FY01 and 80.20% in FY02.

Research Portfolio

The NIH ranking of award recipients for FY96 was 26 for the DOM and 24 for VUSM (see Figure 2A). By FY01, the DOM ranking had grown to 12, an improvement from 22 at FY99 and 18 at FY00. The VUSM's ranking in the same period increased to 19, up from 25 in FY99 and 24 in FY00.

During FY96–FY99, NIH federal dollars awarded to physician–scientist principal investigators in the DOM averaged $27,000 more than NIH dollars awarded to VUSM's principal investigators (see Figure 2B). In FY99, mean NIH funding for physician–scientist principal investigators in the DOM was $392,263, while the average NIH funding in VUSM was $371,050 per principal investigator (Figure 2B). In FY02, the mean NIH dollars awarded physician–scientist principal investigators in DOM was $691,524, compared with $556,723 for VUSM principal investigators, a $134,801 difference and 400% increase in the average DOM/VUSM gap over that which existed in FY96–FY99 (see Figure 2B).

The percentage change in NIH awards per physician–scientist principal investigator from FY96 ($389,559) to FY02 ($691,524) was an increase of 77.5%, a 10% CAGR (Figure 2B). By dividing the same period into pre- and post-plan years, the CAGR change was 0.2% for FY97–FY99, compared with a CAGR change of 20.8% for FY00–FY02. During this same time period, VUSM awards per principal investigator grew from $346,579 in FY96 to $556,723 in FY02 (see Figure 2B), a change of 60.6%, or a CAGR of 8.2%. The CAGR changes for awards per principal investigator in VUSM were 2.3% for FY97–FY99 and 14.5% for FY00–FY02.

An analysis of all DOM funding from the NIH, federal-other, and non-federal grants was normalized for the number of all physician–scientists in the department (see Figure 2C). For FY96–FY02, the CAGR of all funding sources per physician–scientist was 15.7%. Allocating the overall growth rate to pre- and post-plan years indicated CAGR changes of 9.3% for FY97–FY99, and 22.5% during FY00–FY02. By restricting the same analysis (see Figure 2C) to both NIH and other federal funding per physician–scientist, we found a CAGR change of 9.2% for FY97–FY99, compared with 24.8% for FY00–FY02. Further restriction of the analysis to only NIH funding per physician–scientist indicated CAGR of 8.4% for FY97–FY99 and 24.8% for FY00–FY02.

From FY96–FY01, the NIH annual total awards to departments of medicine grew by 69.8%. From FY96 to FY01, the 30 departments of medicine with the most NIH funding (as of NIH FY96) experienced a mean increase of funding of 55.0%. During the same period, the NIH awards to the DOM increased by 190.6%.

From FY96 to FY02, mean physician–scientists' salaries, including research bonuses, grew at a CAGR of 5.4%. Research bonuses were paid to 54.5% of physician–scientists in FY00, and 49.2% and 57.8% of these faculty in FY01 and FY02, respectively. Approximately 13% of the clinician–educators received research bonuses in years FY00, FY01, and FY02.

Faculty Satisfaction

A total of 132 faculty (89.8%) responded to the survey: 64 clinician–educators, 58 physician–scientists, and ten division chiefs, all of whom had worked under both methods of compensation. The respondents did not differ from the non-respondents in gender, rank, tenure, or years in the department. A majority of converted faculty (56.0%) were satisfied with the new plan. The level of satisfaction was highest among division chiefs (90.0%), followed by clinician–educators (59.7%) and physician–scientists (50.9%).

Satisfaction and years of service had an inverse relationship (see Figure 3A). For division chiefs with one to seven years of service who responded, all were satisfied with the plan, compared with 80% of clinician–educator responders and 69% of physician–scientist responders. For faculty with more than 14 years of service, satisfaction with the plan declined to 80% for division chiefs; 33% for clinician–educators; and 42% for physician–scientists. When physician–scientists and clinician–educators were combined, satisfaction increased to 75% when understanding of the Plan was highest (Figure 3B).

When compared with the historical methods of compensation, clinician–educators (67.7%) and physician–scientists (58.3%) believed the new plan was more fair. Slightly less than half (49.9%) of the clinician–educators reported that they spent less time teaching, and 66.7% reported spending less time on VUSM or DOM services such as committees. There was no significant difference among survey respondents for teaching ($p = .523$) and no statistically significant difference for service dedication ($p = .058$) between clinician–educators who received a QPA and those who did not. Physician–scientists (56.9%) reported that they did not spend less time teaching, but nearly half (49.1%) spent less time on VUSM and DOM committees. No significant difference in time spent teaching ($p = .789$) or time spent on committees ($p = .715$) was found between respondents who received a research bonus and those who did not.

Aggregate housestaff and students' teaching evaluations from FY00 ($n = 1,229$) scored faculty on a 4.0 scale with the following results: punctuality (3.6), enthusiasm (3.6), and teaching effectiveness (3.5). At the end of FY02, faculty scores for punctuality (3.7), enthusiasm (3.8), and teaching effectiveness (3.6) had remained stable

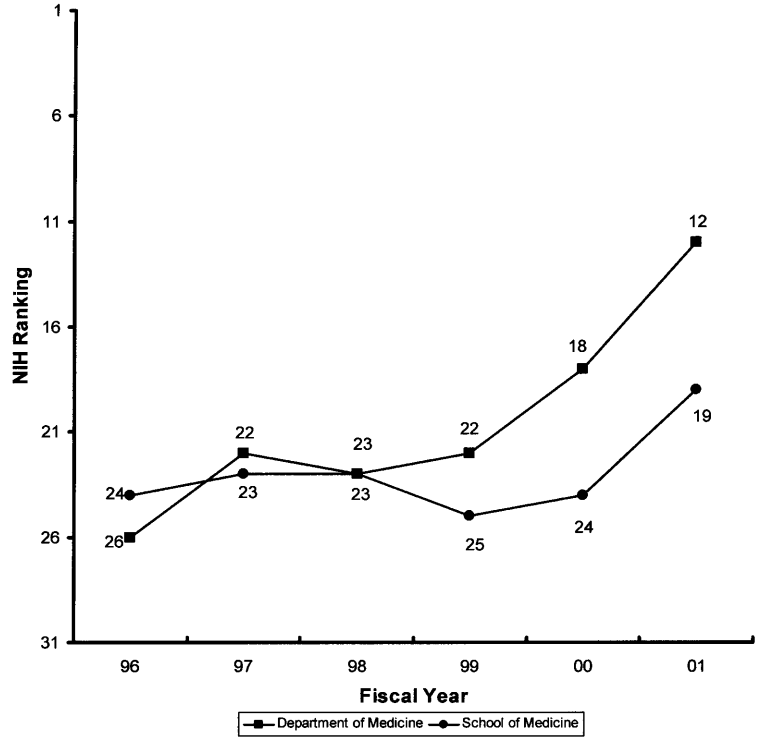

Figure 2A. National Institutes of Health (NIH) rankings of Vanderbilt University School of Medicine and its Department of Medicine among award recipients, 1996–2001. Note, the NIH fiscal year ranking ends September 30 of each calendar year.

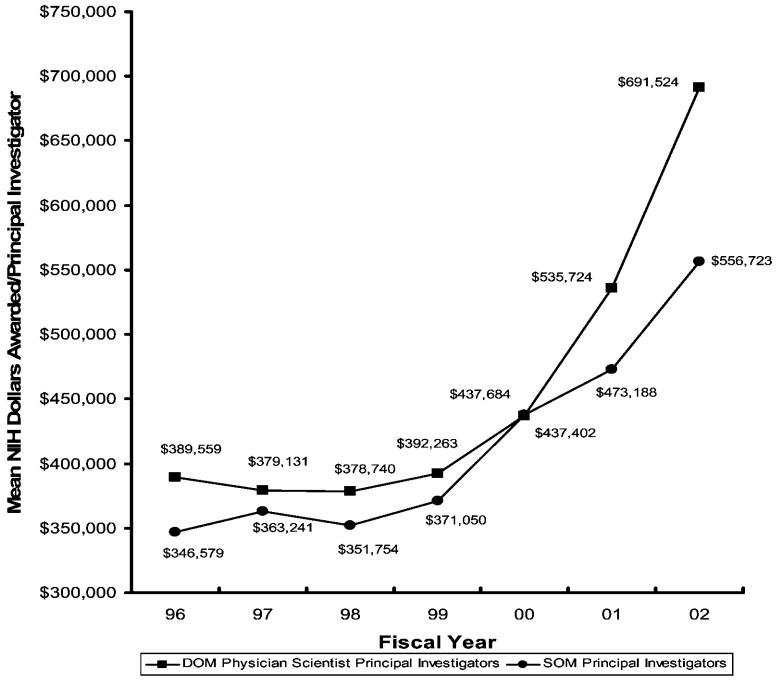

Figure 2B. Mean dollar amounts of NIH awards to Department of Medicine physician–scientist principal investigators and Vanderbilt University School of Medicine principal investigators, 1996–2002. Awarded dollars are total costs awarded by the NIH as recorded by the Vanderbilt Office of Research at the end of each fiscal year.

(n = 1,192). No significant difference was found in scoring evaluations among physician–scientists, clinician–educators, or medical center clinicians.

Discussion

Concurrent increases in the NIH's annual budgets, a core component of faculty already well established in the tradition of federally funded research, and the parallel improvements in clinical productivity and billing office

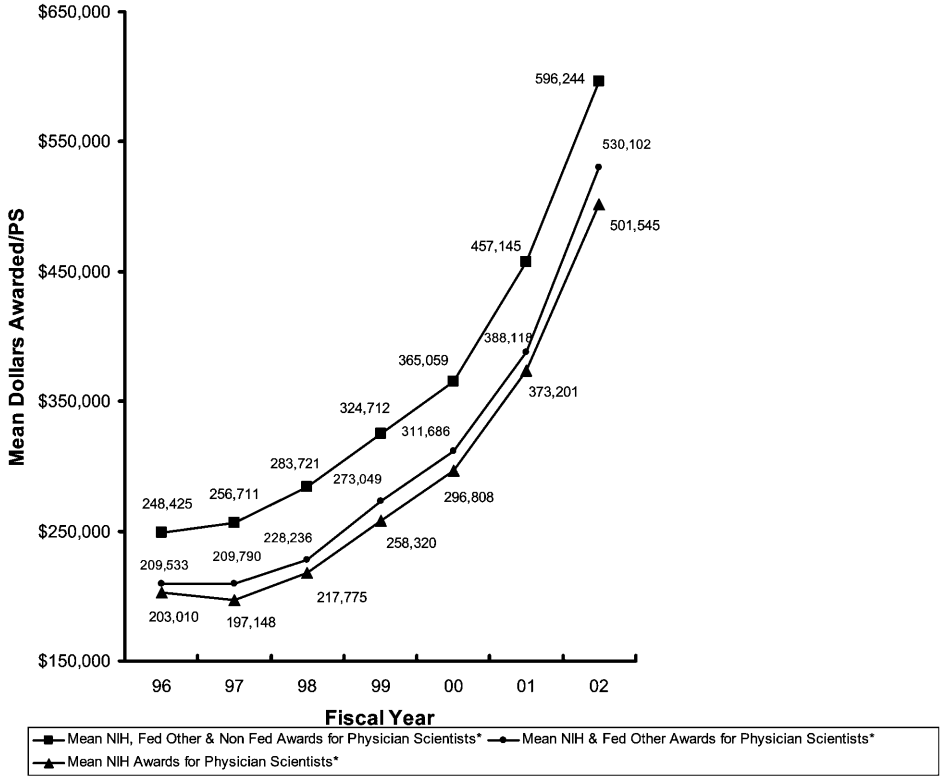

Figure 2C. Mean funding from NIH, federal–other, and non-federal grants for all physician–scientists in the Department of Medicine, Vanderbilt University School of Medicine, 1996–2002. Note: Other-federal funding includes all non-NIH funding such as AHRQ, Army, NASA, NSF, and NIH-funded subcontracts from other institutions. Non-federal funding includes all funding from foundations, agencies, and pharmaceutical/biotechnology.

performance all contributed to the initial success of the performance-based compensation plan. The sustained improvements in the level of performance among faculty strongly suggest that a combination of features was important to its success.

Faculty Track

One of the most notable changes in the plan was the emphasis placed on the individual goals of faculty and the performance criteria associated with the research and clinical appointment tracks. The emphasis on track was a direct link to the rewards embedded in the concepts of performance-based compensation. Two examples of the implementation of these concepts were salary based on levels of clinical work and research rewards for grant submissions. We believe that renewed emphasis on track requirements for appointment, reappointment, and promotion produced philosophical and behavioral changes among faculty. The focus on tracks inspired faculty to ask questions about "what they did" and "how they did it" on a daily basis. Promotion rates in either the physician–scientist or clinician–educator appointment tracks during FY00–FY02 were comparable to those in earlier periods (data not shown).

Clinical Productivity and Compliance

Performance-based compensation led faculty to think about RVUs as the currency for all clinical and administrative work. The RVU system permitted all patient care to be rewarded exactly the same, regardless of the patient's insurance or ability to pay. A byproduct of performance-based compensation was that business issues that historically consumed faculty attention, such as collection rates, insurance contracts, payer mix, and billing office competencies, became less important to individual faculty and a renewed priority of department leadership.

Also implicit in performance-based compensation was the role leadership had in setting benchmark levels for various forms of work in the department. This approach more easily permitted utilization of cost–effectiveness analyses for resource evaluations of clinic, hospital, or laboratory space. In many cases, faculty negotiated increases in their contracts for medical directorships and helped eliminate missing encounter forms from the clinical practice to get

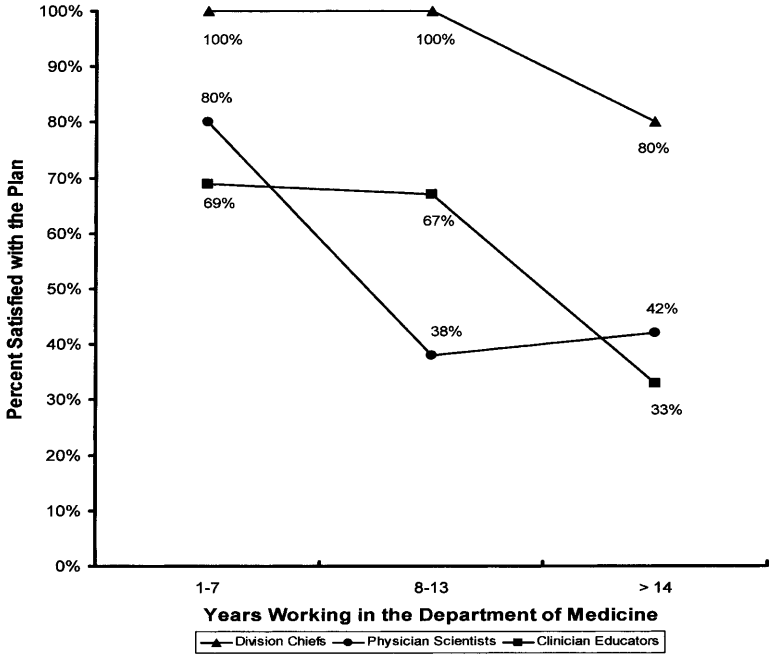

Figure 3A. Percentages of satisfaction with a performance-based compensation plan among clinician–educators, physician–scientists, and division chiefs according to their years of service in the Department of Medicine, Vanderbilt University School of Medicine.

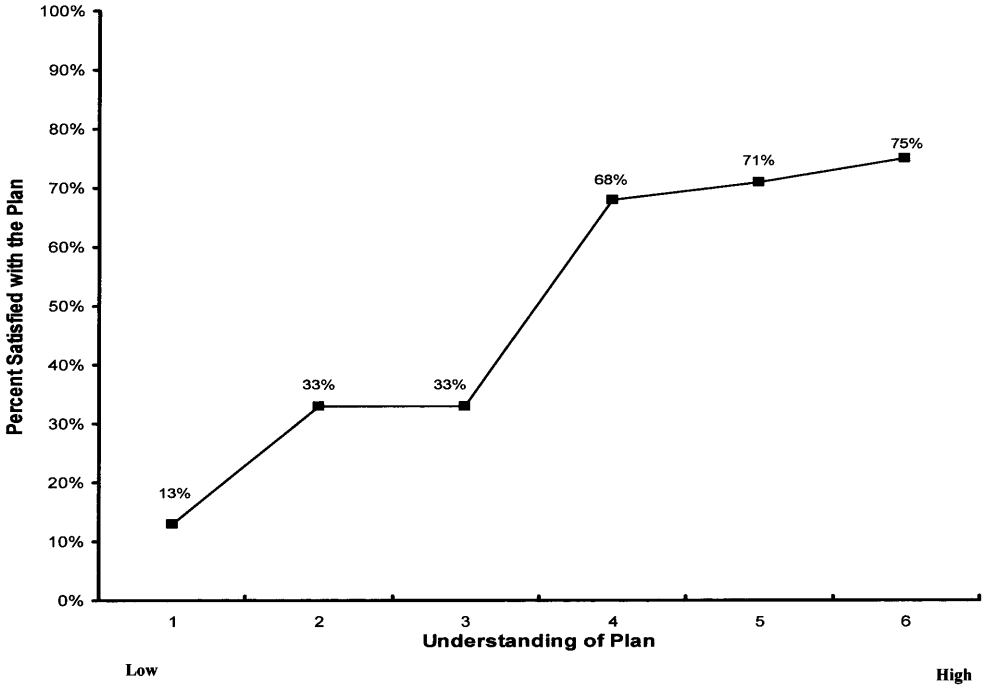

Figure 3B. Percentages of satisfaction with a performance-based compensation plan among physician–scientists *and* clinician–educators based on their understanding of the plan, Department of Medicine, Vanderbilt University. Understanding of the plan was based on a six-point Likert-type scale (1 = low understanding, 6 = high understanding).

credit for all the work they had generated to meet benchmarks.

With the faculty's new attitude toward productivity, the department stressed the importance of coding compliance by implementing new programs such as division compliance experts (DCEs) who work with the VUSM's independent compliance office. In each division, a DCE clinician–educator was identified to develop specialty knowledge of coding rules and guidelines, and the DCEs now regularly provide educational instruction to new fellows and faculty or updates to established faculty. The DOM also requested more frequent random compliance audits and that

VUSM dedicate more personnel to manage the increase in audits. The annual expense of these increases was borne by the DOM as part of its contribution to plan supervision. VUSM and the department's leadership have monitored compliance with documentation requirements and DOM coding levels.

Research Portfolio

The department clearly benefited from the increased availability of NIH support in the latter part of the 1990s. Its research grant portfolio grew 1.82 (FY00) and 3.68 (FY01) times the average growth rate of the 30 best-funded departments of medicine. One might worry that our valuation of research rewards in Table 1 would reduce the willingness of faculty to engage in interdisciplinary research as a co-investigator. This did not happen. The number of multi-investigator awards grew from a high of 12 before the plan was implemented (FY99) to a high of 21 after the plan's implementation (FY02). As another measure of interdisciplinary research, the number of NIH-RO1s, in which principal investigators contributed effort on other RO1 funding, increased from 35 before the plan in FY99 to 43 after the plan in FY02, an increase of 23%.

Faculty Satisfaction and Teaching

Faculty satisfaction among those living through the conversion generally improved with implementation. The plan avoided ambiguous goals or annual negotiations. It is possible that feelings of fairness along with the self-determining features of the plan were perceived as novel and contributed to positive outcomes. In support of this belief, both clinician–educators and physician–scientists enjoyed mean salary increases above historical levels through the first three years of the plan.

It is interesting that high satisfaction levels were clearly linked to the faculty's understanding of how the plan operated, and not enough can be said about the importance of working regularly with faculty to raise their levels of comprehension. The satisfaction reported by division chiefs was an unanticipated positive outcome. Although some initial apprehension existed toward changing compensation mechanisms, chiefs may have found it more rewarding to use time once spent on salary issues to mentor faculty research and clinical productivity.

Most important, teaching did not suffer while faculty made the transition from receiving fixed salaries to receiving salaries based on performance. It was interesting that, although some clinician–educators felt they spent less time teaching, the students and housestaff gave high marks on general measures of availability and quality. The department met all of its substantial teaching obligations without disruption or reductions of effort. The perceptions of some faculty-that they did less teaching-were not reflected in their commitment to assignments. Although arguable,[8] in subtle ways teaching may have become more efficient and effective under these conditions.

Leadership, Design, and Implementation of a New Compensation Plan

One important component of the plan's design and implementation, to which the department's leadership felt particularly committed, was that nearly all department faculty should participate in the plan. Consequently, very few faculty were excluded from the process of converting to performance-based compensation. Departments that attempt a partial conversion of selected faculty face the difficulty of managing conflicted messages, and this may be a less successful approach.[15] Although we did not break down our results by division, nearly all faculty in the department realized income improvement.

Our performance-based compensation plan was designed to be financially flexible or adaptive to institutional initiatives through the use of QPA payments. Financial responsiveness included the ability to adjust the $/RVU amount used in determining QPA payments to local and national reimbursement policies or unexpected increases in expense on a monthly or quarterly basis. For example, as rates on insurance contracts vary or malpractice and other expenses increase, the $/RVU can be quickly adjusted to remain on budget, and benchmark salary and clinical performance can be easily adjusted to market conditions. QPA payments to faculty provided a mechanism to compensate for additional work without waiting for a traditional annual adjustment. Resetting annual base salaries for faculty in the CE track at the beginning of each fiscal year also reduced the department's risk for high-end clinical salaries and has helped to ensure solvency.

Finally, strategic initiatives are easily incorporated into this plan. For example, administrative RVUs can be allocated to support important tasks such as paying a percentage of benchmark RVUs for course directorships, for fellowship program directors, or to support faculty DCEs who teach compliance to their division faculty. We also have a mission to better serve our community by creating a more welcoming vision of the department. Several years ago when the delays incurred by the backlog of patients wishing to see a Vanderbilt physician increased to many weeks or months, the Faculty Compensation Advisory Committee agreed to increase the RVU weighting for new visits or consults up to 200% of customary levels, and over a year, wait times returned to community standards. In future years, the plan is likely to be modified to incent other desired faculty behaviors such as improving patient satisfaction or participating in lengthy teaching assignments.

Conclusion

A performance-based compensation plan was implemented in a large academic department of medicine with multiple divisions and a faculty who provided a wide range of clinical care as well as extramural research. The new plan in aggregate was deemed a success. Levels of teaching remained strong, and no apparent issue surfaced during the first three years of operation that would prevent a similar approach from being implemented in any medical school once modeled for institutional nuances.

The authors thank Peter Traber, MD, and Judy Swain, MD, for information regarding the compensation plans used in their respective departments in 1998.

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References

1. Krakower J. Review of US medical school finances, 1999–2000. Personal communication of unpublished data received December 11, 2001.
2. Krakower J. Williams D, Jones R. Review of US medical school finances, 1997–1998. JAMA. 1999;282:847–54.
3. Jones R, Ganem J, Williams D, Krakower J. Review of US medical school finances, 1996–1997. JAMA. 1998;280:813–8.
4. Dickler R, Shaw G. The Balanced Budget Act of 1997: its impact on U.S. teaching hospitals. Ann Intern Med. 2000;132:820–4.
5. Academic Medical Centers' Faculty Incentive Compensation Models: HealthCare Advisory Board Issue Tracking Service, Project #2. Washington, DC: The Advisory Board Company, 1998:1–23.
6. Bonner TN. Crushing the commercial spirit in academic medicine: a crusade that failed. Acad Med. 1999;74:1067–71.
7. Bryan CS, Stinson MS. The choice: Lewellys F. Barker and the full-time plan. Ann Intern Med. 2002;137:521–5.
8. Fox RC. Time to heal medical education? Acad Med. 1999;74:1072–5.
9. Appointments and Promotions to Senior Ranks Full Time Faculty. ⟨http://www.mc.vanderbilt.edu/medschool/faculty.php⟩, 2001, Vanderbilt University School of Medicine. Accessed April 2, 2003.
10. Info Guide for the Committee on Appointments and Promotions (COAP). ⟨http://medicine.mc.vanderbilt.edu/RVUCOAPDocs/COAP_Guide.DOC⟩, 2000. Vanderbilt University School of Medicine, Department of Medicine. Accessed April 2, 2003.
11. Levinson W, Rubenstein A. Mission critical—integrating clinician-educators into academic medical centers. N Engl J Med. 1999;341:840–3.
12. Kelley WN, Stross JK. Faculty tracks and academic success. Ann Intern Med. 1992;116:654–9.
13. Academic Practice Faculty Compensation and Production Survey. Englewood, COl: Medical Group Management Association. 1998:3–10,52–4.
14. Resource-based relative value scale. ⟨http://www.ama-assn.org/ama/pub/category/2292.html⟩, 2003. American Medical Association. Accessed April 2, 2003.
15. Cramer J, Ramalingam S, Rosenthal T, Fox C. Implementing a comprehensive relative-value–based incentive plan in an academic family medicine department. Acad Med. 2000;75:1159–66.

Appendix 2J

A Novel Incentive System for Faculty in an Academic Medical Center, Annals of Internal Medicine, 2002

A Novel Incentive System for Faculty in an Academic Medical Center

Terry L. Brandt, MBA; Clifford R. Romme, MS; Nicholas F. LaRusso, MD; and Keith D. Lindor, MD

The need to contain health care costs has led some physicians to become salaried employees of health care organizations. However, the use of nonfinancial incentives for physicians in such an environment has not been broadly explored. The authors describe a novel incentive system that is designed to promote continuing high-quality care and to increase patient access to health care while enhancing clinical and academic productivity and physician satisfaction. Key components of this system include annual targets, flexibility in meeting these targets, and ability to convert clinical productivity generated in excess of what was necessary to meet the target to support scholarly activities. This system led to increased faculty productivity, improved patient access, enhanced scholarly activity, and overall enhanced career satisfaction.

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For author affiliations, see end of text.

The need to contain health care costs in the United States has led some physicians to become salaried employees of health care organizations (1, 2). Traditionally, physician compensation has included some incentive pay based on revenue production (3). Providing *nonsalary* incentives to physicians can be challenging. The Mayo Clinic has salaried physicians who practice in an environment that emphasizes the needs of the patient without compromising academic excellence. This balance between practice, education, and research is a fact of life in all academic medical centers.

Reforms in physician payments and decreases in reimbursement have necessitated efforts to reduce expenses and increase clinical productivity while maintaining compensation to recruit and retain a high-quality faculty. There is also a need for individual faculty members to pursue academic interests. We found numerous articles that addressed financial incentives in managed care, teaching institutions, for-profit groups, and health maintenance organizations (HMOs) (4–9). However, the use of nonfinancial incentives in a salaried environment has not been broadly explored.

To achieve the goals of enhancing patient care, increasing productivity, decreasing expenses, and creating flexible schedules for faculty members, we sought to develop a nonsalaried incentive system that could accomplish these outcomes.

The system needed to ensure that individual faculty members contributed to the divisional financial targets and that these contributions were distributed equitably, that patients seeking medical care had access to timely appointments, and that patients were assigned to faculty members with the greatest expertise in the medical problem being addressed.

The nonsalaried incentive system described here was developed and implemented in the Division of Gastroenterology and Hepatology, an approximately 70-member group, which is 1 of 14 divisions of the Department of Medicine at the Mayo Medical School and Mayo Clinic in Rochester, Minnesota. This system, which did not replace an existing incentive system, provided nonsalaried rewards to faculty members for their clinical efforts over and above predetermined annual targets. The system was called "GAIN" (Greater Access and Independence Now). We describe the program design and how it increased productivity and patient access and contributed to academic productivity.

Structure of the Division and Methods

Salary Structure

Physicians' salaries at the Mayo Clinic are established on the basis of market surveys of other large academic centers and multispecialty groups. Typically, the salaries are set at the 70th to 80th percentile of the market. The salary structure is differentiated by subspecialty, and all faculty within the subspecialty have the same target salary regardless of assignment (practice, research, education, or administration) or productivity. New (junior) faculty usually begin at two thirds of the target salary, which they reach within 5 years.

Clinical Activity

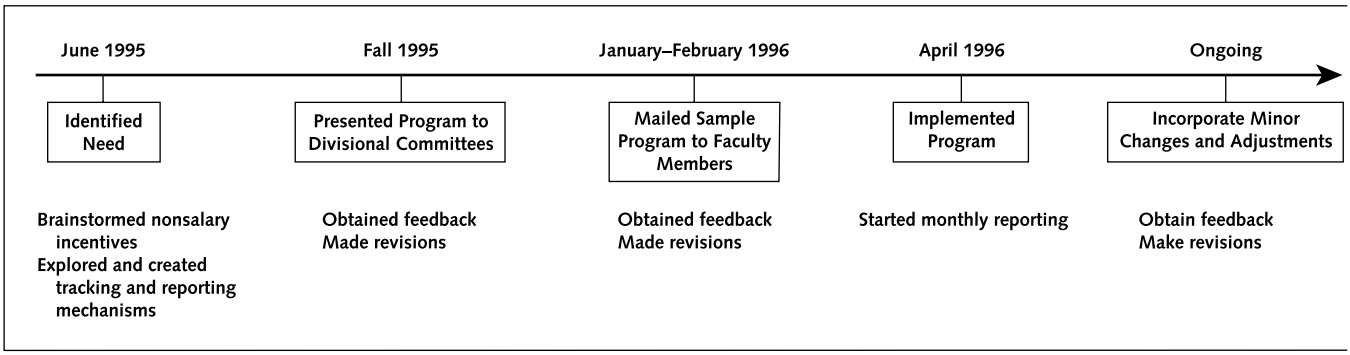
Seventy percent of the division's clinical activity, as measured in total relative value units (RVUs), comes from the endoscopic procedure practice. Total procedure volume in 2000 was more than 30 000 cases. The outpatient practice makes up approximately 20% of the division's total RVUs, whereas the two primary inpatient services and consulting service yield 10% of the total RVUs. All faculty members participate in the outpatient practice; 75% perform procedures and 15% support the inpatient practice.

Appointment Process

Aligning patients' medical problems with physician expertise is an underlying principle that we have emphasized in our practice. Both patient care and patient-oriented research benefit because many faculty members have research programs based on the patients being seen in their focused practices. The division employs a centralized appointment office, which coordinates new-patient appointments for faculty members. This office is also the focal point for building and maintaining schedules for such activities as endoscopy, outpatient clinic, and hospital rotations.

Individual physicians and their secretaries can schedule

Figure 1. **The Greater Access and Independence Now (GAIN) implementation timeline.**



patients that are referred directly to the physician; the central appointment office schedules patients referred to the division using available openings in the individual physician's personalized appointment calendar. The appointment office schedules patients into the outpatient practice by matching the patient's medical problems with an individual physician's expertise. This process was not affected by GAIN, although the incentives provided by GAIN led to more timely access for patients with problems in areas of individual physician expertise.

Setting Annual Expectations

The concept of creating individual annual expectations for outpatient clinical productivity was initially presented and discussed at several division meetings before implementation. **Figure 1** shows a timeline illustrating the steps taken to present and discuss the implementation process. In addition, all division members received multiple mailings, which included more detailed information about the program. The individual faculty member targets (clinical expectations) were established using total RVUs, as published by the Centers for Medicare & Medicaid Services (CMM) (formerly the Health Care Financing Administration). Total RVUs were used because they are linked to reimbursement; organization targets were also established on an expense per RVU basis.

Relative value units are designed to represent the resources used to perform a particular medical service. As established by the CMM (10), RVUs are used for both reimbursement and productivity purposes (11, 12).

In the process of setting outpatient expectations, annual expenses and the expected RVUs to be generated from the procedural and inpatient practices were estimated. The total number of RVUs needed to cover the expected expenses (largely salary) within the target was calculated for the division. After the estimated RVUs to be generated for the procedural and inpatient practice were subtracted, the number of RVUs needed in the outpatient practice was calculated. Individual expectations were set on the basis of the number of days faculty members spent in the outpatient practice and whether they were working alone or with fellows, residents, or nurse practitioners.

An annual target of expense per RVU was assigned by the Department of Medicine, which receives its target from the Board of Governors, our prime administrative body. These targets vary little year to year, and the value of an RVU has been relatively consistent; minor adjustments by Medicare affect the actual value slightly. If our expense per RVU targets were met, there was great flexibility on how resources could be allocated within the division. We were confident in our ability to fund the GAIN incentives because of this flexibility and the relative stability of the targets and the value of an RVU.

Incentives

Developing incentives that would appeal to faculty members and that would meet divisional, departmental, and institutional goals was a critical element in the development of the program (13–16). Rewarding clinical and scholarly productivity met the desired goals of all levels of the organization (individual, division, department, and medical center).

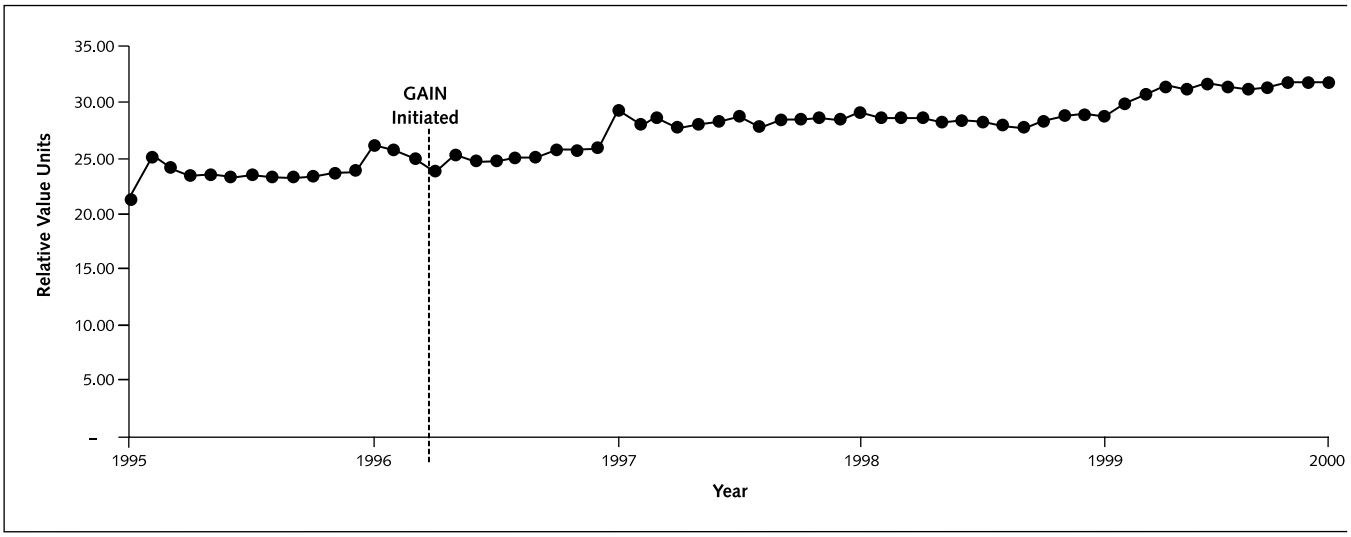
Implementation

Once GAIN was thoroughly discussed and endorsed by division members, an implementation date was selected and the program initiated. As part of the implementation process, the incentive component of the program was also presented and discussed. This component has evolved over the 4-year life of the program. Faculty members do not have to produce RVUs before "spending" them because they are responsible for their own productivity on an annual basis. The RVUs earned by a faculty member in a calendar year do not carry over to the next calendar year. Faculty members could convert RVUs that exceeded the annual target to dollar equivalents in order to acquire time for scholarly activities or to support additional allied health staff for research or other scholarly activities.

Monitoring and Management

The daily expectations were tracked from the central appointment office via a Microsoft Excel 97, SR-2 (Microsoft Corp., Redmond, Washington), spreadsheet. The RVU expectations were compared with billing data listing actual RVUs produced. By using the daily expectations and

Figure 2. **Outpatient evaluation and management relative value units per faculty day spent in the outpatient practice.**



GAIN = Greater Access and Independence Now.

billing data, monthly reports were generated and sent to individual faculty members for review, comment, and sign-off. If the overall expense per RVU targets for the division were not being met, the expectations for faculty members could be increased; this occurred once during the 4 years that the program has been in place. Access to appointments within the division, particularly in support of our integrated multispecialty group practice at the Mayo Clinic, needed to be maintained on a timely basis. Because faculty members accrued RVU credit if they saw additional patients, it was much easier for the appointment office to identify physicians willing to see extra patients on any given day to help maintain timely access.

Faculty members had flexibility to determine whether to use excess RVUs. The monthly reporting system was used to track and report expenditure of excess RVUs. If faculty members did not "spend" excess RVUs, these RVUs became available for divisional re-allocation to other programs.

As with any reporting and monitoring system, ongoing attention to the program and evolution of the system based on faculty feedback have been important in supporting incentives and maintaining credibility of the system (17).

Staff Satisfaction

A survey questionnaire to assess staff satisfaction was distributed to all faculty members in the medical center in February 1999. The more than 850 responses to this quantitative survey (a return rate of approximately 70%) allowed for comparison of responses between the division and the department as well as the institution as a whole. The survey used a five-point scale (strongly agree/very satisfied ranging to strongly disagree/very dissatisfied) and asked questions about overall job satisfaction, recognition, leadership, future direction, academic opportunities, benefits, support systems, and patient care.

Academic Productivity

Academic productivity was measured in terms of both peer-reviewed papers published and the level of external funding acquired. Peer-reviewed publications were obtained by searching PubMed and MEDLINE online resources by individual faculty member; potential duplicate entries were removed. Publications and external research funding were adjusted per faculty full-time equivalent to account for changes in faculty size, and research funding was expressed in constant 1993 U.S. dollars.

Results

During the first 4 years after GAIN was implemented in the division, overall clinical productivity increased and divisional expense per RVU targets were met. Outpatient RVUs per clinical full-time equivalent/d increased 33% for the duration of the program (**Figure 2**), which was substantially more than the modest 13% increase in productivity in the other divisions within the Department of Medicine during this same period. The incentive program resulted in a reduced number of unfilled appointment slots—from 10% to 15% to almost none. Furthermore, patients who needed to return for follow-up care were more easily accommodated because physicians received credit for the work arising from those visits. During the 4-year observational period that GAIN has been in place, total divisional RVUs exceeded the target by 15%. During this period, most of the faculty (usually >95%) have met their annual RVU expectations. No punitive measures have been implemented for those few faculty members who have not met their annual targets.

Access targets for appointments in support of the integrated group practice have typically been met. More than 90% of patients responding to quarterly patient satisfaction surveys (which reflect in part access to care) rated overall outpatient care as excellent or very good for the seven of nine quarters surveyed between January 1998 and March 2000.

During the time of the program, scholarly activity increased. A specific measurement of scholarly productivity was a 28% increase in total papers published over the 4-year period that the incentive program was in place (**Figure 3**); a relatively constant number of papers were published per faculty member despite rapid growth in faculty size during this period. In addition, the incentive program's flexibility in support of research activities contributed to a more than 36% increase in extramural research funding per faculty member (**Figure 4**).

Approximately 50% of faculty members have redeemed excess RVUs in some manner to support their own programs. Members of the division whose responsibilities are primarily to perform procedures, as well as those involved primarily in outpatient or inpatient activities, have participated in this system. The excess RVUs not redeemed by faculty members have been used by the division to distribute resources to division members at the discretion of the division leadership.

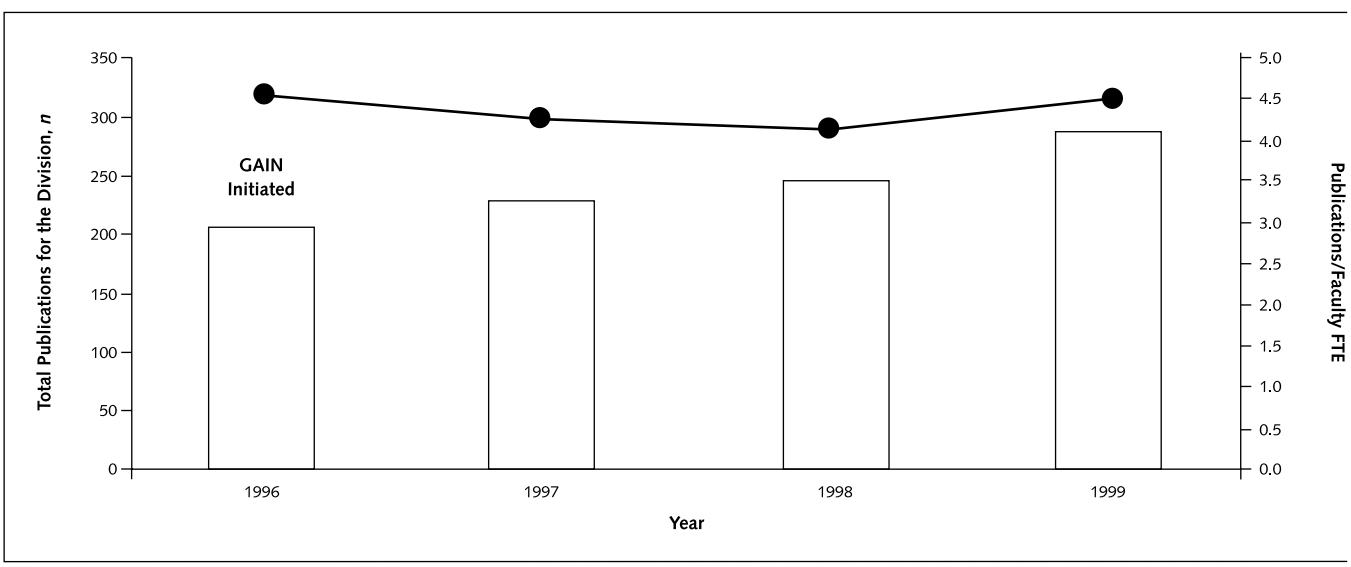
Staff satisfaction surveys showed a high degree of faculty satisfaction in the Division of Gastroenterology and Hepatology, which compared well with the faculty satisfaction in the institution and the Department of Medicine (97% satisfied or very satisfied vs. 89% satisfied or very satisfied for the institution and 90% satisfied or very satisfied for the Department of Medicine). These differences were especially noticeable within the realms of overall satisfaction, appropriate use of expertise, and opportunities for scholarly activities.

DISCUSSION

The GAIN program that was implemented in 1996 has been widely accepted. This incentive system motivated the faculty to see more patients without detracting from research and educational activities. In fact, the successful use of GAIN resulted in additional support for scholarly activities, which is the direct outcome of increased practice volumes. An incentive system such as the one we describe here would probably be most effective in a salaried environment. When physician reimbursement is based on clinical productivity, incentives are already in place for faculty members, and the additional revenues generated would typically accrue to the individual. Those funds, then, are not available to be used in support of research and education initiatives. We believe that the availability of resources to be used broadly in support of scholarly endeavors by faculty members is a unique feature of the GAIN system and is highly valued by the faculty in this division.

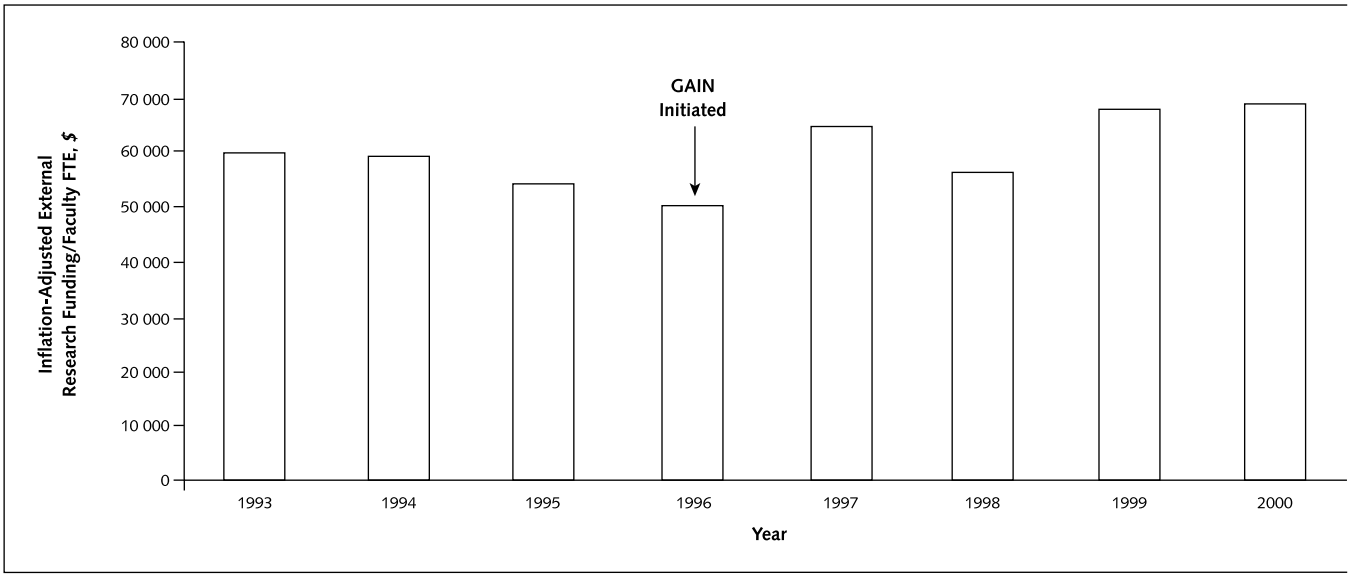
The GAIN system has also been used in three other divisions of the Department of Medicine (Nephrology, Hypertension, and Hematology) as well as the Department of Neurology at the Mayo Medical School and Mayo Clinic in Rochester, Minnesota. These four divisions have used the GAIN system for only the final 1 to 2 years that the program was in place, so their experience with the system is considerably less than that of the Division of Gastroenterology and Hepatology. The GAIN system has been tailored for use in each of the four divisions. Com-

Figure 3. **Publications for the Division of Gastroenterology and Hepatology and for each faculty member over the 4-year period of the Greater Access and Independence Now (*GAIN*) incentive program.**



The bars represent total publications for the division and the line represents publications per faculty full-time equivalent (*FTE*).

Figure 4. **Average extramural research funding per faculty full-time equivalent (*FTE*) between 1993 and 2000.**



GAIN = Greater Access and Independence Now.

mon elements of the system included individual productivity expectations; productivity in excess of that needed to meet the targets used to support an academic environment; and the need for improved management data and dedicated administrative support to provide accurate and timely reporting. The use of the GAIN system in these other areas presented challenges to successful implementation. These challenges included issues related to physician acceptance, the need for accurate data, and concerns about a negative impact on morale resulting from individual production targets.

The GAIN system has been considered for implementation in the Mayo Clinic in Scottsdale, Arizona. We believe the effective use of GAIN in other settings depends on 1) a fixed salary as the primary compensation model; 2) strong support by key leadership; 3) clear and open communication channels; 4) adequate resources to implement and administer the system, including accurate reporting of data; and 5) a flexible system of reporting, rewards, and oversight.

Open communication, both before and after implementation of an incentive system, is very important. We have presented the results of our own experience; however, others who have successfully implemented productivity and incentive systems have drawn similar conclusions (3, 18, 19).

A potential drawback of our observations is that before implementing the GAIN system, an incentive system did not exist; therefore, the changes we describe could have resulted from the addition of any incentive system and not this one specifically. However, the benefits of this system, which are spread across the full spectrum of activities in an academic division, make GAIN relatively unique. The implementation of the GAIN system in our division may have been more successful because of the large size of our division, which allows clinical needs to be met even when faculty are involved in nonclinical activities. However, the implementation of the system in much smaller but highly specialized groups (10 to 20 physicians) in our institution demonstrates that the system can also be used successfully on a smaller scale.

Conclusion

The GAIN program has been effective in increasing clinical productivity while at the same time supporting increases in scholarly activity. The program has become valued by the faculty members in the Division of Gastroenterology and Hepatology of the Mayo Medical School and Mayo Clinic in Rochester, Minnesota, and is being more widely implemented across our institution.

From Mayo Clinic and Foundation, Rochester, Minnesota, and Scottsdale, Arizona.

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References

1. **Epstein D.** What it's like to be a salaried physician. Manag Care. 1996;5:26-8, 35-6. [PMID: 10159155]

2. **Relman AS.** Salaried physicians and economic incentives [Editorial]. N Engl J Med. 1988;319:784. [PMID: 3412400]

3. **Maria BL, Tosi HH.** Medicine and money: an approach to compensating university physicians. J Fla Med Assoc. 1997;84:510-4. [PMID: 9401348]

4. **Hemenway D, Killen A, Cashman SB, Parks CL, Bicknell WJ.** Physicians' responses to financial incentives. Evidence from a for-profit ambulatory care cen-

ter. N Engl J Med. 1990;322:1059-63. [PMID: 2320066]

5. **Blalock J, Mackowiak PA.** A resource-allocation model to enhance productivity of academic physicians. Acad Med. 1998;73:1062-6. [PMID: 9795623]

6. **Terry K.** Equal shares or productivity? How doctors divide income. Med Econ. 1998;75:114-6, 119-24. [PMID: 10185532]

7. **Grumbach K, Osmond D, Vranizan K, Jaffe D, Bindman AB.** Primary care physicians' experience of financial incentives in managed-care systems. N Engl J Med. 1998;339:1516-21. [PMID: 9819451]

8. **Atlas RF, Ghoshtagore I.** Physician incentive schemes in prepaid health plans. Journal of Compensation and Benefits. 1996;July/August:45-8.

9. **Shea S, Nickerson KG, Tenenbaum J, Morris TQ, Rabinowitz D, O'Donnell K, et al.** Compensation to a department of medicine and its faculty members for the teaching of medical students and house staff. N Engl J Med. 1996;334:162-7. [PMID: 8531973]

10. Centers for Medicare & Medicaid Services (formerly the Health Care Financing Administration). Accessed at http://cms.hhs.gov/regs/laws.htm on 3 September 2002.

11. **Donnelly JT.** RBRVS as a financial assessment tool. Healthc Financ Manage. 1993;47:44-6, 48, 50-1. [PMID: 10145752]

12. **Louiselle PP.** Easing the transition to an RBRVS-based physician compensation system. Healthc Financ Manage. 1998;52:67-8, 70. [PMID: 10187634]

13. **Garcia LB, Safriet S, Russell DC.** Pay-for-performance compensation: moving beyond capitation. Healthc Financ Manage. 1998;52:52-7. [PMID: 10180895]

14. **Guzzetta D.** Developing an incentive system for PHO physicians. Healthc Financ Manage. 1996;50:50, 52, 54-5. [PMID: 10154436]

15. **Cejka S.** Incentive-based compensation. Healthc Exec. 1998;13:38-9. [PMID: 10186216]

16. **Averill R, Kalison M, Surpin J.** Align docs', hospitals' money incentives. Mod Healthc. 1999;29:50, 66. [PMID: 10558246]

17. **Tkach DJ, Cook DR.** Developing a merit compensation plan in an academic setting. Med Group Manage J. 1991;38:32-4, 36. [PMID: 10114592]

18. **Woodson SB.** Making the connection between physician performance and pay. Healthc Financ Manage. 1999;53:39-42, 44. [PMID: 10345615]

19. **Smith R.** Maximizing physician performance: a systems approach. Healthc Financ Manage. 1997;51:48-51. [PMID: 10174784]

"The good physician has four qualities. There are also four qualities of the patient, four of the attendant, and four of the medicines. There are thus sixteen qualities that affect the treatment.

"The physician should have a thorough understanding of medicine, practical experience, sound logic and justification of the diagnosis and treatment, and a good relationship with the patient that inspires faith.

"The patient should be mentally stable, have faith in the doctor, be willing to follow the doctor's advice, and have the willpower to be cured.

"The attendant should be soft in nature, punctual in times of administering medicines and treatments, have good behavior and conduct toward the patient, and know the proper method of medication.

"The medicine should be easily available, affordable, presentable in various forms, and have no side effects or toxicity."

How clear, simple, and wonderfully true are the words of the ancients, I reflected, as the guru's voice rose and fell in the sacred language of the old gods. How difficult it is for doctors and patients to encounter the conjunction of all these conditions conducive to recovery, and how fortunate when it occurs.

David Crow
In Search of the Medicine Buddha: A Himalayan Journey
New York: Jeremy P. Tarcher/Putnam; 2002:71

Submitted by:
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Submissions from readers are welcomed. If the quotation is published, the sender's name will be acknowledged. Please include a complete citation (along with page number on which the quotation was found), as done for any reference.–*The Editor*

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Appendix 2K

Using Relative Value Units to Measure Faculty Clinical Productivity, Journal of Internal Medicine:1997

Using Relative Value Units to Measure Faculty Clinical Productivity

T. Andrew Albritton, MD, Max D. Miller, EdD, Maribeth H. Johnson, MS, Daniel W. Rahn, MD

The objective of this project was to compare faculty productivity in teaching and nonteaching clinical settings. We hypothesized that teaching activity would have no impact on productivity. A mixed model, repeated measures analysis of variance was used to analyze average relative value units (RVUs) billed and to test for differences between clinics. Data were drawn from 4,956 clinical encounters made within a student, resident, and faculty clinic. Average RVUs per visit were similar in the three settings. Resident supervision increased faculty productivity, while student supervision had no impact on billed RVUs. Thus, RVUs can be used as a measure of faculty clinical productivity in different settings in an academic medical center. Precepting students does not appear to affect clinical productivity.

KEY WORDS: **faculty productivity; relative value units; resident training; student education.**
J GEN INTERN MED 1997;12:715–717.

Academic health science centers are coming under intense financial pressures; thus, efforts are under way at many institutions to optimize faculty clinical productivity.[1] Faculty clinical productivity has been measured in various ways: for example, number of patient visits, procedures performed, visits billed, and dollars collected.[2–6] These measures are inadequate if adjustments are not made for differences in practice characteristics such as the complexity of patients' diseases, variations in the length of time spent with patients, and differences in types of reimbursement for patients seen in various settings. Relative value units (RVUs) offer one way to measure productivity directly. The Health Care Financing Agency uses RVUs as the measure of physician productivity to calculate reimbursement for Medicare patients. According to this system, professional services (except for hospital based-services such as clinical pathology, radiology, and anesthesiology) are given a unique weight in RVUs based on the amount of time spent with patients and problem severity using Current Procedural Terminology (CPT4) codes.[7] Total RVUs reflect the practice costs and professional work associated with delivering a clinical service.

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At the same time as faculty are expected to optimize clinical productivity, many also have the added responsibility of supervising students and residents. The purpose of this study was to determine whether faculty clinical productivity, as measured by RVUs, is affected by teaching in outpatient clinics.

Three clinics were compared: a medical student clinic characterized by episodes with case patients in which two students were supervised by one attending physician, a resident continuity care clinic in which four internal medicine residents at various levels of experience saw the panels of patients assigned to them and were supervised by one attending physician, and a faculty primary care clinic in which clinical services were provided by faculty who did not supervise students or residents. Our hypothesis was that teaching in outpatient clinics—either students or residents—would result in reduced clinical productivity, primarily measured by average RVUs per half-day of clinic.

METHODS

Fourteen attending physicians from the section of General Internal Medicine at the Medical College of Georgia were eligible for the study. Participants were included if they spent the majority of their time in one of the three clinical settings on a regular basis. No physician was included for analysis in more than one of the clinical settings. Because of conflicting clinic schedules, three physicians did not meet the inclusion criteria and were eliminated from the study. We used a retrospective analysis of billing records of 11 physicians who practiced in one of the three clinic settings for the 6 months of the study, January 1 through June 30, 1996.

We chose specific CPT4 codes, selected to control for patient care variations that might bias one clinic over another. Our goal was to reflect typical activities in our ambulatory health care clinics. We included for analysis only those visits of new and established patients classified under codes for "office and other outpatient medical services": i.e., CPT4 codes 99201–99205 and 99211–99215. We excluded uncommon patient care services such as consultations, office procedures, inpatient services, and family or telephone consultations. In a 6-month period, 4,987 billed patient encounters were available for analysis.

We used CPT4 codes to calculate the RVUs, which were summed for each half-day clinic. Average RVUs per half-day were used to test a hypothesis of no differences

between clinics. We also examined average number of billed encounters and RVUs per billed encounter.

Statistical Analysis

Descriptive statistics were used to assess comparability of the three clinics in terms of types of patients and CPT codes. The primary outcome variable defined to quantify physician productivity was the total RVUs produced for a half-day clinic. Secondary outcome variables of interest were the number of patient billings per half-day and half-day average RVUs. A mixed model, repeated measures analysis of variance was used to analyze the primary and secondary outcome variables for clinic differences. The random effect of provider was fit using a compound symmetric model, which was then grouped by clinic to allow for differences in variance components between clinics. The fixed effect of clinic and the effects of gender, academic rank, and private practice experience (yes/no) were tested using these underlying variances. Least-square means and their standard errors are reported. The differences between no-show rates in each of the clinics were adjusted using a χ^2 test of association. A Bonferonni adjustment of the p values was made for the multiple tests. SAS/STAT Proc Mixed software (SAS Institute, Cary, NC, 1996) was used for all analyses.

RESULTS

As shown in Table 1, some differences were detected between the clinics in the percentages of new and established patients. More established patients with low to moderate severity (CPT code 99213) were seen in the resident clinic (71.2%) than in the faculty clinic (37%) ($p < .05$). More new patients with low to moderate severity (CPT4 code 99202) were seen in the student clinic (47.4%) than in the resident clinic (4.5%) or faculty clinic (6.7%) ($p < .01$). Physicians in the faculty clinic tended to care for a higher percentage (43%) of established patients with moderate severity (CPT4 code 99214) than those in the resident (24.4%) or student clinics (19.5%) ($p < .05$). This code would tend to affect the productivity in favor of faculty clinics owing to the more severe diseases seen.

Table 1 also shows several measures of faculty productivity. The average numbers of billed encounters per half-day for physicians in the resident clinic were significantly higher ($p < .001$) than those from the faculty or student clinics. The average RVUs per billed encounter did not differ significantly between the three clinics ($p = .095$).

There was a significant difference between the clinics on half-day average RVUs ($p = .0038$). The half-day average RVUs were significantly higher ($p < .003$) for physicians in the resident clinic than for those in the faculty clinic and the student clinic. Gender, academic rank, and

Table 1. Characteristics of Patients Seen in the Different Clinics over a 6-Month Period for Selected CPT Codes and Measures of Faculty Clinical Productivity

Patient Characteristics	Clinic			*p* Value
	Faculty*	Resident	Student	
Number of visits	3,365	1,132	490	
New patients, %	18.6	7.8	28.0	.01
Established patients, %	81.4	92.2	72.0	.05
New patients in CPT4 code category, %				
Self-limited/minor—99201	1.4	2.3	8.8	.05
Low/moderate severity—99202	6.7	4.5	47.4	.05
Moderate severity—99203	21.0	29.5	35.0	NS
Moderate/high severity—99203	58.2	58.0	8.8	.01
Moderate/high severity—99205	12.6	5.7	0.0	.05
Established patients in CPT4 code category, %				
Minimal—99211	1.1	0.9	0.3	NS
Self-limited/minor—99212	9.0	2.8	12.2	.05
Low/moderate severity—99213	37.0	71.2	67.4	.01
Moderate severity—99214	43.0	24.4	19.5	.05
Moderate/high severity—99215	9.9	0.7	0.6	.05
Measures of faculty clinical productivity				
Half-day clinics, *n*	345	63	78	
Average billed encounters†	4.8 (0.41)	18.1 (1.2)	6.2 (1.1)	.001
RVUs per billed encounters†	1.5 (0.2)	1.2 (0.2)	1.1 (0.2)	.095
Total RVUs	2,507	1,338	569	
Average RVUs per half-day clinic†	7.2 (0.8)	22.0 (5.2)	7.0 (1.5)	.0038

**CPT results for faculty clinic are based on full-day clinics. Thus, half of each days' billings were selected to obtain half-day comparisons of faculty clinical productivity.*

†Least-square mean (SE).

private practice experience did not have an effect on physician productivity (all $p > .20$).

DISCUSSION

The study of faculty clinical productivity is important as academic medical centers adapt to managed care and shrinking patient care revenue. The resource-based relative value system converts effort and practice characteristics into RVUs for different levels of care.[8–10] Because RVUs reflect clinical effort rather than dollars billed or collected, this system can be used to measure physician clinical productivity independent of financial production. Increasingly, private insurers also are using RVUs.[11]

This study has shown that the RVU system can be used to assess the clinical productivity of teaching faculty in an academic health science center. We demonstrated that faculty physicians were significantly more productive when supervising resident physicians than when engaged in independent delivery of patient care with no teaching responsibilities. Supervising residents increased clinical productivity of faculty physicians 3-fold. Having students in the clinic did not affect faculty clinical productivity.

More studies need to be done using this method. Obviously, this study is limited in that data come from a single site and a small number of physicians. Also, we excluded the less clinically active physicians who are clearly an important part of the cost and productivity debate. As economic pressures on academic health centers mount, accurate measurement of teaching costs and clinical productivity becomes increasingly important. Studies using RVUs could measure the impact clinical teaching has on productivity in other settings. Further, this method of measuring clinical productivity could be used to determine the impact of the recently instituted Health Care Financing Agency guidelines for teaching residents and students.

REFERENCES

1. Chin D, Hopkins D, Melmon K, Holman HR. The relation of faculty academic activity to financing sources in a department of medicine. N Engl J Med. 1985;312(16):1029–34.
2. Shea A, Nickerson KG, Tenenbaum J, et al. Compensation to a department of medicine and its faculty members for the teaching of medical students and house staff. N Engl J Med. 1996;334(3): 162–85.
3. Vinson DC, Paden C, Devera-Sales A. Impact of medical student teaching on family physicians' use of time. J Fam Pract. 1996;42(3): 243–9.
4. Smith DM, Martin DK, Langefeld CD, et al. Primary care productivity: the physician factor. J Gen Intern Med. 1995;10:495–503.
5. Garg ML, Boero JF, Christiansen RG, Booher CG. Primary care teaching physicians' losses of productivity and revenue at three ambulatory-care centers. Acad Med. 1991;66(6):348–53.
6. Fields SA, Toffler WL, Bledsoe NM. Impact of the presence of a third-year medical student on gross charges and patient volumes in 22 rural community practices. Acad Med. 1994;69(10):S87–9.
7. Kearl GW, Mainous AG. Physicians productivity and teaching responsibilities. Acad Med. 1993;68(2):166–7.
8. Levy JM, Borowitz M, McNeill S, et al. Understanding the Medicare fee schedule and its impact on physicians under the final rule. Med Care. 1992;30(11 suppl):NS80–93.
9. Hsiao WC, Braun P, Becker ER, et al. Results and impacts of the resource-based relative value scale. Med Care. 1992;30(11 suppl): NS61–79.
10. Latimer EA, Becker ER. Incorporating practice costs into the resource-based relative value scale. Med Care. 1992;30(11 suppl): NS50–60.
11. Dove HG. Use of the resource-based relative value scale. Health Affairs. 1994;13(5):193–201.

Appendix 2L

Finding An Incentive Plan That Actually Works, Academic Medicine: 2005

Finding An Incentive Plan That Actually Works

By Ronald D. Kratz, MD, MHA and
Berend Mets, MB, ChB, PhD

IN THIS ARTICLE...

Discover the steps an anesthesiology department took to come up with a fair and equitable incentive plan.

Incentive systems are all the rage in academic medical centers these days, driven by the need to maximize and direct faculty effort.[1,2] However, many well-intentioned plans fail because the system rewards an intermediate goal while hoping for completion of the activity, or rewards one activity while hoping for a different activity altogether.[3]

During a recent change in our department's administration, we felt it was important to assess the effectiveness of our department's incentive plan. We developed and administered an anonymous Likert-type survey to assess the level of faculty satisfaction with and impact of the incentive plan.

The results showed that, based on their experience in fiscal year 2002:

- 80 percent of our faculty did not understand how the amount of their incentive was determined
- 40 percent felt the incentive plan did not play a role in increasing their productivity
- Only 35 percent could agree that they were highly satisfied with the current incentive plan

So we set out to create a more effective reward system by combining motivational theory, the experience of other departments, and our own departmental needs.

A review of the literature revealed that the majority of departments appeared to be using a straightforward value-based approach. The value-based or points plan is a system in which every departmental activity is assigned a value.

When it is time to pay out incentives, individual faculty member's points are divided by the total number of points obtained during that period to determine their proportion of the incentive. This type of plan is easily understood and is particularly helpful if there are system deficiencies that need to be addressed.

We presented this to our department as a model to emulate. After much discussion, the faculty rejected a value-based approach, as the majority felt it would change the culture of our department from focusing on the team to focusing on the individual.

Specifically, the value-based approach changes the faculty focus from how they can advance the departmental mission to how they can earn points.[3] It is a zero sum system, meaning if you get more points, the relative value of mine goes down. So there is actually an incentive to not help others.

A goal-setting model

Our faculty specifically asked for an incentive plan with a goal-based approach and accepted the fact that, while it is more ambiguous than a values-based approach, it was most consistent with the current philosophy and culture of our department.

However, the chairman felt it necessary to incorporate a mechanism to track the productivity of the individual faculty members. Also, about this time, the dean of the medical center mandated that all departments develop a system to track the productivity of their faculty.

The compromise reached was that 50 percent of the incentive plan would be goal-based, and the other 50 percent would be at the discretion of the chair based on performance standards that were established and monitored.

Due to its multifaceted approach, the plan was named the Motivation/Incentive/Professional Evaluation (MIPE) plan.

The annual incentive payment was weighted 60 percent for clinical activities and 40 percent for activities in other areas.

At the next annual evaluation, the chair met with each clinical faculty member to determine their goals and the methods of attaining them. Recognizing that many faculty had not formally set goals in the past, we developed a goal template to aid them in designing goals. We also provided measurement criteria to bring to their discussion with the chair.

One of the most difficult steps was to ensure the resources necessary for goal achievement were available. In our department, the biggest resource was time. The chair and each faculty member negotiated an appropriate match of goals and resources, and determined measurement criteria.

Finally, ongoing follow-up for feedback and evaluation was provided through the annual faculty evaluations. However, we stressed with our faculty that it is important to address problems early rather than wait until the end of the year.

The development of the professional productivity evaluation portion required multiple steps. The most demanding part of this task was to formalize the system of data collection and analysis. Data are being gathered and organized on a Microsoft Access database.

Multiple discussions were required between the faculty and the chair as some faculty members were uncomfortable with the concept of data being collected on their productivity. The activities have not been assigned specific values, but the chair reviewed the performance of each faculty member when assigning incentives.

When a faculty member appears to be deficient in a certain area, the chair addresses this with him or her. This area is then incorporated into a goal for the next year, or a reduction in incentive if the discrepancy persists.

To minimize faculty complaints of extra work and to promote honesty, the vast majority of data are not collected by the faculty themselves but by a project specialist.

Our original plan called for incentives to be given once a year; but early in the first year our chair realized that a year is too long to wait for incentives and he gave additional incentive payments four months into the fiscal year.

These payments were based on productivity as measured by clinical activity, with some consideration for research, teaching and administrative efforts. The year-end incentive still reflected goals attained.

During the course of the first year of implementation when 50 percent of incentives were to be based on goal achievement, it became clear that this approach was very demanding because:

- The achievement of goals set without very specific metrics could not be accurately delivered
- Goals might be of different levels, and consequently easier to achieve for some and less so for others (so equity was not clear)

- In an academic anesthesia department that experienced an unprecedented increase in operating room case numbers, less time was available to achieve academic goals than had been anticipated.

The motivator-hygiene model

Because the goal-based incentives were regarded as de-motivating, the chair, after discussion, decided to uncouple specific goal achievements from incentive payments.

In motivational lingo, the hygiene needs (those built-in desires to avoid pain) were separated from the growth or motivational factors. How did we do that?

First, we addressed the hygiene needs. Incentive payments were determined on clinical productivity (measured as American Society of Anesthesiologists' time units—specific units for every 15 minutes of billed operating room time—adjusted for clinical time in non-income-generating clinical activity) and a comprehensive annual review of academic (teaching, research, scholarship), service (departmental, institutional, national), and teamwork contributions.

In so doing, the annual incentive payment was weighted 60 percent for clinical activities and 40 percent for activities in other areas. Work conditions, like the call schedule, were addressed by organizing faculty work teams to develop and implement an equitable and efficient call strategy. Departmental policies were clarified and made easily available on the intranet.

The goals were then regarded as a means to focus and motivate faculty, rather than a reward system. A mentoring process was established to provide the faculty with support and direction. A mentorship oversight group, comprised of the chair and four full professors, was established.

The younger faculty members are encouraged to partner with a more senior faculty member to use that person as a sounding board for concerns and an alternative mechanism for feedback regarding their goals.

The oversight group reviews the progress of faculty in tandem with the departmental promotion and tenure committee. This provides faculty members with the best opportunity for growth, achievement, recognition and advancement.

As we implemented the motivator-hygiene model, we realized that the true answer to the motivation question is not found in only one model of motivation. Any motivational plan needs to address the expectations of the faculty and be equitable.

References

1. Griner PF, Blumenthal D. "New bottles for vintage wines: the changing management of the medical school faculty." *Academic Medicine* 1998; 73:720-724.
2. Jones RF, Gold JS. "The present and future of appointment, tenure, and compensation policies for medical school clinical faculty." *Academic Medicine* 2001; 76:993-1004.
3. Lawler III EE. *Motivation in Work Organizations.* San Francisco, Calif; Jossey-Bass Publishers, 1994.

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Appendix 2M

Physician Compensation Programs in Academic Medical Centers, Health Care Management REVIEW: 2006

Physician Compensation Programs in Academic Medical Centers

Margie C. Andreae
Kirk Blad
Michael D. Cabana

Abstract: Many academic health centers are creating incentive-based physician compensation programs, leading to skepticism regarding the impact on the academic mission. We sought to systematically review the impact of these programs. Most academic compensation programs demonstrate a positive impact on clinical and scholarly productivity, quality of education, and faculty satisfaction.

Academic medical centers (AMCs) have faced significant financial pressures over the past decade. The sources are multiple and include reduction in National Institutes of Health research support, constraints on federal graduate medical education funds, and decreases in clinical reimbursement after the Balanced Budget Act of 1997.[1,2] As a result, AMCs have been focusing on physician salaries, with incentive-based physician compensation programs becoming more common. By shifting financial risk to the physician, most programs seek to motivate physicians to improve their performance.

Key words: academic health centers, faculty compensation, incentive program, systematic review

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The literature supports the use of financial incentives as an important motivator of physician behavior. However, most studies focus on payment arrangements between health plans and provider organizations, where the primary goal is to motivate physicians to conserve health care resources. For example Magnus[3] described a conceptual framework for health maintenance organization managers to use in evaluating physician financial incentives where the primary focus is on patient care. More recently, Conrad and Christianson[4] presented a model to evaluate physician incentives, with the primary focus on improving the quality of patient care. Although aligning physician incentives with the goals of the organization is central to the success of any incentive program, it is unclear if the three-tiered mission of AMCs (patient care, education, and research) would allow the same conceptual framework to be applied.

Thus, developing a fair and successful compensation program in an AMC can be daunting. The variation in clinical services, the uncertainty of extramural funding, and the historic belief of many faculty that they should receive a guaranteed salary to allow for academic freedom create significant challenges. Critics claim that programs with a focus on clinical revenue generation will have a negative impact on the education of trainees and quality of patient care.[5] AMCs that are in the process of developing or improving an existing program may benefit from understanding the aspects of both successful and unsuccessful programs at other institutions.

This study sought to systematically review incentive-based physician compensation programs in AMCs, their overall financial impact, and their effect on professional productivity, quality of educational services, and faculty satisfaction.

METHODS

DATA SOURCES

We conducted a systematic review to identify the studies examining physician compensation plans in academic health centers. We searched articles exclusive of commentaries, editorials, or news and that are limited to English language and published from January 1, 1995, to January 1, 2005. In MEDLINE, we used a Medical Subject Heading of "Salaries and fringe benefits" or "Physician incentive plans" and either "Faculty, medical" or "Academic medical centers." We searched three business research databases, including EconLit, Business Source Premier, and (ABI)-INFORM, using unique but related terms recognized by each source. For EconLit, we used the terms "physician" and "incentives," "compensation packages," or "fringe benefits." For Business Source Premier, we used "physician" and "incentives in industry." For (ABI)-INFORM, we used "academic medical center" or "academic health center" and either "compensation" or "salaries and fringe benefits." We identified additional titles of candidate articles by reviewing the cited references of included articles from our original search and by contacting experts in health care management.

DATA SELECTION AND INCLUSION CRITERIA

Two investigators (MCA, an expert in physician compensation plans, and MDC, an expert in health services research, including systematic reviews) screened titles and/or full bibliographic citations to identify candidate articles. The full text of each article was then independently reviewed to exclude articles that did not fulfill our criteria. Differences were resolved with full text review by a third investigator (KB, a graduate student in health care finance). We calculated a kappa score to measure the degree of agreement in the selection process.

We included all articles that described compensation programs for faculty physicians in AMCs in the United States and that measured the compensation program in relation to one of four outcomes: (1) overall financial impact, (2) the effect (positive or negative) on professional productivity, (3) quality of educational services, and (4) faculty satisfaction. Articles that focused on nonstaff physicians (e.g., office staff, nurses, medical assistants, and house officers) and articles that focused on physician compensation in nonacademic settings or AMCs outside of the United States were excluded.

OUTCOMES FOR ANALYSIS

We defined four possible outcomes measures: (1) overall financial impact, (2) the effect (positive or negative) on professional productivity, (3) quality of educational services, and (4) faculty satisfaction. The definition of professional productivity was a quantitative measure of clinical care (e.g., relative value units [RVUs]—a standardized measure of physician work associated with clinical billing codes, visit numbers, or gross charges) or scholarly activity (e.g., extramural funding or publications) at the individual faculty or department level. Quality of educational services was defined as an evaluation of the educational experience of medical trainees (students and/or house officers). Faculty satisfaction was measured directly via faculty surveys or indirectly via faculty retention after the implementation of the program.

DATA EXTRACTION AND ANALYSIS

We abstracted the type of medical specialty, the number of faculty in the program, geographic location, the characteristics of the compensation program, the duration of the study, and the outcomes measured. Simple counts and statistics of the articles were calculated to provide a descriptive analysis of the programs. Because we did not pool the data in our analysis, we did not rate the quality of the studies, following the recommendations of Petitti.[6]

RESULTS

SEARCH YIELD

We found 306 titles from our original search. Based on our stated criteria, we excluded 158 and examined the abstracts of the remaining 147 articles. We excluded an additional eighty-five based on abstract review, leaving sixty-two articles. After examining the full text of these remaining articles and their cited references, we found fourteen articles that fulfilled the study criteria. The number of studies not meeting inclusion criteria is summarized in Table 1. The κ to measure the preconsensus interrater reliability for article selection was .71.

STUDY POPULATIONS AND LOCATIONS

A summary of the characteristics of each program grouped by the organization's level of administration of the program is shown in Table 2. Two of the articles focused on programs administered at the medical center

TABLE 1

Number of Articles Failing to Meet Specific Inclusion Criteria

	Number of Articles
Initial database and endnote search	306
Inclusion criteria not met	
Academic program	70
U.S. program	25
Staff physicians	40
Compensation program described	105
Included at least one measure of financial impact, productivity, quality of educational services, or faculty satisfaction	52
Studies meeting all inclusion criteria	14

level, with all clinical departments included. Nine of the fourteen articles (64%) focused on programs administered at the department level, with representation from the departments of internal medicine (n = 5 studies), family medicine (n = 2 studies), emergency medicine and obstetrics and gynecology (n = 1 study each). Three of the programs were administered at the division level, including the specialties of gastroenterology, general internal medicine, and general pediatrics. Ten of the articles described a program with incentives based on individual performance, whereas the remainder focused on incentives for collective performance. Only half of the articles indicated the number of physicians included in the program, which ranged from 18 to 338.

The academic centers represented in the review were widely distributed across the country, with no single geographic predominance.

CHARACTERISTICS OF THE COMPENSATION PROGRAM AND DURATION OF THE STUDY

The characteristics of the programs varied from simple tracking of clinical activity to complex systems of assigning points for multiple types of clinical, teaching, and research activities. The goal of 93 percent of the programs was to improve financial accountability at some level of the organization. Thirteen of the programs offered monetary incentives to departments, divisions, or faculty to modify faculty behavior. Nine of these were in the form of bonus payments, whereas two were salary withholds and the other two were in the form of reallocation and competition for existing funds among divisions. One program offered nonmonetary incentive in the form of protected time for scholarly activity and staff support.[7] Most programs focused on enhancing the quantity of professional activity, and only two sought to enhance the quality of patient care.[8,9] Of the eight studies reporting time from program conception to implementation, the average duration was twelve months (range, nine to eighteen months). The duration of time over which the effect of the program was measured varied from 9 months to 8 years, with the average duration being 2.62 years. Five of the articles (37%) reported measurement of outcomes at the end of the first year.

OUTCOMES MEASURED

Not all of the programs provided a measure for each of the four outcomes. Their impact was predominantly positive or neutral (Table 3).

Financial Impact. Twelve articles (86%) provided information on the financial impact of the faculty compensation program on revenues and/or expenses. Five of the studies reported an improvement in the division's, department's, or institution's financial margin,[9–13] whereas three indicated enhanced revenues[7,14,15] and two showed reduced expenses.[8,16] Two studies demonstrated a neutral impact on faculty salary expense or distribution of teaching funds by design.[17,18]

Effect on Professional Productivity. Eight studies measured clinical productivity, with the RVU being the primary unit of measure in over half of these programs. One study looked at visit numbers alone,[14] whereas another looked at gross charges[19] and a third one looked at collections.[12] Four of the studies measured RVUs in combination with either visit numbers or collections,[7,9,13,15] whereas one looked at RVUs alone.[10] The increase in RVUs, when measured over a one-year period, ranged from 20 percent to 30.5 percent. One program demonstrated a 37-percent increase in RVUs/faculty over a three-year period, and another showed a 33-percent increase over a four-year period.[7,13]

Six studies measured scholarly productivity, with the most common measure being extramural funding (n = 4 articles).[7,11,13,14,19,20] Publications (n = 3 articles) and national scholarly ranking (n = 2 articles) were measured alone or in combination with extramural funding. When measured quantitatively, the increase in extramural funding per faculty was reported to be 22.5 percent annually over a three-year period in one study and 36 percent over four years in another.[7,13]

Quality of Educational Services. Three articles (21%) contained information on the effect of the program on the quality of the educational experience for trainees.[10,11,13] One study reported that the aggregate student and house officer teaching evaluations on a 4.0 scale were unchanged in the first and third years of the program in punctuality (3.6 to 3.7), enthusiasm (3.6 to

TABLE 2

Characteristics of the Programs of the Studies Reviewed

Reference and Level of Program Administration	Academic Institution	Study Unit	Duration of Study	Program Intervention	Outcome(s)
Medical center					
Hopkins, 1999	Stanford University Medical Center, Palo Alto, Calif.	Clinical departments	1 yr.	Financial incentive for departments to develop a clinical QI project and reduce expenses by 5%	8 of 13 departments developed 19 QI projects; 5 departments achieved cost containment goal
Stewart et al., 2001	Baylor College of Medicine, Houston, Tex.	Clinical departments	1 yr.	Determined department compensation budgets based on mean national salaries by specialty and rank. Incentive portion of budget distributed if Department met RVU target	30% ↑ in RVUs; 49.5% ↑ in collections
Department					
Blalock and Mackowiak, 1998	University of Maryland School of Medicine, Baltimore, Md.	Internal medicine	8 yr.	Department funds for salary support allocated to divisions based on % clinical workload and VA funded research	↑ in outpatient visits/MD; ↑ procedure based RVUs; ↑ from 31st to 6th in VA research funding
Cramer et al., 2000	State University of New York School of Medicine and Biomedical Sciences, Buffalo, N.Y.	Family medicine	3 yr.	Defined complex point system for clinical , teaching, and research activities. Withheld 2% of salary for incentive pool. Awarded financial incentives for points earned.	↑ in clinical productivity/session; ↑ in scholarship and teaching activity
Guss, 2002	University of California San Diego Medical Center, San Diego, Calif.	Emergency medicine	6 yr.	Base salary determined by clinical hours, rank, and years in service. Financial incentives for increased clinical hours or research funding	Low faculty turnover; highly rated residency program; top-tier scholarly productivity. No quantitative measures
Hilton et al., 1997	Lousiana State University School of Medicine, New Orleans. La.	Internal medicine	1 yr.	Defined value for clinical, teaching, research, and administrative activities. Compensation and raises linked to the total value score	Value system determined to be reliable, fair, and adjustable. Noquantitative measures reported
Kastor et al., 1997	University of Maryland School of Medicine, Baltimore, Md.	Internal medicine	1 yr.	Defined expected work hours per year and time required for professional activities. Salaries reduced for unfunded time at end of year	1% ↓ in faculty salary expense; 4 faculty resigned
Rouan et al., 1999	University of Cincinnati, Cincinnati, Ohio	Internal medicine	2 yr.	Defined value for teaching activity. Reallocated financial support for teaching based on amount of teaching activity in each division.	Change in funds allocation per division ranged from 78% ↑ to 28% ↓. Percent distribution closely resembled distribution of questions on in-training and board certification exams

(continues)

TABLE 2

Continued

Reference and Level of Program Administration	Academic Institution	Study Unit	Duration of Study	Program Intervention	Outcome(s)
Shaw, 2002	Brigham and Women's Hospital, Boston, Mass.	Obstetrics and gynecology	3 yr.	Revenue and expense statements calculated for each faculty. Financial incentives awarded for faculty whose revenue exceeded expenses	Faculty with revenue greater than expense ↑ from 50% to 90%
Tarquinio et al., 2003	Vanderbilt University School of Medicine, Nashville, Tenn.	Internal medicine	3 yr.	5 faculty tracks defined with protected research or teaching time determined by track. Financial credit for research funding and RVUs greater than target. Specialty based $/RVU	37% ↑ in RVUs; 51% ↑ in collections; 22% ↑ in funded research; 56% satisfied with plan; quality of teaching unchanged
Willis et al., 2004	Indiana University, Bloomington, Ind.	Family medicine	2 yr.	Utilized complex relative value scale for calculating weighted points for professional activity. Compensation based on points earned.	No change in department salary expense by design; 72% of faculty felt program was needed; 70.5% of faculty were satisfied or neutral.
Division					
Andreae and Freed, 2001	University of Michigan Medical School, Ann Arbor, Mich.	General pediatrics	9 mo.	Compensation based on wRVU; financial credit for time teaching	22% ↑ in wRVUs; 3% ↑ in salary expense; no change in quality and quantity of medical student teaching
Brandt et al., 2002	Mayo Medical School and Mayo Clinic, Rochester, Minn.	Gastroenterology and hepatology	4 yr.	Nonfinancial incentives (↑ protected time and research support staff) awarded to faculty who exceed clinical RVU target	36% ↑ in research funding/MD; 28% ↑ in publications; 33%↑ in RVUs; 97% job satisfaction; 90% of care rated very good or excellent
Sussman et al., 2001	Brigham and Women's Hospital, Boston, Mass.	General internal medicine	1 yr.	Base salary determined on previous year wRVU. Financial incentives added for quality of care, seniority, teaching, and efficient medical management	20% ↑ in wRVUs; 17% ↑ visits; 15% ↑ in HEDIS compliance; no faculty turnover; 6.6%↑ in capitated health plan medical expenses

Notes: QI, quality improvement; RVU, relative value units; VA, Veterans Affairs; MD, medical doctor; HEDIS, Health plan Employer Data and Information Set.

3.8), and teaching effectiveness (3.5 to 3.6) of the faculty.[13] The authors of this study concluded that "teaching did not suffer while faculty made the transition from receiving fixed salaries to receiving salaries based on performance." One study reported that the number and quality of educational experiences for trainees were unchanged,[10] whereas the third reported that the program contributed to departmental growth in all areas and that the residency program was now highly rated.[11]

TABLE 3

Impact of Compensation Program on Four Outcome Measures

Outcome Measure	Overall Financial Impact	Professional Productivity	Quality of Educational Services	Faculty Satisfaction
Andreae and Freed	↑	↑	↔	↑
Blalock and Mackowiak	↑	↑		
Brandt et al.	↑	↑		↑
Cramer et al.		↑		
Guss	↑	↑	↔	↔
Hilton et al.		↔		
Hopkins	↑	↑		
Kastor et al.	↑			↓
Rouan et al.	↔			
Shaw	↑	↑		
Stewart et al.	↑	↑		
Sussman et al.	↑	↑		↑
Tarquinio et al.	↑	↑	↔	↑
Willis et al.	↔			↑

Notes: ↑ = Positive impact; ↔ = neutral effect; ↓ = negative impact.

Faculty Satisfaction. Seven of the articles (50%) reported faculty satisfaction either directly through a survey measurement (n = 3 articles) or indirectly by reporting faculty retention (n = 4 articles). One study that involved a single division of internal medicine found that overall faculty job satisfaction was 97 percent compared with 90 percent for the department of internal medicine and 89 percent for the institution as a whole.[7] Another noted that most faculty (56%) were satisfied with the new plan.[13] The third article found that 72 percent of the faculty thought the program was necessary and 70.5 percent were satisfied or neutral with the system being used.[18] Of those articles that reported faculty retention, three listed actual turnover rates ranging from 0 percent to 5.7 percent.[9,10,16] One simply stated that unexpected turnover was low.[11]

DISCUSSION

The most important finding from our review was that incentive-based compensation programs can motivate academic physicians to improve their productivity in both the clinical and scholarly arena *without* a negative impact on job satisfaction or education of trainees. Use of financial incentives is not necessarily in opposition with and may actually enhance the academic missions.

This review suggests that effective faculty compensation programs are being implemented nationwide. We found efforts to design and implement programs originating more frequently at the department or division level than at the institution level. Nonsurgical departments or divisions more commonly report the use of productivity-based compensation programs. It is not clear if the use of such programs is less frequent in the surgical fields or if they are not represented in the literature. The surgical fields may experience less financial pressure than the cognitive-based fields do because reimbursement for procedures continues to exceed that for office visits.

All of the programs reviewed showed a positive or neutral effect on the financial status of the unit. This was most commonly achieved by providing individual or group incentives to enhance revenue-generating activity. The number of articles reviewed was too small to compare the impact of individual versus group incentives, but other studies have demonstrated that individual incentives are more effective than group incentives.[21]

It is not surprising that the RVU was used most often to measure clinical activity. The Medicare Resource–Based Relative Value Scale payment system uses the RVU to reflect actual physician work performed.[22] The RVU varies with the level of service, and although it reflects clinical revenue, is not tied to collections. As such, the use of the RVU does not penalize faculty for complexity of visits or payer mix, unlike other measures of clinical activity.

Providing financial incentives for increasing extramural funding can be an effective method to enhance funded scholarly activity. Measuring scholarly success is not new to AMCs, where the number of grants and publications is considered for promotion in rank. An expectation of a salary increase with a promotion in rank is the traditional method of motivating faculty involved in research, a process that often takes five to seven years minimum.

Implementing incentives that are timelier and linked to a specific goal, such as increasing the indirect cost recovery, may help AMCs to remain competitive in this era of decreasing financial resources.

Concern that productivity incentives for faculty will have a negative impact on teaching has been expressed.[5] Critics have pointed out that faculty will spend less time in education or supervision of trainees and the quality of the educational experience will suffer.[23] Three of the studies reviewed measured the impact of the compensation program on teaching and found the absence of any negative impact.[10,11,13] Two of these programs provided a credit for time spent teaching, and the third set an expectation for faculty participation in educational activities. It is unclear whether these particular interventions influenced the persistence of a quality educational experience at these centers after the implementation of the program. Because teaching is a fundamental service of academic institutions, further study is needed to determine if other programs experienced any decline in the quality of teaching.

The literature has many examples of skepticism regarding the acceptance of productivity-based compensation programs by academic physicians. In the articles reviewed, faculty job satisfaction was high, and most faculty were satisfied with their program. Faculty retention was not affected by the use of such programs. Three studies that measured satisfaction reflected that having adequate resources to provide accurate and timely data and open communication with faculty during implementation were essential to their success.[7,10,13]

The use of incentives to improve quality of care and the measurement of the impact of productivity-based compensation programs on quality of patient care were not well represented in this review. Several studies mentioned plans to implement quality of patient care incentives into their programs in the future. The paucity of quality-of-care incentives among programs may reflect the inherent difficulty of defining fair, reliable, and meaningful measures for physician quality-of-care delivery.

An unexpected finding in the review was the consistency in the length of time required to design and implement a program. Twelve months was the average duration and should be considered by health centers adopting a new program. Allocating less than nine months for the process may be unrealistic. Fewer than half of the studies reported having a specific committee charged with the design and implementation of the program.

LIMITATIONS

Because this review includes only published articles, it is susceptible to publication bias. We searched four large databases; however, it is possible that other articles that fulfilled our criteria were not indexed in these databases. We only included studies published in the past decade, and although the health care economic climate today is different compared with that of the previous decade, it is possible that programs developed and implemented before 1995 may have relevance to today's market. We did not exclude articles based on the methodology used to measure the success of the program. It is not clear if this may lead to an underestimation or overestimation of the success of a program.

CONCLUSION

A variety of academic physician compensation programs involving multiple specialties in various regions of the country are described in the literature. These programs are associated with positive financial impact and increased professional productivity in both clinical and scholarly activity. Programs can be implemented with the absence of a negative impact on medical education and a high degree of faculty satisfaction. However, further study is needed to understand the effect of such programs on the quality of patient care.

Health care leaders and managers should consider using the RVU as a fair and standardized measure of clinical productivity for physicians in AMCs. Providing faculty with access to timely data and administrative support is necessary to promote their success in the program. A minimum of nine months should be allowed for the design and implementation of a new program.

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REFERENCES

1. Mandel, G.H., and Vesell, E.S. "From Progress to Regression: Biomedical Research Funding." *Journal of Clinical Investigation* 114, no. 7 (October 2004): 872–6.
2. Inglehart, J.K. "Medicare and Graduate Medical Education." *NEJM* 338, no. 6 (1998): 402–7.
3. Magnus, S.A. "Physicians' Financial Incentives in Five Dimensions: A Conceptual Framework for HMO Managers." *Health Care Management Review* 24, no. 1 (1999): 57–72.
4. Conrad, D.A., and Christianson, J.B. "Penetrating the "Black Box:" Financial Incentives for Enhancing the Quality of Physician Services." *Medical Care Research and Review* 61, no. 3 (2004): 37S–68S.
5. Houpt, J.L., Good, L.D., Anderson, R.J., Aschenbrener, C.A., DeAngelis, C.D., Fortuner, W.J. 3rd, et al. "How Medical Schools Can Maintain Quality While Adapting to Resource Constraints." *Academic Medicine* 72, no. 3 (March 1997): 180–5.

6. Petitti, D.B. *Meta-Analysis, Decision Analysis, and Cost Effective Analysis*. 2nd ed. New York: Oxford University Press; 2000.
7. Brandt, T.L., Romme, C.R., LaRusso, N.F., and Lindor, K.D. "A Novel Incentive System for Faculty in an Academic Medical Center." *Annals of Internal Medicine* 137, no. 9 (November 2002): 738–43.
8. Hopkins, J.R. "Financial Incentives for Ambulatory Care Performance Improvement." *Joint Commission Journal on Quality Improvement* 25, no. 5 (May 1999): 223–38.
9. Sussman, A.J., Fairchild, D.G., Coblyn, J., and Brennan, T.A. "Primary Care Compensation at an Academic Medical Center: A Model for the Mixed-Payer Environment." *Academic Medicine* 76, no. 7 (July 2001): 693–9.
10. Andreae M.C., Freed G.L. "A New Paradigm in Academic Health Centers: Productivity-Based Physician Compensation." *Medical Group Management Journal* 48, no. 3 (May–June 2001):44–50, 52, 54.
11. Guss, D.A. "A Simple Plan—Faculty Compensation in an Academic Department of Emergency Medicine." *Academic Emergency Medicine* 9, no. 6 (June 2002): 654–7.
12. Shaw, D.V. "Practice Efficiency and Physician Compensation: A Case Study." *Journal of Medical Practice Management* 18, no. 3 (November–December 2002): 138–41.
13. Tarquinio, G.T., Dittus, R.S., Byrne, D.W., Kaiser, A., and Neilson, E.G. "Effects of Performance-Based Compensation and Faculty Track on the Clinical Activity, Research Portfolio, and Teaching Mission of a Large Academic Department of Medicine." *Academic Medicine* 78, no. 7 (July 2003): 690–701.
14. Blalock, J., and Mackowiak, P.A. "A Resource-Allocation Model to Enhance Productivity of Academic Physicians." *Academic Medicine* 73, no. 10 (October 1998): 1062–6.
15. Stewart, M.G., Jones, D.B., and Garson, A.T. Jr. "An Incentive Plan for Professional Fee Collections at an Indigent-Care Teaching Hospital." *Academic Medicine* 76, no. 11 (November 2001): 1094–9.
16. Kastor, J.A., Mehrling, M.M., Mackowiak, P.A., and Breault, P.W. "The Salary Responsibility Program for Full-Time Faculty Members in an Academic Clinical Department." *Academic Medicine* 72, no. 1 (January 1997): 23–9.
17. Rouan, G.W., Wones, R.G., Tsevat, J., Galla, J.H., Dorfmeister, J.W., and Luke, R.G. "Rewarding Teaching Faculty with a Reimbursement Plan." *Journal of General Internal Medicine* 14, no. 6 (June 1999): 327–32.
18. Willis, D.R., Kelton, G.M., Saywell, R.M. Jr., and Kiovsky, R.D. "An Incentive Compensation System That Rewards Individual and Corporate Productivity." *Family Medicine* 36, no. 4 (April 2004): 270–8.
19. Cramer, S.J., Ramalingam, S., Rosenthal, T.C., and Fox, C.H. "Implementing a Comprehensive Relative-Value-Based Incentive Plan in an Academic Family Medicine Department." *Academic Medicine* 75, no. 12 (December 2000): 1159–66.
20. Hilton, C., Fisher, W. Jr., Lopez, A., and Sanders, C. "A Relative-Value-Based System for Calculating Faculty Productivity in Teaching, Research, Administration, and Patient Care." *Academic Medicine* 72, no. 9 (September 1997): 787–93.
21. Conrad, D.A., Sales, A., Liang, S.Y., Chaudhuri, A., Maynard, C., Pieper, L., et al. "The Impact of Financial Incentives on Physician Productivity in Medical Groups." *Health Services Research* 37, no. 4 (August 2002): 885–906.
22. Gallagher, P.E., ed. *Medicare RBRVS: The Physician's Guide*. 5th ed. Chicago: American Medical Association Press; 2004.
23. Skeff, K.M., Bowen, J.L., and Irby, D.M. "Protecting Time for Teaching in the Ambulatory Care Setting." *Academic Medicine* 72, no. 8 (August 1997): 694–7; discussion 693.

Appendix 2N

An Academic Compensation Plan for an Orthopaedic Department, Harvard Clinical and Related Research: 2007

CLINICAL ORTHOPAEDICS AND RELATED RESEARCH
Number 457, pp. 64–72

An Academic Compensation Plan for an Orthopaedic Department

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The academic orthopaedic department has the primary goal of providing clinical services, educating orthopaedic surgeons, providing advancements through research and technology development, and creating and maintaining the administrative infrastructure that monitors and enables the department's overall mission. Simultaneous reductions in revenues and increases in the cost to practice medicine pose the greatest challenge to maintaining the academic orthopaedic department. Fundamental differences exist between the private practice and academic orthopaedic surgeon. Most importantly, while their value systems may differ, appropriate incentives (tangible and intangible) must exist to promote growth and retention in a non-private practice setting. A proper compensation plan must consider revenue and nonrevenue-generating activities within the context of the academic orthopaedic department to maintain the department's mission. This article discusses these issues and provides an overview of solutions available to structure an appropriate compensation plan that encourages academic and clinical productivity yet remains sensitive to divergent goals and values of the department's members.

The mission of the academic orthopaedic department is extraordinarily complex with divergent goals. The primary initiatives include the provision of clinical services, educating current and prospective orthopaedic surgeons, translational advancements through basic science and clinical research, and administering these functions while remaining economically solvent. The burden of these responsibilities is especially challenged by policy and third-party payers that have substantially reduced reimbursement as practice costs have simultaneously continued to rise.

In the current environment, providing proper incentives to maintain a committed physician base willing to fulfill the department's mission is the greatest challenge in an academic orthopaedic department. Indeed, in order to accomplish its initiatives an academic department must not only first obtain quality faculty, but also retain them. This necessarily results in a competition for quality surgeon resources within the local and regional healthcare environment.

This article provides an overview of how the academic orthopaedic practice differs from the private setting. It includes a construct to develop and implement a proper compensation plan that induces beneficial behavior supporting the department's mission and maximizing physician retention. Notably, the academic orthopaedic surgeon is often committed to striking a balance of revenue and nonrevenue-generating activities that in totality are practically and philosophically difficult to value. Understanding this complexity and implementing solutions that remain sensitive to the needs of both the department and its individuals remain the most reliable means to stay academically productive, facilitate physician recruitment, maximize retention, and create lasting harmony within the complex setting of an academic orthopaedic department.

Basic Economics of Health Care and the Academic Mission of an Orthopaedic Department

The contemporary mission of an academic orthopaedic department can be described as a four-legged stool supporting the departmental role in the academic community (Fig 1). The four key elements (legs) of the mission are (1) clinical services, including those provided to the medical and orthopaedic communities; (2) teaching future orthopaedic surgeons (medical students, residents, and fellows) for society; (3) advancement of new techniques, treatments, and quality care through research; and (4) admin-

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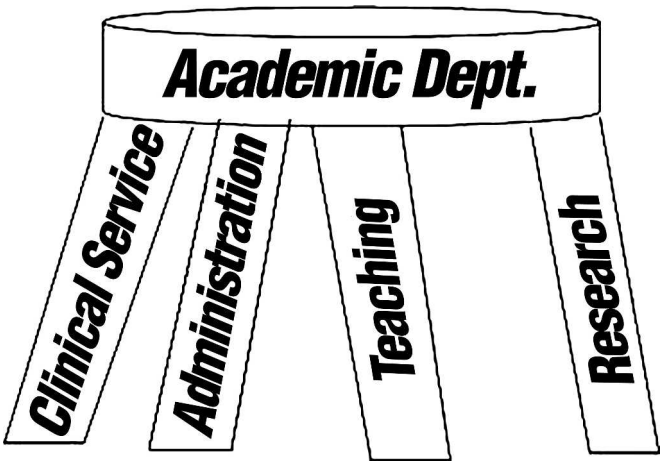

Fig 1. This drawing shows the "four-legged stool" model of the academic mission.

istration of the department. In a healthy department, all four components must be considered equally. However, that four-legged stool may be turned upside down so the foundation of these four initiatives is the base of the stool representing sound financial health of the department. Without adequate finances the department cannot maintain its faculty, who are the clinicians, teachers, researchers, and administrators (ie, the legs) (Fig 2).

This mission has been substantially challenged by financial pressures imposed by a growing economic burden of decreasing reimbursements for clinical services over the past decade. Medicare became an important source of revenue for patient care in the 1990s as managed care reduced the value of services provided by orthopaedic surgeons.[8,13,26] Revenues then dropped considerably with the Balanced Budget Act of Medicare in 1997.[4] Furthermore, there has been a steady growth in uninsured and underinsured patients who usually form a major proportion of cases treated by orthopaedic surgeons working in an academic health center. In a multispecialty hospital environment where financial statements are heavily scrutinized, the financial stability of one department often confers stability to financially ailing specialties. These and other factors have had a major effect on the diminishing margins that have become reality for most academic orthopaedic departments.[15]

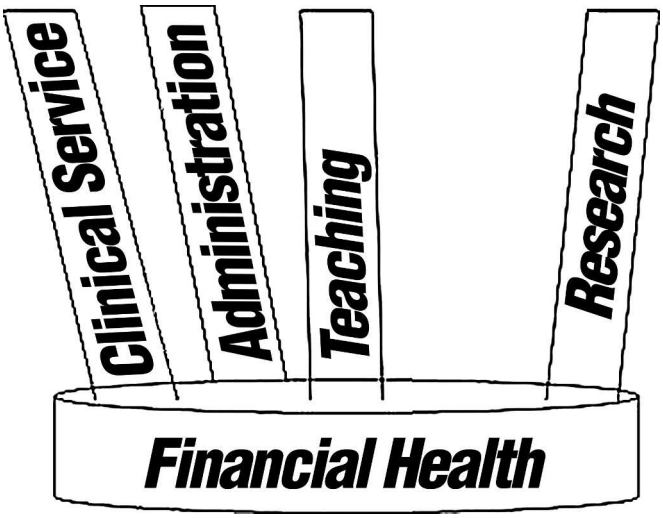

Fig 2. This drawing shows the "upside-down four-legged stool" model of the fiscal mission.

Academic Full-time Versus Private Practicing Orthopaedic Surgeon

Orthopaedic surgeons who practice their specialty in an academic health center environment differ in many ways from their colleagues in a private practice environment.[1,2,9,12,15–17,19] These differences lead to inherent advantages and disadvantages relative to issues related to the surgeon's quality of life. First, the academic orthopaedic surgeon begins his or her career with a clinical and an academic appointment. There is a commitment to teaching medical students, residents and, in some cases, fellows in postgraduate training. Depending on the individual surgeon's goals and desires, these responsibilities may be perceived as a benefit or burden. The added value of educating future orthopaedic surgeons is not only emotionally satisfying to the academic orthopaedic surgeon but provides a forum for his or her continuing education and a system for checks and balances governing clinical decision making. In addition, resident assistance in the operating room, clinic, and hospital settings is a valuable resource to the academic orthopaedic physician. Alternatively, the educational responsibilities require an additional time commitment in the clinic and operating room greater than required of the orthopaedic surgeon in private practice. Despite academic institutional models, which attempt to compensate academic full-time physicians for this added burden, they are rarely utilized and generally are insufficient to compensate for time lost from activities that generate revenue.[22] Adding to this financial compromise, most hospital-based academic orthopaedic programs have a mission to care for indigent patients and this burden generally is considered a shared responsibility among academic orthopaedic physicians. Payer mix can have a substantial impact on orthopaedic practice expenses because of the preponderance of nonvalue-added activity-related expenses.[6] Finally, an additional burden is contracting with insurance companies, financial registration, charge capture, billing and collection practices often beyond the control of the academic physician.

Second, the academic orthopaedist is often viewed in the community as the referral resource for the most complex and difficult cases. This case load, in addition to an often large primary care physician network, leads to consistent referrals. While conferring some advantages, this case load imposes limitations. Notably, on the physician side, there are often disincentives to treat these complex cases. For example, these cases may require substantial investments of time without proportional increases in relative value units or reimbursement, and given the greater variability in outcomes in managing this difficult patient group, these physicians are exposed to a greater medicolegal risk. Alternatively, the institution may benefit at the "expense" of the physician as these diagnoses and treatments are often associated with comorbidities that have a positive financial impact on Diagnosis Related Groups hospital reimbursement.

There are other examples where the hospital and physician incentives are not aligned. In most states, hospital reimbursement (as measured by the ratio of revenue to charges) is better than physician reimbursement from the State (eg, Medicaid). Moreover, hospitals also have access to the federal Disproportionate Share for Hospitals program that provides substantial revenues for charity services and other undercompensated services. Most hospitals (especially academic hospitals) are reluctant to share these revenues with physicians even though physicians do not have access to such a federal or state program. This has placed a disproportionate burden on faculty physicians and the ability of academic departments to recruit and retain experienced professionals. In addition, some academic practices include salary caps, usually based on benchmarks which are lower than MGMA benchmarks, and there are also limits on outside consulting.

Third, the academic orthopaedist usually has a commitment to basic science and translational research, which supplants available time for patient care and other revenue-generating activities. Clearly, the motivation for this activity is not financial because these activities are rarely supported by salary or financial incentives but rather based on a desire to contribute meaningful information to the advancement of care of musculoskeletal problems. In addition, there is no doubt the academic orthopaedic surgeon finds the peer-review process and respect achieved from the associated publication and presentations particularly intellectually gratifying. Unfortunately, funding for these activities, especially for salary support, has substantially eroded over the last decade and physicians have been forced to turn to industry research support over the public sector (ie, the National Institutes of Health). This burden is associated with inherent conflict that must always be defined at the time of presentation or publication.

Fourth, compared to a decade ago, hospitals have greater demands on liquidity, such as pension requirements and larger capital needs for aging facilities and clinical technologies. Therefore, there are fewer resources available to subsidize physician operations and clinical critical pathways leading to inefficiencies for the academic orthopaedic surgeon. Additional factors contributing to the academic medical center's inefficiencies are its relatively large size, hands-on surgical training of residents and fellows, and a general lack of incentives for hospital nursing and anesthesia staff. Added to this burden are billing and collection practices often beyond the control of the academic physician. This is especially true if the department has its own billing service as relationships with the hospital infrastructure can be complex and counterproductive to optimum performance of billing activities. Despite these issues, there are clear advantages derived from the depth of resources and the multidisciplinary nature of a typical medical center that provide the academic orthopaedic surgeon substantial opportunities for excellence in patient care.

Fifth, academic orthopaedic surgeons are at times exposed to institutional aspects of their practice including salary caps, limits on outside consulting opportunities, and taxation from the dean of the medical school and/or the department. These taxes are imposed to support the social missions of the department and institution in addition to research and teaching. They may be outside the control of the leadership of the department and the tangible advantages of being a member of the academic community of a university may be difficult to measure. For example, there may be tuition benefits for faculty and their families in some institutions partly underwritten by departmental contributions. In addition, institutional guidelines may prohibit entrepreneurial activities because of perceived conflicts associated with resource utilization. These activities can require substantial time commitments outside of the institution, leading to a compromise in the physician's ability to teach, perform research, and remain clinically active. Alternatively, the tangible benefits include the provision of institutional research support and a heuristic environment for intellectual exchange and fruitful research.

Because of these differences, it is logical the compensation plans that usually govern the income for academic physicians will differ from those applied in a private practice.[10] Academic compensation plans are varied and seem to be determined by several factors, some of which are driven by institutional concerns and some of which are internal to the department.[15] Not uncommonly, academic orthopaedic surgeons are salaried with some incentive structure that considers clinical and academic productivity, as well as the participation in activities of citizenship. This last component may include committee involvement, other

administrative responsibilities, and teaching. Furthermore, some programs reward academic productivity in the form of extra compensation for research, grants, and published peer-reviewed papers. In other models, physicians are less tied to the academic center and the institution functions more like a "landlord" than an employer. In these scenarios, physicians may be compensated more like private practice physicians while the institution seeks to minimize agency-related issues and their associated liability. Despite the arms-length relationship in this model there often remains some form of taxation, whether through research overhead or direct taxation on behalf of the department or institution.

History of Physician Compensation

During the past decade, the precedent has been academic physician's salaries are lower than their private practice counterparts. For example, primary care physicians in an academic environment have earned 24% and specialists 51% less than their private practice colleagues.[1,5,12,18,23,24] Some of this disparity may be explained by the observation private practice physicians are more clinically productive than academic physicians in terms of revenue-generating activities (higher gross charges; greater patient volumes; a larger number of relative value units completed; a paucity of teaching and academic commitments, including conferences and participation in continuing medical education); however, extrinsic market factors also have had a major effect on the net overall decrease in physician earnings during the past decade.[15]

These have included greater commitments to managed care, negotiated contracts, uncompensated care, decreasing Medicare payment rates, increased overhead, increasing malpractice premiums, increasing compliance costs for programs such as those mandated by the Health Care Financing Administration (now termed Centers for Medicare and Medicaid Services, CMS) and the Health Insurance Portability and Accountability Act, larger capital investments in technology (ie, the electronic medical record), and higher costs for physician recruitment and retention. For example, in the current complex health insurance system, it is estimated 30% of all initial claims for payment from a physician's office are initially rejected. An initial claim costs slightly less than $7 to bill; however, the cost to resubmit a claim is approximately $25.[15] This adds greatly to the overall cost of a department's overhead. Moreover, some departments work with a centralized billing service and a failure of resubmission is not uncommon in some circumstances; thus, many services actually go unreimbursed due to lack of followup or appeal, which is critical to the success of the orthopaedic billing process.[15] Lastly, unlike "in-house" billing where physician oversight is consistent and the process generally is a prioritized administrative function, hospital billing operations are often undercapitalized and have little physician oversight.

In some institutions, academic health centers have increasingly relied on excess revenues from their clinical departments to subsidize the institution's social mission for charitable and academic work. This can be in the form of taxation or it can be through an institutional-wide practice plan that builds in mechanisms for overtaxation for "richer departments" to subsidize the weaker financial departments in the institution.[4] In general, a dean's tax may in part be returned to the academic practice in the form of overhead support (ie, secretaries, academic support staff), and a department tax is more likely to be returned in part to the academic practice when it is an orthopaedic department rather than a division of a department (ie, the department of surgery).

As physicians have felt the pressure from reduced payment for services, they have generally responded through greater work efforts in the absence of a proportional return for this effort. For example, from 1995 to 1999, orthopaedic surgeons as a group had a mean increase in compensation of 2.3% but a mean increasing in billing of 24%.[12] This reflects a substantially larger work effort in the presence of decreased remuneration.

Thus, with declining reimbursements for specific services, a need for higher levels of physician productivity has also developed particularly in practice environments where clinical productivity is a major component of overall income. This increases the pressure to efficiently see patients and perform surgery, which may substantially compromise the remaining three legs of the stool: teaching, research, and administration. These components of the overall mission seem increasingly undervalued in these kinds of environments. Furthermore, competition for patients and resources, such as operating room time, may detract from the overall collegial environment of an academic orthopaedic program in such situations.[15]

The challenge that affects most academic institutions is the need to balance the desire for increased clinical productivity with the mission to support medical research and education. In fact, despite their lower academic salaries, academic physicians work longer hours than physicians in private practice (American Academy of Orthopaedic Surgeons-Orthopaedic Practice in the US 2005–2006, Final Report; June 2006).

Physician Recruitment and Retention

Recruitment of young, energetic, and enthusiastic talent and retention of high-performing, dynamic academic orthopaedic surgeons is a major challenge to leading programs throughout the country. Although income is not the only factor in this equation, it is the major factor as shown in many analyses and polls.[25] In 2002, a survey of almost

2000 practicing physicians across the United States found approximately 27% indicated they would likely leave their current practice in the next 2 years. Inadequate income was cited as the main reason in groups of fewer than 50 physicians.[25] The cost of such physician turnover is difficult to calculate because it involves not only lost billing revenue, but also the added cost of recruiting and orienting new faculty to assume these positions. Furthermore, it disrupts the mission of the department in its teaching and research commitments.

The ideal healthy department retains its members until they have the opportunity to leave for vertical movement into leadership positions in other departments. The fitness of the department also depends on the subspecialists who remain involved in clinical care and focused areas of basic science and clinical research. Emerging interests in outcomes research and health care economics and policy have led to the pursuit of additional areas of expertise for department members (ie, MBA, MPH).

Incentive-based Compensation Plans

Because of changes in the way hospitals and physicians were reimbursed in the past, compensation plans have evolved out of necessity. In the 1970s, physician compensation was based on fee-for-service payment. Most patients paid their physician and received reimbursement from their insurance company.[5,14] In addition, current contract arrangements prohibit the practice of balance billing, and reimbursements remain well below actual charges in most instances. Due to substantial growth in health care costs, health maintenance organizations and third-party administrators began to evolve in the 1980s, and a large percentage of the United States population is now covered through these organizations.[10] Therefore, physician practices in private and academic health care sectors consolidated to create a greater economy of scale for negotiating contracts and reductions in expenses. Still, reimbursements have declined due to the factors already cited.

Measuring Physician Productivity: Past, Present, and Future

Historically, physicians functioned as separate entities without attending to costly overhead and deteriorating time management. This was understandable as the economic environment was less complex, relatively large surgical fees were rarely questioned and the bureaucracy of administrating billing and collections was minimal. As physicians formed groups to navigate the increasingly complex health care system, an attempt was made to align the financial goals and health of the overall organization with its individual members. In academic institutions, a highly variable system of measuring an individual physician's productivity against his or her expenses evolved, usually in the context of the additional taxation required to support the social mission of the institution and the orthopaedic department. The most common measurement methods used for determining a physician's productivity was physician profiling and benchmarking.[3,24] Physician profiling involves a combined analysis of cost, utilization of resources, and assessment of treatment outcomes. The goal is to lower costs and improve quality of care.

Benchmarking compares factors such as productivity (number of patient visits) and clinical outcomes among patient groups in an effort to measure the overall success of care. The problem with these measures is methods for measurement have not been clearly established, validated, or objectively tied to a compensation formula.

Economic valuation of intervention is an emerging area of interest that will require high-quality information if policy makers emerge and engage in decision making related to physician reimbursement. Recently the concept of "pay for performance" has been developed in an attempt to improve patient outcomes, increase safety, decrease medical errors, and reduce costs by tying these objectives to physician reimbursement.[11] Although this is an evolving metric as it applies to orthopaedics, it is likely to become an accepted method to measure the value and quality of musculoskeletal care in the future. Compensation plans in academic orthopaedic programs will incorporate this into their formula for reimbursement. Elevated standards and measures of quality will provide an important opportunity for academic health centers and their orthopaedic departments to differentiate themselves from the private sector. If this metric becomes incorporated into compensation plans and by insurers, an academic orthopaedic department should be able to prove quality of care is a rationale that fairly values its clinical services. This is a key strategy to achieve and maintain a successful business.[25]

Another factor being considered for "pay for performance" is the relationship of efficiency to the costs of delivering care. A growing concern is physicians who simply "cost" more to practice will be singled out with ramifications on how patients are referred for treatment. Patient satisfaction scores that include waiting times (in clinic and for surgery), which are typically better in a private environment compared to the academic, may be considered during this process.

Academic Physician Compensation Plans Compared

A compensation plan must be created in the context of the overall mission and vision of the department and it must be framed into the strategy and operations of that department. These concepts are beyond the scope of this article but are central to the concept of fair compensation that motivates productivity and promotes quality of care.

The two main goals of a compensation plan for an academic orthopaedic surgery department are (1) to recruit the best and brightest young orthopaedic surgeons and retain them through their developing careers; and (2) to provide fair compensation that is competitive with private practice colleagues while balancing the overall financial and social mission of the department to provide excellence in teaching, clinical care (regardless of ability to pay), and advancing knowledge through research and education.

The optimal compensation plan must be based on the philosophical commitment expressed above and on the practical business management of the department. This must include a shared goal of management of the costs of the group and a willingness to allocate certain administrative and practice shared expenses. These expenses, whether direct or indirect, must be transparent to all members of the group. For example, a physician cannot be subsidized by the department unless explicitly agreed to or they are knowingly supported by an endowment or institutional tax due their novel role as a clinician-scientist or for assuming a substantial academic or administrative responsibility. A method advocating activity-based costing to evaluate expenses has been proposed by Brinker et al.[7] This methodology is truly objective and considers all activities in an orthopaedic practice when calculating an overhead profile. The compensation plan must also be constrained by budgetary commitments and future projections for departmental needs. Furthermore, it must also fulfill the following criteria:[21] (1) motivate through reward for performance on all levels; (2) influence behavior (efficiency, cost management, quality of care, commitment to teaching and research); (3) create and maintain a sense of fairness; (4) be framed in a clear methodology with a transparent architecture; (5) promote the overall financial and academic success of the group; and (6) be true to the four-legged stool model for balanced mission of the department.

Certain extrinsic factors also must be considered: (1) fair balance for individuals who use more resources as a requirement of their practice specialty or commitment to research (eg, support in addition to a mutually agreed upon package of support and services might come from several sources, including the practice income, department taxes, grants, endowments, or a percentage of overhead from research grants); (2) fair support as agreed by the group or subsidization by other means for individuals whose specialty historically reimburses less than other specialties; (3) importance and value of citizenship, such as teaching, community service, and committee responsibilities; and (4) value of time spent conducting research.

Three basic models are relevant to an academic orthopaedic program and the benefits and disadvantages of each are noted.[20] (1) Straight Salary: In this model, physician recruitment efforts, retention, job satisfaction, and motivation to teach and conduct research are variable. (2) Production-Based Payment: In this model, physician recruitment, retention, and satisfaction are fair, and the motivation for teaching and research are variable. (3) Salary and Incentives: In this model, physician recruitment and retention are good, and the motivation for teaching and research is variable.

Another model used successfully in academic orthopaedic practices is the "pod" concept where each subspecialty group (eg, spine, sports, arthroplasty, pediatrics, etc) is managed as a separate "pod" with separate financial profit and loss statements. This provides incentives for productivity and accountability while allowing individual pods to capitalize on the strengths of individual pod members (eg, clinical volume, research, administrative skills, and providing care for the indigent).

A Model Academic Orthopaedic Compensation Plan

In a recent article published as a case study in the Harvard Business Review, Barro et al[3] reviewed the success of a compensation plan in an academic orthopaedic department. They described the motivations behind this plan as reward for clinical productivity and entrepreneurship, as well as individual accountability for utilization of resources. In this plan, each surgeon was given a base salary based on historical net revenues but with an incentive tied to productivity (ie, case volume and number of office visits completed) and calculated at the half year and end of fiscal year cycle. Overhead was shared (indirect) and individual (direct), and this was transparent so all members were aware of their exact business costs. A departmental tax was created to ensure sufficient funds were made available to satisfy the needs of the department's social and academic mission to perform research and teach.

Base salaries were adjusted annually based on the year's performance (Fig 3) based on a specific set of goals for the compensation plan (Appendix 1).

The details of this compensation plan are relatively straightforward. Some components built into this plan, which may not be self-explanatory, are the shared administrative expense for staff required to perform services that benefit the entire department. These include, but are not limited to, administration of the residency, delegation of teaching responsibilities, participation in the establishment of guidelines for operating room use, and management of the information services (computers, etc) for the department. It also may include overhead payment to the hospital for services such as compliance and legal counsel or billing operations. In addition to this, the department sets a percentage of gross collections as a supplemental tax to place money in a department development fund. This fund is used by the chairperson to support the mission of the

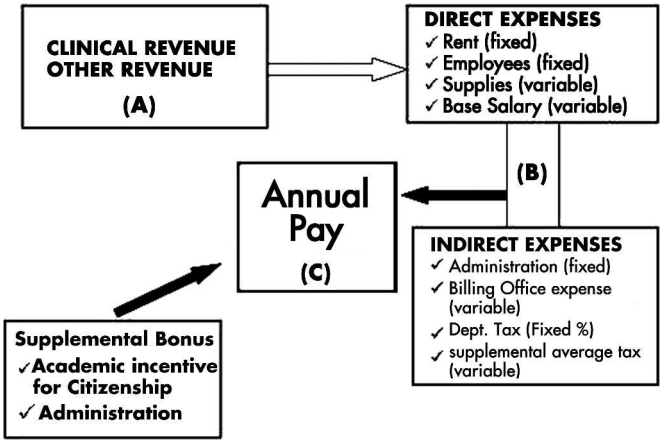

Fig 3. The flow chart shows the organization of physician compensation in a model academic orthopaedic program.

department as supplemental financial incentives in recognition of nonclinical service (Fig 3).

Lastly, because each physician may exceed his or her overhead or expenses at the end of a fiscal year, overage money is subject to a supplemental tax at a variable percentage. The basis for this added tax is to ensure the fiscal health of the department. Departmental expenses are calculated to keep an adequate cash reserve to pay out bonuses and meet needs for added expenses such as recruitment of new faculty. The percentage of this overage money paid as a bonus is then determined based on these factors.

Institutional Oversight

The academic institution oversees the orthopaedic department's compensation plan to ensure it remains true to its mission (previously stated) and is consistent with the guidelines of the institution. It may be determined salary caps are associated with disincentives for productivity; and in the current economic environment this may detract from the department's overall mission if members of the department are not given incentive to work hard to achieve a net-positive bottom line. Thus, the chairperson may negotiate with his or her institution to seek waivers when appropriate. Ideally, salary caps do not make fiscal sense in the current health care environment in which academic compensation has historically lagged behind private practice compensation.

Expected Results: The Bottom Line

The model described by Barro et al[3] has been in effect for more than 4 years at its institution. Clinical productivity has increased in all divisions of the orthopaedic department; in some divisions, the growth of clinical income has exceeded 20% per year. More than 80% of the department members eligible for bonus pay above their base income have received an annual bonus, and the research component of the department has flourished in its productivity and growth of faculty.

This approach has advantages and disadvantages. On the positive side, clinical productivity and income increase. On the negative side, incentives to teach, lecture, volunteer, and spend time performing research activities such as writing and applying for grants may suffer. The current economic infrastructure must remain sensitive to generational change and its desire for balance. For example, the contemporary academic yet clinically active physician is less likely to spend evenings and weekends away from his or her family to complete the responsibilities of boards, committees, and research.

This case study represents only one of many models for an academic orthopaedic department; however, it describes a success story that may be worth emulating. Each academic health center has its own guidelines, and they all have the same mission to cultivate the best clinicians, educators, and researchers and to retain and develop these individuals. A sound and fair compensation plan is a means to this end.

Private practice orthopaedic surgeons have multiple opportunities to establish revenue centers from ancillary activities, including imaging, ambulatory surgery centers, and physical/occupational therapy. All of these ancillaries will have similar issues related to the specific model deployed by the academic compensation plan. Traditionally, these activities have been forbidden or at least highly discouraged in an effort to avoid direct competition with the institution. This competition may have implications financially and academically. For example, while it might prove financially beneficial for the orthopaedic practice to incorporate radiography and magnetic resonance imaging as a service line and derive revenues from the technical and professional components, the institution not only suffers financially, but should there be a radiology residency program at that institution, it too might suffer due to a drop in the number of examinations requiring a radiologist's interpretation. Contemporary academic orthopedic practices have evolved to include the development of ancillary income-generating activities as well. With imaging, a viable compromise for "in-institution" physician offices might be for the physician practice to bill and collect for the technical component and allow the institution's radiologists to bill and collect for the professional component. Another benefit derived from this compromise is several insurance carriers may require a board-certified radiologist to interpret advanced imaging studies such as an MRI in order to be reimbursed. In addition, CMS policies require a formal

radiology interpretation as part of the medical record to substantiate charges. This interpretation may be given by any physician privileged by the hospital to give such an interpretation. This can include orthopaedic surgeons as well as radiologists. Other areas of compromise might include full implementation of imaging services only at off-site physician offices in an effort to offset the on-site commitment to the institution.

Ambulatory surgery centers offer a substantial financial opportunity and, depending on the region of the country, can have profound benefits on a physician's yearly salary. Historically, facility fees associated with surgical procedures have provided the largest contribution to the hospital's bottom line and are directly related to surgical activity. Not-for-profit hospitals and institutions are reluctant to involve themselves with private for-profit ventures that compromise their share of the revenues. This delicate area can create profound tension between an academic institution and a surgical department. There are several instances where physicians have attempted to vest in outside ventures with their institution responding to these efforts with punitive measures.

Compromise can be achieved with enhanced productivity, reductions in overhead, and surgeon buy-in when joint ventures are established. These arrangements must strictly abide by the Stark regulatory guidelines. Joint management and ownership examples do exist proven beneficial to all vested parties. For example, at Rush University Medical Center in Chicago, the hospital remains the General Partner in a Limited Liability Corporation (51% ownership) and the physicians (49% ownership) have important oversight and decision-making power. This has led to enhanced quality of care, improved morale, a reduction in employee turnover, improved quality of life for physician users, and greater profitability.

Finally, the implementation of physical/occupational therapy creates additional challenges. Alienating referral sources is a potential risk of these ventures but can be mitigated by creating management relationships with therapy vendors that minimize these concerns. Hospitals generally have considerable concerns related to direct competition for these services and often the only opportunity to establish this service line is at off-site offices geographically disparate from the medical center. Even these opportunities will depend heavily on the nature of the relationship between the academic physician practice and the governing institution.

DISCUSSION

To foster academic productivity, facilitate physician recruitment, maximize retention, and create an enduring balance of these factors, there must exist a mutual understanding of the respective needs of the orthopaedic department and the academic medical center that houses this department. Unfortunately, guidance is largely lacking in the development of appropriate compensation formulas. Contemporary solutions are varied and often predicated on anecdotal experience. There is a need for the development of basic understanding of how the academic orthopaedic surgeon differs from the private practice orthopaedic surgeon. The infrastructure provided in the academic setting creates a unique environment that fosters the ability to perform research, teach our existing and next generation of orthopaedic surgeons, and provide care that meets the needs of the hospital community. Turning to the literature to answer questions related to physician compensation offers limited assistance in this regard. Thus, adhering to basic principles that foster buy-in from department members is a helpful adjunct to achieve and maintain physician and departmental productivity (clinical and academic) while continuing to serve for the greater good of the institution.

Provision of clinical services is generally a foregone conclusion for department members as most desire some element of clinical activity. An exception to this is the physician who desires to minimize his clinical activity in lieu of maximizing academic or administrative responsibilities. Provisions for this behavior must exist to compensate these individuals for their non-revenue-generating activities. Independent of the system employed, it must be prospective, well-defined, and transparent to department members. In essence, a desire to coexist in an orthopaedic department at an academic institution requires some economic sacrifice on the part of those unwilling to contribute to the academic or administrative burden.

All department members who function in the presence of medical students, residents, or fellows have an obligation to educate. This responsibility, while often a primary reason for an individual's desire to pursue practice outside the private setting, is too often overlooked due to economic concerns and administrative pressures for time and commitment. At some level, departmental enforcement of this responsibility may be required if only to remind physicians of the "give and take" environment that benefits their practice. Arguably, clinical productivity in some aspects of patient care or surgical efficiency are compromised due to this commitment, but the system as a whole benefits from a firm contribution to our future orthopaedic practitioners.

Access to an academic infrastructure enables the academic orthopaedic surgeon to develop new techniques, perform clinical and basic science research, and ultimately, benefit our patients from the translational component of this work. The compensation formula can encourage these activities by protecting some element of remu-

neration specifically dedicated to achieving these goals. However, similar to all aspects of the compensation plan, it must remain prospective and transparent to all.

The development and implementation of an academic compensation plan in an institutional setting is obviously complex and challenged by divergent goals. Unifying the department's members can occur by economic and noneconomic considerations. Strong leadership in this regard is required, but encouraging contributions from all department members will have the greatest potential to maintain the balance of productivity and commitment to the social good of the department.

References

1. Academic Faculty Pay Hikes Keep Pace with Increases for Private-Sector Groups. Physician Compensation Report, May 2002. Available at: http://findarticles.com/p/articles/mi_m0FBW/is_5_3/ai_86040103. Accessed February 10, 2005.
2. Baigelman W. Avoid these traps in creating a primary care compensation system. *Manag Care*. 1995;4:24–30.
3. Barro JR, Bozic KJ, Zimmerman A. Performance Pay for MGOA Physicians (A), Harvard Business School Case #9-902-159. *Harvard Business Review*. March 2002.
4. Blumenthal D. Unhealthy hospitals: addressing the trauma in academic medicine. *Harv Mag*. 2001;29–31.
5. Bohlmann RC. Physician compensation in transition: the market-based alternative. *Med Group Manage J*. 1996;43:8–10, 12–15.
6. Brinker MR, O'Connor DP, Woods GW, Pierce P, Peck B. Orthopaedic practice expenses. *J Bone Joint Surg Am*. 2002;84:1816–1822.
7. Brinker MR, Pierce P, Siegel G. Development of a method to analyze orthopaedic practice expenses. *Clin Orthop Relat Res*. 2000; 372:302–313.
8. Cave DG. Vertical integration models to prepare health systems for capitation. *Health Care Manage Rev*. 1995;20:26–39.
9. Glass KP, Pieper LE, Berlin MF. Incentive-based physician compensation models. *J Ambul Care Manage*. 1999;22:36–46.
10. Gottlieb S, Einhorn TA. Beyond HMOs: understanding the next wave of change in health-care organization. *J Am Acad Orthop Surg*. 1998;6:75–83.
11. Herndon JH. Pay for performance: coming your way soon. *AAOS Bulletin.* 2005:42–44.
12. Johnson BA. Trends in physician compensation: growth in workload continues to outpace growth in compensation. *Hosp Physician*. 2001;47–58.
13. Kongstvedt PR. *The Managed Care Handbook.* Gaithersburg, MD: Aspen Publishers Inc; 1996.
14. Kowalczyk L. For doctors, bonuses for quality care. *The Boston Globe* Web site. Available at: www.boston.com/dailyglobe2/311/na._doctors_bonuses_for_quality_careP.shtml. Accessed February 10, 2005.
15. Krakower J, Williams D, Alexander H, Kahn C, Blaine A. *An Emerging Clinical Imperative: Challenges and Solutions for Faculty Practice Plans and Clinical Departments,* Vol 1. Washington, DC: UHC-AAMC; 2002.
16. Levine JK. Compensation models and issues for a multispecialty group practice. *J Ambul Care Manage*. 1996;19:50–58.
17. Mallon WT. *The Handbook of Academic Medicine.* Washington DC: Association of American Medical Colleges; 2004.
18. Medical Group Management Association. *Academic Practice Faculty Compensation and Production Survey.* Englewood, CO: Medical Group Management Association; 2000.
19. Nichols CE 3rd. Physician compensation in the academic setting. *AAOS Bulletin.* 2004.
20. Sahney VK. Integrated health care systems: current status and future outlook. *Am J Health Syst Pharm*. 1996;53(Suppl 1):S4–S7.
21. Specialty Group Practice Physicians' Compensation. Medical Group Management Association Web site. Available at: www.mgma.com/press/physcomp-2005.cfm. Accessed February 10, 2005.
22. Stites S, Vansaghi L, Pingleton S, Cox G, Paolo A. Aligning compensation with education: design and implementation of the educational value unit (EVU) system in an academic internal medicine department. *Acad Med*. 2005;80:1100–1106.
23. Tufano JT, Conrad DA, Liang SY. Addressing physician compensation and practice productivity. *J Ambul Care Manage*. 1999;22: 47–57.
24. Weber DO. Hiring, engaging, and retaining the A-team. *Physician Exec*. 2005;31:6–12.
25. Welch J, Welch S. People management. In: *Winning.* New York, NY: Harper Business; 2005:97–118.
26. Zelten RA. Provider reimbursement alternatives and the placement of financial risk: a framework for analysis. *Top Health Care Financ*. 1981;8:61–72.

APPENDIX 1. Goals of Compensation Plan

(1) Achieve production-driven compensation format
(2) Reward clinical service activities
(3) Require basic level of clinical, teaching, and research work
(4) Support and reward academic, research, and teaching activities
(5) Reward citizenship (committee involvement and department service)
(6) Require responsibility of individual for expense of doing business
(7) Use actual dollars as measure of productivity
(8) Employ modified cost accounting to fairly allocate practice expenses
(9) Promote teamwork and collegiality
(10) Assure compensation system is fair and transparent

Appendix 2O

An Incentive System for Radiologists in an Academic Environment, American College of Radiology: 2007

An Incentive System for Radiologists in an Academic Environment

Edward I. Bluth, MD

The management of a staff of outstanding academic radiologists poses the challenge of directing highly intelligent, individualistic, and motivated individuals to move in the same strategic pathway. For a radiology department to be successful, it is generally understood that a mission statement, goals, objectives, and a strategic plan are essential. In many industries, incentive plans are used to accomplish the task of moving an enterprise forward. For an incentive plan to be a successful motivator, it must be fair and easy to understand, put a significant dollar amount at risk, and offer a payout that is definitely achievable.

At the Ochsner Health System in 2002, all chairs were asked to develop incentive plans for their departments. They were given the freedom to develop their own plans, but each chair was given instructions that 10% of individual compensation must be at risk with this plan. The following details describe a plan that was successfully implemented 4 years ago in the Department of Radiology of the Ochsner Health System.

BASICS OF THE PLAN

As directed by the administration of the Ochsner Health System, 10% of individual compensation was placed in a pool for distribution. In accordance with this directive, the details of the plan were developed in the radiology department by its chair. In radiology, the risk pool was broken down into 2 components: 80% (of the 10%) was designated for work activity directly related to being a "good citizen" in the department and was expected to be achieved by all. The remaining 20% was designated for activities that were under voluntary personal control and therefore could be used to motivate an individual.

Eighty percent of the incentive plan was expected to be achieved and paid out to a departmental member for being a good citizen. This meant causing no significant interpersonal problems in the workplace; performing all assigned work activities, such as arriving and leaving at appropriate times during the day; and showing respect for all members of the department, including the technologic, secretarial, and nursing staff members. Last and more important, all members were expected to participate in developing and ultimately following the administrative strategy and rules developed within the department. As stated, it was expected from the onset that everyone would receive this payout. This rule quelled a considerable amount of fear among members of the department that their salaries could be arbitrarily cut by the chair.

The smaller 20% component of the incentive plan was designated for specific activities considered to be under personal control. These are voluntary activities the chair believed would definitely benefit the department. To develop this component of the incentive plan, the chair appointed an advisory incentive committee consisting of 5 individuals: a chair, a vice chair for clinical activities, a vice chair for academic and research activities, and 2 elected members from the general department. The elected members serve 1-year terms and can be reelected. Although the chair made an initial presentation, it was up to the committee to develop a list of desired activities and behaviors that should be rewarded. The committee met several times to discuss activities considered to be of value and to develop a self-study on the basis of these desired activities and behaviors, which would be filled out personally by members of the staff. The committee carefully defined the criteria and developed a point system on the basis of the self-study that rewarded activities on a sliding scale of their importance to the department and the institution. The committee determined the number of points to award for each activity. The self-study was presented, explained, and discussed at staff meetings before it was implemented.

The self-study had multiple components. Departmental members were given approximately 2 weeks to complete these forms and return them to the chair. The components of the self-study included the following elements:

1. Resident lectures and case conferences; different points were given for new or revised formal lectures. Fewer points were given for previously presented lectures, case conferences, and board reviews.
2. Committee work both within the department (involving education, quality improvement, the picture archiving and communication system, and

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equipment evaluation), within the institution (involving medical affairs, professional affairs, the institutional review board, benefits, etc), and at the national and state levels (involving the ACR, the Radiological Society of North America, the American Board of Radiology, the Radiology Residency Review Committee, etc).
3. The development of new components of the practice or business.
4. Resident interviews.
5. Attendance and participation at interdepartmental conferences.
6. Institutional review board-approved research.
7. Research presented by mentored residents or staff members at national and regional meetings.
8. Papers submitted to peer-reviewed journals (case reports submitted to journals were given fewer points than original research).
9. Editorial board positions.
10. Speaking at local, regional, and national meetings.
11. Being assigned as a resident mentor during the 4-year program.
12. The timely signing of reports.
13. Regular attendance (85%) at staff meetings.
14. Teacher of the year.
15. The percentage of clinical production by the individual was also given a point basis. (The top 3 performers in clinical production were guaranteed to receive the mean number of points for departmental activities. In other words, individuals who simply focused on clinical output rather than scholarly and educational activities were also rewarded in this incentive program.)
16. Individuals were also allowed to include other components they thought the Incentive Committee should consider regarding their individual cases and that were not included in the self-study.

The committee was also responsible for reviewing and grading the self-study when it was returned. As such, the assignment of points for activities was not considered biased or arbitrary by staff members. The total number of points achieved by each member in the department was summed and divided by the total dollars in the 2% pool, thus producing a dollar per point value. Each radiologist's points were multiplied by the dollar per point number to achieve the 2% varied incentive payment. In addition, the chair had a small discretionary fund to resolve what he considered to be inequities to deal with special individual circumstances.

OUTCOME

This program of an incentive system has been in use since 2003 and has been accepted by all members of the department without any significant challenges. The administration has been very happy with the incentive plan, because it has improved departmental behaviors. Among the changes noted were the more timely signing of reports and improvements in resident lectures, with a considerable number of old lectures being updated and the development of many new lectures. There were no longer any "no-shows" for resident lectures, because points were deducted if such an occurrence was reported. Individuals were motivated to trade lecture dates for any conflicts. Other outcomes were that attendance at staff meetings rose to nearly 100%, which allowed greater participation and involvement of the staff in strategic planning. Residents' and staff members' involvement in research also increased, and the number of papers submitted and ultimately presented at national radiology meetings increased significantly. New clinical programs were established during this time, such as uterine artery embolization and radiofrequency ablation. Additionally, there was a significant increase in the volume of work without significant complaints among the professional staff members.

The individual points given to individuals were confidential, but the number of points generally ranged from 25 to 70. The dollar per point value ranged from $100 to $200, depending on the 6-month interval.

After several rounds, this program has now become an accepted component of our departmental compensation. From the viewpoint of administration and the chair, the implementation of the plan has led to major improvements in access, production, and scholarly activities. For the most part, difficult discussions with staff members regarding participation in departmental activities and promoting strategies have been significantly reduced. The dollar spread has not caused significant dissension, because it has been kept relatively small, yet the improvement in departmental involvement in achieving strategic objectives has been great.

Incentive plans have been proposed in the past primarily as tools to increase clinical productivity [1] or to reward the cost-effective delivery of health care [2]. No previous publications in the literature discuss the use of incentive programs in radiology. Additionally, the incentive plans published previously focused primarily on increasing clinical productivity and patient ac-

cess and rewarding cost-effective care. Academic and research achievements have not been included in the reward systems proposed. Also, the value of individual involvement in departmental and institutional management has not been considered. The plan presented takes all these into account and guarantees that clinical productivity is rewarded.

The effectiveness of this program is interesting, considering the generally accepted wisdom that to be effective, incentives must involve 20% to 30% of compensation. In this program, the maximum incentive was only 10%. In fact, the incentive that varied was really only 2%. All the members of the department were at risk for the other 8% but were all given this amount because they complied with their "citizenship" obligations. Although very little incentive was really at risk, the small variable component was sufficient to cause significant behavioral changes in many members of the department. Perhaps if the incentive truly at risk were much larger, as consultants advise, there may have been more resistance to the program. Perhaps unhappiness might cause members to consider other options, which in this time of personnel shortages is not a desired outcome. No member of the department left as a result of feeling poorly treated.

In summary, a properly designed incentive plan, no matter the percent at risk, can be an effective tool to motivate a professional staff to adopt the attributes needed to successfully implement a strategic plan in a radiology department.

REFERENCES

1. Hickey M. Performance-based physician incentives. Physician Manage 1998;38:25-6.
2. Guzetta D. Developing an incentive system for PHO physicians. Healthcare Financ Manage 1996;50:50-4.

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Appendix 2P

The Continued Evolution of Faculty Appointment and Tenure Policies at U.S. Medical Schools, Academic Medicine: 2007

The Continued Evolution of Faculty Appointment and Tenure Policies at U.S. Medical Schools

Sarah A. Bunton, PhD, and William T. Mallon, EdD

Abstract

For the past several decades, financial uncertainty, changes in health care delivery and reimbursement, and changing workforce needs have prompted medical schools to continually refine their appointment and tenure policies. Studies during the past 30 years have examined the nature of these faculty appointment and tenure policies in U.S. medical schools, and in this article the authors present data from a 2005 survey on faculty personnel policies to extend this analysis.

For both basic science and clinical faculty in U.S. medical schools, the authors describe tenure systems, trends in the number and percentage of full-time faculty on tenure-eligible tracks, the financial guarantee of tenure, and probationary period lengths. They review the status of flexible policies and highlight two current faculty policy changes that many institutions have made or are actively contemplating: the recognition of interdisciplinary and team science, and a broadening view of scholarship.

Results show that although tenure systems remain well established in medical schools, the proportion of faculty on tenured or tenure-eligible tracks has continued to decline over time. Changes in the financial guarantee associated with tenure have transformed the fundamental concept of tenure at many medical schools, and the percentage of schools that have lengthened the probationary period for tenure-track faculty has steadily increased during the past 25 years. Tenure-clock-stopping policies and part-time tenure policies continue to exist at medical schools, though results indicate low faculty use of the policies, suggesting a disconnect between policy and practice.

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For three decades, studies have examined the nature of faculty appointment, tenure, and promotion policies in U.S. medical schools.[1–8] Reviewed longitudinally, these reports reveal two prominent reasons for the continued evolution of faculty appointment policies: (1) to respond to the uncertainties of the financial model in which medical schools operate, and (2) to acknowledge the different needs, responsibilities, and expectations of various faculty members.

For many years an incongruity existed between the tenuousness of U.S. medical schools' financing and the stability of institutional commitments to faculty. As others have described, medical schools have operated with a financial model of uncertainty and volatility.[9] In contrast, medical faculty employment arrangements typically modeled the stability and security of policies promoted by the American Association of University Professors, in which tenure was designed to protect academic freedom and bring "a sufficient degree of economic security to make the profession attractive to men and women of ability."[10] For many years, tenure typically was thought to guarantee the full salary of medical faculty, and the ability of a medical school to reduce salaries or eliminate positions was considered to be extremely constrained. Over time, however, medical schools have been forced to align their faculty employment policies and practices with the economic realities of their environments.

Changes in faculty work responsibilities and preferences have also contributed to the continued evolution in faculty appointment and tenure policies. The difficulty of establishing research careers in an era of increased competition for grants and greater work pressures to fulfill patient care responsibilities has prompted a reconsideration of probationary period length; expanding definitions of scholarship have led to new faculty promotion pathways; and the changing composition of the faculty itself has prompted institutional flexibility. For example, the proportion of female medical school faculty members has continually increased,[11] and a younger generation of both male and female faculty has demanded policies that accommodate a more balanced work and family life.[12–13]

In this article, we present data from 2005 that extend the aforementioned themes. We describe tenure systems, trends in the number and percentage of full-time faculty on tenure-eligible tracks, the financial guarantee of tenure, and probationary periods for both clinical and basic science faculty in U.S medical schools. We then briefly review the status of flexible policies, including clock-stopping policies, part-time tenure options, and track choices. Finally, we highlight two current faculty policy changes that many institutions have made or are actively contemplating: the recognition of interdisciplinary and team science and a broadening view of scholarship.

The data in this article come primarily from responses to the 2005 Faculty Personnel Policies Survey, a survey conducted by the Association of American Medical Colleges (AAMC) of the 125 U.S. medical schools accredited by the Liaison Committee of Medical Education. Administered triennially since

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1994, the survey instrument consists of questions about policies and procedures related to appointment, promotion, tenure, and compensation structures for medical school faculty. Deans or designated staff members with expertise in an institution's policies governing faculty appointment, tenure, and compensation completed the survey instrument, which received a 100% overall response rate. We supplemented survey responses with data from the AAMC Faculty Roster database—a national database that tracks characteristics of more than 95% of all full-time U.S. medical school faculty—and from institutional policy documents, bylaws, and faculty handbooks.

Prevalence of Tenure Systems and the Tenure Track

As previously reported, tenure systems remain well established in U.S. medical schools.[1,3,5,6] In 2005, only six of the 125 U.S. medical schools did not offer tenure: Boston University School of Medicine, Mayo Medical School, Morehouse School of Medicine, Ponce School of Medicine, Universidad Central del Caribe School of Medicine, and Wright State University School of Medicine. Six additional schools generally limit tenure eligibility to basic science faculty: Brown Medical School, Loma Linda University School of Medicine, Northeastern Ohio Universities College of Medicine, Tufts University School of Medicine, University of Missouri–Kansas City School of Medicine, and Sanford School of Medicine of the University of South Dakota.* Except for the inclusion of the University of South Dakota, this list has remained unchanged since the last comprehensive report published in 1997.[6]

Although tenure systems remain common, the proportion of faculty on tenured or tenure-eligible tracks has changed significantly over time, especially for clinical faculty. In 1985, 57% of full-time MD faculty in clinical departments were either tenured or on the tenure track, but in 2004, this percentage decreased to 42% (Figure 1, top panel). Yet, an important, and sometimes overlooked, component of this analysis is that the number of tenured and tenure-eligible MD clinical faculty increased by 50% during the same period: from 14,026 in 1985 to 21,921 in 2004 (Figure 1, bottom panel). In other words, there were far more, not fewer, tenured and tenure-track clinical faculty at U.S. medical schools in 2005 than ever before. Yet, the *percentage* of tenure-eligible clinical faculty declined even while the absolute numbers increased, because the number of nontenure-track clinical MDs grew even faster: from 8,612 in 1985 to 27,207 in 2004 (an increase of over 315%). During these two decades, as medical schools expanded their clinical enterprises, they most commonly populated their faculty ranks with nontenure-track MD practitioners whose primary responsibility was patient care.[6] In the period from 1985 to 1995, although tenured and tenure-track clinical MDs increased at an average rate of 4% per year, they were still eclipsed by nontenure-track MDs, which realized a sizable growth rate of 8% per year (Figure 2). From 1996 to 2002, the growth in tenure-eligible clinical MD faculty decreased to an average rate of 1% per year.

Although the steady decline in the overall percentage of tenure-eligible MD clinical faculty is certainly noteworthy, it would be difficult to conclude that tenure is in jeopardy of disappearing for these faculty, at least in absolute terms. New MD faculty in clinical departments, however, are increasingly appointed to nontenure-eligible positions, thus influencing the overall trends in tenure status. In 1985, 41% of newly hired full-time clinical MD faculty were on tenure-eligible tracks, but in 2004, that percentage declined to 28% (Figure 3).

As previously reported,[8] there has also been an increased use of nontenure-eligible appointments for basic scientists during the past two decades, although the change is much less dramatic than for clinical MD faculty. In 1985, 83% of PhD basic science faculty were either tenured or on the tenure track; in 2004, this percentage had declined to 76% (Figure 4). During this time, the overall number of PhD basic science faculty steadily increased from 8,726 in 1985 to 12,553 in 2005. Unlike the trends for clinical faculty, the patterns of tenure status for basic science faculty are consistent with those for all faculty in higher education: 78% of all full-time faculty at four-year U.S. colleges and universities were tenured or on the tenure track in fall 2003.[14] Despite the decrease in tenure-eligible appointments, the majority of basic science PhD faculty continue to have traditional academic appointments.

Although tenured positions in both basic science and clinical departments serve as mechanisms to attract and retain exceptional faculty by providing stability and security, they remain more common in basic science departments for several reasons: first, the growth in the biomedical research enterprise in medical schools notwithstanding, basic science departments have not realized the same levels of explosive growth in faculty positions as have clinical departments. Second, basic scientists' salaries, on average, are far lower than their clinical counterparts. To the extent that the push for nontenure-track appointments is rooted in institutional fear of having to support full salaries regardless of the productivity of individual tenured faculty members, that fear would be much greater with highly paid clinical subspecialists than with basic science bench researchers. Finally, we assert that the culture in basic science departments, on average, is more akin to the traditional academic ethos in other university divisions than to the health care–driven environments of clinical departments. In other words, it is our supposition that basic science faculty have held onto the notion that tenure matters to a greater extent than have clinical faculty.

Similar to the pattern seen for clinical MD faculty, a large part of the decreasing percentage of tenure-eligible positions for PhD basic scientists is driven by new faculty hires. For newly hired full-time PhD basic science faculty, 68% were on tenure-

*Wright State University School of Medicine does not offer tenure *per se*, although a small number of basic science faculty are eligible for tenure through their joint appointment in the Wright State University College of Science and Math. For basic science faculty at the University of Missouri–Kansas City School of Medicine, tenure is awarded through the university rather than the medical school. The elimination of tenure for clinical faculty at Sanford School of Medicine of the University of South Dakota occurred in 2002 when the faculty practice plan was significantly downsized. At that time, most faculty in clinical departments left the faculty practice and joined another clinic or hospital. Most tenured clinical faculty lost that status, although a few near-retirement tenured faculty were placed in other positions at the school for the duration of their careers. Clinical faculty are no longer eligible for tenured or tenure-track positions (Ronald Lindahl, PhD, dean, Basic Biomedical Sciences, Sanford School of Medicine of the University of South Dakota, written communication, October 2005).

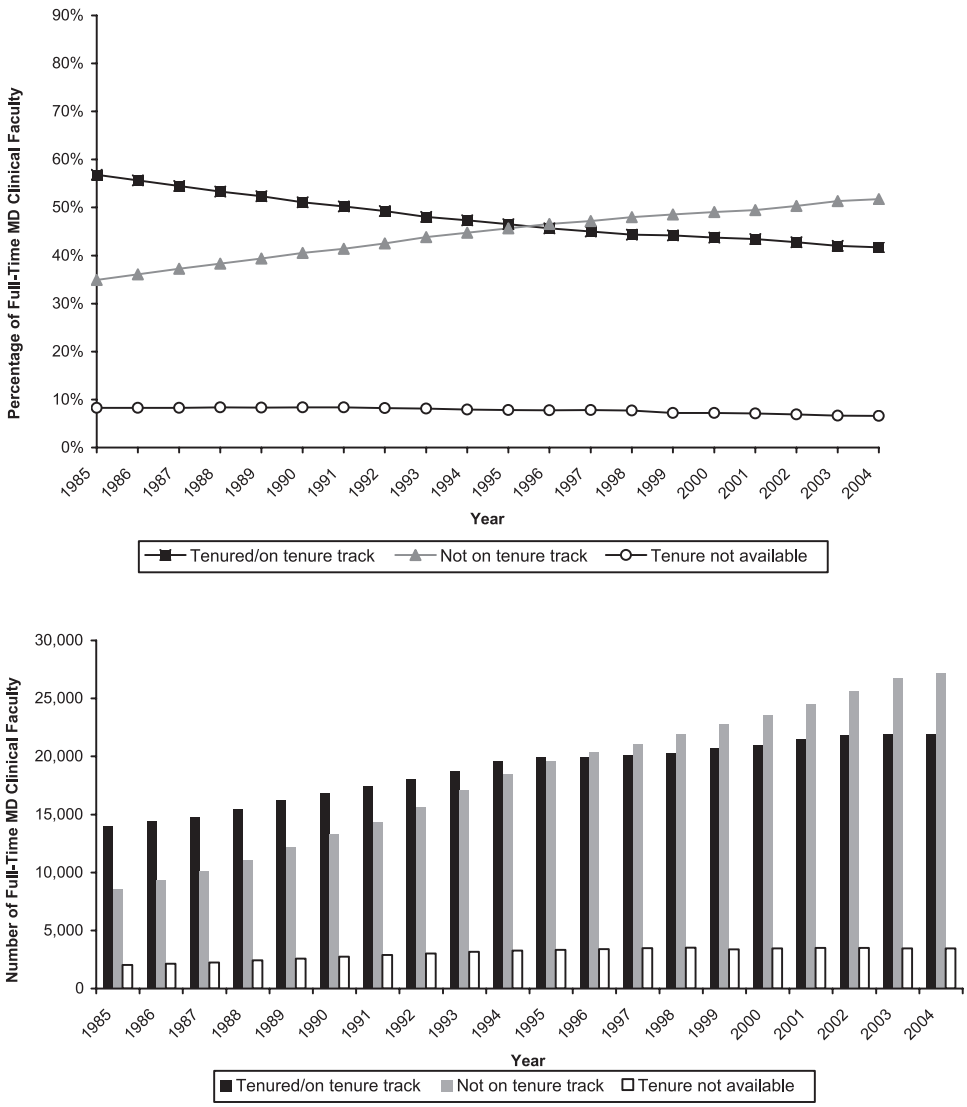

Figure 1 Tenure status for full-time MD faculty in clinical departments at U.S. medical schools, in percentages (top panel) and in absolute numbers (bottom panel), 1985–2004.
Source: AAMC Faculty Roster database.

eligible tracks in 1985 compared with 51% in 2004 (Figure 5). Previous research has suggested that medical schools have increased the use of nontenure tracks, as they have hired more junior research faculty whose positions are funded completely on grant funds to afford flexibility in terminating such appointments if that grant money ends.[8]

Relationship between Tenure and Guaranteed Salary

Historically, tenure has been linked to the economic security of faculty members.[10] The modern concept of tenure, however, especially for medical school faculty, does not necessarily encompass this concept.[15] Of the 113 medical schools that offered tenure to clinical faculty in 2005, 56 (50%) had a financial guarantee associated with tenure, whereas 43 (38%) had none (Table 1). Of those 56 schools with a tenure guarantee, only three asserted that they guaranteed total institutional salary, and all three were considering a revision or clarification of what portion of compensation was guaranteed by tenure. The majority of institutions with a specific tenure financial guarantee for clinical faculty defined the guarantee as base salary, whether it was the state-funded portion of salary or was otherwise defined. Similar patterns exist with basic science faculty. Of the 119 medical schools that offer tenure to basic science faculty, 62 (52%) noted that tenure had a specific financial guarantee, and 42 (35%) had no financial guarantee associated with tenure. Of those with a tenure guarantee for basic scientists, only eight schools (13%) guaranteed total institutional salary.

These relationships continue to change: 12 schools (10%) revised or clarified their tenure guarantee policies between 2002 and 2005, and another 17 schools (14%) were actively considering such changes in 2005. Medical schools also continued to resolve unclear policies in this area: the percentage of schools indicating that their tenure financial guarantee for basic science faculty was not clearly defined declined from 20% in 2002[8] to 10% in 2005.

The changes in the financial guarantee associated with tenure during the last several decades have transformed the fundamental concept of tenure at many medical schools. At more than 40

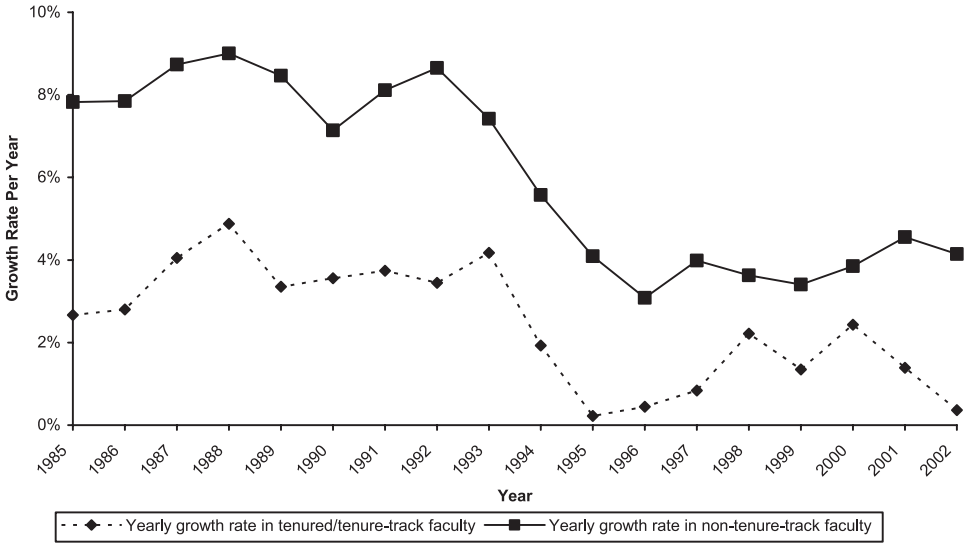

Figure 2 Annual growth rates in the number of tenure-track and nontenure-track MD faculty in clinical departments at U.S. medical schools, 1985–2002. *Source:* AAMC Faculty Roster database.

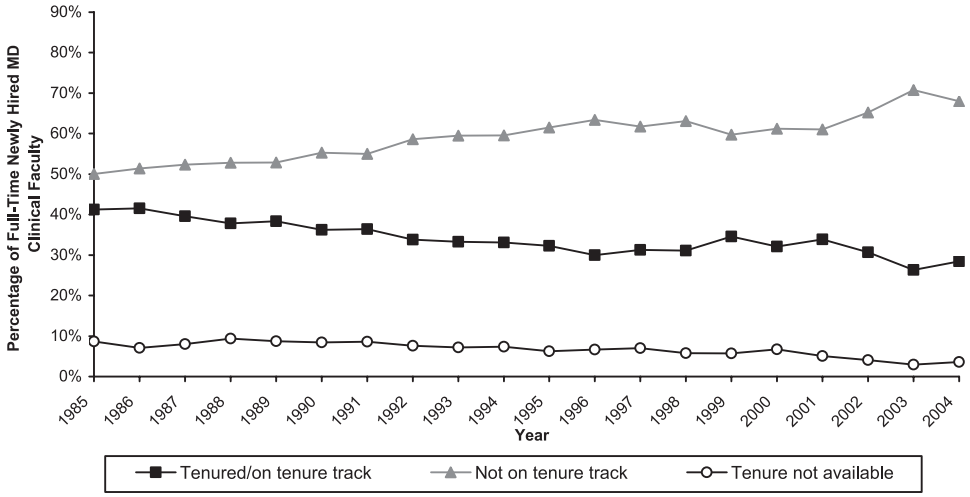

Figure 3 Tenure status for full-time newly hired MD faculty in clinical departments at U.S. medical schools, in percentages, 1985–2004. (Newly hired faculty are those at the rank of assistant professor and above hired in the previous year.)
Source: AAMC Faculty Roster database.

institutions where tenure does not guarantee any level of salary support, the meaning of tenure is no longer clear. Does tenure protect job security or academic freedom if a tenured faculty member's salary could effectively be reduced to zero? Many medical schools may have reached the point at which the difference between tenured and nontenured faculty appointments is more symbolic than substantive, more important for prestige than for job protection.

It also seems that enough medical schools have altered tenure policies that academic medicine has reached a tipping point in the fundamental faculty reward structure. Historically, that structure guaranteed job security and stability and protected time for scholarly pursuits in exchange for lower salaries than those found in industry and other sectors. Limited financial remuneration was not as important as the benefits of tenure and other intrinsic rewards.[16] That traditional reward structure for a majority of faculty in academic medicine is now an anachronism, replaced with a contract—implicit or explicit—that aligns risk with reward, where guaranteed salary through tenure has been diminished or has vanished, and contingency-based (i.e., bonus and incentive) pay structures are common, certainly for clinical faculty and now, too, for basic science faculty. As a case in point, in 2004, 78% of medical school clinical faculty and 59% percent of basic science faculty were eligible for bonus pay, and 52% of clinical faculty and 20% of basic science faculty received bonus pay (AAMC Faculty Salary Survey, unpublished data, 2005).

Flexibility in Tenure Policies

To meet the needs of medical school faculty who are facing increased pressures to develop research agendas, attract funding, fulfill patient care responsibilities, contribute to the educational mission, and balance work and family demands, institutional

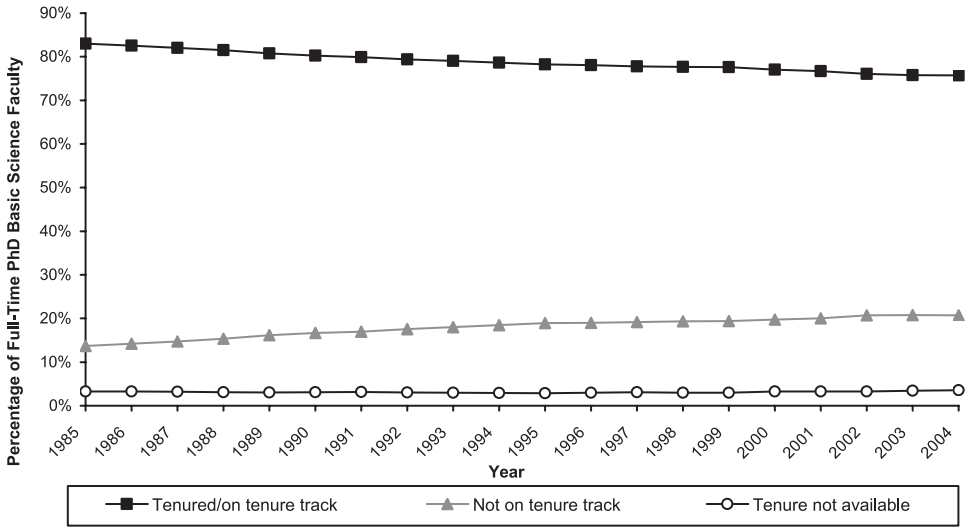

Figure 4 Tenure status for full-time PhD faculty in basic science departments at U.S. medical schools, in percentages, 1985–2004.
Source: AAMC Faculty Roster database.

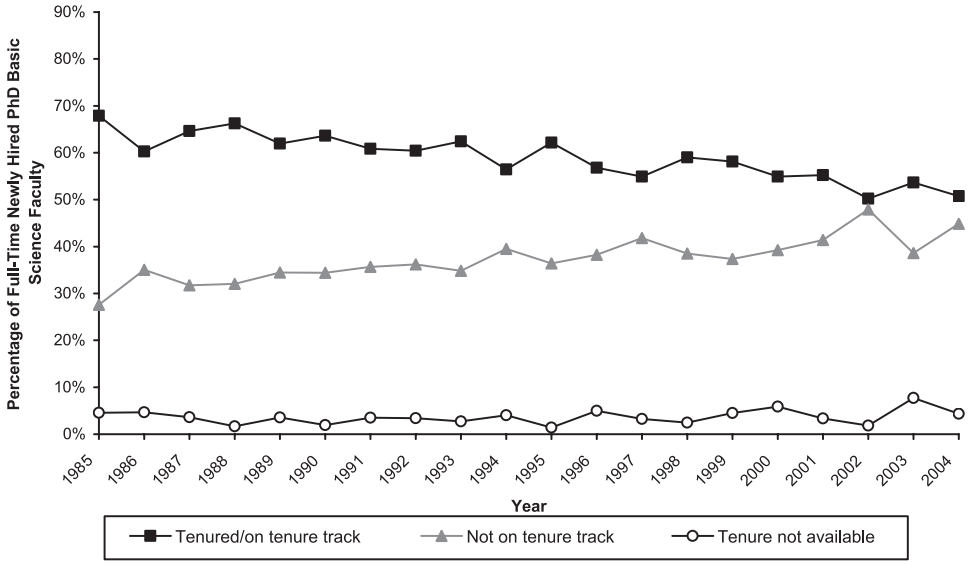

Figure 5 Tenure status for full-time newly hired PhD faculty in basic science departments at U.S. medical schools, in percent, 1985–2004. (Newly hired faculty are those at the rank of assistant professor and above, hired in the previous year.)
Source: AAMC Faculty Roster database.

policies increasingly permit flexibility for tenure-track faculty. These strategies include lengthening the pretenure probationary period, offering clock-stopping policies, and creating new appointment tracks.

Probationary periods. The percentage of medical schools that have lengthened the probationary period for tenure-track faculty beyond the traditional six- to seven-year period endorsed by the American Association of University Professors (AAUP) has steadily increased since 1983 (Table 2). In that year, of those medical schools with fixed probationary length, 74% (70/95) had probationary periods of seven or fewer years for their clinical faculty; by 2005, 57% (61/107) of schools did. Similar trends exist for basic science faculty: in 1983, 74% of schools (73/99) had probationary periods of seven or fewer years for basic science faculty; in 2005, 61% (69/114) of schools did. Many of these changes have occurred recently: 10 schools (8%) noted that they lengthened their pretenure probationary period for basic science faculty between 2002 and 2005, and another 11 (9%) were actively considering a change in 2005. Eleven schools (9%) made a change in probationary period length for clinical faculty between 2002 and 2005, and another nine (7%) were actively considering a change in 2005. These policy revisions typically reflect the difficulty for faculty to become established within the traditional time frame because of increasing demands on their time as they also try to maintain a balance of work and family.[17]

Tenure clock-stopping and part-time tenure policies. Another institutional strategy that purports to offer flexibility to tenure-track faculty is tenure-clock-stopping policies. These policies, which allow faculty on a tenure-eligible track to extend the probationary period, were available at 82 (69%)

Table 1

Relationship Between Tenure and Financial Guarantee for Faculty at U.S. Medical Schools, 2005*

Response	Clinical faculty no. (%)	Basic science faculty no. (%)
Tenure has a specific financial guarantee	**56 (50)**	**62 (52)**
Total institutional salary	*3 (5)*	*8 (13)*
State-funded base salary	*16 (29)*	*18 (29)*
Base salary, otherwise defined	*19 (34)*	*18 (29)*
Fixed dollar amount	*4 (7)*	*5 (8)*
Amount referenced to an internal standard	*10 (18)*	*10 (16)*
Amount referenced to an external standard	*3 (5)*	*3 (5)*
No response	*1 (2)*	—
Subtotal for respondents in above category	*56 (100)*	*62 (100)*
Financial guarantee is not clearly defined	**10 (9)**	**12 (10)**
Other	**4 (4)**	**3 (3)**
No financial guarantee	**43 (38)**	**42 (35)**
Total for all respondents	113 (100)	119 (100)

* Does not include schools with no tenure system.

medical schools in 2005. These policies could be used for child care (at 87% [71/82] of the institutions with such policies), care for sick family members (84% [69/82]), and for a medical disability (84% [69/82]), among other reasons. Yet, critics have noted that these policies fail to offer flexibility for tenure-track faculty because they are rarely used.[18–19] Our data support this point. Of the 82 medical schools with tenure-clock-stopping policies in 2005, 57 were able to provide recent statistics about the use of these policies by their faculty members. At these 57 institutions, an average of only 1.0 men and 1.5 women at each institution used these policies each year in 2003–2004 and 2004–2005.

Medical schools and research universities continue to wrestle with how to translate flexible policies into practice. As our data indicate, few medical school faculty actually use policies to extend probationary periods. Innovative ideas taken from the higher education sector are, therefore, now being considered. In 2005, for example, Princeton University began to automatically grant an extra probationary year to all faculty with a new child rather than making faculty members specifically request the extension.[20] The purpose of the automatic extension was to remove the stigma associated with the request. Medical schools might consider similar policy revisions to increase the use of such flexible policies.

Some institutions also have policies that allow faculty to work less than full-time while remaining on a tenure-eligible track. Such policies were available at 37 (31%) medical schools offering tenure in 2005. Here, too, a disconnect exists between having policies on the books and faculty members' use of the policies. Of the 37 medical schools with part-time tenure policies, 23 were able to provide recent data on the number of tenure-track faculty who worked less than full-time. At these institutions, an average of 4.1 men and 4.3 women at each institution used the policy each year in 2003–2004 and 2004–2005.

Table 2

Percentage of U.S. Medical Schools with Various Probationary Period Lengths for Tenure-Track Faculty, 1983–2005*

Probationary period length	1983	1994	1997	1999	2002	2005
Clinical faculty probationary period						
7 years or fewer	74	69	59	58	53	57
8 years or more	26	31	41	42	47	43
Basic science faculty probationary period						
7 years or fewer	74	73	66	62	63	61
8 years or more	26	27	34	38	37	39

* The number of medical schools included in the calculation of the percentages varies by year because of variability in response rate and data classification.
Sources: 1983: Association of American Medical Colleges[3]; 1994: Jones and Sanderson[5]; 1997: Jones and Gold[6]; 1999: AAMC Faculty Personnel Policies survey (unpublished data, 1999); 2002: Liu and Mallon[8] and AAMC Faculty Personnel Policies survey (unpublished data, 2002); 2005: current survey findings.

New faculty tracks. During the past 25 years, medical schools have introduced various faculty appointment tracks or pathways to accommodate the differing work arrangements of clinical and research faculty. These types of policy changes have continued in the last few years. Twenty-seven institutions (22%) reported that they introduced a new faculty track or career pathway between 2002 and 2005. Many of these new tracks are based on well-established models. For example, several schools instituted nontenure-eligible research tracks for faculty who are affiliated with independent research centers or programs or who are engaged in research support activities but do little teaching. The Feinberg School of Medicine at Northwestern University created its research track to "[permit] appointment of scholars to the faculty on a nontenure basis in order to participate in and cooperate with the research efforts of faculty with tenure-track appointments." For clinical faculty, clinical educator tracks have frequently been added for faculty who are engaged primarily in patient care. The University of Virginia School of Medicine created a tenure-eligible track for faculty who spend approximately 80% of their time "devoted to patient care and/or teaching [and] 20% of time devoted to scholarly activities with research focused in the area of medical education."

A different type of faculty track has also emerged recently. The University of Iowa Carver College of Medicine, University of New Mexico School of Medicine, East Tennessee State University Quillen College of Medicine, and West Virginia University School of Medicine have introduced an "undeclared," or "flex," track for new faculty, in which faculty do not have to choose a tenure-eligible or nontenure track at the initial point of their hiring. This option has been

designed for several reasons. In some cases, the parent university has not permitted the medical school to extend the traditional probationary period. An undeclared track effectively accomplishes that goal. Also, this type of track is designed to give basic science faculty time to garner R-01 grants as well as clinical faculty time to establish their clinical practice before turning to research. Officials at the University of New Mexico, for example, report that most clinicians without previous research training opt for a nontenure-track clinical educator track if forced to choose on initial appointment. With the undeclared track, however, clinicians can establish a clinical practice and then focus more attention after 2 to 3 years to developing a research program. Without the pressure to address all parts of their career at the same time, a greater number of clinicians, they hope, will ultimately choose a tenure track (Susan Scott, MD, senior associate dean for academic affairs, University of New Mexico School of Medicine, written communication, October 2005).

Emerging Tenure Policies

Two trends in promotion and tenure policies have emerged in the last few years as particularly important at large numbers of U.S. medical schools, and we anticipate these issues to continue to be at the forefront of policy discussions in upcoming years: first, institutional recognition of interdisciplinary and team science in the tenure and promotion process, and second, the evolving notions of educational scholarship.

Emphasis on interdisciplinary team science

Many medical schools recently have incorporated or are discussing the recognition of interdisciplinary team science in the tenure and promotion process. Historically, medical schools have emphasized individual faculty work in their structure, through promotion and tenure guidelines, and in their culture. As biomedical research increasingly becomes interdisciplinary, however, scientific process often demands collaboration with teams of researchers from diverse fields, creating a difficult situation for some faculty—they may wish to engage in interdisciplinary research, but their institutional policies and practices serve as roadblocks for the recognition of such work in the promotion and tenure process.

Some medical schools have begun to modify their policies to address the need for greater collaborative and team-based research. Between 2002 and 2005, 15 medical schools (12%) revised their tenure and promotion guidelines to include an emphasis on interdisciplinary team science, and another 24 (19%) were actively considering such a change. For example, Vanderbilt University School of Medicine has included recognition of collaboration in its criteria for promotion and tenure; at the time this article was written, the language had not been added to its promotion and tenure guidelines, but it had received endorsement of the executive faculty:

> Vanderbilt recognizes the critical importance of collaboration ("team science") in research and scholarly activity and that the contributions of middle authors in multiauthored publications are often seminal and of the highest quality. When the research and/or scholarship is pursued in a collaborative fashion and results in multiauthored publications, the specific contributions of the candidate must be clear and significant. The candidate's role can be described via the Critical Reference Form that must be included in the promotion dossier. In addition, the Chair, the manuscript's senior author, and external correspondents can make an assessment of the quality and impact of a middle author's contribution. (Steven Gabbe, MD, dean, Vanderbilt University School of Medicine, written communication, June 2006.)

Michigan State University College of Human Medicine also has incorporated the notion of collaborative work in their definition of scholarly activity contained in their promotion and tenure guidelines:

> To advance in rank in any of the faculty appointment systems, all MSU-CHM faculty members should regularly communicate newly obtained and/or applied knowledge and analytical thinking to their peers both within and outside the university. Accordingly, generating high-quality, peer-reviewed publications (e.g., journal articles, electronic publications, other scholarly works) based on original research by faculty members, *including research conducted in collaboration with colleagues, students, and postdoctoral associates*, represents a major source of evidence for productive research activity [emphasis added].[21]

Not all schools have gone so far as to specifically include new policy language in promotion and tenure documents. At one school, for example, the dean made an announcement about including translational research in the consideration of scholarship at the 2004 state of the school address. Yet, without codifying such pronouncements into formal policy, their effectiveness may be unclear, especially as administrators and tenure and promotion committee members come and go. Rewarding the collaborative contributions of faculty is an integral component of an organizational milieu that supports interdisciplinary work. Turning rhetoric into policy and practice is essential to facilitate collaborative and team-based science. As basic research and clinical application require greater links among and beyond disciplines and across institutions, institutions will need to interweave these realities into the fabric of promotion and tenure.

Expanded definition of scholarship

Another revision to appointment, promotion, and tenure policies is the incorporation of an expanded definition of scholarship. Scholarly activity has been a prominent component of medical schools' tripartite mission of clinical care, education, and research. Traditionally, recognition of scholarship has focused on the conventional areas of hypothesis-driven research or clinical application. In the last decade, the academic medicine community, as well as higher education more broadly, has debated the notion of educational scholarship, its role in career advancement, and evidence of its achievement for purposes of academic recognition and reward.[22]

Medical schools are engaging in these discussions because of the rapid growth in the number of clinical faculty with heavy patient care responsibilities who have a difficult time meeting promotion criteria that reward a traditional notion of scholarship.[23] Broadening these definitions to include other types of scholarly activities acknowledges the various career structures and pathways at the modern medical school. Although discussions about this matter have occurred during the past several decades, it has only been recently that medical schools have incorporated different forms of scholarship into their promotion and tenure guidelines. For example, at the

University of Michigan Medical School, the criteria for promotion on the instructional track states:

> All Instructional Track faculty must be individuals of scholarly ability and achievement. Scholarship may be categorized in terms of the scholarship of discovery (basic research), scholarship of integration, scholarship of application, and scholarship of education . . . . Interdisciplinary work, success in training graduate and professional students (as attested to by academic/research positions obtained), participation and leadership in professional associations, and editing of professional journals are measures of success and stature in scholarship. Peer-reviewed papers and grant funding are strong evidence of scholarship with high impact. Independent and peer-reviewed funding is the norm in research-based careers. There should be a strong prediction of continued excellence throughout the faculty member's professional career.[24]

Similarly, the University of Kansas Medical Center recently added a clinical scholar track for faculty "whose primary mission is education with a component of their position to include the scholarship of education, learning, or discovery . . . and/or service." Other institutions such as Case Western Reserve University School of Medicine, the University of Washington School of Medicine, and Mercer University School of Medicine are working to include revised advancement criteria for various faculty pathways, including the evaluation of clinical care or teaching for promotion and tenure.

The Continuing Evolution of Faculty Policies

For the last 30 years, financial uncertainty, changes in health care delivery and reimbursement, and changing workforce needs have prompted medical schools to depart from faculty employment norms that were developed in a different era and to continually refine their appointment and tenure policies. Given the predictions about the new generation of faculty members,[19] we would expect to see continued growth of flexible policies such as probationary period extensions, track changes, and flexible career pathways.

An institutional environment and culture that support the use of flexible policies are also important in encouraging a match between academic structure and faculty career needs. Yet, our data also suggest that having policies in place is not necessarily sufficient to address the issues for which they were created. The fact that, on average, fewer than three men and women per medical school used clock-stopping policies from 2003 to 2005, and the low number of faculty that used policies to work less than full time while remaining on a tenure-eligible track, indicates a dissonance between policy and practice. Although some faculty choose not to use these policies out of a desire to move through the faculty ranks at a normative rate, others may not take advantage of the flexible policies because of constraints of the clinical and research workplace, an institutional culture that discourages their use, or their ignorance that such policies exist. Each barrier must be removed.

The ultimate goal of faculty appointment and tenure policies, of course, is to structure career pathways that accommodate the needs and preferences of both the medical school and its faculty to ensure academic quality, attractive and rewarding work environments, and sustainable institutions. Thirty years ago, Spellman and Meiklejohn[1] predicted the "continuing modification . . . and experimentation" of faculty policies "to promote equity, retain the effectiveness of faculty members, assure access to the academic ladder for young persons and members of minority groups and women, and at the same time enable appropriate institutional responses to financial problems." We suspect this will still hold true 30 years from now.

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References

1 Spellman MW, Meiklejohn G. Faculty tenure in American medical schools. J Med Ed. 1977; 52:623–632.

2 Smythe CM, Jones AB, Wilson MP. Tenure in medical schools in the 1980s. J Med Ed. 1982; 57:349–360.

3 Association of American Medical Colleges. Faculty Appointment Policies and Practices: Reference Guide. Washington, DC: Association of American Medical Colleges; 1983.

4 Bickel J. The changing faces of promotion and tenure at U.S. medical schools. Acad Med. 1991;66:249–256.

5 Jones RF, Sanderson SC. Tenure policies in U.S. and Canadian medical schools. Acad Med. 1994;69:772–778.

6 Jones RF, Gold JS. Faculty appointment and tenure policies in medical schools: a 1997 status report. Acad Med. 1998;73:212–219.

7 Jones RF, Gold JS. The present and future of appointment, tenure, and compensation policies for medical school faculty. Acad Med. 2001;76:993–1004.

8 Liu M, Mallon WT. Tenure in transition: trends in basic science faculty appointment policies at U.S. medical schools. Acad Med. 2004;79:205–213.

9 Korn D. Reengineering academic medical centers: reengineering academic values? Acad Med. 1996;71:1033–1043.

10 American Association of University Professors. 1940 statement of principles on academic freedom and tenure with 1970 interpretive comments. In: AAUP Policy Documents and Reports. 9th ed. Washington, DC: American Association of University Professors; 2001.

11 Magrane D, Jolly P. The changing representation of men and women in academic medicine. AAMC Anal Brief. 2005; 5:1–2.

12 Family-Friendly Policies in Higher Education—Where Do We Stand? Available at: (http://www.umich.edu~cew/PDFs/pubs/wherestand.pdf). Accessed March 24, 2006.

13 Williams JC. Are your parental leave policies legal? Chron High Educ. February 11, 2005:C1.

14 U.S. Department of Education, National Center for Education Statistics. 2004 Study of Postsecondary Faculty (NSOPF:04). Washington, DC: U.S. Department of Education, National Center for Education Statistics; 2004.

15 White L. Academic tenure: its historical and legal meaning in the United States and its relationship to the compensation of medical school faculty members. St. Louis Univ Law J. 2000;44:51–80.

16 Hearn JC. Pay and performance in the university: an examination of faculty salaries. Rev Higher Educ. 1999;22:391–410.

17 Curtis JW. Balancing work and family for faculty: why it's important. Academe. 2004; 90. Available at: (http://www.aaup.org/publications/Academe/2004/04nd/04ndcurt.htm). Accessed March 24, 2006.

18 Colbeck CL, Drago R. Accept AVOID resist: how faculty members respond to bias against

caregiving . . . and how departments can help. Change. 2005;37:10–17.

19 Colbeck CL, Drago R, Wilson R. Rigid tenure system hurts young professors and women, university officials say. Chron High Educ. October 7, 2005:A12.

20 Fogg P. Princeton gives automatic tenure extension to new parents. Chron High Educ. August 19, 2005. Available at: (http://chronicle.com/daily/2005/08/2005081901n.htm). Accessed May 31, 2006.

21 Michigan State University College of Human Medicine. Promotion and Tenure Guidelines. Available at: (http://www.chmfacultyaffairs.msu.edu/promotion.htm). Accessed June 14, 2006.

22 Simpson DE, Hafler J, Brown D, Wilkerson L. Documentation systems for educators seeking academic promotion in U.S. medical schools. Acad Med. 2004;79:783–790.

23 Nora LM, Pomeroy C, Curry TE Jr, Hill NS, Tibbs PA, Wilson EA. Revising appointment, promotion, and tenure procedures to incorporate an expanded definition of scholarship: the University of Kentucky College of Medicine experience. Acad Med. 2000;75:913–924.

24 University of Michigan Medical School. Criteria for appointment and promotion. In: Faculty Handbook 2006–2007. Available at: (http://www.med.umich.edu/medschool/faculty/handbook.pdf). Accessed June 14, 2006.

Did You Know?

In 2005, researchers at Vanderbilt University Medical Center discovered that frogs may possess a weapon against HIV. Compounds on frog skin are potent HIV infection blockers, which may lead to a topical HIV treatment.

For other important milestones in medical knowledge and practice credited to academic medical centers, visit the "Discoveries and Innovations in Patient Care and Research Database" at (www.aamc.org/innovations).

Appendix 2Q

Clinical Revenue Investment in Biomedical Research Lessons From Two Academic Medical Centers: 2007

ciency in health care [transcript]; Kaiser Permanente Institute for Health Policy and Health Affairs 1-Day Conference; March 17, 2004; Washington, DC. http://www.kaisernetwork.org/health_cast/uploaded_files/031704_kp_iom.pdf. Accessed January 6, 2007.
15. Fisher ES, Staiger DO, Bynum J, Gottlieb J. Creating accountable care organizations: the extended hospital medical staff. *Health Aff (Millwood)*. 2006;26:w44-w57.
16. Reichard J. MedPAC fix for flawed doctor payment system may mean transforming health system. *CQ HealthNews*. January 9, 2007.
17. Barr M, Ginsburg J. *The Advanced Medical Home: A Patient-Centered, Physician-Guided Model of Health Care*. Philadelphia, Pa: American College of Physicians; 2006. Policy monograph. http://www.acponline.org/hpp/adv_med.pdf. Accessed February 16, 2007.
18. Ambulatory Care Quality Alliance Announces pilot project: six sites will combine public and private data on physician practice [news release]. Washington, DC: Ambulatory Quality Care Alliance. March 1, 2006. http://www.aqaalliance.org/files/AQApilotFINAL.Doc. Accessed March 15, 2007.
19. *Development of State Level Health Information Exchange Initiatives: Final Report.* September 1, 2006. Chicago, Ill: Foundation of Research and Education of American Health Information Management Association. http://www.staterhio.org/documents/Final_Report_HHSP23320064105EC_90106_000.pdf. Accessed March 15, 2007.
20. Gruen RL, Campbell EG, Blumenthal D. Public roles of US physicians community participation, political involvement, and collective advocacy. *JAMA*. 2006;296:2467-2475.
21. Cutler D. *Your Money or Your Life: Strong Medicine for America's Health Care System.* Cambridge, Mass: Oxford University Press; 2005.

Clinical Revenue Investment in Biomedical Research

Lessons From Two Academic Medical Centers

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INCREASING AN ACADEMIC HEALTH SYSTEM'S RESEARCH PRODUCTIVITY is an institutional challenge that requires multiple complex actions over a sustained period of time. In this Commentary, we describe how 2 academic health systems with different organizational structures used similar models of investment of clinical income in the research enterprise to enhance their success. This strategy assumes enhanced urgency in the current climate of flat National Institutes of Health (NIH) budgets. In 2006, NIH experienced its first budget cut since 1970, resulting in a 13% loss of research purchasing power since 2003, while grant applications have doubled since 1998.[1]

The level of NIH support remains one of the few objective benchmarks by which an academic health system can evaluate its academic and research success. Unlike reputational rankings, the NIH process is the only nationally competitive, peer-reviewed metric available. By this criterion, the University of Pennsylvania (Penn) and the University of Pittsburgh (Pitt), led by their medical schools, have thrived in receipt of research awards. Penn has been among the top 10 institutions in NIH rankings of research awards to university faculty since 1985. Pitt moved into the top 10 in 1997 and has maintained that position since, a shift in rank that occurs only rarely.[2-4] Life sciences comprise 80% of Penn's research dollars and 87% of Pitt's. Without their medical schools, Penn's ranking would decline from 6th to 48th in National Science Foundation total research rankings; Pitt's ranking would decrease from 13th to 30th.[5,6]

Institutional Comparison

Although Penn is a private institution and Pitt is state-related, the schools share a number of characteristics. Both have strong undergraduate and graduate medical education programs; support robust basic science portfolios but also emphasize clinical and translational research (both received 1 of the inaugural 12 NIH Clinical and Translational Science Awards); and are associated with large, profitable hospital systems. Additionally, both academic health systems include large clinical practice plans, are major transplant centers, and began significant expansions of facilities, services, and programs in the mid-1980s emerging as large, stable enterprises, despite marketplace challenges. Differences between the institutions include the University of Pennsylvania Health System (UPHS) having 4 hospitals, 15 000 employees, a 2006 fiscal year revenue of $2.4 billion, and a service area presence as 1of 4 academic health centers in Philadelphia, while the University of Pittsburgh Medical Center (UPMC) has 19 hospitals, 43 000 employees, a 2006 fiscal year revenue of $6 billion, and it is the only academic health system in western Pennsylvania.

Penn and Pitt also share financially challenged urban environments and austere support for higher education from the Commonwealth of Pennsylvania. Over the last 5 years, one asset that has offset this otherwise modest support has been Pennsylvania's use of 19% of its funds from the master settlement agreement with tobacco manufacturers to support biomedical research. Through this legislation, Penn and Pitt each receive $9 million to $10 million per year based on their share of Pennsylvania's total NIH funding.

The major difference between the 2 academic health systems is their organizational models. In the mid-1980s, when the universities faced heightened concern about the potential financial risk of their large health systems, the organizations responded differently. At Penn, UPHS was retained as part of the university but with rearrangements in report-

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ing and board structures.[7] At Pitt, UPMC became a separate corporation but remained closely linked to the university, including a substantial number of shared board members and formal contractual relationships that defined UPMC's longstanding financial support of the medical school.

Strategies for Success

Despite their differences, the success of Penn and Pitt in sustaining research productivity rests on the decision of both institutions to adopt a growth strategy centered on 1 principle: In an academic health center, research and clinical success are synergistic and interdependent. A strategic collaboration between the clinical and the academic enterprises will enhance the success of both beyond what would occur with an investment in either alone. For both institutions, the starting point for making this philosophy operational was to invest clinical income in research infrastructure, including facilities, equipment, and investigator start-up packages. The TABLE shows hospital system revenue and investment in each institution's medical school.

An example of the interaction between clinical success and research investment at Penn is seen in cardiovascular surgery. Led by Michael Acker, MD, beginning in the early 1990s, clinical growth has been driven by the use of innovative technology and new approaches to cardiovascular disease, such as novel mechanical assist devices, minimally invasive approaches to valvular heart disease, and the development of endovascular stents for thoracic aortic aneurysms. The program's clinicians, engineers, and computer scientists collaborated to develop mitral valve imaging and repair techniques that are unique to Penn. This work has attracted an increasing patient volume as well as large NIH grants, industry-sponsored research, and licensing agreements.

At Pitt, clinical growth was led by organ transplantation—but this growth began with a substantial investment in research. In 1981, university leaders recruited Thomas E. Starzl, MD, PhD, when liver transplantation was still a controversial concept. Starzl assembled an interdisciplinary team of surgeons, immunologists, pharmacologists, and other clinicians and expanded his previous clinical and laboratory research. The US Food and Drug Administration's approval of the immunosuppressant cyclosporine in 1983, based largely on Starzl's clinical experience with the experimental drug, greatly improved graft survival and long-term outcome. In 1986, UPMC invested $230 million to expand the transplantation program and to provide space for its fledgling cancer institute and other research initiatives. By 1988, more than half the world's liver transplantations were performed in Pittsburgh,[8] generating exceptional clinical revenue.

Activities Promoting Research and Clinical Success

Each institution bolstered its investment of clinical revenue by creating mechanisms to impel new research initia-

Table. University of Pennsylvania and University of Pittsburgh Hospital System Revenue and Medical School Investment

	$ in Millions						
	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
University of Pennsylvania							
Health system revenue*	1671	1756	1876	1962	2148	2398	2617
Health system academic support†	73	81	99	95	94	98	134
National Institutes of Health funding to the university‡	430	482	509	538	551	532	Not yet available
Medical school revenue§	934	1007	1114	1222	1319	1440	1495
Medical school endowment‖	694	668	694	789	842	933	1036
Available endowment income¶	24	27	26	26	26	27	29
Invention disclosures#	182	154	221	276	253	219	138
University of Pittsburgh							
Health system revenue*	2883	3507	4169	4667	5100	5699	6200
Health system academic support†	78	73	78	82	95	108	135
National Institutes of Health funding to the university‡	289	339	380	396	431	447	Not yet available
Medical school revenue§	792	849	943	1027	1148	1295	1425
Medical school endowment‖	343	312	294	336	358	397	456
Available endowment income¶	8	15	15	15	15	15	16
Invention disclosures#	47	64	62	78	67	65	106

Abbreviation: FY, fiscal year.
*Fiscal year 2007 reports the projected amount; FY 2001 through FY 2006 amounts are actual.
†Does not include contributions to laboratory construction, endowed chairs, and recruitment packages for clinical department chairpersons.
‡Reported data are for grants to university faculty; data for FY 2006 are preliminary.
§Fiscal year 2007 reports the budgeted amount; FY 2001 through FY 2006 amounts are actual.
‖The market value of endowment is reported; the data for FY 2007 represent market value as of March 31, 2007.
¶For University of Pennsylvania, figure represents endowment income available to spend, minus overhead; for University of Pittsburgh, figure represents distributed income. Data for FY 2007 are projected for both institutions.
#A disclosure is counted if at least 1 medical school faculty member is listed among the inventors; a disclosure is counted only once regardless of the number of medical school inventors listed. Data for FY 2007 are reported year-to-date as of April for both institutions.

tives, including technologically rich core facilities for use by multiple investigators. These core facilities were developed in the areas of genomics, proteomics, bioinformatics, clinical research computing, DNA sequencing, transgenic and chimeric animals, diagnostic imaging, microarrays, and others. Other research-support resources include technical assistance in grant preparation, financial and protected time incentives, pilot and bridge funding mechanisms, and active guidance in technology commercialization.

With this focused resource commitment, faculty at both universities were able to translate this revenue into successful grant applications. The ensuing faculty success in reporting research findings, especially those related to significant clinical advances, promoted the visibility of each institution's medical school, affiliated health system, and of each entire university, which has led to the increased clinical volume and robust financial performance that is the cycle's entry point. The more dynamic research climate also led to more faculty entrepreneurship. For example, at Penn, defining the basic principles by which erbB oncoproteins could be disabled by monoclonal antibodies led to development of Genentech's Herceptin, an important anticancer drug. This class of therapeutic molecules has benefited patients and has financially benefited Penn through intellectual property rights concerning this class of pharmaceuticals. In Pittsburgh, UPMC created Stentor, a start-up company based on medical imaging technology developed collaboratively by university and UPMC researchers. In 2006, Royal Philips Electronics acquired Stentor for approximately $280 million, giving UPMC a $36 million gain from its research investment and providing the medical school with nearly $11 million. UPMC's Strategic Business Initiatives division was subsequently launched, in part, with the profit from this deal to create and manage small companies, many based on faculty-developed technologies.

Other tactics were also used. At the leadership level, both institutions emphasized recruiting research-experienced leaders throughout the organization, consistent with best practice in successful research enterprises.[9] Both institutions developed online training modules in research conduct and compliance, the Health Insurance Portability and Accountability Act, and other fundamental research issues. Pitt established a formal Office of Academic Career Development to offer guidance, assistance, and mentoring to faculty. Penn created a similar function in the School of Medicine's Office of Faculty Affairs. Both schools also increased enrollment of the number of PhD students, added new interdisciplinary doctorates in fields such as integrative molecular biology and structural biology, and developed research requirements for medical students.

Both institutions preferentially hired basic scientists whose research themes foster translational research, focusing on platform disciplines such as structural and computational biology, pharmacology, developmental biology, and biomedical informatics. The expectation is that close relationships between MDs and PhDs, such as having MDs in basic science departments, PhDs in clinical departments, and more MD/PhD faculty, will stimulate collaborations that lead to tangible bench-to-bedside outcomes. MD/PhDs or PhDs in clinical departments represented 64% of Penn's faculty increase from 1999-2004, and 68% of clinical department growth. Pitt began with a larger, more rapidly growing clinical faculty and fewer basic science faculty. Thus, recruitment of PhDs to both basic science and clinical departments accounted for almost half of Pitt's faculty increase. By 2004, 32.3% of Penn's faculty had a PhD (either alone or with an MD), as did 37.6% of Pitt's faculty, compared with the national average of 30.7%.[10,11]

Both institutions have revamped their policies governing academic rank and tenure to emphasize research productivity. Since a renewed R01 application is associated with longer-term NIH funding,[12] both institutions increasingly expected a second R01 or R01 renewal for tenure. Other policy changes included research incentive plans and a lengthened tenure clock for faculty with clinical duties. Interim faculty reviews, prior to the up-or-out tenure timeframe, were strengthened to provide clear feedback on how to improve the likelihood of promotion.

At both institutions, interdisciplinary research and team science were encouraged and implemented as the cultural norm, resulting in the development of multiple centers and institutes, as has become common in academic health centers nationally.[13] These entities provide a physical or virtual environment for topic-specific intellectual interchange and often are assets for faculty recruitment and retention. Specialized research support staff were hired to organize program project submissions and to secure additional industry-sponsored grants. Both institutions also expanded research facilities; where feasible, space was innovatively designed with open laboratories and modular bench systems to encourage interfaculty interaction and to enable rapid space repurposing at minimal expense.

Financial Resources

In addition to health system transfers and federal funding, both institutions have had access to endowment and philanthropic support (Table). Penn has a larger endowment, whereas Pitt has a strong local philanthropic tradition for current-use gifts. However, by far the most important reason for the success of the 2 academic health centers has been the transfer by UPHS and UPMC of significant funds to their respective medical schools.

Given that health system finances have fluctuated substantially over the years, this funding source varies more dramatically than endowment income. For example, the Balanced Budget Act of 1997 decreased Medicare revenues for major teaching hospitals approximately 6% in 1998 and decreased Medicare payments to a low of about 9% below 1997 revenues in 2000,[14] decreasing margins for academic health centers. Nonetheless, the investment of clinical revenues in the medical school did not falter.

Sustaining Success in Biomedical Research

A combination of strategic investments and initiatives has enabled 2 Pennsylvania universities to achieve and sustain an NIH ranking among the top 10, even during periods of health care financing turbulence. An institutional commitment to excellence in both clinical and basic research, with academic leaders who created systems to encourage such research, has been critical to this success. Equally critical has been the commitment of abundant funds and other resources from supportive hospital system partners.

With these fundamental elements in place, further programmatic strategies focused on supportive faculty advancement systems and innovative student, postdoctoral, and faculty education mechanisms. Similarly, research facility expansion, including core services, was essential for growth. Faculty research expertise was both fostered internally and recruited from outside.

The Penn-Pitt strategy foreshadows the recommendations of the 2006 Association of American Medical Colleges Task Force report on how academic health centers can attract, nurture, and support clinical and translational investigators.[15] However, it is difficult to define the relative contribution of any single factor to either institution's research productivity; rather, a combination of strategies is likely critical to success. While many tactics addressed short-term goals, others, such as expanded laboratory space, targeted faculty recruitment, and research-philic tenure policies, ensured sustained results. Increased research productivity created long-term technology transfer income. In all cases, the hospital system's financial and philosophical partnership was the most critical factor in fostering research success. These investments should help the institutions overcome the current regressive NIH budget climate.

This model demonstrates how investment of clinical revenues can help an institution sustain itself, even when confronted with extreme funding fluctuations. For example, after much investment had occurred, UPHS lost about $100 million in 1998 and $200 million in 1999, resulting in a 20% staff reduction (emphasizing nonpatient care personnel), minimal capital spending, and a temporary decline in the number of PhDs awarded and the number of postdoctoral positions. In response, UPHS steadily improved its revenue cycle and budget control mechanisms. Despite this temporary setback, Penn sustained its research funding growth.

Institutions should invest in long-term research expansion strategies when finances are conducive. An influx of wisely invested clinical revenue will strengthen the entire enterprise—research and clinical—for the longer term and far beyond that which would occur with an investment in either alone. For example, UPMC's investment of clinical revenue in transplantation research eventuated in an exponential clinical return, fostering its rapid growth. The heightened research success enhances both the reputation of the parent university and the stature of the hospital system, enabling it to accrue sufficient market share to remain financially successful, even during periods of market instability. This overall success will enable the health system to continue to invest in the medical school—the starting point of the strategy for success.

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REFERENCES

1. Moore DB. NIH advocacy tool kit. Group on Institutional Advancement Professional Development Conference of the Association of American Medical Colleges; March 29, 2007; Tampa, Fla.
2. Moy E, Griner PF, Challoner DR, Perry DR. Distribution of research awards from the National Institutes of Health among medical schools. *N Engl J Med*. 2000;342:250-255.
3. Joiner KA, Wormsley S. Strategies for defining financial benchmarks for the research mission in academic health centers. *Acad Med*. 2005;80:211-217.
4. Quon A. Changes in US medical schools' NIH rankings, 1991-2000. Association of American Medical Colleges Web site. http://www.aamc.org/data/aib/aibissues/aibvol1_no3.pdf. Accessed March 14, 2006.
5. Lombardi JV, Capaldo ED, Reeves KR, Craig DD, Gater DS, Rivers D. The top American research universities: an annual report from the Lombardi Program on Measuring University Performance. Gainesville: The Center at the University of Florida; 2003.
6. Lombardi JV, Capaldi ED, Mirka DS, Abbey CW. The top American research universities: an annual report from the Lombardi Program on Measuring University Performance. Gainesville: The Center at the University of Florida; 2005.
7. Rodin J. A revisionist view of the integrated academic health center. *Acad Med*. 2004;79:171-178.
8. Levin S. Empire building: consolidation and controversy at UPMC. Pittsburgh Post-Gazette. December 27, 2005:A1.
9. Bland CJ, Center BC, Finstad DA, Risbey KR, Staples JG. A theoretical, practical, predictive model of faculty and department research productivity. *Acad Med*. 2005;80:225-237.
10. AAMC Faculty Roster Benchmark Reports. US medical school faculty trends: 2004 full-time faculty by degree and department. Template Report, Table 6. Association of American Medical Colleges Web site. http://www.aamc.org/data/facultyroster/usmsf04/start.htm. Accessed May 21, 2007.
11. AAMC Faculty Roster Benchmark Reports. Custom report: 2004 faculty by degree by school; comparison group: all regions. Association of American Medical Colleges Web site. http://www.aamc.org/data/facultyroster/reports.htm. Accessed May 21, 2007.
12. Rajan TV, Clive J. NIH research grants: funding and re-funding [letter]. *JAMA*. 2000;283:1963.
13. Mallon WT, Biebuyck JF, Jones RF. The reorganization of basic science departments in US medical schools, 1980-1999. *Acad Med*. 2003;78:302-306.
14. Konetzka RT, Zhu J, Volpp KG. Did recent changes in Medicare reimbursement hit teaching hospitals harder? *Acad Med*. 2005;80:1069-1074.
15. AAMC Task Force II on Clinical Research. *Promoting Translational and Clinical Science: The Critical Role of Medical Schools and Teaching Hospitals*. Washington, DC: Association of American Medical Colleges; 2006.

