

A Multidisciplinary Approach for Teaching Systems-Based Practice to Internal Medicine Residents

CHRISTOPHER NABORS, MD, PhD
STEPHEN J. PETERSON, MD
ROGER WEEMS, MBA, MSHA
LEANNE FORMAN, MD
ARIF MUMTAZ, MD
RANDY GOLDBERG, MD
KAUSIK KAR, MD
JOSEPH A. BORGES, MD, MHA
IDA DOCTOR, RN, MA
ORPHA LUBBEN, RN, MPA, CCM, CPHQ
NISHA PHERWANI, PHARM D, BCOP
WILLIAM H. FRISHMAN, MD

Abstract

Background Rapid growth in the complexity of the health care environment (including monitoring systems for health care quality and patient safety) may result in graduating internists not being adequately prepared for the demands the system places on them. In response, the Residency Review Committee for Internal Medicine created the Educational Innovations Project (EIP) to encourage select residency training programs to develop new strategies and methods to meet changing demands in graduate medical education.

Methods As part of the EIP, our program created an innovative *administrative internship*. This multiyear curriculum provides systems-based practice training and consists of a series of rotations that take place during the 3 years of internal medicine residency. Each session involves close interaction with the nonphysician personnel who are instrumental in making our institution a functional and cohesive unit. To assess the

potential impact of the rotations, we survey senior residents, recent graduates, and faculty educators. In conjunction with the Performance and Patient Experience departments of the hospital, we track several systems-based practice metrics for residents, including compliance with core health care measures, length of stay, and patient satisfaction.

Results Residents recognize the need to develop systems-based practice skills, to readily participate in structured curricula designed to enhance such skills, and to provide leadership in organizing and publishing quality improvement initiatives, and upon graduation, they may lament that they did not receive even more vigorous training in these areas.

Conclusion Although internal medicine residencies continue to improve their training in systems-based practice, our experience suggests that an even greater emphasis on these skills may be warranted.

Introduction

In 2002, the Accreditation Council for Graduate Medical Education instructed residency training programs to evaluate residents using the 6 core competencies, leading to a greater emphasis on teaching and assessment of competency in systems-based practice.¹⁻⁵ However, defining teaching and evaluation of systems-based practice in residency programs has proven to be challenging.⁶⁻⁸ As such,

All authors are at Westchester Medical Center. **Christopher Nabors, MD, PhD**, is Assistant Professor in the Department of Medicine and is Associate Residency Program Director, Director of Education Innovations Project at New York Medical College; **Stephen J. Peterson, MD**, is Chief of the Division and Director of Residency Training in Internal Medicine and is Professor of Medicine and Pharmacology at New York Medical College; **Roger Weems, MBA, MSHA**, is Senior Vice President of Performance Management; **Leanne Forman, MD**, is Director of Adult Primary Care Center and is Assistant Professor of Medicine at New York Medical College; **Arif Mumtaz, MD**, is Associate Section Chief and is Hospitalist Division Chief at New York Medical College; **Randy Goldberg, MD**, is a Hospitalist and is Assistant Professor of Medicine; **Kausik Kar, MD**, is an Attending Physician, Director of Occupational Health, and is Site Director of the Internal Medicine Sub Internship Program and Assistant Professor of Medicine at New York Medical College; **Joseph A. Borges, MD, MHA**, is Vice President of Clinical Care Management; **Ida Doctor, RN, MA**, is Director of Risk Management; **Orpha Lubben, RN, MPA, CCM, CPHQ**, is Director of Quality Management; **Nisha Pherwani, PharmD, BCOP**, is Pharmacist in the Pharmacy Department; and **William H. Frishman, MD**, is Director of Medicine and is Chairman and Professor of the Department of Medicine and Professor of Pharmacology at New York Medical College.

Corresponding author: Christopher Nabors, MD, PhD, Department of Medicine, New York Medical College, Westchester Medical Center, Munger Pavilion, Room 529, Valhalla, NY 10595, 914-493-1459, Christopher_Nabors@nysmc.edu

Received March 1, 2010; revisions received April 16, 2010, and October 18, 2010; accepted November 3, 2010.

DOI: 10.4300/JGME-D-10-00037.1

the graduating internist may not be fully prepared to integrate into an ever-more-complex health care system that demands of the practitioner not only excellent medical knowledge and patient care skills but also the ability to effectively manage quality improvement and patient safety-related endeavors. To address such issues, the Residency Review Committee for Internal Medicine created the Educational Innovations Project (EIP) to encourage select residency training programs to develop new strategies and methods to meet changing graduate medical educational demands. At the time our residency joined the EIP, in July 2006, we developed a 3-year, longitudinal curriculum (the *administrative internship* [AI]) to teach our residents systems-based practice through a series of hands-on quality and patient safety-centered rotations among our hospital administrators and nonphysician staff (and our own physician-faculty). Our aim was to provide an experience that would afford residents a systems-oriented view of their training environment, would foster a patient-safety and quality-improvement mindset, and would engender a positive attitude toward multidisciplinary collaboration and leadership in quality-improvement initiatives. We describe the process by which our AI curriculum was developed (based on the 6-step method of Kern et al⁹) and our experience with the program to date.

The Administrative Internship Curriculum

The curriculum for the AI began with the realization that a growing divide had emerged between what medical residency programs were teaching in systems-based practice and what the health care system was demanding. After reviewing the educational literature¹⁰⁻¹⁷ to identify relevant systems-based practice teaching and assessment strategies, our program formed a curriculum committee that conducted a needs assessment through a review of our end-of-rotation and end-of-year resident surveys and comments, suggestions box comments, faculty suggestions and anecdotal feedback, review of in-service and board examination scores, patient satisfaction surveys, and hospital adverse-events reports. A series of discussion sessions between the program director and the curriculum committee led to a tentative set of goals and objectives and the identification of potential educators thought to be most capable of addressing such goals and objectives. We approached potential faculty, enlisted their support, and began to work in cooperation to identify the components of an early curriculum and to lay out specific plans for a set of rotations. Each educator provided the curriculum committee with a set of didactic materials, goals and objectives, and a plan for a postrotation evaluation. In addition, each educator submitted 10 questions to the committee. From this pool, 20 questions would be selected for a "health care systems examination" to be administered to residents before the start and at the completion of the entire AI. Inconsistencies between the goals and objectives

initially identified by the curriculum committee and those developed by the AI educators were reconciled at a meeting of the program director, the curriculum committee, and individual educators. Thereafter, a written curriculum was produced by the committee, along with an end-of-rotation global assessment form and a postrotation feedback form. These were disseminated to all faculty and residents just before the implementation of the program on July 1, 2006. The curriculum is shown in the BOX.

Administrative Internship Rotations

The AI consists of a series of rotations (ranging in length from 4 hours to 20 hours) that take place as a subcomponent of the annual month-long ambulatory-care block. Each involves close interaction with the (largely) nonphysician staff whose training and expertise not only help our facility to function as a cohesive unit but represent a valuable educational resource. All categorical residents proceed through the AI according to the sequence displayed in the FIGURE, and a detailed description follows.

Inpatient Nutrition (postgraduate year-1 [PGY-1]) The resident spends one-half day reading assigned materials and then meets with a nutritionist for 2 full-day sessions, learning to identify patients at nutritional risk, to seek consultation appropriately, to choose appropriate therapeutic diets for high-risk patients, to review the institution's enteral formulary and indications for its use, to initiate and maintain patients on parenteral support safely, and to effectively use clinical nutrition staff and resources.

Case Management (PGY-1) This full-day rotation includes a 2-hour meeting with the vice president of the Department of Clinical Care Management, who provides didactic materials and an introduction to managed care systems, health care financing, and case management. Working directly with case managers, the resident gains insight into the importance of early and thorough discharge planning; the roles of case management staff; the positive effect of collaborative efforts on patient outcomes; the need to tailor discharge plans to the patient's unique financial, personal, and social needs; and how financial issues influence postacute care placement, including home services and access to durable medical equipment and medications. The discharge appeal process is reviewed; at the end of the academic year, the resident completes an oral examination with the vice president of the Department of Clinical Care Management.

Pharmacy (PGY-1, PGY-2) During this rotation, a pharmacist at the hospital with a Doctor of Pharmacy degree shows the resident basic pharmacy operations and medication error tracking, provides a historical perspective of the US Food and Drug Administration and drug legislation, and reviews important drug interactions, commonly employed monitoring tests for medications, and important drug-induced diseases. When possible, the

BOX OUTLINE OF ADMINISTRATIVE INTERNSHIP CURRICULUM DEVELOPMENT PROCESS

1. Problem identification and general needs
 - 1.1. Residency program director
 - 1.1.1. Lack of comprehensive systems-based practice training
 - 1.2. Deputy residency program director: review of educational literature; targeted learner needs assessment: resident surveys, in-service scores; patient satisfaction data; hospital adverse events; faculty feedback
 - 1.2.1. Key concepts and areas of focus
 - 1.2.2. Targeted learner needs assessment
 - 1.2.2.1. Multidisciplinary (team) focus: collaborative efforts by individuals from a variety of clinical and administrative areas
 - 1.2.2.2. Integration of educational and quality improvement activities
 - 1.2.2.2.1. Improved resource use: collaborative discharge planning, effective and safe care transitions, patient-centered care
 - 1.2.2.3. Communication and patient safety: medical errors, adverse events, near misses
 - 1.2.2.4. Resident involvement in training program changes and quality improvements; resident leadership
 - 1.2.2.5. Interaction between administrators and residents
 - 1.2.2.6. Culture oriented toward patient safety and quality of care
 - 1.2.2.7. Measurement of quality and patient safety markers relative to educational processes
 - 1.3. Formation of curriculum committee
 - 1.3.1. Residency program director, deputy residency program director, 2 associate residency program directors
2. Goals and objectives
 - 2.1. Curriculum committee and stakeholder meetings
 - 2.2. Goals and objectives identified
 - 2.3. Curriculum written with creation of
 - 2.3.1. Resident report cards, annual systems-based practice test, evaluator forms
 - 2.3.2. Rotation evaluation forms, patient safety surveys, schedule outline and process
3. Educational strategies
 - 3.1. Goals and objectives for guidance, standardized didactic materials, hands-on approach, data collection and project presentations and publications encouraged, encourage collaboration
4. Implementation
 - 4.1. Multiple meetings, finalization of scheduling, agreement on curriculum and evaluation process
5. Evaluation and feedback
 - 5.1. Formal evaluation forms encouraged but not required
 - 5.2. Postrotation verbal report from educators to program director
 - 5.3. Resident evaluations during formative and summative evaluation meetings with program director, resident report cards
 - 5.4. Annual systems-based practice written examination (pre-AI and post-AI)
 - 5.5. Oral case management examination
 - 5.6. Pharmacy written quiz
 - 5.7. Formalization of evaluation process, as possible, in future

PGY-1	PGY-2	PGY-3
CAI - Case Management (8 hrs)	QAI - Inpatient Quality Improvement (20 hours)	RAI - Risk Management (20 hours)
INAI-Inpatient Nutrition (12hours)	BAI - Billing and coding (4 hours)	OHC - Occupational Health Center (12 hours)
PAI-Pharmacy (20 hours)		ONAI - Outpatient Nutrition (12 hours)
CQI - Continuous Quality Improvement (20 hours)		

FIGURE ADMINISTRATIVE INTERNSHIP ROTATIONS BY TRAINING YEAR

quality improvement, working on projects of escalating complexity that begin with monitoring Joint Commission quality indicators during the intern year, progress to monitoring quality measures related to specific chronic conditions identified by the resident during the second training year, and culminate in the third training year with projects focusing on patient motivation and education. During the continuous quality improvement experience residents learn the importance of continuous quality improvement initiatives and appropriate documentation, learn the Plan-Do-Study-Act process and its application to various clinical settings, and develop hands-on experience in designing and implementing quality improvement projects.

In July 2009, based on recent graduate survey data, we also created a 2-week inpatient research rotation during which PGY-2 and PGY-3 residents have additional time to plan and collect data on a quality improvement topic—with an eye toward presenting their findings at a scientific meeting or following the project through to publication. Written summaries of the quality improvement projects become part of the residents' portfolio on the Residency Management Suite (Residency Management Suite, Inc, Uniontown, OH) system.

Billing and Coding (PGY-2) The resident meets with a physician who is versed in financial matters related to medical practice and is shown common coding and billing procedures and is introduced to practice management issues. Health Insurance Portability and Accountability Act guidelines are reviewed with the resident and *Current Procedural Terminology* codes and *International Classification of Disease*, 9th edition, coding and related billing methods are discussed in the context of the residency, hospital and outpatient business/care models.

Quality Improvement (Inpatient; PGY-2) The resident meets with the director of the Department of Hospital Quality Management and with key staff, who provide a series of three 2-hour lectures on the institution's quality-monitoring systems, ongoing initiatives (both resident initiated bottom-up and institutionally driven top-down

resident attends the Pharmacy and Therapeutics Committee meeting and explores a root cause analysis of a medication error. Residents complete a 2-day pharmacy AI experience during each of their first 2 years of training.

Continuous Quality Improvement (Outpatient/Inpatient; PGY-1, PGY-2, PGY-3) Each year, residents devote a minimum of 5 half-day sessions to outpatient continuous

types), and key participants in those initiatives. The resident then spends approximately 14 hours with nurses charged with monitoring quality indicators (National Hospital Quality Measures), learning the significance of and the reporting mechanisms for these quality measures. The resident is shown the types of incidents that are reported in the New York Patient Occurrence Reporting and Tracking System, the National Quality Forum, and the Sentinel Events Reporting System and how those events are detected and handled within the institution. The role of the Joint Commission's National Patient Safety Goals are reviewed and placed in the context of the quality structure.

Risk Management (PGY-3) The resident meets with the director of the Department of Risk Management during 5 one-half day sessions. At the first session, the director provides reading materials and introduces the resident to various legal concepts, such as the elements of a malpractice case and the basic features of the litigation process. The roles of appropriate documentation and informed consent are discussed in relation to quality, patient safety, and legal matters. The director relates these concepts to ongoing legal cases and the hospital's medical error and adverse events reporting systems. If either a root-cause-analysis or a court case is in progress, the resident observes the proceedings with the director of risk management.

Occupational Health Center (PGY-3) Residents are introduced to the rotation by the director of the Department of Occupational Health, who provides didactic materials regarding current occupational and environmental medical practice. The resident then shadows the director as patients are seen in the clinic, but after becoming comfortable with the situation (typically after 1 to 2 hours), the resident begins to examine patients with the director acting as supervisor. This allows residents to become familiar with the presentation and management of common occupational disorders and to become more adept at delineating functional work limitations and at defining when employees may safely return to work. The resident is also shown the appropriate process for handling occupational exposures to blood and body fluids.

Outpatient Nutrition (PGY-3) During 3 one-half day sessions, the resident works directly with a nutritionist in the outpatient setting performing nutritional assessments and counseling for all patients referred from the medical subspecialty (cardiology, renal, human immunodeficiency virus and AIDS, etc), obstetrics and gynecology, and surgery clinics. After becoming comfortable in the clinic, the resident performs assessments and counsels patients while being directly observed and guided by the nutritionist. Through this approach, the resident develops an appreciation for the medical conditions for which nutritional evaluations are critical, advances his or her counseling skills, better understands the sources of important nutrients, and appreciates the benefit of a multidisciplinary approach to nutritional management.

Curricular Change

The rotations and overall educational experience have remained relatively constant since AI inception—the principal exceptions being that 2008 graduates completed only 2 years of the 3-year curriculum, and 2007 graduates participated in only 1 year of the curriculum. Minor scheduling adjustments and some turnover of educators have also occurred. In addition, the process of evaluating the AI and its participants has evolved during the course of the program. For that reason, this report is limited to an overview of the program's early impact and a description of the past and current evaluation process. A presentation of specific outcome measures will be reserved for a future publication, at which time, a larger number of participants will have been evaluated in a uniform fashion.

Evaluations

The AI participant performance has been monitored through a combination of verbal feedback, end-of-rotation written assessments, rotation-specific written and oral examinations (pharmacy and case management, respectively), a written systems-based practice test (20 questions, pre-AI and post-AI), and program ratings of quality improvement portfolios. During this academic year, we placed greater emphasis on direct observation by implementing a health care system clinical evaluation exercise, which is conducted by an associate program director using chart-stimulated recall of a patient with complex medicine service, following each PGY-3 resident's completion of the AI. A less-conventional tool by which we provide systems-related feedback is the resident report card, which consists of a letter grade computed by our performance department for interns and residents during months spent on floor duty. The score reflects the resident's case-mix-weighted mean length of stay and the efficiency with which discharge orders were entered, as well as an adjustment factor for against-medical-advice departures. The data allow us to remind trainees (during formative feedback sessions) that physician labors are becoming ever more closely tied to performance measures and financial reimbursement. This year, we modified the report card to account for National Hospital Quality Measures core-measures adherence and patient-satisfaction scores. Since the outset of the AI, residents have completed a brief postrotation survey regarding their AI experience (2006 to present). Since 2009, residents also complete a more comprehensive survey after concluding their entire AI experience, and are also surveyed regarding their perceptions of their AI experience in light of their newly acquired practice experience. Faculty educators also are surveyed annually to determine their perceptions of the AI and needed changes.

TABLE SELECTED ADMINISTRATIVE INTERNSHIP-RELATED QUALITY IMPROVEMENT PROJECTS

Forum	Participants	Project Name and Status	Source, year
Publication	Faculty and residents	Experience with faculty supervision of an electronic resident sign-out system	Nabors et al, ¹⁸ 2010
Poster	Faculty and residents	Faculty supervision of transitions of care: the time has come	Nabors et al, ¹⁹ 2010
Publication	Faculty, residents, and QI team	Voluntary physician reporting of clinically significant events via a computerized patient sign-out system	Nabors et al, ²⁰ 2010
Publication	Faculty and residents	Etiologies of syncope in patients hospitalized with syncope and predictors of mortality and rehospitalization for syncope at 27-month follow-up	Sule et al, ²¹ 2010
Publication	Faculty and residents	Prevalence of appropriate management of diabetes mellitus in an academic general medicine clinic	Singh et al, ²² 2010
Publication	Faculty and residents	Prevalence of influenza vaccination and pneumococcal vaccination in elderly and high-risk patients seen in a university general medicine clinic	Lai et al, ²³ 2008
Publication	Faculty and residents	Prevalence of inappropriate use of digoxin in 136 patients on digoxin and prevalence of use of warfarin or aspirin in 89 patients with persistent or paroxysmal atrial fibrillation	Lleva et al, ²⁴ 2009

Abbreviation: QI, quality improvement.

Program Impact

Institutional Benefits

Although it is difficult to quantify the institutional-level influence that the AI has had at our facility, several developments bear mention. Following a 2009 presentation of the AI program to our Graduate Medical Education Committee and the hospital board's quality council, the institution expanded the AI to permit participation by residents from other departments. Institutional financial support of AI-related projects has significantly increased annually, allowing us to enhance our sign-out software and to create a Center for EIP Quality Research, which now facilitates collaborative projects between residents, faculty, and quality improvement personnel—including our ongoing efforts to identify best hand-off practices¹⁸ and to improve physician near-miss and adverse-events reporting through our handheld platform. Through end-of-rotation evaluations, our educators have noted that residents' insights have spurred important systems changes: near-miss and adverse-events reporting leading to improvements in how narcotics and insulin are ordered and how medications are dispensed; simulation training to better prepare residents to act as "code team" leaders; use of sign-out software instant-messaging capability to facilitate discharge planning, to permit correct provider-relaying of critical imaging and laboratory test results and to facilitate concurrent monitoring of National Hospital Quality Measures (core measures) by members of the quality staff. Without the AI to foster a patient safety and quality mindset, to promote collaboration between residents and hospital personnel, and to enlist the support of our institution, we do not believe our facility would have benefitted from such a depth of quality improvement activities. This suggests that institutions that strongly

support systems-based practice educational programs may derive significant returns from their investments.

Resident Leadership and Quality Improvement Portfolios

All residents now participate in both inpatient and outpatient AI quality improvement projects, reporting their results at quality improvement committee meetings and noon conferences. Many also have presented their findings at local and national meetings and/or published their work. The TABLE displays a selection of recent AI-related projects. The materials from AI projects are also uploaded into the New Innovations Portfolio module and are reviewed during summative evaluations by the program director. The resident with the best portfolio receives the annual Center for EIP Quality Research award. Given that many projects started during AI rotations are voluntarily carried through to publication or presentation, the AI curriculum appears to promote leadership among our trainees.

Discussion

Although our experience in establishing the AI has been positive, there have been a number of challenges encountered along the way. First, because the project involved the creation of an institution-wide educational process, logistical problems arose. For example, although standardized evaluation forms were created along with the new curriculum, use by faculty educators was inconsistent. This limited to some degree (despite other methods of evaluation) our ability to rate the extent to which AI participants meet the educational aims on particular rotations. However, as the AI is now well established and a computerized evaluation system is in place, we have found the end-of-month evaluation process to be more

manageable and useful. Other challenges have related to availability of educators. As teaching on several AI rotations depended heavily on particular educators, we were not able to easily compensate for their absence during vacations and other times. This resulted in some loss of consistency in the educational experience. Perhaps the greatest limitation of our AI program has related to the finite amount of time that can be allocated. Nearly all of our educators have lamented the fact that residents cannot spend more time on each AI rotation and have expressed a belief that the educational experience would be enriched by additional training. A final item worth noting is that our institution has been supportive of our EIP-related educational activities. Absent such support, developing and implementing a similar systems-based practice curriculum elsewhere might prove to be challenging.

We believe our study confirms earlier reports that implementing a comprehensive systems-based practice teaching curriculum within the structure of an internal medicine training residency is both possible and beneficial.¹⁹ As we have focused more intensively on teaching systems-based practice, our residents have become leaders in quality and patient safety projects that now help to shape how we care for patients. We believe that our results are important in that they may provide guidance to other residency programs that seek to implement a similar curriculum and may encourage institutional support for such initiatives. In the near future, our challenge will be to show that our educational initiatives can, in fact, result in quantifiable quality improvements.

References

- Englander R, Agostinucci W, Zalneraiti E, Carraccio CL. Teaching residents systems-based practice through a hospital cost-reduction program: a "win-win" situation. *Teach Learn Med.* 2006;18(2):150–152.
- David RA, Reich LM. The creation and evaluation of a systems-based practice/managed care curriculum in a primary care internal medicine residency program. *Mt Sinai J Med.* 2005;72(5):296–299.
- Allen E, Zerzan J, Choo C, Shenson D, Saha S. Teaching systems-based practice to residents by using independent study projects. *Acad Med.* 2005;80(2):125–128.
- Medio FJ, Arana GW, McCurdy L. Implementation of a college-wide GME core curriculum. *Acad Med.* 2001;76(4):331–336.
- Peters AS, Kimura J, Ladden MD, March E, Moore GT. A self-instructional model to teach systems-based practice and practice-based learning and improvement. *J Gen Intern Med.* 2008;23(7):931–936. Accessed August 29, 2010.
- Johnson JK, Miller SH, Horowitz SD. Systems-based practice: improving the safety and quality of patient care by recognizing and improving the systems in which we work. Available at: http://www.ahrq.gov/downloads/pub/advances2/vol2/Advances-Johnson_go.pdf. Accessed February 15, 2010.
- Delphin E, Davidson M. Teaching and evaluating group competency in systems-based practice in anesthesiology. *Anesth Anal.* 2008;106(6):1837–1843.
- Mohr JJ, Randolph GD, Laughon MM, Schaff E. Integrating improvement competencies into residency education: a pilot project from a pediatric continuity clinic. *Ambul Pediatr.* 2003;3(3):131–136.
- Kern DE. *Curriculum Development for Medical Education: A 6-Step Approach*. Baltimore, MD: Johns Hopkins University Press; 1998:178.
- Heard JK, Allen RM, Clardy J. Assessing the needs of residency program directors to meet the ACGME general competencies. *Acad Med.* 2002;77(7):750.
- Delzell JE Jr, Ringdahl EN, Kruse RL. The ACGME core competencies: a national survey of family medicine program directors. *Fam Med.* 2005;37(8):576–580.
- Ogrinc G, Headrick LA, Mutha S, Coleman MT, O'Donnell J, Miles PV. A framework for teaching medical students and residents about practice-based learning and improvement, synthesized from a literature review. *Acad Med.* 2003;78(7):748–756.
- Reed VA, Jernstedt GC, Ballow M, Bush RK, Gewurz AT, McGeady SJ. Developing resources to teach and assess the core competencies: a collaborative approach. *Acad Med.* 2004;79(11):1062–1066.
- Djurichich AM, Ciccarelli M, Swigonski NL. A continuous quality improvement curriculum for residents: addressing core competency, improving systems. *Acad Med.* 2004;79(10, suppl):S65–S67.
- Weingart SN, Tess A, Driver J, Aronson MD, Sands K. Creating a quality improvement elective for medical house officers. *J Gen Intern Med.* 2004;19(8):861–867.
- Ziegelstein RC, Fiebach NH. "The mirror" and "the village": a new method for teaching practice-based learning and improvement and systems-based practice. *Acad Med.* 2004;79(1):83–88.
- Tomolo A, Caron A, Perz ML, Fultz T, Aron DC. The outcomes card. Development of a systems-based practice educational tool. *J Gen Intern Med.* 2005;20(8):769–771.
- Nabors C, Peterson SJ, Lee WN, et al. Experience with faculty supervision of an electronic resident sign-out system. *Am J Med.* 2010;123(4):376–381.
- Nabors C, Sule S, Mumtaz A, Peterson SJ. *Faculty Supervision of Transitions of Care: The Time Has Come*. Poster presented at the Mid-Atlantic Meeting of the Association of Medical Directors in Internal Medicine, New York, NY, March 5, 2010. Alexandria, VA: AMDIM.
- Nabors C, Peterson SJ, Lu S, et al. *Voluntary Physician Reporting of Clinically Significant Events via a Computerized Patient Sign-Out System*. Submitted for publication, September 13, 2010.
- Sule S, Palaniswamy C, Aronow WS, et al. Etiologies of syncope in patients hospitalized with syncope and predictors of mortality and rehospitalization for syncope at 27-month follow-up. *Clin Cardiol.* 2011;34(1):35–38. 10.1002/clc.20872.
- Singh P, Aronow WS, Mellana WM, Gutwein AH. Prevalence of appropriate management of diabetes mellitus in an academic general medicine clinic. *Am J Ther.* 2010;17(1):42–45.
- Lai H, Aronow WS, Gutwein AH. Prevalence of influenza vaccination and pneumococcal vaccination in elderly and high-risk patients seen in a university general medicine clinic. *Am J Ther.* 2008;15(6):528–530.
- Lleva P, Aronow WS, Gutwein AH. Prevalence of inappropriate use of digoxin in 136 patients on digoxin and prevalence of use of warfarin or aspirin in 89 patients with persistent or paroxysmal atrial fibrillation. *Am J Ther.* 2009;16(6):e41–43.