Practicing Effectively in Today’s Health System: Teaching Systems-based Care

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Background and Objectives: The Institute of Medicine and the new Accreditation Council for Graduate Medical Education General Essentials have focused attention on the Undergraduate Medical Education for the 21st Century (UME-21) core content area of systems-based care. Through teaching systems-based care, medical students can learn how physicians effectively deliver and coordinate care within the health system. While medical students can be introduced to the organization, financing, and delivery of the health care system through lectures, the principles and practice of systems-based care must be reinforced through structured learning experiences during the clinical (ie, third and fourth) years. The purpose of this article is to define the undergraduate clinical content and experiences in systems-based care offered by the eight UME-21 partner schools. Methods: The eight partner UME-21 schools exposed third- and fourth-year medical students to a variety of clinical experiences outside the traditional teaching hospital in such settings as physician offices, skilled nursing facilities, the patient's home, hospice, and public health departments. They also taught systems-based care skills such as care coordination, performance assessment, and quality improvement. Results: Based on surveys of graduating students, the UME-21 programs were successful in exposing students to the aforementioned topics, though there was variability among schools. Discussion: The experiences of the UME-21 schools in teaching about systems-based care, as discussed in this paper, may be useful to those involved in medical school curricula planning.

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The Institute of Medicine’s (IOM) two recent landmark publications, To Err Is Human: Building a Safer Health System and Crossing the Quality Chasm: A New Health System for the 21st Century, focused national attention on health system performance. The IOM reports concluded that “fundamental changes are needed in the organization and delivery of health care” to “reduce the burden of illness, injury, and disability and to improve the health and functioning of the people of the United States.” The IOM Committee proposed six specific goals for improvement—that health care should be safe, effective, patient centered, timely, efficient, and equitable—and a national agenda and budget for health system restructuring and performance assessment. To attain these goals, the IOM advised that health care organizations need to redesign care processes, make effective use of information technologies, manage clinical knowledge and skills, and develop effective teams. They also need to coordinate care across patient conditions, services, and settings over time and incorporate performance and outcome measurements for improvement and accountability. Numerous reports and articles have underscored the need for health system improvement and the essential contribution of physicians to this effort.

The Accreditation Council on Graduate Medical Education (ACGME) recently endorsed a new set of general competencies for residents in six areas. One of these new general competencies is systems-based practice. To demonstrate competency in systems-based practice, the ACGME has stated that residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Specifically, residents are expected to (1) understand how their patient care and other professional practices affect other health care professionals, the health care organization, and the larger society and how these elements of the system affect their own practice, (2) know how types of medical practice

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and delivery systems differ from one another, including methods of controlling health care costs and allocating resources, (3) practice cost-effective health care and resource allocation that does not compromise quality of care, (4) advocate for quality patient care and assist patients in dealing with system complexities, and (5) know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance.

During the next several years, the ACGME’s Residency Review and Institutional Review Committees will incorporate systems-based practice and the other general competencies into their “Requirements” affecting all specialties. Residency programs are being asked to define the specific knowledge, skills, and attitudes required and provide educational experiences as needed for their residents to demonstrate these competencies.

Given this attention, systems-based care was, arguably, one of the most important of the nine core UME-21 competencies. This article summarizes the learning objectives, content, and clinical experiences for teaching systems-based care to third- and fourth-year medical students, based on an analysis of the eight UME-21 partner school reports.

Methods
The UME-21 schools exposed third- and fourth-year students to the components of the health care system and the principles and practices of systems-based care (Table 1). Clinical experiences addressed such tasks as ordering a consultation, performing home or skilled nursing care visits, and evaluating and improving office practice. Short-term projects typically involved a variety of student-selected activities, such as educating high school students about the dangers of tobacco use; developing a program to improve treatment of diabetes, heart failure, or other common chronic conditions; or describing what diseases are reportable to and investigated by the health department. Site visits were generally discrete half- or full-day visits to a particular component of the health system (eg, health department, health plan, hospice agency, etc) available to a portion of the class during a specific clinical rotation. These varied experiences were often incorporated into or added onto the third-year primary care clerkships and followed by small-group sessions facilitated by the clinical faculty to allow for student and faculty dialogue.

There was a rich variety of third- and fourth-year clinical experiences (Table 1) in systems-based care developed through UME-21. The highlights of these experiences are discussed here.

### Coordinating Care Through Consultations

At the University of Pittsburgh, third-year students selected experiences in settings where referred patients were evaluated and treated by a multidisciplinary team of consultants, including specialists in geriatrics, women’s health, substance abuse, disabilities, and rehabilitation. Medical students learned about the referral and consultation process and how a multidisciplinary team coordinates the patient’s care with the primary care physician.

At the University of Wisconsin (UW), third-year students learned how to order an effective consultation. Students completed a form summarizing a patient’s clinical presentation, posed a specific question for the consultant, and determined the urgency of the request. Students then evaluated the completeness and usefulness of the consultation. Student feedback indicated that the exercise helped beginning third-year students coordinate care through consultations.

### Discharge Planning

UW students learned that they must begin discharge planning at the time of inpatient admission and about the use of nurses and social workers to arrange ongoing care in skilled nursing facilities, acute rehabilitation facilities, hospices, or at home. The evaluation indicated that medical students gained appreciation and

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### Table 1

**Learning Objectives and Content for Systems-based Care**

- Describe the collaborative roles of primary care physicians, specialist consultants, nurses, pharmacists, social workers, and other health care providers in the health care system.
- From participating in patient care in the following health care settings, describe the services provided in skilled nursing and acute rehabilitation facilities, home health, pharmacy, hospice, public health departments, social service agencies, dialysis centers, and geriatric and other facilities.
- Describe the characteristics of an effective physician’s office practice, including how to adhere to practice laws and regulations, maintain medical records, monitor and improve key clinical outcomes and patient satisfaction, appropriately code and bill for services rendered, and refer and coordinate care with different facilities and health professionals within the health system.
- Discuss with patients (and their families as appropriate) their ongoing health needs and help them coordinate their care among different health professionals and settings.
- Describe what insurance plans (Medicare, Medicaid, HMOs) commonly cover and what are health benefits, formularies, preauthorization, appeals, disease management, and quality improvement.
- Describe how physicians take into account medical evidence, health care costs, and patient preferences to provide quality and affordable health care with high patient satisfaction.
- Describe how evidence-based clinical guidelines for preventive, acute, and chronic care can be used to monitor and improve a physician’s medical group’s, or health care system’s performance.
- Demonstrate respect for other members of the health care team and an understanding of how to function as primary care, consultant, and inpatient care attending physician.
- Demonstrate a sense of responsibility for factoring in health care costs, quality, and patient preferences while coordinating a patient’s care.
respect for their medical colleagues and learned how best to use their expertise.

University of Nebraska medical students had the option to visit a skilled nursing facility, acute rehabilitation facility, or home care setting. They visited the facilities and observed the care that nurses, therapists, and other health professionals provide in these settings.

**Hospice Care**

Third-year UW students participated in a day-long session on communication skills and end-of-life care. An interdisciplinary hospice team faculty included psychiatrists, oncologists, and primary care physicians. They used lectures, videotape case scenarios, and small-group skill sessions to teach students how to discuss advance directives, help patients and families cope with end-of-life care, and refer appropriately to hospice.

**Laboratory Testing and Reporting**

Fourth-year UW students were offered an elective to learn where laboratory testing is provided, how lab results are transmitted to the physician's office, and how the patient is informed about test results. They also identified what systems were in place to ensure that important information is reported, tracked, and stored to minimize reporting errors by both the laboratory and ordering physician.

**Public Health and School Health Care**

Third-year University of Miami (UM) students learned about the interface between medicine and public health through several experiences. Through a day-long site visit to the Miami-Dade County Public Health Department, students learned about the services provided by health departments and the responsibilities of practicing physicians to meet public health requirements, such as reporting infectious diseases. In addition, students were prepared in clinical counseling skills before spending a week in public school-based health clinics counseling adolescents about healthy behaviors. Finally, UM students learned to present a smoking prevention and cessation program to Miami-Dade County middle school students.

**How Health Plans Operate**

Third-year UM students spent a day at the administrative offices of AvMed Health Plans. Moming didactic presentations described how health plans operate and provided time for dialogue among health plan physicians, UM faculty, and students. In the afternoon, students rotated for 30-minute periods through each of four health plan departments: disease management, preauthorization, member services, and physician services. The evaluation of this experience demonstrated increased student knowledge and attitudes about how health systems operate and improve health care quality. On request, AvMed Health Plans replicated this site visit for the University of Florida third-year medical students.

Similarly, University of Nebraska medical students spent 3 hours in a health plan observing its operations in the call center, preauthorization, case management, utilization review, and credentialing departments. Students learned how health plans operate and how physicians can interact most effectively with health plans.

**Improving Office Practice**

Third-year UM students performed a quality assessment of a primary care physician's office practice. The office assessment instrument was derived from criteria used by NCQA (National Committee for Quality Assurance), JCAHO (Joint Commission for the Accreditation of Healthcare Organizations), and HEDIS (Health Plan Employer Data and Information Set). The instrument also assessed compliance with office safety standards, the adequacy of medical records, and other aspects of an effective office practice. After completing the survey, the medical students met in small-group sessions to discuss the results with their faculty preceptors and with their primary care physician preceptor. Students learned what elements are important for effective office practice.

**Systems-based Chronic Disease Care**

During the third-year primary care clerkship, Dartmouth medical students learned how to design systems for managing chronic diseases. Through lectures, patient interviews, and interaction with health and social services organizations, the students learned what services were available to help physicians care for patients with chronic conditions. Students also carried out population-based health care projects. In these projects, they assessed the health care in the community and collected and analyzed population data to examine variations in clinical care for specific diseases. They also used personal digital assistants (PDAs) (eg, Palm Pilots) to record and analyze their clinical encounters.

During the AvMed Health Plans site visit, UM medical students learned how health systems help physicians provide state-of-the-art care to populations of patients with common chronic conditions. Through didactic presentations, they learned how health systems used hospital, laboratory, and physician databases to identify high-risk patients and used evidence-based guidelines to develop “best practices” for each chronic condition. They participated in a group exercise to develop a program to increase mammography screening rates among eligible women. The medical students then visited the disease management department to observe the health plan's congestive heart failure, diabetes, and asthma programs. They observed how nurse care coordinators use early-warning patient alerts and tracking systems to help physicians ensure their patients are re-
receiving the evidence-based care for their specific chronic conditions.

Quality Improvement and Patient Safety

Third-year UW students received a 4-hour workshop on “Medical Mistakes,” taught by physicians, patient advocacy representatives, attorneys, and ethics experts. Students viewed two videotapes (“Beyond Blame” and “Do No Harm”) involving a series of patient care mistakes in health systems. The panelists discussed with the students how to design a systems-based approach to enhance patient safety in the office, hospital, and health system.

Fourth-year UW students also could choose to interview their preceptor or another health professional about systems to reduce medical errors. Students identified systems in the physician’s office or hospital to reduce adverse drug interactions, ensure that patients received appropriate medications, and to track and report abnormal laboratory results.

Systems-based Care in Integrated Health Systems

To understand systems-based care, third-year medical students at the University of California, San Francisco, participated in a longitudinal, 6-month experience working a half day a week in one of three local integrated health systems: Brown and Toland Medical Group, the City and County of San Francisco’s Community Health Network, and Kaiser Permanente Medical Group. Students worked a half day a week for 6 months in one of a variety of settings ranging from hospital-operated clinics to primary care physician offices.

The longitudinal experience provided students an opportunity to develop a long-term relationship with a preceptor and to follow the care of patients over time within the entire health care system. Students learned about office operations by talking with billing and operations staff, attending office meetings, and accompanying their preceptor on community and home visits. In small-group discussion sessions with health system medical directors, physicians, and other health professionals, students were taught communication skills, conflict management and resolution, and quality improvement. After the longitudinal clerkship, students better understood the physician’s role and the requisite knowledge and skills to practice effectively within a health care system. Students felt that patients received high-quality care in such integrated systems.

Results

The UME-21 Supplemental Questionnaire, which surveyed graduating seniors from each of the eight UME-21 schools from 1999 to 2001, provided a limited tool from which to evaluate systems-based care teaching among the eight UME-21 project schools. Graduating senior scores suggest variability in medical student experiences among the eight UME-21 schools (Table 2). For example, 2001 senior student reports of experiences conducting utilization review or chart audits ranged from 11%–76%, while senior student reports of experiences reviewing quality benchmarks (e.g., immunization goals) ranged from 24%–76%. This variability appears consistent with the observation that some schools provided a diverse array of systems-based care experiences in the third and fourth years, whereas others did not. The eight schools, in aggregate, increased student exposure to some of the key elements of systems-based care. For example, 10% or more seniors in 2001, compared with 1999, reported

<table>
<thead>
<tr>
<th>Experience</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>Change 1999 to 2001 (%)</th>
<th>Range of School Scores</th>
<th>Change Among Schools 1999 to 2001 (%)</th>
</tr>
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<tbody>
<tr>
<td>Rounds with nursing or social worker</td>
<td>84</td>
<td>77</td>
<td>83</td>
<td>-1</td>
<td>70 to 95</td>
<td>-9 to 11</td>
</tr>
<tr>
<td>Interviewing office administrative staff about managing patient care</td>
<td>44</td>
<td>55</td>
<td>54</td>
<td>10</td>
<td>40 to 75</td>
<td>-12 to 36</td>
</tr>
<tr>
<td>Conducting utilization review or chart audit</td>
<td>22</td>
<td>30</td>
<td>24</td>
<td>12</td>
<td>11 to 70</td>
<td>-12 to 44</td>
</tr>
<tr>
<td>Reviewing quality benchmarks (e.g., HEDIS, immunization goals)</td>
<td>32</td>
<td>43</td>
<td>46</td>
<td>14</td>
<td>24 to 76</td>
<td>1 to 37</td>
</tr>
<tr>
<td>Visiting a patient at home</td>
<td>90</td>
<td>83</td>
<td>92</td>
<td>2</td>
<td>65 to 100</td>
<td>-19 to 44</td>
</tr>
<tr>
<td>Using formal practice guidelines in caring for a patient</td>
<td>88</td>
<td>86</td>
<td>93</td>
<td>5</td>
<td>88 to 97</td>
<td>-6 to 27</td>
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conducting a utilization review or chart audit, reviewing quality benchmarks and clinical guidelines for a specific health condition, and interviewing office staff about how they manage patient care.

Discussion

The challenge of teaching systems-based care is to offer a comprehensive clinical experience beyond the traditional academic medical center teaching hospital where only about one in 1,000 patients end up seeking medical care. Teaching systems-based care requires medical students to understand the major elements of the health system and how physicians and other caregivers mobilize and coordinate care for patients and populations. Through the UME-21 project, the eight partner schools incorporated some important new elements of systems-based care into the third and fourth years. These components included exposing medical students to care provided in skilled nursing facilities, the patient’s home, and public health agencies and in teaching students skills in quality improvement, utilization management, and systems-based chronic disease care.

The schools had variable success providing a comprehensive set of clinical experiences in systems-based care outside the traditional teaching hospital. This may reflect, to some degree, the challenge of developing necessary partnerships with health plans, health systems, public health agencies, and other organizations external to the traditional medical school and teaching hospital. It appeared that medical schools operating within a comparatively well-developed, integrated, and comprehensive academic health system were in a better position to enhance clinical experiences in systems-based care. Yet, with a committed dean and senior medical education faculty, several medical schools were able to form effective partnerships beyond their existing academic health system (eg, with a public health department and managed care organization) to enhance student experiences in systems-based care.

The national attention brought by the IOM, ACGME, and others to health system performance and the leadership role of the physician may be expected to main-

tain a focus on teaching systems-based care to medical students and residents. The experiences of the UME-21 partner schools may be helpful to medical school deans, curriculum committees, and faculty as they seek to incorporate this important content area into undergraduate and graduate medical education.

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