ABSTRACT. Managed care is becoming the dominant form of health care delivery and financing in the United States, necessitating changes in pediatric education. This transition is redefining the questions of what needs to be taught, who should be teaching it, where it should be taught, and how to pay for this education. We performed a literature review and examined reports from policy and professional groups to seek answers to these questions. We have identified curricular, administrative, and financial challenges to pediatric education in managed care. Although road maps for innovation have been described, there is a deficiency of research and information in key areas of pediatric education in the managed care environment. Pediatrics 1998;101:739–745; managed care, graduate medical education, pediatric residency, health care financing, pediatric training.

ABBREVIATIONS. HMO, health maintenance organizations; GME, graduate medical education; COGME, Council on Graduate Medical Education; AAHP, American Association of Health Plans; AMCO, managed care, Association of American Medical Colleges; AAMC, American Academy of Pediatrics; MCO, managed care organization; GHAA, Group Health Association of America; PCP, primary care physician; FOPE II, Future of Pediatric Education II.

Health care delivery in the United States is increasingly becoming integrated under a variety of arrangements known collectively as managed care. Almost two thirds of privately insured patients in the United States are presently enrolled in a managed care plan. In 1995, 88% of pediatricians participated in health maintenance organizations (HMOs), with 68% participating in a capitation plan (Fig 1). Medicaid pays for the health care of one quarter of all children in the United States and is the largest payer for most pediatric teaching hospitals. To restrain rising Medicaid costs, states are turning to managed care, with the percentage of Medicaid beneficiaries enrolled in managed care rising from 9.5% in 1991 to 40.10% in 1996 (Fig 2). As the various models of managed care become the dominant form of health care delivery and financing for children, the pediatric education system is struggling to adapt to new demands from the changing health care system. The transition to managed care is redefining the questions of what needs to be taught, who should be teaching it, where it should be taught, and how to pay for this education.

In preparation for a 1996 conference sponsored jointly by the Health Resources Services Administration and the Ambulatory Pediatric Association, we reviewed the published literature for relevant articles and reports on pediatric graduate medical education (GME). Medline searches using the keywords managed care, graduate medical education, residency and internship, and pediatrics were performed. Reports from policy and professional groups concerned with medical education and managed care such as the Council on Graduate Medical Education (COGME), the Pew Health Professions Commission, the American Association of Health Plans (AAHP), the Association of American Medical Colleges (AAMC), and the American Academy of Pediatrics (AAP) also were reviewed. The search and review were updated before publication in this supplement.

REPORTS OF POLICY AND PROFESSIONAL GROUPS

In 1995, COGME examined changes in medical education brought about by managed care. Members of COGME concluded that managed care will magnify the deficiencies of the current medical education system and that changes in the curriculum and financing of GME were required. In its sixth report, COGME predicted that the transition to managed care would lead to:

1. a physician oversupply, particularly of specialists and subspecialists, whereas the supply of generalist physicians would be in “near balance” in the next 15 years;
2. the need for physicians to acquire a different set of skills than those traditionally taught in medical schools and residencies; and
3. less financial support for education in the new health care environment as well as many barriers and few incentives for teaching institutions and managed care organizations (MCOs) to work together to resolve problems in medical education and the physician work force.

COGME called for broad reforms in medical education curricula, accreditation, and financing. The Pew Health Professions Commission also examined the role of managed care in medical education. The Commission’s Advisory Panel on Health Professions Education and Managed Care noted that managed care is changing the culture and values of medicine. Managed care requires physicians to assume responsibility and accountability for the health of a defined population.
population, including the assumption of financial risk. The physician's goal under such arrangements is to maximize the value of health care given with the resources provided. The Advisory Panel outlined six core concepts of managed care with corresponding educational responses.

1. Managed care is population-based and comprehensive; therefore, students need to learn epidemiology, health pro-motion, and disease prevention in community settings.

2. All participants in health care including clinicians, patients, health care organizations, and government need to be accountable. The clinician is described as having a dual role as an advocate for the individual patient and as a guardian of the institutional welfare of the health care organization.

3. Information on patients and clinicians must be available to manage care effectively, and students need to learn how to use information to provide cost-effective and high quality care. Information systems will give physicians greater ability to monitor the outcomes of care provided, but also will place their care under greater scrutiny by administrators, colleagues, and patients.

4. Primary care attributes are central to managed care. These attributes were defined by the Institute of Medicine as "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community." The panel also identified these as ideal attributes of managed care.

5. Managed care requires coordination and interdependence among many professionals in many disciplines, and students should learn about effective teamwork.

6. The financing and delivery of care will be linked explicitly, with an emphasis on minimizing cost while simultaneously increasing quality.

The Advisory Panel concluded that health profession education is a social good and must produce practitioners prepared for the new health care environment.

Although the impact of managed care on medical education has been, and continues to be, the topic of many editorials, there are few empirical studies on this subject. Most studies are from the fields of internal medicine and family practice or focus solely on undergraduate medical education. Only a few refer to pediatrics specifically. However, in this paper, we will highlight literature that forms a base from which to understand the current challenges facing pediatric education. We have chosen to divide our examina-
The AAP Resident Section has expressed concern about the adequacy of managed care education in pediatric residencies. HMO managers estimate that it takes 1 to 2 years of experience after residency to prepare graduates for managed care practice, and some HMOs have established training programs for physicians entering their organizations.

New skills are being demanded by MCOs. In 1994, the Group Health Association of America (GHAA), now the AAHP, produced an internal report on reforming medical education. The AAHP encouraged moving a part of residency training from hospitals to MCO sites and listed 12 competencies needed by primary care physicians (PCPs) in managed care settings (Table).

**Key Areas for Physician Education in Managed Care**

Four areas are particularly characteristic of managed care practice: population-based care, coordination of care, quality improvement, and new ethical issues.

The most fundamental change that managed care brings to the role of the PCP is the expanded responsibility for the health of a population. Pediatricians of the future will need to learn how to care for panels of children directly under their care and the community from which they are drawn. Greenlick has suggested that education for a population-based clinical practice includes training in three components of care: resource allocation, the epidemiology of practice, and care for excluded populations. As individuals or as participants in larger organizations, he states, physicians must make decisions on effective utilization of limited resources to maximize the health of all the people for whom they have assumed responsibility, or these decisions will be abdicated to others. The future physician also will be collecting information on the demographics and epidemiology of his/her patient population and applying this knowledge to improve and individualize the care of his patients. Finally, Greenlick notes that the physician will be assuming responsibility for all the people in her/his panel, even those with whom she/he never has direct contact. Health promotion and prevention and interventions to reduce health risk in the community will become an integral part of primary care practice.

As members of integrated systems, physicians no longer function as the owner of a practice with a few colleagues, nurses, and administrative staff; pediatricians will become members and leaders of teams composed of many different professionals who are contributing to comprehensive care for patients. The AAP has embraced a broad role for the pediatrician in coordinating care through its advocacy of a "medical home" for each child. Coordinating this type of care will be demanded by managed care systems and will require managerial and communication skills. Clinical ability alone will not ensure optimal care, especially for patients with chronic disease or disabilities.

Because payers are now demanding value in the health care they purchase, quality has to be demonstrated to payers and patients. Evidence of patient satisfaction, technical quality, and appropriate delivery of preventive care will be required by MCOs. Industry and consumer groups are demanding disclosure of physician-specific information on outcomes. Organizations such as the National Center for Quality Assurance are working to develop standard measures of quality for health care purchasers. Tools such as clinical practice guidelines, patient satisfaction surveys, and comparisons of processes and outcomes among practitioners increasingly are an important part of medical practice. Physicians must participate in defining quality standards for themselves and become engaged in quality improvement processes.

The most fundamental change that managed care raises ethical concerns. Physicians are expected to balance the interests of individual patients against the interests of other patients, and more insidiously, physicians may receive financial incentives that conflict with the needs of individual patients. The ability to understand and resolve these ethical conflicts is a critical competency for practicing in the managed care environment.

**Responses From the Pediatric Education Community**

The pediatric education community is beginning to respond to the needs of pediatric residents to learn how to practice effectively in a managed care environment.

**TABLE.** AAHP Competencies for Primary Care Physicians in Managed Care Settings

<table>
<thead>
<tr>
<th>Competency</th>
<th>Description</th>
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<tbody>
<tr>
<td>Foster health promotion and deliver disease prevention services</td>
<td>Communicate effectively with patients and panels of patients</td>
</tr>
<tr>
<td>Detect, diagnose, and manage common symptoms and physical signs effectively</td>
<td>Manage acute and chronic medical conditions, including musculoskeletal and mental health conditions, and perform ambulatory diagnostic procedures and simple surgeries</td>
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<tr>
<td>Understand and practice the principles of effective quality improvement</td>
<td>Detect, understand, and manage health risk problems of home and workplace</td>
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<tr>
<td>Demonstrate leadership and team-building skills, including resource allocation, for effective practice management in an organizational care system</td>
<td>Use clinical and information systems to analyze and improve practice and practice patterns</td>
</tr>
<tr>
<td>Engage in participatory decision making with patients, families, and other providers</td>
<td>Understand the health-related needs of a defined population</td>
</tr>
<tr>
<td>Apply a general knowledge of managed care systems in evaluating the relevant medical literature</td>
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The GHAA competencies for managed care practice are included in the APA Educational Guidelines for Residency Training in General Pediatrics,27 and the recent revision of the Program Requirements by the Residency Review Committee for Pediatrics will increase the emphasis on ambulatory care education and community pediatrics in residency training.28 The pediatric education community is currently engaging in a reexamination of pediatric education through the Future of Pediatric Education II (FOPE II) project sponsored by the AAP, the American Board of Pediatrics Foundation, the American Medical School Pediatric Department Chairs, and the Center for the Future of Children of the David and Lucile Packard Foundation. The FOPE II project plans to address the future supply and training of pediatricians and the future provision of pediatric care in the context of the new health care environment.

Many of the principles of managed care practice are analogous to those of community-based primary care practice. Because the majority of community pediatric practitioners are also engaged in some form of managed care, the renewed emphasis on community pediatric education29 may provide opportunities for education in managed care competencies as well. During a longitudinal experience in the private office setting, residents can be exposed to managed care concepts and preceptors can serve as role models in managing successful practices.30 The Pediatric Education in Community Settings program, cosponsored by the University of Massachusetts Medical Center, the Ambulatory Pediatric Association, and the AAP, is providing guidance to pediatric residency programs on establishing community-based education for residents.31 In addition, the AAP has been actively promoting a community-based approach toward improving children’s access to health care through the Community Access to Child Health program. The AAP Resident Section is working with the Community Access to Child Health program to increase resident education in community pediatrics. This program seeks to develop resident competencies in understanding the health needs of populations, team-building, and coordination of care.32

ADMINISTRATIVE CHALLENGES

Several leaders in both academic medicine and managed care have suggested that MCOs collaborate with academic health centers to help train residents. Moore, however, has identified several barriers to effective collaboration in medical education.33 Academic health centers are concerned about the quality of education and the expense of training in managed care sites and loss of academic control over appointments and academic health center governance. MCOs have concerns about loss of managerial control over care processes, inefficiencies from teaching residents and students, and decreased patient satisfaction from care provided by trainees. However, Moore states that the academic health center and the MCO also benefit from closer ties. Academic health centers gain a larger teaching base and more referrals and admissions to the teaching hospital. MCOs may receive increased prestige and recruit future staff from the graduates of associated training programs.

Two examples of collaboration between an academic health center and an MCO are presented.

In 1986, the collaboration between Harvard Medical School and a nonprofit staff model HMO, Harvard Community Health Plan, now Harvard Pilgrim Health Care, was described by Moore.34 Harvard Pilgrim contributed a small percentage of its revenues to a foundation to support teaching, research, and community service. The foundation in turn helped fund a joint academic department, the Department of Ambulatory Care and Prevention, of the medical school and HMO. Harvard Medical School has granted faculty appointments to many Harvard Pilgrim staff, and Harvard Pilgrim supports HMO faculty who supervise and teach residents caring for HMO patients at affiliated teaching hospitals.

The experience of the affiliation of Case Western Reserve School of Medicine and the Henry Ford Health System described by Steven et al also illustrates the challenges of academic health center and HMO collaboration.35 The medical school committed itself to full-time faculty appointments for qualified health system staff and appointments to key committees. Both organizations made significant funding contributions for curriculum development and tuition. Barriers to collaboration included cultural differences between the medical school and health plan, difficulties with faculty appointment procedures, and concern that the health plan was competing with the teaching hospitals for students, residents, and staff.

A 1994 symposium sponsored jointly by the AAMC and the GHAA presented six successful academic health centers and HMO partnerships.36 However, there continues to be a lack of data on partnerships between MCOs and academic health centers.37 In 1997, the Pew Charitable Trusts committed $8 million to establish the Academic Health Center/Managed Care Organization Partnership to encourage partnerships in the development of innovative models of training.38

Resident Experience in Managed Care

Currently, only a small number of MCOs participate in medical education. A 1990 survey of HMOs showed that only 15% were involved directly in GME, and most served as an ambulatory care rotation site.39 Involved HMOs were primarily nonprofit staff or group model HMOs where physicians are affiliated with or employed by one HMO. In contrast, the fastest growing type of MCO is the network model in which independent individual and group practices contract with several managed care plans to provide care. A survey of primary care residency programs found that only 28% of pediatric residencies had provider contracts with HMOs, and approximately 40% had <10% HMO patients. Pediatric residents on average handled only 15% of the HMO patient encounters.40 A 1988 survey of pediatric program directors indicated that 14% of programs required an HMO experience and that 21% offered an elective HMO experience.41 A 1996 survey of residents in six programs including pediatric and medicine–pediatric residents at the University of Kentucky showed that 92% of all respondents reported little to no exposure.
to managed care, and 73% rated their experiences with managed care as being fair to poor. This relative lack of involvement of managed care in medical education inhibits on-site opportunities for education of residents in the managed care competencies needed for managed care practice. There is little information published on the quality of educational experiences in MCOs. An examination of the literature by Barzansky and Perloff found that most of the experiences described were limited in the duration of the experience and the number of students or residents involved. They noted that managed care settings were being used primarily as generic ambulatory care training sites; there is little information on whether students learned about the unique attributes of managed care systems. Veloski et al found that medical schools used MCOs for education because of their patient base, not because of their unique characteristics. Learning objectives for experiences at managed care sites usually did not explicitly address managed care competencies. There is minimal information in the literature on successful programs or techniques for training in managed care competencies.

Experiences in family practice resident continuity clinics, which joined prepaid health plans at Duke–Watts Family Medicine Program and the Family Practice Center at the University of North Carolina, pointed out additional challenges in teaching managed care. Both clinics experienced a substantial increase in patient volume with their new affiliations. Both programs also noted that the residents saw a larger volume of patients; however, residents also ordered more tests and follow-up visits. At the University of North Carolina, Curtis et al suggested that this may be a result of residents not being at personal financial risk for overutilization of resources. Bradley et al at Duke–Watts reported that residents were concerned that the increased pace diminished time for teaching, and they expressed discomfort with a focus on cost containment. However, the authors state that the residents felt that they learned skills for successful practice in prepaid plans and that they thought more critically about clinical decisions.

Finally, managed care places a premium on primary care. In the academic health center, however, attitudes toward primary care have been generally negative. A survey of faculty, residents, and students by Block et al found that academicians view primary care as requiring little expertise and primary care physicians as being unable to manage serious illnesses. They also observed that students and residents perceive little encouragement for primary care careers and view the quality of primary care education as inferior to that for specialty education. These attitudes among faculty must change if the academic health center is to adapt to the managed care environment.

Moore et al described the concept of the “teaching HMO,” which should be explored. Even as many hospitals a century ago were reluctant to be sites of medical education because of concerns about cost, administration, and patient satisfaction, many HMOs are avoiding involvement in medical education. Yet, there is an opportunity for HMOs to join with academic medicine that will benefit both in a way similar to that of the very successful partnership between the medical school and the teaching hospital earlier this century.

FINANCIAL CHALLENGES

For most of this century, medical education was financed primarily by patient care revenues. Determining the actual cost of medical education is difficult because it is delivered jointly with patient care and research. A study that attempted to determine support for teaching activities at an academic health center showed that faculty are poorly compensated for teaching.

Medicare is the dominant financier of GME in the United States, providing >$5 billion a year. Under the present structure, this funding is provided as an adjustment to Medicare reimbursement for hospital services and is not available for outpatient or community sites not owned by the hospital. Therefore, teaching hospitals may be reluctant to pay residents for time spent out of the hospital.

In pediatrics, residency financing is even more problematic because independent children’s hospitals do not care for a significant number of Medicare patients. On the other hand, the large proportion of pediatric residency positions based at general hospitals do receive Medicare funding for all of their residents. Other federal sources of funding for general pediatric education include general pediatric residency training grants under Title VII, community and migrant health center monies, family planning grants, Head Start programs, health care for the homeless, and Maternal and Child Health grants, although these amounts are almost insignificant compared with Medicare subsidies and may be diminishing because of budgetary pressures in the federal government. In addition, some state Medicaid programs provide GME funding.

The growth of Medicaid managed care will have a particularly significant impact on pediatric education because Medicaid funds almost half of the care given in children’s hospitals. The rapid establishment of Medicaid managed care and its impact on academic health centers in Tennessee is particularly illustrative. In 1994, Tennessee enrolled all of its Medicaid beneficiaries and many of its uninsured patients into MCOs. Medicaid GME and disproportionate share payments for uncompensated care were eliminated, leading academic health centers to cut residency positions. Restoration of some funding for GME was accompanied by demands that the academic health centers train more PCPs who would remain in the state to practice. In addition, academic health centers experienced a drop in clinical volume because of competition from MCOs without affiliations with the academic health center.

Although there are few data on the costs of training in managed care settings, these costs are probably very similar to the cost of education in other ambulatory settings. Ambulatory care education is considered by many to be more expensive than in-
patient education because it requires greater overhead expenses and more faculty time, although there is evidence to suggest that residents may be able to generate enough clinical revenue to break even. Sargent and Osborn found that group practices precepting pediatric residents showed no difference in the number of patients seen or the amount billed when comparing clinical sessions with and without residents. PL-1 residents were able to bill $11,000 to $15,000 a year working 2 half-days per week, and PL-2 and PL-3 residents billed $23,000 a year working 3 half-days per week. A time-motion study in a prepaid group practice showed an insignificant loss in staff pediatrician productivity because of the presence of residents as measured by revenues and number of patients seen. There are additional costs associated with education in community settings including curriculum development and the monitoring and evaluating of residents and site.

Therefore, lack of financing for education in managed care settings is a barrier, but not an insurmountable one. The literature indicates that residents may be able to generate sufficient revenue in ambulatory care sites to finance a significant portion of the cost of their education. In addition, the medical profession has recognized the disincentives in the current system of GME financing and are seeking changes that may increase funds available for ambulatory care education. In a joint statement in 1997, the American Medical Association, the AAMC, the Association of Academic Health Centers, and other professional organizations called for a national all-payer fund to support GME with the funds going to the entities that incur the costs of education whether or not hospital-based. With stable funding to support resident training in ambulatory care sites, a major barrier to education in managed care would be overcome.

**FUTURE DIRECTIONS**

The available literature offers a great deal of thoughtful consideration on how to effectively train pediatricians for careers in a managed care environment. The published experience of several MCOs and academic medical centers provides useful guidelines for others attempting innovations in this area. However, this review also highlights the lack of research and information in a number of key areas.

First, there is a lack of data on resident exposure to managed care. This data should be collected as managed care becomes the dominant health care financing and delivery system and residents receive greater exposure to managed care. Whether this exposure is through formal educational experiences or informally in the course of clinical activities, it is important to determine what residents are learning about managed care and how it is shaping their perceptions about their role as pediatricians of the future. It is also critical that medical education continue to instill professional ethics and values despite uncertainty about the future of medicine.

Second, more data are needed on the characteristics of sites that will be most effective in providing training for managed care competencies. Most experience, to date, has been in the setting of group or staff model HMOs. As more decentralized practice networks become the predominant form of managed care, education in individual or group practices may be more appropriate. However, unlike the staff or group model HMO sites, the network site is likely to contract with several MCOs who have differing standards, practices, and levels of commitment to education. Models of education in both types of sites need to be developed and studied.

Third, there is a need for faculty development at potential sites. Faculty development will be a necessary area of collaboration between academic settings and the practices of MCOs. Educational techniques that are effective in clinical settings where efficiency and productivity are high priorities need to be developed and disseminated. The ongoing work in improving and expanding pediatric training in community sites could provide important lessons in this regard.

Fourth, there is a need for effective curricula that help students and residents achieve the competencies for managed care practice that have been discussed in the literature. Studies that evaluate such curricula must begin with clear educational goals and use measurable outcomes such as attitudes, knowledge, and skills, as well as the satisfaction of the students and residents. Learners in such programs should be tracked and asked whether the skills developed were useful in their subsequent activities and practice. MCOs should be surveyed concerning the effectiveness of the preparation of these students and residents for practice in the managed care environment. Effective educational experiences in resource allocation, defining the health needs of a population, and quality improvement also must be developed. The development and testing of information systems that allow residents to monitor their own practice patterns and the outcomes of their care decisions would help residents understand how managed care competencies fit into the practice of pediatrics.

Finally, data are needed on the actual costs of pediatric education and the volume of services provided by pediatric residents. Because medical education is no longer being implicitly funded through patient care, it will be critical to quantify training costs in various settings. This will be a first step toward getting cost-conscious MCOs to participate in supporting education. Alternative methods of financing educational costs should be explored such as a billing code for educational services to reimburse clinicians explicitly for teaching in their practice.

Opportunities for scholarly work in these and related areas abound in this period of rapid change in both health delivery and medical education. Educators in academic centers and the administrative and physician leadership in MCOs must be encouraged to collaborate, innovate, and publish so that others may benefit from the increasing experience in training providers for practice in managed care environments. Increasing knowledge and understanding of how to provide high quality pediatric education will
benefit everyone involved: the MCO, the residency programs, the residents, and most important, the children they will serve.

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