The Future of Pediatric Education II: Organizing Pediatric Education to Meet the Needs of Infants, Children, Adolescents, and Young Adults in the 21st Century

EXECUTIVE SUMMARY

Introduction

The Future of Pediatric Education II (FOPE II) Project was a 3-year, grant-funded initiative, which continued the work begun by the 1978 Task Force on the Future of Pediatric Education. FOPE II takes a more in-depth look at issues relating to primary and subspecialty care, the role and education of nonpediatrician providers of child health care, and the financing of pediatric education. FOPE II was a project of the entire pediatric community; a Task Force, composed of leaders in pediatric education, was responsible for the overall direction of the FOPE II Project and for generating the final report. Throughout the course of the Project, the Task Force sought advice and input from a wide variety of knowledgeable and interested individuals and organizations.

In carrying out their charge, the Task Force was guided by 3 overarching goals:

• To evaluate the 1978 Report with respect to its relevancy to the education of pediatricians and others providing health care to children in the 21st century.
• To provide direction for the improvement of pediatric education, with special emphasis on workforce requirements, new instructional methodologies, and the financing of pediatric education.
• To recommend essential changes in the educational process to meet the current and future health care needs of all infants, children, adolescents, and young adults.

To achieve these goals, 5 topic-specific Workgroups were formed:

• The Pediatric Generalists of the Future Workgroup
• The Pediatric Subspecialists of the Future Workgroup
• The Pediatric Workforce Workgroup
• The Financing of Pediatric Education Workgroup
• The Education of the Pediatrician Workgroup

The 1978 Report was pivotal in addressing necessary changes for pediatric training in the late 1970s. It anticipated the need to increase residency training in the ambulatory setting; to incorporate more training in behavioral, developmental and adolescent issues; and to improve physicians’ skills in working with other health professionals.

New forces have emerged since the release of the 1978 Report that will have a significant influence on the future of the specialty, including the changing demographic profile of the US population; an increase in the percentage of single-parent families; growth in the number of dual-parent families in which both parents work outside of the home; an increase in the number of children enrolled in day care; an increase in the number of uninsured children; a rise in youth-related violence; new diseases; technological advances; more pediatricians employed or working in groups; more pediatricians seeking a better balance between work and family; a major expansion of managed care; increased competition; pervasive strategies to limit costs and reduce reimbursements; and a shift in emphasis from inpatient to outpatient care.

This report examines these and other factors that have altered child health needs and pediatric practice over the last 2 decades and presents a vision of the scope of practice of the pediatrician of the future, including an evaluative process for the core competencies pediatricians will need to acquire during residency and the lifetime educational processes needed for the provision of quality pediatric services.

There are 5 key principles that guide all predictions and recommendations pertinent to the provision of optimal pediatric care in the future.

• The pediatrician is the best and most extensively trained professional to provide quality health care services to infants, children, adolescents and young adults within the context of their families, communities, and environments.
• All children should receive primary care services through a consistent “medical home,” which is an approach to providing continuous and comprehensive primary pediatric care from infancy through young adulthood, with availability 24 hours a day, 7 days a week, from a pediatrician or a physician whom families trust. The medical home offers care that is accessible, affordable, family-centered, continuous, comprehensive, coordinated, compassionate, and culturally competent.
• Pediatric training should continue to emphasize in-depth knowledge of normal development, childhood disease processes, evidence-based management, and technical skills, but should also embrace new areas that mirror the changing health care needs of children, including neurodevelopmental, behavioral, and genetic issues.
• Pediatric training should focus on providing a core foundation of attributes, skills, and competencies to all pediatric residents—regardless of their future career paths.
• A 36-month pediatric residency (33 months of pediatric residency training usually completed in 3 years) is only part of the continuum of learning for pediatrics; continuing medical education (CME), including the utilization of information system technology, will play an increasingly important role for pediatricians.
The Changing Pediatric Practice Environment

Changing Demographics

The changing sociodemographic characteristics of children in the United States are likely to exert a substantial influence on the future health needs of the pediatric patient population. One negative trend over the past 2 decades has been the increased number of children living below the poverty line. Poor children are less likely to visit a physician and, thereby, have reduced opportunities to receive preventive or continuous care.

Cultural and ethnic diversity also have increased over the past 20 years and are projected to increase even more in the 21st century. The US Census Bureau projects that by 2020, nearly one half of US children under age 18 will be African American, Latino, Asian American, or Native American.1

Families in the United States today also face a number of challenges that were not as prevalent 20 years ago. In addition to a dramatic increase in the number of single-parent families, many dual-parent families have 2 wage earners. Parents are trying to balance multiple roles, often in isolation from neighbors, community institutions, and extended family.

Biomedical Advances

Since the publication of the 1978 FOPE Report, there has been significant scientific progress in reducing childhood health risks from medical conditions. Advances in molecular biology and genetics have occurred at a rapid rate and promise to affect substantially the diagnosis, treatment, and understanding of a number of pediatric conditions. Success in these arenas led to the establishment of the Human Genome Project in 1990, which will determine the entire sequence of the human genome by the year 2003. The detailed DNA information that will become available as a result of the Human Genome Project will offer a more complete understanding of the structure, organization, and function of DNA in chromosomes. By being able to identify individuals who are predisposed to a particular disease, pediatricians will be able to place much greater emphasis on prevention and intervention, whether by gene therapy techniques, avoidance of environmental co-morbid factors, the development of new therapeutic agents, or other mechanisms.

With this explosion of knowledge and technology, however, will come new educational needs and responsibilities. In addition to increasing physician understanding of the scientific principles involved, attention will need to be focused on the ethical implications associated with this new knowledge, in such areas as genetic testing, carrier identification, prenatal diagnosis, gene therapy, and insurability. Because medical training in genetics has not kept pace with these rapid scientific advances, it will be important for medical schools, residency programs, and CME providers to expand course offerings and training opportunities in this area.

Technological Advances

There have been remarkable advances in information system technology since the issuance of the 1978 FOPE Report. In addition to enhancing physician efficiency and productivity, these new information technologies are reshaping the relationships among physicians, their patients, and other members of the multidisciplinary care team, and are enhancing the ability of pediatricians to provide and support health care for patients in rural and underserved areas.

Changes in Pediatric Health Care Delivery

Public and Private Sector Initiatives

Political and economic forces have driven much of the change in pediatric practice since the 1978 FOPE Report, and such forces are likely to continue to influence pediatric practice in the 21st century. The role of the government as a primary purchaser of health care has resulted in a restructuring in the financing and organization of health care in an effort to control escalating health care costs. The widespread adoption of managed care in both the private and public sectors as a panacea for rising health care costs has also had a significant impact on pediatricians. Much like private insurance purchasers, state Medicaid programs are looking to managed care to cut costs, expand preventive services, and decrease use of emergency rooms and inpatient hospital facilities. As state and federal coverage for children’s health services increases, the role of managed care may increase.

The Role of Prevention

Prevention is a core value for pediatricians. Well-child care provides a vehicle for focusing on immunizations, and it allows pediatricians to promote healthy lifestyle choices, to monitor patients for physical and behavioral pathology, and to provide age-appropriate and individualized anticipatory guidance. Well-child care will continue to be an increasingly important part of the pediatrician’s responsibilities in the 21st century. The growth of other child health professionals and technological innovations may, however, radically alter the manner in which well-child care is provided. Nonpediatrician child health professionals, for example, may provide a more prominent role in direct patient contact, while the media and the Internet are likely to become more significant sources for patient education.

Changing Patterns of Morbidity

While pediatricians in past decades spent much of their time dealing with acute illnesses, providing care for patients with chronic conditions will play a more important role in the future. The number of children and adolescents with moderate-to-severe chronic medical conditions, requiring ongoing care, has increased over the last several decades. Although some of this reflects the growing incidence of certain conditions, such as asthma and acquired immunodeficiency syndrome (AIDS), much of the increase reflects improvements in life-prolonging medical and surgical care, which leaves children permanently dependent on complex medical interventions. In addition, a growing percentage of children are developing severe developmental-behavioral pathology,
placing them in need of more intensive therapy. These trends highlight the need for careful attention in pediatric training to the evaluation and management of children with chronic conditions.

The Changing Child Health Care Team

Another factor likely to affect the role of pediatricians in the 21st century is the growth in the number of child health care professionals and an expansion of their professional responsibilities. Over the last 20 years, pediatricians have pioneered the use of a variety of nonphysician providers in their practices, forming alliances that have allowed for the integration of children’s health care with related services. Other physicians, including family physicians and psychiatrists, have also played a role in meeting the health care needs of pediatric patients. These relationships will continue to evolve in the future.

Changing reimbursement patterns will further the creative use of an extended network of professionals to meet the health care needs of children. These providers will assume more responsibility for such activities as patient and family education and patient follow-up. Research will need to be done, however, to demonstrate the effectiveness of these partnerships and to address the appropriate ratio of providers to available patients.

Although the overlap between the roles of primary care pediatricians and family physicians will continue to create the potential for competition, there will be opportunities—particularly in underserved areas—to implement cooperative models through which pediatricians and family physicians can work together to improve the health status of children.

The combined Internal Medicine/Pediatrics (Med/Peds) residency pathway will continue to influence the delivery of pediatric care. An indirect impact of Med/Peds will be to help maintain interdisciplinary integration within medical centers and to create new collaborative bridges with other fields outside the customary domain of pediatrics.

In the 21st century, the pediatric profession will grow to encompass a number of new and expanded functions and settings, including pediatricians providing care in managed care settings; pediatricians practicing in rural settings; pediatricians in the role of hospitalists; pediatricians as community consultants; school-based pediatricians; pediatricians in the role of home health providers; pediatricians practicing population-based, community medicine; and pediatricians in administrative medicine.

Changes in the Pediatrician Workforce

Underrepresented Minorities

Over the past several decades, there has been an impressive increase in the number of American-educated and internationally educated pediatricians. However, much work remains in increasing the diversity of the profession; specifically, increasing the number of underrepresented minorities in pediatric training programs. The US Census Bureau projects that by the year 2020 nearly 50% of US children under age 18 will be African American, Latino, Asian American, or Native American; yet of the 1997 medical school graduates entering pediatrics programs, only approximately 15% were African American or Latino.

More significantly, the total number of underrepresented minorities who entered medical school in 1997 declined to 1770, the lowest number since 1991. If the trends toward lower minority representation in medicine continue, which appears likely in the foreseeable future, the problem of access to care in minority communities will likely be exacerbated. A higher percentage of minority pediatricians increases the probability of improving access in underserved areas, which traditionally have a disproportionate number of minority group residents.

Gender-related Issues

There is a clear and significant trend toward a workforce comprised predominantly of women pediatricians. Nearly two thirds of current first-year pediatric categorical residents are women. Female pediatricians on average work fewer hours than their male counterparts, primarily because they tend to assume much of the responsibility for child care, household needs, and the care of elderly parents. As a result, there may be a continued, gradual overall decline in productivity for the specialty as a whole, which will affect workforce projections.

Changing Attitudes Toward Work and Family

Recent surveys have pointed out that both younger male physicians and female physicians are reporting moderate levels of role conflict. The pediatric specialty, therefore, must not only consider the needs of women entering the field, but also the impact of the increasing number of young, dual-career couples, with 1 or both partners practicing medicine, who are attempting to balance multiple roles. The trend toward group rather than solo practice may help address some of the important work/family-related issues, but other steps should be explored, including nontraditional work hours, quality day care at or near the workplace, flexible policies for academic advancement, and job sharing.

Projections of Future Workforce Needs

Recent analyses of the physician workforce have yielded widely disparate estimates about how appropriately physician supply will match the demand for physician services in the 21st century. The Task Force believes that no downsizing in the current number of general pediatricians being educated is required, and that no substantive growth in numbers is warranted. It will be important in the future, however, to develop effective strategies to increase the pediatrician-to-child population ratio in underserved areas.

The Role of Pediatric Subspecialists

Declining Interest in Subspecialization

As of December 1998, 11,823 pediatric subspecialists had been certified by the American Board of Pediatrics (ABP) in 14 subspecialties, which repre-
ments just under 18% of all board-certified pediatricians. In recent years, there has been a decline in interest in pediatric subspecialization, which has been attributed to a number of changes in medicine, including a shift to managed care; an increased emphasis on primary care by payers; an increasing debt burden among residents; increasing subspecialty faculty dissatisfaction; and decreased research support. Efforts to address these issues will be important in ensuring an adequate supply of pediatric subspecialists in the future. In particular, because the majority of candidates taking ABP subspecialty examinations choose careers in academic settings, it will be essential in the future to identify strategies to enhance the attractiveness of careers in academic medicine. According to unpublished data from the ABP, in both 1997 and 1998, over 50% of subspecialists recertified in general pediatrics (52.7% and 55.1%, respectively). The data varies considerably, however, by subspecialty, from 79% for adolescent medicine diplomates, to 36% for neonatologists (written communication, W. Tunnessen, 1999).

Training Issues

Pediatric subspecialists need training in both inpatient and ambulatory settings. The increasing shift of patient care to ambulatory settings, however, requires that curricula be developed to ensure that residents have adequate exposure to the natural history of disease, as well as opportunities to experience the complexity of the psychosocial and financial issues that confront families and children who have chronic disease. To develop the skills necessary to succeed in the future, subspecialty training will need to focus on areas such as team leadership, consultative liaison, clinical outcomes, evidence-based clinical decision-making, critical pathways, cost and resource utilization issues, and information systems.

The Relationship Between Pediatricians and Subspecialists

The respective roles of and linkages between generalists and specialists—particularly primary care pediatricians and pediatric subspecialists—is an issue that will generate continued discussion in the years ahead. Research also is needed comparing the quality and cost of care provided to children by pediatric subspecialists as compared with adult subspecialists.

Future Scope of Activity

Looking ahead, it is likely that pediatric subspecialists will continue to function in a wide variety of traditional roles in direct patient services, research, and education, as well as assuming new and expanded roles and responsibilities. To assume these multiple and varied roles, the pediatric subspecialist of the future will not only need to be educated to provide the highest standard of care for children, but also must acquire the skills necessary to conduct independent, funded research, to educate other health care providers, and to serve as the principal consultant to all health care providers involved in caring for children with severe, complex, or rare disease.

Financial Support of Trainees

Residency training positions have traditionally been supported by hospital funds, whereas support for subspecialty fellowships has been obtained from multiple sources, including practice plans, hospital funds, foundations, and governmental supported grants. Recent changes in support for graduate medical education (GME) by the federal government have markedly reduced support for training beyond the core years of primary training. These financial cuts, which were aimed primarily at decreasing the number of adult-based subspecialists, have simultaneously reduced support for the training of pediatric subspecialists. The shift to managed care, declining reimbursement for clinical services, and competition for care of patients with less acute or complex conditions, are likely to continue to challenge the financial stability of pediatric subspecialty programs in the future.

The Education of the Pediatrician of the Future

Financing Pediatric Medical Education

The ongoing transformation of the health care industry will have a number of effects on medical education, including increased pressure on faculty to generate revenues. Also, for medical schools located in competitive, managed care markets, there will continue to be fewer discretionary funds to support medical education.

As resources to support education are decreasing, costs are increasing. More patients are being managed on an outpatient basis, where teaching is more costly, and a broadened curriculum has resulted in increased costs. If pediatric education programs are to be supported appropriately in the future, a number of steps must be taken, including developing validated methodologies to determine the costs of education at all levels; creating a multipayer system to fund the entire spectrum of medical education; and supporting medical student education centrally, rather than departmentally.

An Educational Framework for Pediatric Education

Medical education is properly viewed as a continuum, from medical school through residency, fellowship, and continuing education, with variations both in the content and the level at which that content is taught. Therefore, a coordinated and continuous oversight process needs to be established that will involve educators at all levels. The development of core competencies should logically derive from an assessment of the current health status and needs of children, within the context of their families and communities. This process should take into account advances in the biomedical and psychosocial sciences and the structure of the medical system in which health care is provided. In turn, these competencies should inform and guide the development of curricula for medical students, pediatric residents, fellows, and the continuing education of generalists and specialists in academics and community practice.
Future Trends in Medical Student Education in Pediatrics

Several trends are forcing medical schools to re-examine their curricula. Today only the most severely ill children who require the highest levels of care tend to be admitted to hospitals, and those who are admitted rarely remain in the hospital through the whole course of their illness. This phenomenon, which has been attributed to the effects of managed care, changing patterns of disease, and advances in medical technologies and therapeutics, has also been experienced in the other primary care specialties. As a result, medical students who are trained primarily in teaching hospitals learn a great deal about a limited range of the most complex pathologies.

Medical schools need to continue to respond to these forces, with innovative curricular changes and enhancements of educational methods. Possible strategies include decreasing lecture time and replacing it with small group discussions that connect the basic science lectures to clinical applications; using computers to supplement the teaching of basic and clinical science topics; implementing problem-based education; and offering clinical training in community settings.

Trends in Pediatric Graduate Medical Education

Today, residents still spend the majority of their time in hospital settings, usually in a tertiary care hospital. The underlying assumption has been that work in the hospital is similar to or generalizable to practice, thus making the hospital setting the appropriate principal learning environment. Although this assumption may be reasonable for subspecialty training, it is less true for primary care and is probably least true for pediatrics. It is appropriate, therefore, to ensure that the residency training of pediatricians continues to emphasize a well-thought out experience in ambulatory and community settings, where the majority of pediatricians will eventually work.

Continuing Medical Education

Because the body of medical knowledge is constantly expanding, clinicians must accept the challenge of lifelong learning. Since the 1978 FOPE Report, the human learning process has become an intense area of research, and there has been a broadened understanding of how adults in general, and physicians in particular, learn. The intricate system for educating postresidency physicians that exists today has many strengths, but requires improvement and innovation to meet the challenges of pediatric care in the 21st century.

Just as the needs of children are met best when they have an established medical home that can treat them as individuals and provide coordinated, continuous care, so will the educational needs of individual practitioners be met best when they have an established “CME home.” The “CME home” should provide an assessment of the educational needs of the individual; furnish information on and facilitate access to CME resources; and offer guidance in constructing a professional educational plan unique to each individual.

In addition to pediatricians, there are numerous physician specialists and nonphysician health care professionals who are involved in child health care. Many of the traditional professional groups representing these health care providers have expressed an interest in collaborating with pediatricians in educational endeavors for their own trainees, and some have done so in the past. Although pediatricians feel particularly knowledgeable and qualified to define educational standards for those who will care for children, it is important to recognize that a collaborative approach will be much more likely to succeed, both in influencing the educational standards of others and in obtaining their input into the education of present and future pediatricians.

Conclusion

The FOPE II Project envisioned from its inception a bold and futuristic educational plan for pediatricians and other health care professionals that would prepare them to provide optimal care to infants, children, adolescents, and young adults in the 21st century. This plan was driven by the conviction that the changing landscape of health care delivery in the last 2 decades would require dramatic changes in the current roles and education of providers of pediatric care. Indeed, the 1978 FOPE Report identified areas in need of improvement and raised concerns about emerging new influences on the delivery of care to the pediatric population.

While examining these and several new issues, the FOPE II Project’s Task Force discovered not only the scope of the critical work yet to be done, but also the level of success already achieved. It became clear that paying the way for pediatric education in the next century would be bold and futuristic, not by leading it into a completely new direction, but by making judicious adjustments to the course it has already followed.

Recommendations

The principles, concepts, and recommendations below, some of which originated in the 1978 Report of the Task Force on the Future of Pediatric Education, are intended to enhance current pediatric educational processes to prepare pediatricians of the future better for the new challenges they will encounter. Most importantly, however, it is hoped that implementation of these recommendations will ultimately benefit patients, whom the pediatric profession is entrusted to serve and protect.

In addition to the recommendations from the 1978 Report, which are being reaffirmed, the FOPE II Task Force offers the following new recommendations. The FOPE II Task Force believes that all of the 34 recommendations are important and deserve both immediate and ongoing consideration, and has decided, therefore, that they should not be prioritized.

• Pediatric medical education at all levels must be based on the health needs of children in the context of the family and community.
• Pediatricians have the most advanced education and training to provide the best care for infants,
children, adolescents, and young adults. Whenever possible, they should provide this care directly. However, in many cases, other child health professionals are responsible for providing care to the pediatric population. Therefore, pediatricians should establish the standards for the medical care of children. Nonpediatric providers must likewise be educated and trained according to these standards. Furthermore, access to pediatricians as consultants should be ensured via direct or distant mechanisms such as telemedicine.

• All children should receive primary care services through a consistent “medical home.” A “medical home” is not a building, house, or hospital, but rather an approach to providing continuous and comprehensive primary pediatric care from infancy through young adulthood, with availability 24 hours a day, 7 days a week, from a pediatrician or a physician whom families trust.

• Pediatrics should take steps to enhance the scientific foundation of pediatric medical education and ensure that its programs (curriculum, teaching, and evaluation methods) are based on this science. Research centers for pediatric medical education should be established to develop and disseminate innovations in medical education, to collaborate with educators in other fields, and to enhance generally the profession’s scientific knowledge about medical education. Faculty leadership in medical education should be encouraged.

• The goal of residency education should be to emphasize the knowledge, skills, experience, and attitudes necessary for a pediatrician in varied roles. Residents should be educated with a core curriculum so that pediatricians have a common foundation that defines the field. Pediatric residency education should remain 3 years in duration. Residency education needs enough flexibility to accommodate a broad range of initial competencies and individual career goals. There should be a future reassessment of the length of training after the development of core competencies and the evaluation of educational outcomes. Residency programs must ensure that all residents have designed and implemented an individualized professional education plan (CME) by the third year of residency training that incorporates anticipated needs for their future practice.

• Pediatrics should assume the leadership in establishing a process by which core competencies for educating pediatricians at all levels are continuously developed, revised, and evaluated. Program requirements, curricula, and evaluation systems, for both programs and learners, should be based on these competencies.

• Determining needed adjustments to the current Residency Review Committee (RRC) requirements must be the focus of all pediatric organizations on an ongoing basis. The duration and depth of training will continue to ensure that pediatricians are sufficiently differentiated from other child health professionals who care for children. Residents should be educated with a core curriculum so that pediatricians have a common foundation that defines the field and are prepared to address a broad spectrum of child health needs in a wide variety of practice settings.

• Pediatric program directors should work with pediatric department chairs to ensure that career counseling and mentorship assume more prominence in training programs.

• Because a pediatric workforce of the highest quality is essential, those residency programs whose graduates do not pass board certification examinations must be monitored carefully. Moreover, those programs where a significant percentage of graduates performed poorly on the certification examinations should be closed.

• The education of the pediatric subspecialist and academic generalist should provide a full range of clinical, teaching, and research experience. In many cases, this will require an extended period of research training and protected research time either before or after the individual attains faculty status.

• The Task Force embraces combined residency programs (eg, Med/Peds and psychiatry/child neurology) as a method of enhancing child health care opportunities.

• Education of subspecialists should be based in high resource centers of educational excellence, with core scientific teaching and adequate patient volume for fellows to develop a full range of cognitive and technical proficiencies. The educational process should be sufficiently broad-based to support lifelong learning and necessary career transitions and to ensure that subspecialty residents become competent educators.

• Every pediatric practitioner should have a “CME home” that will provide assessment of that individual’s learning needs, access to local and national CME resources, and guidance in constructing a professional educational plan. A research project should be undertaken to set up pilot programs of the different models and to assess the efficacy and efficiency of each.

• CME programs will need to ensure that pediatricians learn management of pediatric problems within the context of evidence-based medicine and have rapid access to important new developments. The American Academy of Pediatrics (AAP) will need to continue to take the lead in ensuring quality CME programs for both pediatricians and subspecialists and experimenting with new educational strategies.

• Validated methodologies for determining costs of education at all levels should be used to estimate accurately the costs of medical student, residency, fellowship, and continuing medical education.

• A multipayer system should be created to fund the entire spectrum of medical education. Educational dollars should flow into a national medical trust fund administered by a nonpartisan mechanism.

• Medical student education should be centrally (not departmentally) supported at a level that will ensure innovative, comprehensive exposure for all students to the principles of child health care.
* Core pediatric residency education, including dual specialty (eg, pediatric neurology) training, should be supported fully for all required years by a multipayer mechanism.
* Pediatric residents and fellows at freestanding children’s hospitals should receive the same level of federal support as those trained elsewhere.
* Federal formulas for GME reimbursement should be applied equally to pediatric core and subspecialty residents. Given the shortage of pediatrician-scientists, the National Institutes of Health (NIH) and other federal agencies, as well as foundations, should develop additional mechanisms to support research fellowship training in pediatrics.
* Unless funding of medical education can be separated from patient care revenues, Health Care Financing Administration (HCFA) regulations need to be modified either to allow subspecialty residents to bill for medical care or to allow teaching physicians to bill for care given by subspecialty residents.
* Research training in academic fellowships should be funded by the NIH and other federal agencies through their established training grant mechanisms. More research training dollars must be appropriated to meet these demands.
* Based on US Census Bureau population data middle (probable) projections, the United States will need 55,800 physicians (not full-time equivalents [FTEs]) in primary care pediatric practice by the year 2010.
* To fill the needs of the pediatric workforce, about 3000 pediatric residents should start pediatric training each year. This will require stabilization in the number of pediatric residents in the pipeline at the current level.
* As a nation, the United States needs to continue to develop effective mechanisms to increase the pediatrician-to-child population ratio in underserved areas.
* The number of pediatrician-scientists is critically low and remedies to increase their number must be implemented as rapidly as possible. Incentives to maintain an appropriate number of pediatrician-scientists should be considered (including federally sponsored loan forgiveness), to ensure that infants, children, adolescents, and young adults of 2010 have access to the knowledge developed by pediatrician-scientists.
* Extensive and effective efforts need to be made to increase the percentage of underrepresented minority pediatricians in practice and academic medicine.
* There has been a rapid increase in the number of women in pediatrics over the last 2 decades; however, strategies that meet the needs of women pediatricians (eg, mentoring, role modeling, flexible scheduling) are needed to promote the success of women in fellowship training and academia.
* Both practices and academic settings should consider coordinated schedules, fair leave policies, quality day care at or near the workplace, and flexibility in academic promotion, advancement, and in achieving partnership. Both men and women need multiple points of entry to these settings (including opportunities to reenter the academic track) to maintain an adequate supply of clinicians, researchers, and educators.
* Because of its focus on optimal development of children, pediatrics should lead the field of medicine in addressing role conflicts between professional and family responsibilities.
* Systems of care must be structured to facilitate rapid, ongoing communication and integration of care between general pediatricians with special interests and pediatric subspecialists. No one individual pediatrician can be expert enough to be up-to-date on the management of all conditions across the spectrum of subspecialties. Pediatricians have often developed special interests in the management of certain conditions, and this is appropriate.
* Health care delivery systems need to adopt empirically based, data-driven guidelines and quality of care measures developed by respected child health-related organizations. The same performance and outcome standards should apply to all child health professionals within their respective scopes of practice. All providers of children will need to acknowledge and adhere to these guidelines and measures.
* Pediatricians should collaborate with families and other child health professionals to identify and address challenges and barriers to the health and well-being of infants, children, adolescents, and young adults in the communities they serve.
* The FOPE II Task Force recommends that the oversight for implementation of the recommendations in this report be vested in the Federation of Pediatric Organizations (FOPO). The Task Force further suggests that FOPO hire an Executive Director and appropriate staff to coordinate implementation. Additionally, FOPO should consider delegating recommendations from this report to various, appropriate organizations within the pediatric community for implementation and monitoring.

The FOPE II Task Force affirms the following principles, concepts, and recommendations from the 1978 Report.

**FOPE I: Fundamental Educational Principles**

- The pediatric community affirms the importance of education in both ambulatory settings and inpatient services.
- The purpose of undergraduate pediatric education is to help students learn to react with empathy and sound medical judgment in clinical situations involving infants, children, adolescents, and young adults. The student must learn how to do a history and physical examination on pediatric patients. The medical student must understand normal growth and development, the influence of the environment on health, and the principles of health maintenance.
- In the future, pediatricians will continue to manage both acute and chronic health problems of
FOPE I: Recommendations

- Biopsychosocial and developmental problems, such as early family adjustment difficulties and school failure, adversely affect the health of many children and adolescents. These problems are serious and very widespread. All pediatricians should have the skills to cope with them.
- The health needs of adolescents are being inadequately met. Pediatricians should take the responsibility for improving health care and research for this segment of the population.
- The care provided to children with chronic handicapping conditions continues to be problematic. Although pediatricians are uniquely qualified to provide this care, too many residency programs underemphasize this aspect of pediatrics. Reimbursement for this complex care must be available. (Words in italics were added by FOPE II.)
- Pediatric practice is essentially office-based primary care, while pediatric education often centers around inpatient tertiary care experiences. There needs to be continuous emphasis given to excellent ambulatory care experiences during the pediatric residency.
- In the future, pediatrics will increasingly be practiced in groups, which emphasize the health team concept. Therefore, pediatricians should be prepared to serve as members, as leaders, and as consultants in such health teams. Contact with nurses, nonpediatrician child health personnel, and other potential team members should be included in pediatric residency programs.
- All medical students should have a clinical experience of approximately equal length in pediatrics and internal medicine.
- Residency in pediatrics should be 36 months. Learning time should be apportioned on the criterion of the need for competence in both the biomedical and biopsychosocial aspects of pediatrics. The health needs of children and adolescents should be explicitly considered in planning the educational program. There should be increased emphasis on the biosocial aspects of pediatrics and adolescent health.
- Residency training programs should be flexible and provide for increasing levels of supervisory responsibility as the resident’s medical judgment matures. Education should take place in a variety of environments, including ambulatory, community, and inpatient settings.
- Pediatricians must accept responsibility for developing a plan of personal continuing education. However, department chairs and program directors must recognize the responsibility of the teaching institution to provide continuing education opportunities suited to each pediatrician’s needs.

FOPE I: Concepts

- Pediatric patients must have access to medical and dental treatment.
- Pediatric patients must also share in the advances made possible by biomedical and biopsychosocial research.

children and adolescents. They will use consultants when appropriate. They will provide or arrange health maintenance services for children and their families. They will educate and counsel families regarding the stages of normal development and identify early those health problems and risk factors that may adversely affect development.

- Pediatricians will be called on increasingly to manage children with emotional disturbances, learning disabilities, chronic illnesses, and other problems of a developmental, psychological, and social nature. They will provide increased amounts of health care to adolescents. They will be expected to manage their practices efficiently, collaborate with other members of the health care team, and use community resources to enhance the effectiveness of services to children and their families.

- The fundamental components of the pediatric residency remain: inpatient services, ambulatory training, care of the normal newborn, neonatal intensive care, subspecialty rotations, elective experiences, developmental and behavioral pediatrics, adolescent medicine, clinical pharmacology, community pediatrics and training in chronic illness, health maintenance, and medical ethics. These need to continue to be part of the RRC requirements for a pediatric residency.

- Although the incidence of some health problems has declined, others are appearing with increased frequency. There has been a dramatic increase in the recognition of child health problems associated with poverty, a deteriorating physical environment, changing family structures, and other social and psychological factors. There is growing evidence that encouragement of health promotion and changes in lifestyles may become more important than medical intervention in affecting morbidity and mortality.

- The general needs of children remain that they need to be valued, to be born healthy, to undergo optimal growth and development, to be raised in a nurturing environment, to learn the skills necessary for success, and to receive health assessment maintenance and anticipatory guidance.

- Children with serious health risks continue to be those from low-income families, children with handicaps, emotionally disturbed and depressed children, foster children, children of high-risk mothers, children in single-parent families, children of racial minorities, and children of unregistered aliens.

- The recognition of child health problems associated with poverty, a deteriorating physical environment, changing family structures, and other social and psychological factors. There is growing evidence that encouragement of health promotion and changes in lifestyles may become more important than medical intervention in affecting morbidity and mortality.

- The general needs of children remain that they need to be valued, to be born healthy, to undergo optimal growth and development, to be raised in a nurturing environment, to learn the skills necessary for success, and to receive health assessment maintenance and anticipatory guidance.

- Children with serious health risks continue to be those from low-income families, children with handicaps, emotionally disturbed and depressed children, foster children, children of high-risk mothers, children in single-parent families, children of racial minorities, and children of unregistered aliens.
The Future of Pediatric Education II: Organizing Pediatric Education to Meet the Needs of Infants, Children, Adolescents, and Young Adults in the 21st Century

INTRODUCTION

Since the early 1900s, pediatrics has evolved as the medical specialty focused on the provision of exemplary health care to infants, children, adolescents, and young adults. To establish and maintain excellence, pediatricians train for 3 years under expert supervision to care for children within the context of the family and larger community. Pediatric board certification, CME, and board renewal of certification are also in place to ensure quality lifelong learning.

The following FOPE II report presents a fresh look at the future of pediatric education. It also provides an opportunity to reassert many of the fundamental precepts of pediatric education that have evolved through the years. The reaffirmation of a number of the recommendations from the 1978 Report, along with the development of new recommendations to address emerging issues and trends, is a recognition of the need not to lose sight of the traditional, central role of pediatricians, while at the same time making necessary changes to respond to the realities of medical practice in the new millennium.

In 1976, when the first Task Force on the Future of Pediatric Education was formed, it was recognized that many of the important health needs of infants, children, adolescents, and young adults were not being met as effectively and as fully as they should be. Its primary goal was to identify these health needs and to point out the educational strategies required to prepare the pediatricians of the future to meet them.

The Task Force, which issued its report and recommendations in 1978, was a broadly representative group charged with exploring and evaluating the complex factors influencing pediatric education. Members of the Task Force represented 10 collaborating societies that shared a common concern for the welfare of children.

The 1978 Report on the Future of Pediatric Education was an impressive document that not only addressed the need for a 36-month residency that would broadly educate residents, but asserted the need to care for children using both a biomedical and a biopsychosocial/developmental approach. The report accurately anticipated a number of important issues and trends, including the need to increase the amount of time spent in residency training in the ambulatory setting; to incorporate more training in behavioral, developmental, and adolescent issues; and to improve physicians’ skills in working with other health professionals.

However, there have been a number of significant developments since 1978 that have changed the environment in which pediatricians provide patient care, thereby prompting the need to take a fresh look at the future of pediatric education. These changes include:

- **Trends in Society at Large**: For example, a changing racial/ethnic profile, an increase in the percentage of single-parent families, growth in the number of dual-parent families in which both parents work outside of the home, an increase in the number of children enrolled in day care, an increase in the number of uninsured children, and a rise in youth-related violence.
- **New Diseases and Medical Challenges**: For example, human immunodeficiency virus (HIV), antibiotic resistance, bacterial contamination of food products, Type II diabetes in children, Kawasaki disease, and more infants weighing <750 g at birth.
- **Technological Advances**: For example, the Human Genome Project and gene therapy; more widespread usage of in utero ultrasound, magnetic resonance imaging (MRI), echocardiography, and extracorporeal membrane oxygenation (ECMO); and more effective injury prevention strategies, including automobile and bicycle safety.
- **Changes in the Characteristics of the Profession**: For example, the trend toward a pediatric workforce comprised primarily of women, more dual-career couples, more pediatricians employed or working in groups, and more pediatricians seeking a better balance between work and family.
- **Changes in Health Care Delivery**: For example, managed care; increased competition; public and private strategies to limit costs and reduce reimbursements; and a shift in emphasis from inpatient to outpatient care for an increasingly complex array of services.

Despite the many benefits that have been achieved through medical advances and an increased emphasis on prevention, several challenges remain. For example, the progress that has been made in disease prevention and treatment is balanced by an increase in many socioeconomic risk factors that have an adverse effect on child health. Injuries, homicides, and suicides remain the leading causes of mortality in children more than 1 year old and are a major challenge to those concerned about the health and well-being of children.

Despite the many changes that have taken place since the 1978 Report, the central role of the pediatrician as the primary health care provider for infants, children, adolescents, and young adults remains the same. This fact should not be overlooked...
as one considers the multitude of changes likely to affect pediatricians in the 21st century.

The Future of Pediatric Education II (FOPE II) Project, a 3-year, grant-funded initiative, continues the work begun by the 1978 Task Force on the Future of Pediatric Education. When first conceived in 1995 at a meeting of pediatric educators and clinicians, it was determined that the FOPE II process should not represent the views of any single organization or group of organizations. As such, FOPE II was designed to be a project of the entire pediatric community. The aim of FOPE II was to focus on the likely characteristics of children in the year 2010, to attempt to predict their health care requirements, and of primary importance, to recommend how pediatric education should be structured to meet those requirements. The overarching objective of the project was to ensure the continued provision of optimal pediatric care to patients in the 21st century.

The working group that stimulated the development of FOPE II agreed on a clear-cut set of Project goals:

- To evaluate the 1978 FOPE Report with respect to its relevancy to the education of pediatricians and others providing health care to children in the 21st century.
- To provide direction for the improvement of pediatric education, with special emphasis on workforce requirements, new instructional methodologies, and financing of pediatric education.
- To recommend essential changes in the educational process to meet the current and future health care needs of all infants, children, adolescents, and young adults.

To achieve these goals, a Task Force, composed of leaders in pediatrics, was formed (see Appendix A). All organizations in pediatrics were contacted for input, with members of virtually every pediatric organization serving on the Task Force. The Task Force was responsible for providing overall direction for the Project and for generating the final report. In addition, 5 topic-specific Workgroups were formed, with the Chairperson and Vice Chairperson for each Workgroup serving as members of the parent Task Force:

- Pediatric Generalists of the Future Workgroup
- Pediatric Subspecialists of the Future Workgroup
- Pediatric Workforce Workgroup
- Financing of Pediatric Education Workgroup
- Education of the Pediatrician Workgroup

The Task Force met 6 times over a period of 3 years. In addition, 2 meetings of the Vice Chairpersons, who were responsible for generating the individual Workgroup reports, were convened to discuss issues related to the content and format of the FOPE II Task Force Report. On average, each Workgroup met separately 3 times and held several conference calls during the 3-year period to develop and refine their reports and recommendations. Midway through the Project, a joint meeting of the Generalists and Subspecialists Workgroups was held to discuss some areas of overlap and to come to agreement on recommendations.

The Workgroups solicited information from a variety of sources ranging from federal agencies to medical student organizations and parent groups. Many individuals representing these groups attended either a Workgroup or Task Force meeting to share their expertise. Additionally, Project members gave grand rounds at many medical centers and made presentations at the meetings of numerous organizations to provide information and solicit input from the pediatric community. The FOPE II Project was a major discussion item at meetings of the AAP, ABP, Association of Medical School Pediatric Department Chairmen (AMSPDC), National Association of Children’s Hospitals and Related Institutions (NACHRI), Pediatric Academic Societies (PAS) Annual Meetings, and others. The Task Force hosted 2 major open forums at the annual meetings of the AAP to solicit feedback on their Preliminary Recommendations (1997) and Draft Abstracts (1999). At these forums, leaders from pediatric organizations testified, and many individuals provided additional perspectives.

In carrying out their responsibilities, the Task Force and Workgroups examined various national data sets and conducted their own surveys. Throughout the course of the Project, surveys were sent to individual pediatricians, pediatric residents, pediatric residency program directors, pediatric department chairs, and other organizations in the medical community.

To promote awareness of the Project and to encourage participation in the process, the Task Force communicated frequently with the pediatric community. In addition to developing a FOPE II web page, the Task Force provided a variety of opportunities for interested individuals and organizations to submit data, to share their perspectives on issues affecting the future of pediatric education, and to comment on the preliminary recommendations of the Workgroups.

This report, which presents the final conclusions and recommendations of the Task Force, incorporates and synthesizes salient findings and recommendations from the 5 Workgroups. The report is organized into the following sections:

- Executive Summary
- Introduction
- The Changing Pediatric Practice Environment
- Changes in Pediatric Health Care Delivery
- The Changing Child Health Care Team
- Changes in the Pediatrician Workforce
- The Role of Pediatric Subspecialists
- Financing Pediatric Medical Education
- The Education of the Pediatrician of the Future
- Conclusions and Recommendations
- Appendices A and B
- References

Each of the major sections of the report preceding “The Education of the Pediatrician of the Future” is designed to provide information on changes that will
THE CHANGING PEDIATRIC PRACTICE ENVIRONMENT

Demographic and Societal Changes

The changing sociodemographic characteristics of children in the United States are likely to exert a substantial influence on the future health needs of the pediatric patient population. One negative trend over the past 2 decades has been the increased number of children living below the poverty line. In 1978, the year of the original FOPE report, there were an estimated 9.9 million children (15.9% of all children under the age of 18) living in poverty; by 1997, the number had grown to 14.1 million (19.9%). Although children under 18 made up one fourth of the total population in 1997, they comprised nearly 40% of the total number of people living in poverty.

The majority of children under 18 living below the poverty line are found in single-parent, female-headed families. In 1997, these families comprised 61% of the nearly 5.9 million families with children under 18 living in poverty. In contrast, married-couple families and those headed by single-male parents constituted about 32% and 7%, respectively, of the total number of these families. Children of color are disproportionately represented in poor, single-parent homes. In 1997, 55% of African American children and 63% of Latino children lived with single mothers whose incomes fell below the poverty level, compared with 37% of white, non-Latino children.

Economic status and race/ethnicity affect health status in critical ways. Issues such as infectious diseases, inadequate housing, lack of nutritious food, and environmental pollutants are more likely to threaten the health of poor children. Poor children are also less likely to visit a physician, and thereby have reduced opportunities to receive preventive or continuous care. Children who live in rural and inner-city areas with concentrated poverty pose even greater challenges to the delivery of well-child and other health care services.

Family structure in the United States has also changed substantially since the 1970s. Many more children now spend their childhood in step, blended, sequential, or foster families, and many more are homeless. In 1978, 11.7 million children (18.5% of all children under the age of 18) lived with only 1 parent, compared with 19.8 million (27.9% of all children under the age of 18) in 1997. Divorce affects over 1 million children each year, and an equal number of infants are born into single-parent families. In addition, almost 500,000 children in the United States are in foster care at any one point in time.

Cultural and ethnic diversity have increased over the past 20 years and are projected to increase even more in the 21st century. The Census Bureau projects that by 2020, nearly half of US children under age 18 will be African American, Latino, Asian American, or Native American. Latinos will comprise 21% of the US population, surpassing African Americans (18%) as the largest minority group.

These changing demographics are likely to have implications for the utilization of medical services, as well as for the acceptance of interventions by caregivers. In addition, other special populations—including homeless children, children in migrant families, and children in foster care—will reflect even more cultural and ethnic diversity and will require sensitive attention from the pediatricians and other child health professionals who provide care for them.

Families in the United States today also face a number of challenges that were not as prevalent 20 years ago. For example, the increasing geographic mobility of the US population leads to a consequent lack of social connections. On average, 1 out of every 5 families moves each year, limiting both extended family as well as community support for family units. Second, mothers are increasingly working outside the home, with the numbers doubling since 1970. Indeed, 69% of all mothers of children younger than 18 years old were in the labor force in both 1997 and 1998, and this number will undoubtedly rise under welfare reform.

Parents are trying to balance multiple roles, often in isolation from neighbors, community institutions, and extended family. As a result, well-child care needs to address children's and parents' emotional needs, as well as their time limitations for accessing clinical visits. Pediatricians caring for children will also need more education in child health and development issues related to day care and after-school program attendance.

Biomedical Advances

Since the publication of the 1978 Report, scientific progress in reducing childhood health risks from medical conditions has continued. The introduction of Haemophilus influenzae vaccines has reduced the incidence of this high-morbidity acute infection; the varicella vaccine promises to do the same for this low-morbidity, but ubiquitous, disease. New vaccines like the chickenpox and respiratory syncytial virus vaccines have the potential to dramatically reduce hospitalizations. Alterations in recommendations for sleep positioning have reduced rates of sudden infant death. Growing recognition of the importance and cost-effectiveness of prevention is illustrated by the acceptance by third-party payers of the 1994 Bright Futures health supervision guidelines and the AAP periodicity schedule.

Much of pediatric acute care today involves the diagnosis and management of infectious diseases. Development and release of new vaccines in the next decade will greatly impact pediatric morbidity and mortality secondary to acute infectious illnesses. New vaccines or monoclonal antibodies anticipated or recently introduced include the conjugated pneu-
mococcal vaccine, respiratory syncytial virus monoclonal antibody, and group B streptococcal conjugated vaccine. The introduction of these vaccines could potentially decrease otitis media episodes, acute infectious disease-related office visits, and hospitalization rates for infants and children.

Advances in molecular biology and genetics have occurred at a rapid rate and promise to affect substantially the diagnosis, treatment, and understanding of a number of pediatric conditions. The success in these arenas led to the establishment of the Human Genome Project, which began in 1990 as a coordinated effort of the US Department of Energy and the National Institutes of Health to identify all of the more than 100,000 genes in human DNA, and to determine the sequences of the 3 billion chemical bases that make up human DNA.

The goal of the Human Genome Project, which appears to be ahead of schedule, is to determine the entire sequence of the human genome by the year 2003. As of July 1999, more than 7700 genes have been mapped to particular chromosomes, and tens of thousands of human gene fragments have been identified and assigned to positions on chromosome maps. Once compiled, this information will be stored in databases from which data can be retrieved for interpretative analysis.

The detailed DNA information that will become available as a result of the Human Genome Project will offer a more complete understanding of the structure, organization, and function of DNA in chromosomes. Genes involved in many diseases will be identified and analyzed as either direct or indirect contributors to pathophysiology. By being able to identify individuals who are predisposed to a particular disease, pediatricians will be able to place much greater emphasis on prevention and intervention, whether by gene therapy techniques, avoidance of environmental comorbid factors, the development of new therapeutic agents, or other mechanisms.

Although the Human Genome Project holds many potential applications that will improve the prevention, diagnosis, management, and treatment of many pediatric conditions, it also will raise complex ethical issues. One of the unique aspects of the project is that funds have been earmarked to address the ethical, legal, and social issues that inevitably will emerge as a result of the study's findings.

With this explosion of knowledge and technology will come new educational needs and responsibilities. In addition to increasing physician understanding of the scientific principles involved, attention will need to be focused on the ethical implications associated with this new knowledge in such areas as genetic testing, carrier identification, prenatal diagnosis, gene therapy, and insurability. Pediatricians will need to serve as advocates for their patients, to discuss with them the implications of genetic testing, and to help them weigh the psychological, economic, and physical risks that might result from genetic testing against the benefits of earlier detection.

Medical training in genetics has lagged far behind scientific advances, so many pediatricians have had limited training in genetics and are not fully prepared to deal with the complexity of the emerging information. It will be important, therefore, for medical schools, residency programs, and continuing medical education providers to expand course offerings and training opportunities in this area. Because scientific advances are likely to continue at a rapid pace in the 21st century, the availability of computerized databases that can serve as reference tools for pediatricians will be essential.

Despite the tremendous strides in the detection and treatment of disease discussed above, there has been an increase in many socioeconomic risk factors that have an adverse effect on child health. Injuries, homicides, and suicides remain the leading causes of mortality in children more than 1 year old and are a major challenge to pediatricians and others concerned about the health and well being of children and youth.19

Technological Advances

Several other advances over the last 2 decades have improved pediatricians' ability to manage better the health-related needs of the pediatric patient population. Changes in computer and media sciences in particular have revolutionized many areas in Western culture, including medicine. Information systems in pediatricians' offices now provide instant access to demographic data, immunization records, lists of recent diagnoses, and other important patient data. In addition, many physicians routinely use electronic media and the Internet for collecting data and imparting health information to families. Computer advances also are enhancing pediatricians' efforts to monitor and improve quality of care, to increase efficiency, and to enhance communication between the various levels of the health care delivery system.

Ongoing advances in telemedicine have the potential to revolutionize how pediatric care is delivered in the future.20–23 These technologies will also play a role in reshaping the relationships among physicians, their patients, and other members of the multidisciplinary care team. As these technologies become more sophisticated and widely disseminated, pediatricians will likely be able to manage larger numbers of patients. This increase in productivity could result in the need for fewer physicians, both generalists and subspecialists, to meet health care demands. Also, new information technologies will enable pediatricians to provide and support health care when distance separates participants. This offers an exciting opportunity to address the problem of the unequal geographic distribution of physicians and the lack of access to pediatric and other health care services in rural and urban America.

Competition in the health care industry has encouraged the dissemination of teledicine. Integrated delivery systems are aggressively seeking competitive advantages and have been willing to explore the use of new technologies to support this goal.24–26 Ongoing advances in teledicine (ie, telecommunication, multimedia, and information technologies) are likely to change dramatically how pediatric care is delivered in the future.20–23 In addition
to enhancing pediatricians’ efforts to monitor and improve quality of care, telemedicine offers the potential to increase efficiency and to enhance communication between pediatricians and other members of the child health care team. Also, it is likely that these technologies will play a role in reshaping the relationships among physicians, their patients, and other members of the multidisciplinary care team.

From a patient care perspective, a significant impact of emerging new technologies will be a dramatic increase in access to health information on the part of patients and their families. As the volume of health information on the Internet expands, more and more patients and their families will be acquiring medical information from sources other than their pediatrician. This may mean that pediatricians will encounter more patients and families who are better informed on pediatric health issues. In some cases, however, pediatricians may have to correct misinformation or clarify conflicting information that patients and their families have received. Monitoring the results of these studies will provide an early indication of factors that will influence the adoption and evolution of telemedicine.

Conclusion

Many of the changes that are taking place in the medical practice environment have implications for the future of pediatric education. The changing sociodemographic characteristics of children in the United States will require a broader awareness of and sensitivity to multicultural health issues. Increased scientific knowledge, particularly as a result of the Human Genome Project, will prompt more emphasis during all phases of pediatric education on prevention and intervention and will require that more attention be paid to the ethical, legal, and social issues that will arise in such areas as genetic testing, prenatal diagnosis, and gene therapy. Finally, ongoing advances in telemedicine will require that pediatricians be trained in the capabilities and limitations of such technology and in how to use such technologies to promote an effective child health care team, working collaboratively for the ultimate benefit of pediatric patients and their families.

CHANGES IN PEDIATRIC HEALTH CARE DELIVERY

Public and Private Sector Initiatives

Political and economic forces have driven much of the change in pediatric practice since the 1978 Report, and such forces are likely to continue to influence pediatric practice in the 21st century. The role of the government as a primary purchaser of health care has resulted in a restructuring in the financing and organization of health care in an effort to control escalating health care costs. The widespread adoption of managed care in both the private and public sectors as a panacea for rising health care costs has also had a significant impact on pediatricians. Much like private insurance purchasers, state Medicaid programs have looked to managed care to cut costs, expand preventive services, and decrease use of emergency rooms and inpatient hospital facilities. States continue to rely on managed care as they expand coverage of children’s health services.

Health insurance coverage provided through public sector programs is particularly important in pediatrics for several reasons. First, about one fifth of all children in the United States live at or below the federal poverty level and use publicly funded health care services when these services are available. The federal-state Medicaid coalition, or Title XIX of the Social Security Act, has provided substantial funding of health services to low-income children since 1965. The last half of the 1980s witnessed steady expansion of Medicaid services, to the point that 25% of the pediatric population under 21 were enrolled in the Medicaid program at some time during 1995.

Second, employer-based coverage for infants, children, adolescents, and young adults has decreased steadily over the last decade, while the number of uninsured has risen. This decrease in health insurance coverage has been attributed to employers dropping health insurance coverage for dependents or increasing employees’ costs for coverage, as well as workers moving into businesses that traditionally have not offered health insurance.

Lastly, the State Child Health Insurance Program (SCHIP), Title XXI, passed in 1997, extends health benefits to children in low-income families not eligible for Medicaid. About 7 million children—almost three quarters of uninsured children—are eligible for Medicaid or SCHIP-funded state health insurance programs.

Although it is impossible to predict precisely how the health insurance market will evolve in the 21st century, it is likely that the implementation of managed care strategies in both the private and public sectors will continue. Managed care may need to change, however, to survive. Consumer demand will push some of these changes, by advocating for patient protection, health plan accountability, and quality assurance. For example, there has recently been a public backlash against managed care that has resulted in legislation specifying lengths of stay after delivery, ensuring availability of emergency care, limiting gag rules, and promoting patient rights.

The Role of Prevention in Health Care Delivery

Prevention is a key component of pediatric care. Currently, more than 20% of visits to pediatricians are for screening examinations, preventive care services, and anticipatory guidance. Pediatricians spend much of their time in these activities, which has evolved over the years from the so-called “physical” to the “Health Maintenance Visit.” These visits allow pediatricians to promote healthy lifestyle choices (eg, safety and nutrition); monitor patients for physical and behavioral pathology; provide age-appropriate and individualized anticipatory guidance to avert risk-taking behavior patterns; and better understand a child within the context of the family and community.

Well-child care will continue to be an important part of the pediatrician’s responsibilities in the 21st
century, particularly in response to a growing desire on the part of parents for more information and support on many child health issues.36 The growth of nonpediatrician child health professions and technological innovations may, however, radically alter the manner in which well-child care is provided. For example, nonpediatric child health professionals may provide a more prominent role in direct patient contact, and the media and the Internet are likely to become more significant sources for patient education.

Recent advances in pediatric knowledge have broadened the scope of pediatric preventive care. For example, as knowledge of the importance of early brain development continues to increase, preventive care needs to include measures to restore and enhance developmental potential. Also, pediatric preventive efforts will focus on guiding or modifying parental and child behavior to improve outcomes. Preventive measures that focus on infant sleep positions and the hazards of secondary smoke inhalation are examples. In addition, prevention of morbidities common in adulthood requires lifestyle interventions in childhood.

Changing Patterns of Morbidity

Although pediatricians in past decades spent much of their time dealing with acute illnesses, the care of patients with chronic conditions is now beginning to dominate many pediatric practices. Current estimates of the number of individuals younger than 21 years old with chronic illnesses and other disabilities vary somewhat, depending primarily on the breadth of the definition one uses. Approximately 2 million children meet stringent definitions based on the level of severity of the condition.37 A broader definition of disability, based on findings from the National Health Interview Survey on Disability (1994–1995), identifies between 15% to 18% of children as having ongoing chronic health conditions (developmental, physical, or mental) that affect functioning or require compensatory services to maintain functional level.38 Among children with chronic conditions, approximately half have developmental disabilities, mental health impairments, or psychological conditions, ranging from common diagnoses like attention deficit hyperactivity disorder (ADHD) to severe psychiatric disorders. A wide range of chronic physical conditions make up the other half, with moderate and severe asthma accounting for almost one third of such conditions.39

Pediatricians can thus expect that 1 in 10 children will have a moderate to severe long-term health condition. Of this group, almost half will have mental retardation, developmental disabilities, or significant mental health problems. The other half will consist of children with a variety of chronic medical diseases including asthma, diabetes, sickle cell anemia, and cystic fibrosis. Currently, only 5 chronic conditions occur in children with relatively high frequency: asthma, recurrent otitis media, adolescent depression, ADHD, and developmental disabilities (primarily mental retardation and cerebral palsy).

The number of pediatric patients with moderate to severe chronic medical conditions requiring ongoing care has increased over the last 2 decades. Although some of this reflects the growing incidence of certain conditions, including asthma and AIDS, much of the increase reflects improvements in life-prolonging medical and surgical care. Because of technological advances, there are increasing numbers of survivors of previously fatal conditions such as organ failure and childhood cancer.40 Some of these children are permanently dependent on complex medical interventions, and many experience serious developmental or emotional morbidity.40,41 Pediatricians must address the long-term complications of such diseases and treatments, as well as the unique developmental and behavioral needs of children who are affected. Long-term survivors of prematurity and childhood malignancies are altering the profile of pediatric health care, and necessitating decisions about who will provide care as such patients transition into adulthood.

In addition, although behavioral and developmental issues are hidden in the context of most patient encounters in pediatrics, a growing percentage of children are developing more severe developmental-behavioral pathology, placing them in need of more intensive therapy. One study estimated the rate of significant behavioral pathology in children between ages 9 and 17 at 9% to 13%.42

At the same time, infectious disease experts warn that a number of chronic infectious diseases present potential problems for children in the future. Tuberculosis and AIDS rates increased over the last 2 decades, and drug resistance is common in some parts of the country. Altered antimicrobial susceptibility patterns and increasing failure/relapse rates are being identified for streptococcal, staphylococcal, and other infections. Although some infectious diseases may be better controlled or even eradicated in the future, other pathogens will emerge and require more complex treatment regimens and a knowledge of community antibiotic resistance trends.

These changes have important implications for pediatric practice and education. To respond to the increasing percentage of children with chronic conditions, pediatricians may require additional emphasis in residency programs and CME courses on the unique requirements of children with special needs. With respect to developmental-psychological pathologies, practitioner surveys have identified a lack of confidence in their ability to identify and treat these problems as a major barrier to care.43–45 The evolution of new tools, including symptom checklists and the Diagnostic and Statistical Manual for Primary Care (DSM-PC), along with postgraduate education in this area, can allow pediatricians to become more knowledgeable in managing these cases. Families of children with chronic medical needs have reported valuable access to care and confidence in their specialty providers, and have also commented on inadequate attention to parental concerns by primary care providers.46 Clearly, improved partnerships between families, pediatricians, and pediatric subspecialists (medical and surgical) must be developed to ensure an effective response to these concerns.
Also essential to the enhancement of pediatric health care delivery is recognition and implementation of the concept of the “medical home,” through which all children should receive primary care services. A “medical home” is not a place, but rather an approach to providing continuous and comprehensive primary pediatric care from infancy through young adulthood, with availability 24 hours a day, 7 days a week, from a pediatrician or other physician whom families trust. The “medical home” offers care that is accessible, affordable, family-centered, continuous, comprehensive, coordinated, compassionate, and culturally effective. Under this model, pediatricians and parents act as partners to identify and access all of the medical and nonmedical services needed to help children and their families achieve their maximum potential. Integral to this concept is the continuity of this relationship over time. Pediatricians of the future will need to be educated for this role and will need to establish community standards for the management of both routine and complex patients in the “medical home.” This role is based on their education and experience delivering health care to children and on their knowledge of the latest evidence-based research. Because the “medical home” concept is not limited simply to pediatric care, a “medical home” for children should be the goal of all providers who care for children.

Conclusion
Managed care and other changes in the US health care delivery system are affecting not only practicing pediatricians, but also the entire medical education process. Changes in Medicaid policy, particularly those involving a shift to managed care, will require educators to sensitize medical students and residents to a different mode of medical practice, one that involves operating within fixed resources, with financial risk related to resource utilization. Well-child care will continue to be an important focus of pediatric education, but within the context of the new, broader, multidisciplinary team. In addition, changing patterns of child morbidity will require increased attention in pediatric education to the management of chronic, rather than acute, illnesses, because chronic conditions will dominate more and more pediatric practices in the future. Finally, the pediatric medical education system will need to emphasize the concept of the “medical home,” through which all children should receive primary care services.

THE CHANGING CHILD HEALTH CARE TEAM
Another trend likely to affect the role and scope of pediatricians in the 21st century is the growth and changing characteristics of the available pool of child health care professionals. Over the last 20 years, pediatricians have pioneered the use of a variety of providers in their practices, forming alliances that have allowed for the integration of children’s health care with related services. There are a number of reasons that pediatricians work collaboratively with a wide spectrum of health care professionals, for example, seeing a large number of patients who require frequent visits; performing multiple procedures on a daily basis (e.g., immunizations, vision and hearing screenings, laboratory analyses, developmental screenings, blood pressure monitoring); triaging large numbers of telephone queries; and interacting with a variety of private and public agencies that provide services to children.

Nurses have played a vital collaborative role in pediatric practices, by tracking care for children with chronic illnesses, supporting acute care services for children, guaranteeing office follow-up and coordination, and developing case-management services. Pediatricians have also long been dependent on a variety of other professionals to allow them to provide care and services to their patients. For example, pediatricians have worked in concert with nutritionists, social workers, psychologists, occupational therapists, physical therapists, and speech therapists to provide specific, necessary health-related services to children. Other physicians have played a role in meeting the health care needs of pediatric patients, as well, including family physicians, emergency department physicians, psychiatrists, and pediatric subspecialists. These relationships are likely to continue and, if anything, will become even more essential in the future.

Traditional Extenders
Nurses and Medical Office Workers
Future opportunities for nurses and medical office workers in the context of the pediatric practice are many, because they will be needed by pediatricians to help improve access to care, quality of care, and practice efficiency. They will, for example, ensure compliance with treatment, collect data on quality of care and patient outcomes, survey patients regarding satisfaction measures, ensure compliance with government regulations, and assist patients with accessing care and services in an increasingly regulated environment.

Other Child Health Professionals
Practitioners partnering in the care for children with pediatricians include child psychologists; social workers; nutritionists; and physical, occupational, and speech therapists. Although large multispecialty groups have long included mental health services as part of their practice structure, integration of mental health services in most pediatric practices has been slow. Because issues around developmental, behavioral, and mental health are so critical to primary care practice, the success of this particular future alliance will have important implications for the future of the pediatrician. Likewise, the use of nutritionists in pediatric practice for issues such as dietary counseling, weight control, eating disorders, and nutrition for special populations is a natural extension of primary care. The direct integration of occupational, physical, and speech therapy specialists into pediatric practices is also likely to become more common in the future.
In February 1997, there were 5850 certified pediatric nurse practitioners (PNPs) and at least 67 PNP training programs in the US (written communication, R. McLeod and A. Dunn, February 1997). The educational preparation of PNPs has evolved over more than 30 years, with the trend moving away from certificate programs toward master’s and post-master’s preparation. According to a 1997 survey by the National Association of Pediatric Nurse Associates and Practitioners (NAPNAP), over two thirds of its members have completed a master’s or postmaster’s degree. More than 95% of PNPs are women, and 75% are under 50 years of age.47

In 1997, it was estimated that 78% of PNPs were practicing in areas with populations greater than 50 000, 29% had hospital privileges, and more than 70% had prescription privileges. Seventy-two percent (72%) were able to bill through the physicians or agencies with whom they worked, while only 14% were able to bill for services using their own names.47

The collaboration between PNPs and pediatricians has grown over the past 2 decades, and the opportunities for collaboration are likely to increase in the future. For example, PNPs are already acknowledged as particularly skilled in health promotion activities. Expanding opportunities in the 21st century could involve targeting educational programs for families, patients and staff; following up on specific patient populations, like asthmatic children and lead-poisoned children; providing gynecologic and contraceptive services; and performing longitudinal follow-up for children with chronic illness.

Physician Assistants

In 1999, there were a total of 110 accredited physician assistant (PA) programs.48 The American Academy of Physician Assistants (AAPA) estimates that, as of January 1999, there were 34 000 PA program graduates in practice.49 An estimated 4% of PAs (1360) work in pediatrics and an additional 40% (13 600) work in family practice and are likely to see children in their practices.50 Approximately 89% of PAs have a baccalaureate or higher degree. About 30% of PAs work in communities with fewer than 50 000 people. PAs work an average of 44 hours per week, and about 32% take call.50

Because of training biases, preferences, and reimbursement issues, PAs have historically tended to be based primarily in the hospital setting. In the future, it is likely that they will increasingly be integrated into the office setting. Because the nature of their training directs that they must practice in a regulated environment under direct physician supervision, they offer the pediatrician another means of expanding the scope and range of services provided.

Physicians in Nonpediatric Specialties

Family Physicians

The overlap between the roles of primary care pediatricians and family physicians creates the potential for competition, particularly in areas with physician oversupply. Nevertheless, there will be opportunities in the future—particularly in underserved areas—to implement cooperative models through which pediatricians and family physicians work together to improve the health status of children. For example, a pediatrician in a relatively remote area can improve the standard of care for common pediatric illnesses by sharing with local family physicians information regarding new standards of pediatric care. Another possibility is for pediatricians who are subsidized by rural hospitals to provide neonatal services to train a cadre of interested family physicians to share the call burden. Finally, by assuming a consultative role, rural pediatricians can act as intermediaries between local family physicians and pediatric subspecialists, thereby sparing the families the expense and difficulty of traveling a great distance for what might be a quickly resolved problem.

None of these approaches, however, is applicable to a suburban location with large numbers of primary care physicians, subspecialists, emergency departments, and sophisticated hospitals. Pediatricians in heavily populated areas will likely continue to compete both with each other and with other types of providers based on measurable competence, cost-effectiveness, and patient satisfaction.

Psychiatrists

The mental health care needs of children and adolescents are substantial. To prepare pediatricians for a growing need for mental health services among the pediatric patient population in the 21st century, additional training in the diagnosis and management of mental health needs may be required. Additionally, however, pediatricians will need to continue to build and maintain strong working relationships with psychiatrists, psychologists, and social workers to address the mental health needs of their patients.

As pediatricians strive to meet these needs, concern remains that managed care may negatively impact access to mental health services for children by imposing limits on mental health visits that may not be appropriate given an individual child’s level of functioning.51 Also, a continuing problem in the future may be a lack of appropriate specialty care resources within certain managed care networks to meet the mental health needs of the pediatric patient population.

Physicians Trained in Internal Medicine/Pediatrics (Med/Peds) Residency Programs

According to the most recent National Residency Matching Program (NRMP) Match in 1999, 17% of the combined total of filled positions in pediatrics and Med/Peds residency programs were filled by students selecting a Med/Peds residency. Med/Peds are likely to remain a significant proportion of those physicians intensively trained to care for children.52

The obvious advantage of this pathway is the remarkable potential of a dual board-certified generalist physician with an understanding of adult transitional care and the capability to follow patients over long periods of time. An indirect impact of Med/Peds will be to help maintain interdisciplinary inte-
The Pediatrician as Provider of Primary Care in a
•
their role description to include a number of new
the pediatrician of the future? To survive and thrive
The Role of the Pediatrician of the Future
plied to all child health care professionals.
ensured via direct or distant mechanisms such as
to these standards.
The Role of the Child Health Care Team
It is clear that the concept of the child health care
team, encompassing pediatric generalists and subspecialists, other physicians, nurses, nutritionists, social workers, psychologists, occupational therapists, physical therapists, speech therapists, and other child health professionals, will continue to evolve in the 21st century. Because pediatricians have the most advanced education and training to provide the best care for infants, children, adolescents, and young adults, they should, whenever possible, provide this care directly. However, in many cases, nonpediatrician providers are responsible for providing care to the pediatric population. Therefore, pediatricians should establish the standards for the medical care of children, and nonpediatrician child health care professionals should be educated and trained according to these standards.
Access to pediatricians as consultants should be ensured via direct or distant mechanisms such as telemedicine. Also, systems of care should be structured to facilitate rapid, ongoing communication and integration of care between general pediatricians with special interests and pediatric subspecialists. Finally, empirically-based, data-driven guidelines and quality of care measures, developed by respected child health-related organizations, should be integrated into health care delivery systems and applied to all child health care professionals.
The Role of the Pediatrician of the Future
What are the likely roles and scope of practice for the pediatrician of the future? To survive and thrive in the 21st century, pediatricians will need to expand their role description to include a number of new functions. By way of example, some of these new and changing roles might include:
• The Pediatrician as Provider of Primary Care in a Managed Care Environment. As medical decisions increasingly become outcomes-driven, with reimbursement based on such outcomes, pediatricians who are able to understand, adapt to, and capitalize on this new evidence-based approach will thrive. In a managed care environment, pediatricians will need to function both as clinicians and as resource and information managers.
• The Pediatrician as Consultant. Pediatricians in rural practice currently function as consultants to nonpediatrician child health professionals, obstetrician-gynecologists, and family physicians. In the future, pediatrician consultants will become increasingly common in practice networks, at academic medical centers, and in rural areas. In addition to initiating evaluations for complex problems, they will provide consultative back-up for pediatricians and other child health care professionals.
• The Pediatrician as Hospitalist. Following a trend that has become prominent in internal medicine, growth in the number of pediatric hospitalists, who specialize in providing and coordinating in-hospital services, is likely to be significant in the coming years. As the concept of the pediatric hospitalist evolves, criteria for type and scope of certification will need to be defined.
• The Pediatrician as Community Consultant. Linkages with community institutions, such as day care facilities, schools, juvenile halls, foster care systems, and others that care for children, will require the pediatrician of the future to set the standards that will advance health status. Serving as either consultants or as primary care providers for children in these settings will enable pediatricians to provide services to children who may be more difficult to reach, allowing for important preventive and educational interventions.
• The School-based Pediatrician. School-aged children and adolescents represent a significantly underserved population of patients. It is likely that some primary care pediatricians will have a significant portion of their practice based in school facilities, providing services such as vaccinations, prevention of sexually transmitted disease, pregnancy prevention, counseling around issues of substance use and abuse, and developmental and mental health screening.
• The Pediatrician as Home Health Provider. As progressively higher levels of acute and chronic illness move from the outpatient to the home setting, networks of providers are likely to designate physicians to evaluate, coordinate, and facilitate the provision of home health services to children with special needs, both acute and chronic, in their communities. In addition, it is possible that more well-child and acute care will be transferred to the home setting.
• The Pediatrician as Population-based, Community Medicine Practitioner. It is likely that in the 21st century, municipalities, in conjunction with state and federal governmental agencies and industry, will use physicians to integrate community health primary care needs with case management issues, public health promotion, performance measurement, and quality of care initiatives.
• The Pediatrician in Administrative Medicine. Pediatricians, along with other physician specialists generally, will continue to make inroads into
health care administration, working for health systems, insurance companies, health maintenance organizations (HMOs), and other corporate entities. As preparation for such careers, more and more pediatricians will pursue advanced business degrees.

- The Pediatrician as Child Health Services Researcher. With the expected increased focus on accountability and information technology in the 21st century, an important role for pediatricians will be conducting research on access, utilization, and quality-related issues involving pediatric health care services. This research will be conducted by researchers affiliated with academic medical centers and policy groups, as well as by pediatricians in private practice settings.
- The Rural Pediatrician. Rural pediatric practice will continue to present unique challenges. The rural pediatrician must function as neonatologist, intensivist, or pediatric specialist until the arrival of a transport team when a child is acutely critically ill. Telemedicine will allow rural pediatricians to use the services of the appropriate subspecialist at distant centers when necessary and thereby continue to provide optimal pediatric care. Managing chronic illnesses and recognizing and managing severe behavioral problems are other aspects of the rural pediatrician’s role. In addition, many rural pediatricians will continue to be called on to play leadership roles in community organizations and to serve as the public health expert in the community, acting as an advisor to schools, day care facilities, and health and social welfare agencies.

Conclusion

The increasing numbers and expanding roles of child health care professionals will require that pediatric medical education focus appropriate attention on the integration of children’s health care with related services. In particular, it will be important for medical educators to emphasize the acquisition of skills that involve interprofessional and intraprofessional collaboration, because pediatricians increasingly will be practicing in an environment that involves a child health care team. Understanding the roles and capabilities of the variety of professionals who provide health care-related services to children will be an important component of the education and continuing education of pediatricians of the future. Med/Peds will continue to be a model of interdisciplinary integration that may have applications to other specialties. Because, in many cases, nonpediatrician providers will be responsible for providing care to pediatric patients, pediatric education will need to instill in pediatricians the leadership and clinical skills required to establish the standards for the medical care of children. Finally, given the variety of roles that pediatricians will assume in the future, the medical education process will need to create an awareness of the many potential career opportunities through which pediatricians can make a positive impact on children’s health.

CHANGES IN THE PEDIATRICIAN WORKFORCE

The 1978 Report addressed many issues that remain relevant. Also, among the conclusions were several that (in some cases with minor modification) remain equally valid today. For example, the 1978 Report forecasted that pediatricians increasingly would be practicing in groups, rather than in solo practice, and therefore must be prepared to work as part of a health team; that it would be of vital importance for pediatricians to collaborate with family physicians and nonphysician child health professionals in training those who provide care for children; and that women pediatricians and foreign (international) medical graduates (IMGs) would exert a growing influence on the workforce.

This FOPE II Report presents current pediatric workforce information and reviews a variety of workforce models. These models have been examined, however, for the purpose of informing the Task Force’s recommendations regarding pediatric education, rather than developing comprehensive or definitive workforce projections, which would be beyond the scope of this report.

The 1978 Report recommended maintaining at least the numbers of graduates that were being produced from pediatric residencies at that time. Although reaching a similar conclusion, this report considers a number of changes that have taken place over the past 2 decades that will have an impact on the pediatric workforce, including the influence of managed care (which was virtually unknown when the 1978 Report was written) and the effect of telemedicine on patient access to care and opportunities for professional consultation.

Current Physician Workforce

Supply and Characteristics

Between 1980 and 1997, the total number of physicians increased dramatically from 467,679 to 756,710. Although the increase in the number of pediatricians during this same period of time was significant, from 28,803 to 55,427, the rate of increase was somewhat less than that for the physician population overall. Between 1980 and 1997, moreover, the number of interns increased from 71,531 to 128,435, while the number of family physicians increased from 27,530 to 64,611—the most significant rate of increase among the primary care specialties.53

The ABP has estimated that approximately 7685 generalist pediatricians will retire between 1999 and 2010. This figure is based on the assumption that retirement will occur after 33 years in practice at age 65.3

Ninety-five percent of primary care pediatricians identified patient care as their major professional activity in 1997, with 69% working primarily in an office-based setting and 26% in a hospital-based setting. Teaching, administration, and research constituted the major professional activity for the remaining 5%.53 In 1998, 50% of pediatricians identified
their practices is the location of their residences. Indeed, states that do not have pediatric residency programs tend to have the lowest pediatrician-to-child population ratios.66 According to unpublished data derived from AAP surveys of third-year pediatric residents conducted for the FOPE II Project, spouse/family considerations, job security, and geographic location were important factors in selecting a practice. Other important factors included control over working hours, acceptable income, patient population, research/teaching opportunities, and future colleagues.

The Pediatric Workforce Workgroup examined the relationships of pediatric services to the geographic distribution of pediatric populations (0 to 21 years) in 10 cities (Atlanta, Boston, Chicago, Detroit, the District of Columbia, Houston, Minneapolis, New York, Philadelphia, and Seattle). The Workgroup found significant variance from area to area in pediatrician-to-child population ratios and concluded that the distribution of pediatricians in these 10 major US metropolitan areas did not parallel the distribution of the child population.

In 1980, the Graduate Medical Education National Advisory Committee (GMENAC) report indicated that an ideal “child health physician” per child population ratio was 4.915 per 10,000, or approximately 1 child health physician per 2034 children.57 The median pediatrician-to-child population ratio among the 77 counties included in the analyses of the 10 cities mentioned above was 3.8 per 10,000 (1 physician per 2632 children).

A great deal of the legislative energy directed toward increasing the number of primary care physicians relates to the pressing need to increase access for care in rural towns and in many inner cities. Although growth in the total number of physicians in the past 20 years has resulted in a better geographic distribution, the shortage of physicians in selected geographic areas has persisted. As of March 31, 1999, there were 2900 primary medical health professional shortage areas (HPSAs) with an estimated total of 28 million underserved individuals, of which an estimated 7 million were children. It is has therefore been projected that an additional 2000 to 3500 pediatricians might be required to care for these children.57

Pediatrician Pipeline

ABP data reveal that, over the past several decades, there has been an impressive increase in the number of American medical school and international medical school examinees. In 1970, 705 physicians were certified in general pediatrics. Over the next 2 decades, the annual number of newly certified pediatricians more than doubled. Between 1970 and 1998, the annual production rate of certified pediatricians increased by about 275%; in contrast, during this same time span, the population of the United States increased by 24%. In the past decade, the numbers of physicians certified in general pediatrics increased 38%, from 1292 in 1988 to 2069 in 1998.3

In 1998–1999, the total number of residents in general pediatrics, including both categorical pediatrics programs and Med/Peds programs was 9459. The fastest growing segment has been Med/Peds, with the total number of residents in these programs more than doubling between 1991 and 1998, from 724 to 1622.3

Pediatrician Race, Ethnicity, and Gender

The issues of race, ethnicity, and gender are relatively distinct with regard to their potential impact on future trends in pediatric workforce needs. The predominant issues of race and ethnicity deal with the lack of diversity within the pediatric workforce relative to the current and projected child populations, as well as the need to improve access to care for underserved minority populations. Gender-related issues, on the other hand, relate primarily to, first, the calculations of full-time availability of individual practitioners when assessing pediatrician-to-child population ratios, and second, to trends away from pediatric subspecialty training.

Roughly 15% of the 1997 medical graduates entering pediatrics were African American or Latino. More significantly, the total number of underrepresented minorities who entered medical school in 1997 declined to 1770, the lowest number since 1991. Since reaching a record high in 1994, underrepresented minority entrants have declined from 12.4% to 10.9% of all entering medical students, with over two thirds of the decline occurring at schools affected by rulings that prohibited the consideration of race and ethnicity in the admissions process.2

These statistics are of concern for several reasons. Communities with a high proportion of African American and Latino residents are 4 times as likely as other communities to have physician shortages.59 African American physicians are 5 times as likely, and Latino physicians twice as likely, to practice in communities with a high proportion of corresponding minority residents as nonminority physicians.60 In a recent survey, nearly half of minority graduates—compared with less than one fifth of nonminority graduates—indicated that they planned to practice in underserved areas.2 If the trends toward lower minority representation in medicine continue, which appears probable in the foreseeable future, the
problem of access to care in minority communities will likely be exacerbated.

With respect to gender, the most significant pediatric workforce issue relates to the clear trend toward a predominance of women practitioners. In 1997, 46% of current practicing pediatricians were women, while more than 64% of current first-year pediatric categorical residents were women. Female pediatricians in general are a young group, with 61% less than 40 years old, compared with 37% of male pediatricians. There are several implications to this trend. First, because women pediatricians on average work fewer hours than their male counterparts, there is likely to be a gradual decline in average productivity for the specialty, which may affect current workforce projections. Women who work reduced hours do so, for the most part, because of child care responsibilities. As their children age, these responsibilities will decrease; indeed, the productivity differential decreases between men and women over the age of 50. Second, because women pediatricians traditionally have leaned toward primary care practice, the recent slow growth in the number of pediatric subspecialists is likely to continue, although not all subspecialties will be affected similarly.

Changing Attitudes Toward Work and Family

Recent surveys have pointed out that both younger male physicians and women physicians are reporting moderate levels of role conflict. As societal expectations change, male physicians are being asked to shoulder increasing familial and household responsibilities. Both younger male physicians and women physicians also report making career changes because of their marriage or children. As societal expectations change, male physicians are being asked to shoulder increasing familial and household responsibilities. Women who work reduced hours do so, for the most part, because of child care responsibilities. As their children age, these responsibilities will decrease; indeed, the productivity differential decreases between men and women over the age of 50. Women who work reduced hours do so, for the most part, because of child care responsibilities. As their children age, these responsibilities will decrease; indeed, the productivity differential decreases between men and women over the age of 50.4 Second, because women pediatricians traditionally have leaned toward primary care practice, the recent slow growth in the number of pediatric subspecialists is likely to continue, although not all subspecialties will be affected similarly.

International Medical Graduates

Over the past decade, the number of graduates of American medical schools (AMGs) has remained relatively constant, while the number of postgraduate year 1 (PGY-1) positions has increased substantially. In 1995, the number of PGY-1 positions available was 140% of the total number of AMGs. According to data from the ABP, there were 6731 pediatric residents in categorical programs in 1991, compared with 7674 in 1998, of which 32% and 22%, respectively, were IMGs. These statistics demonstrate a steady decrease in the number of IMGs entering the pediatrician pipeline, and suggest that further reductions in the number of residency positions in pediatrics may be unnecessary. Although IMGs account for 29% of pediatricians in the United States according to 1997 data from the American Medical Association (AMA), almost 81% of first-year pediatrics positions were filled by AMGs in the 1999 Match. A number of organizations, including the Association of American Medical Colleges (AAMC), the Council on Graduate Medical Education (COGME), and the Institute of Medicine (IOM), have recommended that the number of IMGs in training programs be reduced. Most suggest that this be accomplished by reducing the number of PGY-1 positions to 110% of the total number of AMGs in 1993. Should such recommendations be implemented, the effect of such a reduction would significantly affect the physician workforce. The implications for entry into the pediatric workforce may not be immediately realized, because in each of the last 5 years, the absolute number and the percentage of pediatric positions filled by graduating AMGs through the Match have increased. The effect of such a reduction, however, would eventually greatly impact the pediatric workforce.

Selected Trends Affecting the Pediatric Workforce

Managed Care

The managed care sector has generated a large demand for primary care physicians. The vigor of this recruitment does not translate directly into a need for more physicians, however, since much of the demand is to enable these organizations to enroll greater numbers of patients, many of whom already are receiving primary care services. According to the Bureau of Health Professions’ managed care dominated scenario, described in the Council on Graduate Medical Education Eighth Report (1996), 50% of physicians in managed care systems are projected to be generalists. This projection is based on the assumption that greater competition among plans and more available generalists will increase their utilization from the 45% generalists indicated by managed care plans in the COGME report. Review of data from the ABP shows that the ratio of generalist to subspecialist pediatricians who are entering the workforce currently is in line with managed care practice standards.

Hospitalists

Recently there has been a slow movement in pediatrics toward the use of pediatricians who specialize in coordinating the full range of inpatient care, often known as hospitalists. Mitigating against this development, however, is the fact that outpatient pediatric care is becoming more complex, and skills previously associated primarily with inpatient settings are increasingly being utilized in outpatient settings. As Roberts and Rappo have observed, “inpatient services are increasingly becoming the prov-
ince of children with complex conditions. Will inpatient units of the future require hospitalists, much as NICUs [neonatal intensive care units] require neonatologists? Will inpatient units become closed, as NICUs have? The implications for practitioners and for pediatrics as a specialty are considerable.70 Reducing the amount of time that generalist pediatricians spend on inpatient care would allow them to concentrate on providing office-based primary care services, which have increased in complexity. The net impact on workforce issues is unclear.

Models for Determining Workforce Needs

The determination of workforce needs must be based on data, but the data can be different depending on the type of model used. Among the current models for determining physician workforce needs are needs-based models; demand-based models; benchmarking; and reviewing the degree of difficulty experienced by graduates in finding positions. In conducting their analyses and in developing their recommendations, the Task Force and the Pediatric Workforce Workgroup primarily relied on data generated through needs-based and demand-based models.

Needs-based Models

Needs-based models project workforce requirements based on existing estimates of morbidity and use of necessary health maintenance and prevention services.71 The GMENAC model started with data on the prevalence of disease, the estimated percentages of persons with specific diagnoses who would require care for those conditions, and the number of visits estimated to be required per episode of illness per year.57 GMENAC summed up all of the morbidities for the entire US population, estimated the percentage requiring treatment from each specialty, and estimated the percentage of each specialty’s visits that could be delegated to other child health care professionals. The total national requirement for physicians was determined by dividing the visits needed by the number of visits estimated to be provided by physicians in each specialty. These estimates, which predicted the growth of managed care, assumed the existence of an efficient health care system, with no barriers to access.

Demand-based Models

Demand-based models forecast future requirements assuming the continuation of existing patterns of care delivery and staffing.71 For example, a number of demand-based workforce estimates have been made based on HMO data.72

Projections of Future Workforce Needs

Previous Workforce Analyses

Recent analyses of the physician workforce have yielded widely disparate estimates about how appropriately physician supply will match the demand for physician services. Weiner,73 assuming extensive growth in managed care, estimated a 40% physician surplus in the year 2000. By contrast, Cooper,59 who also assumed a substantial growth in managed care, estimated a surplus of only 5% in the year 2000, 8% in 2010, and less than 2% in the year 2020.

The discrepancy between these forecasts relates to uncertainty about such factors as the link between physician productivity and changing physician demographics, and the future demand for physician services under managed care. For example, in recent years there has been a sharp decline in the proportion of physicians in traditional solo practices and in the proportion of physicians who have an ownership interest in their practices. Also, there has been a significant increase in the number of female pediatricians. Because employed physicians and female physicians on average work fewer hours per week and see fewer patients each week than other pediatricians,74-76 workforce projections that do not take into account the increasing numbers of employed and women physicians tend to overestimate the impact of the future growth in physician supply.

Workforce studies make a number of explicit and implicit assumptions about physician output and work effort. For example, Cooper59 assumed a general decline in physician work effort attributable to the aging of the physician population, continued increases in the proportion of female physicians, and changes in the lifestyle and expectations of physicians, and Weiner77 incorporated assumptions about physician output when developing staffing requirements for different sectors of the health care system. These analyses, however, did not account for any differences in output that may result from changes in the organization of pediatric medical practice, including the growing number of employed physicians.

Kletke and associates examined data from the AMA Physician Masterfile, which provides data on the size and composition of the entire US physician workforce, and the AMA Socioeconomic Monitoring System (SMS), which provides socioeconomic data on physicians’ practices. Their objective was to project the aggregate time worked by patient care physicians, measured in terms of FTE physicians, according to different scenarios with regard to future changes in physician practice organizations. The studies of Kletke et al document that the proportion of employed physicians is likely to increase in future years because of a wide variety of factors, including the expansion of managed care.78 When all factors are taken into account, this study estimated a supply of 41 600 pediatricians in general pediatric practice in the year 2000; 46 700 in 2005, and 51 500 in the year 2010. In addition, the study projected that there would be a total of 6200 pediatricians in subspecialty practice in the year 2000; 7300 in the year 2005; and 8400 in the year 2010.79

In 1997, there were 32 434 primary care pediatricians in office-based practices.53 Using a needs-based approach, specifically the GMENAC needs-based model of 1980, but updated and based on a projected increase in the population of children, one might predict a need for between 35 000 and 36 000 pediatricians in 2010. This projection is based on a
GMENAC assumption that 1 pediatrician may care for 2034 children.

In 1991, the US Bureau of Health Professions contracted with the consulting firm of Abt and Associates to update the needs-based requirement model of GMENAC for 7 physician specialties, including pediatrics.31 Their estimates were based on ideal levels and types of medical care (preventive and curative), without regard to barriers imposed by ability to pay, access, availability, or lack of knowledge. Abt and Associates recommended a ratio of 1 general pediatrician per 2430 children, suggesting that the need for general pediatricians could be reduced to 28,400.80 This ratio, however, is higher than other current ratios.

Others have analyzed staffing ratios in use by private health insurance plans and HMOs as some measure of physician need. Staffing ratios of children to FTE pediatricians from a variety of different health care settings are shown in Table 1 below.72

To accomplish this, about 3000 pediatric residents will need to enter the pipeline each year. This is based on the most recent data available from the ABP, which reports 2615 PGY-1 categorical residents in pediatrics and 448 first-year Med/Peds residents in 1998.81 If Med/Peds residents are calculated as 0.5 FTE categorical pediatric resident, the total number of first-year FTE residents in pediatrics would be 2839. If this number were adjusted for the projected growth in the 0- to 17-year-old child population from 70.5 million in 1999 to 72.5 million in 2010 (US Census Bureau’s middle projections), then the number of first-year residents would increase to 2917. This number would need to be increased, however, to account for the additional pediatricians needed to

**TABLE 1.** Staffing Ratios for Children per Pediatricians

<table>
<thead>
<tr>
<th>Ages of Children, Years</th>
<th>Children Per Pediatrician in HMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–18</td>
<td>885–1105:*</td>
</tr>
<tr>
<td>0–17</td>
<td>1300:†</td>
</tr>
<tr>
<td>0–14</td>
<td>1157:‡</td>
</tr>
<tr>
<td>0–11</td>
<td>1200:§</td>
</tr>
<tr>
<td>Unknown</td>
<td>1125:‖</td>
</tr>
<tr>
<td>Unknown</td>
<td>1750:‖</td>
</tr>
<tr>
<td>Unknown</td>
<td>1200:‖</td>
</tr>
</tbody>
</table>

* From a staff model Midwestern HMO.
† From an Independent Practice Association model New England HMO.
‡ The average number of HMO enrollees younger than 15 years per full-time pediatrician from 33 different HMOs, 1992. Group Health Association of America, Inc., HMO Industry Profile: 1993. Washington, DC: Group Health Association of America.
§ From a staff model Midwestern HMO.
‖ From a staff and group model New England HMO.

**TABLE 2.** Projected Pediatrician-to-Population Ratios (2010)

<table>
<thead>
<tr>
<th>Pediatricians/Children</th>
<th>Number of Children in the Year 2010</th>
<th>Number of Pediatricians</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1200</td>
<td>65.0 M</td>
<td>54,200</td>
</tr>
<tr>
<td>1:1200</td>
<td>72.5 M</td>
<td>60,400</td>
</tr>
<tr>
<td>1:1300</td>
<td>65.0 M</td>
<td>50,000</td>
</tr>
<tr>
<td>1:1300</td>
<td>72.5 M</td>
<td>55,800</td>
</tr>
<tr>
<td>1:1400</td>
<td>65.0 M</td>
<td>46,400</td>
</tr>
<tr>
<td>1:1400</td>
<td>72.5 M</td>
<td>51,800</td>
</tr>
</tbody>
</table>

**FOPE II Task Force Projections**

According to data from the 1995 National Ambulatory Medical Care Survey (NAMCS), generalist pediatricians provide 53.7% of all office visits of children 0 to 17 years old. This figure, however, does not account for care delivered to the pediatric population by pediatricians in other settings, such as hospital clinics, nor does it signify an optimal percentage of child health visits delivered by pediatricians. As advocates for the optimal health of infants, children, adolescents and young adults, the Task Force believes that approximately two thirds of child health visits should be provided by pediatricians.

Using extrapolation methods that examine current staffing patterns in HMOs and private practices, as described in Table 1 above, determining the number of children that 1 FTE pediatrician can manage, and then extrapolating that number to the total requirements for pediatricians nationally, results in an “ideal” ratio of 1 pediatrician per 1200 to 1400 children. One can then use the US Census Bureau’s projections of the number of children under age 18 to determine the number of pediatricians needed.

For the year 2010, the low census projections are 65 million and the middle (probable) projections are 72.5 million children.81 Based on having 1 pediatrician per 1300 children under 18 years and on the US Census Bureau’s official low population projection of approximately 65 million 0- to 17-year-olds in 2010, it is estimated that 50,000 physicians (not FTEs) in primary care pediatric practice will be needed by the year 2010. Based on the US Census Bureau’s middle (probable) projections of 72.5 million, it is likely that 55,800 physicians (not FTEs) in primary care pediatric practice will be needed by 2010, including those functioning as general pediatric researchers. These projections are illustrated in Table 2.

When one compares these projected pediatric physician workforce requirements (50,000–56,000 pediatricians needed in year 2010) with Kletke and associates’ projected supply of 51,500 general pediatricians in 2010,29 there is a fairly high level of consistency. Using a demand-based model, the total number of pediatricians should be stabilized at current levels or, at most, should increase slightly during the next decade, in part to accommodate the projected increase in the child population.

To accomplish this, about 3000 pediatric residents will need to enter the pipeline each year. This is based on the most recent data available from the ABP, which reports 2615 PGY-1 categorical residents in pediatrics and 448 first-year Med/Peds residents in 1998.81 If Med/Peds residents are calculated as 0.5 FTE categorical pediatric resident, the total number of first-year FTE residents in pediatrics would be 2839. If this number were adjusted for the projected growth in the 0- to 17-year-old child population from 70.5 million in 1999 to 72.5 million in 2010 (US Census Bureau’s middle projections), then the number of first-year residents would increase to 2917. This number would need to be increased, however, to account for the additional pediatricians needed to
care for the 18- to 21-year-old segment of the pediatric population.

Although concluding that a stabilization of pediatricians in the pipeline at the current level, or a slight increase, will achieve desired workforce goals, it is important to continue to develop effective strategies to increase the pediatrician-to-child population ratio in underserved areas. Possible mechanisms to achieve this goal include recruitment of underrepresented minority students, rotations in underserved areas, increased availability of telemedicine, and financial incentives, such as loan forgiveness and financial remuneration.

Conclusion

Over the past few decades, there has been substantial growth in the numbers of pediatricians practicing in the United States. After reviewing the various workforce models and other factors presented in the preceding discussion, the FOPE II Workforce Workgroup and Task Force concluded that the total number of pediatricians should be stabilized at current levels or, at most, should increase slightly during the next decade. There are, however, workforce-related issues that cause concern from a medical education perspective. The trend toward lower minority representation in medical schools and pediatric training programs is particularly worrisome, especially because of its implications for access to care in underserved areas. Also, the clear trend toward a predominance of women practitioners in pediatrics, along with changing attitudes toward work and family, by both female and male pediatricians, will require a fundamental reexamination of pediatric education and practice, and the implementation of flexible, creative, equitable models that will accommodate the changing values of young pediatricians.

THE ROLE OF PEDIATRIC SUBSPECIALISTS

Current Status of Pediatric Subspecialists

A pediatric subspecialist is an individual who, as a result of training and experience, is qualified to provide patient care, teach, and conduct research in a defined or organ-specific area of medical or surgical care. Pediatric subspecialists can be categorized by discipline or by the certification process. Pediatric subspecialists are board certified by a number of different boards approved by the American Board of Medical Specialties (ABMS) or receive a certificate of training by institutions offering nonboard-approved programs.

Pediatric cardiology was the first pediatric subspecialty to petition successfully for the establishment of subspecialty certification and formal training programs. The first cardiology examination was given in 1961. Thirteen years later, the first examinations in hematology/oncology and nephrology were given, and over the last 20 years, 11 additional subspecialty exams have been established. Recently, neurodevelopmental disabilities and behavioral-developmental pediatrics have been formally approved as subspecialties certified by the ABP. Pediatricians may also receive a certificate of added qualifications in medical toxicology and in sports medicine, although the numbers choosing to do so have been very small. Finally, for many years the ABP and the American Board of Internal Medicine (ABIM) have jointly sponsored separate, independent boards in allergy/immunology, which also certifies in clinical and laboratory immunology. Genetics and pediatric neurology, as well as the newly created subspecialty of pediatric rehabilitation medicine, are certified by other boards.

Pediatric subspecialists provide clinical care, education, and research in a number of settings. The majority of pediatric subspecialists conduct their professional activities at academic medical centers; relatively few operate traditional private practices. Subspecialties that are procedurally oriented and dependent on clinical income, such as cardiology, allergy and immunology, neurology, gastroenterology, and surgery, often practice in multiple sites, including academic medical centers and community hospitals.

In most urban and suburban settings, pediatric subspecialists care for the majority of children afflicted with complicated and advanced disease. Because there are few pediatric subspecialists in rural settings, clinical services for patients in these areas are usually provided by periodic outreach clinics, telephone and telemedicine consultation, or referral to local adult subspecialists.

Most pediatric subspecialists conduct their clinical activities in collaboration with other pediatric subspecialists to ensure a full spectrum of care. Subspecialists’ educational and research activities are also provided in an interdisciplinary fashion. In addition to providing subspecialty care, approximately half of pediatric subspecialists also provide some primary care for their patients.

Changes in the Supply of Pediatric Subspecialists

As of December 1998, 11,823 pediatric subspecialists had been certified by the ABP in 12 subspecialties, which represents just under 18% of all board-certified pediatricians.

Despite the overall decline in the percentage of pediatricians entering subspecialty training, women are assuming a greater role in subspecialty training; in 1998, 47% of subspecialty fellows were women. It is important to note, however, that overall there has been a drop in the choice of a pediatric subspecialty by both men and women.

A number of reasons have been offered as an explanation for the reduced interest in pediatric subspecialization, including a shift to managed care; an increased emphasis on primary care by private and public payers; a progressively increasing debt burden among residents; increasing subspecialty faculty dissatisfaction; decreased research support; a widening disparity between faculty and private practice salaries; and an increasing expectation that pediatric subspecialty faculty will have to generate their income through patient care activities. Efforts to address these issues will be important in ensuring an
care for the 18- to 21-year-old segment of the pediatric population.

Although concluding that a stabilization of pediatricians in the pipeline at the current level, or a slight increase, will achieve desired workforce goals, it is important to continue to develop effective strategies to increase the pediatrician-to-child population ratio in underserved areas. Possible mechanisms to achieve this goal include recruitment of underrepresented minority students, rotations in underserved areas, increased availability of telemedicine, and financial incentives, such as loan forgiveness and financial remuneration.

Conclusion

Over the past few decades, there has been substantial growth in the numbers of pediatricians practicing in the United States. After reviewing the various workforce models and other factors presented in the preceding discussion, the FOPE II Workforce Workgroup and Task Force concluded that the total number of pediatricians should be stabilized at current levels or, at most, should increase slightly during the next decade. There are, however, workforce-related issues that cause concern from a medical education perspective. The trend toward lower minority representation in medical schools and pediatric training programs is particularly worrisome, especially because of its implications for access to care in underserved areas. Also, the clear trend toward a predominance of women practitioners in pediatrics, along with changing attitudes toward work and family, by both female and male pediatricians, will require a fundamental reexamination of pediatric education and practice, and the implementation of flexible, creative, equitable models that will accommodate the changing values of young pediatricians.

THE ROLE OF PEDIATRIC SUBSPECIALISTS

Current Status of Pediatric Subspecialists

A pediatric subspecialist is an individual who, as a result of training and experience, is qualified to provide patient care, teach, and conduct research in a defined or organ-specific area of medical or surgical care. Pediatric subspecialists can be categorized by discipline or by the certification process. Pediatric subspecialists are board certified by a number of different boards approved by the American Board of Medical Specialties (ABMS) or receive a certificate of training by institutions offering nonboard-approved programs.

Pediatric cardiology was the first pediatric subspecialty to petition successfully for the establishment of subspecialty certification and formal training programs. The first cardiology examination was given in 1961. Thirteen years later, the first examinations in hematology/oncology and nephrology were given, and over the last 20 years, 11 additional subspecialty exams have been established. Recently, neurodevelopmental disabilities and behavioral-developmental pediatrics have been formally approved as subspecialties certified by the ABP.82 Pediatricians may also receive a certificate of added qualifications in medical toxicology and in sports medicine, although the numbers choosing to do so have been very small. Finally, for many years the ABP and the American Board of Internal Medicine (ABIM) have jointly sponsored separate, independent boards in allergy/immunology, which also certifies in clinical and laboratory immunology. Genetics and pediatric neurology, as well as the newly created subspecialty of pediatric rehabilitation medicine,82 are certified by other boards.

Pediatric subspecialists provide clinical care, education, and research in a number of settings. The majority of pediatric subspecialists conduct their professional activities at academic medical centers; relatively few operate traditional private practices. Subspecialties that are procedurally oriented and dependent on clinical income, such as cardiology, allergy and immunology, neurology, gastroenterology, and surgery, often practice in multiple sites, including academic medical centers and community hospitals.

In most urban and suburban settings, pediatric subspecialists care for the majority of children afflicted with complicated and advanced disease. Because there are few pediatric subspecialists in rural settings, clinical services for patients in these areas are usually provided by periodic outreach clinics, telephone and telemedicine consultation, or referral to local adult subspecialists.

Most pediatric subspecialists conduct their clinical activities in collaboration with other pediatric subspecialists to ensure a full spectrum of care. Subspecialists’ educational and research activities are also provided in an interdisciplinary fashion. In addition to providing subspecialty care, approximately half of pediatric subspecialists also provide some primary care for their patients.83

Changes in the Supply of Pediatric Subspecialists

As of December 1998, 11 823 pediatric subspecialists had been certified by the ABP in 12 subspecialties, which represents just under 18% of all board-certified pediatricians.3

Despite the overall decline in the percentage of pediatricians entering subspecialty training, women are assuming a greater role in subspecialty training: in 1998, 47% of subspecialty fellows were women.3 It is important to note, however, that overall there has been a drop in the choice of a pediatric subspecialty by both men and women.

A number of reasons have been offered as an explanation for the reduced interest in pediatric subspecialization, including a shift to managed care; an increased emphasis on primary care by private and public payers; a progressively increasing debt burden among residents; increasing subspecialty faculty dissatisfaction; decreased research support; a widening disparity between faculty and private practice salaries; and an increasing expectation that pediatric subspecialty faculty will have to generate their income through patient care activities. Efforts to address these issues will be important in ensuring an
adequate supply of pediatric subspecialists in the future.

In particular, because the majority of candidates taking ABP subspecialty examinations choose careers in academic settings, it will be essential to identify strategies to enhance the attractiveness of careers in academic medicine. In the 2 decades since the 1978 Report was released, there has been increased pressure on pediatric subspecialists in academic settings to generate clinical revenues to support the research and education missions of medical schools. Competition for externally funded research has also progressively increased. The majority of support for pediatric research comes from the NIH. In fiscal year (FY) 1998, 3.9% of the NIH funding for institutions of higher education, or more than $317 million, went to departments of pediatrics. For the same period, 19%, or more than $1.58 billion, went to departments of internal medicine. While the total grant award dollars for departments of medicine was almost 5 times that for departments of pediatrics, success rates for funding were similar, 25.9% for pediatrics and 31.1% for internal medicine in FY 1998.

With continued downward pressure on reimbursement expected, it will become more and more difficult for faculty to subsidize the medical school’s research mission out of clinical earnings. Therefore, institutions and departments with a significant commitment to research will need to enhance their ability to pay for faculty time devoted to full-time research activities. Increased efforts at developing programs of philanthropy, including the development of endowments and the further development of industrial contracts and shared technologies and laboratories, will be needed to help support the mission of research. Also, beginning faculty may need to be supported financially for a number of years before being able to compete successfully for externally funded research grants.

Survey of Subspecialists

An important component of the FOPE II Project was the gathering of insights, information, and data that could be utilized in developing recommendations for the future of pediatric education. One tool used was the Survey of the AAP’s Medical and Surgical Subspecialty Sections, in which 17 of these sections as well as appropriate specialty organizations participated. Among the key findings of the survey were the following:

- **Gender:** There is considerable variation among the various pediatric subspecialties in terms of gender composition. There are 6 subspecialties for which the total composition is less than 25% women: orthopaedic surgery (6%), plastic surgery (6%), otolaryngology (10%), cardiology (20%), ophthalmology (23%), and allergy and immunology (24%); and 4 subspecialties for which the total composition is more than 40% female: adolescent medicine (51%), dermatology (49%), clinical genetics (41%), and developmental-behavioral medicine (41%).

- **Time Spent in Professional Activities:** Direct patient care is the major professional activity of pediatric subspecialists. The average percentage of total professional time spent per week by physicians in direct patient care ranges from 44% for infectious disease specialists to 83% for allergists and ophthalmologists. Teaching and administration account for the next most significant portions of pediatric subspecialists’ professional time.

- **Patient Referrals:** Virtually all pediatric subspecialists receive referrals for pediatric patients, with the 3 most significant sources of patient referrals for most pediatric subspecialists being pediatric generalists, family physicians, and pediatric medical and surgical subspecialists.

- **Competition:** Most pediatric subspecialists clearly believe they face competition for pediatric subspecialty services in their geographical area. For most subspecialists, the major perceived source of competition is other pediatric subspecialists. Another major source of competition for many pediatric subspecialists is physicians trained in adult medicine in their subspecialty.

- **Responses to Competition:** Not all physicians who face competition for pediatric subspecialty services have made changes to their practice in response to such competition. In only 2 of the specialties surveyed (cardiology and pulmonology) did half or more of the physicians who said they faced competition actually initiate practice modifications. Of those who have made practice modifications in response to competition, the most common strategies have been to increase office hours, the number and/or responsibilities of support staff, and the number of physicians in the practice.

- **Workforce Requirements:** With the exception of those in developmental-behavioral medicine and emergency medicine, most pediatric subspecialists do not believe there will be a need for additional pediatric subspecialists in their communities in the next 3 to 5 years.

Training Issues

Pediatric subspecialists need training both in inpatient and ambulatory settings, with case-based education serving as the core of the educational experience. The increasing shift of patient care to ambulatory settings, however, requires that curricula be developed to ensure that fellows have adequate exposure to the natural history of disease, as well as opportunities to experience the complexity of the psychosocial and financial issues that confront families and children who have chronic disease or who are technologically dependent. The curriculum should include training in areas that will become increasingly important in the 21st century, such as team leadership, consultative liaison, clinical outcomes, evidence-based clinical decision-making, critical pathways, cost and resource utilization issues, and information systems.

As articulated in the 1990 statement of the Federation of Pediatric Organizations (FOPO) on pediatric fellowship training (revised 1996), the guiding con-
cept for pediatric subspecialty training should continue to be the development of future academic pediatricians capable of providing care for children with complex problems within the pediatrician’s area of special expertise. Within academic medical centers, there is a need for master clinicians, skilled teachers, and productive investigators who conduct research with varied interests. Graduates of pediatric fellowship programs should be proficient in clinical care, direct and consultative; teaching; and a selected area of research. Thereafter, differentiation of interests and activities should be expected and encouraged, but graduates of pediatric fellowship programs in all settings should continue their involvement in research, whether collaborative or direct, to add to the body of knowledge in their areas of interest.

**Paradoxes in Subspecialty Pediatrics**

There are some inherent paradoxes in subspecialty pediatrics. The first concerns the extent of subspecialty training. Since the 1978 Report, most subspecialty disciplines have developed to such a degree that a full 3 years of training is mandatory to provide adequate preparation for a career in research. In the early days of the development of subspecialties, before subboards and defined curricula were fully developed, postresidency fellows could finish a 1- or 2-year fellowship and then practice the discipline. Today, however, such training would not qualify the fellow for subspecialty board certification.

Second, relative value scale billing codes do not adequately value the amount of time and effort required in the intensive care of certain complex patients. These codes, which are predicated on the shorter visits of internal medicine subspecialists with adult patients, were not created to deal with the inherent inefficiency of caring for an infant or young child where developmental factors, fear of pain, the need for sedation before simple procedures, and the inability to communicate directly are constant features.

Third, the pediatric subspecialist, with a few exceptions, such as allergy or neurology, will not practice the subspecialty discipline full time, because the intrinsic incidence of disease in child populations is far less than in adults. Hence, the work pattern of most pediatric subspecialists is supplemented with other roles, such as teaching, administration, research and general pediatric care.

A final paradox is that fellows of subspecialty fellowship programs still require mentoring and increased experience after the 3-year fellowship. This is particularly true for their continuation as research scientists. The additional experience is essential in providing subspecialists with the skills and perspective needed to provide the full scope of services to children with uncommon, but complex, disorders.

**The Relationship Between Generalist Pediatricians and Subspecialists**

The respective roles of and linkages between generalists and subspecialists—particularly primary care pediatricians and pediatric subspecialists—is an issue that will generate continued discussion in the years ahead. Research in internal medicine on the outcomes and quality of care provided by generalists and subspecialists is limited and conflicting. Several studies of adult patients have shown that generalists treating certain conditions achieve equivalent outcomes to subspecialists but consume fewer resources, while other studies have demonstrated better process and outcome measures when these conditions have been managed by subspecialists. Data for pediatric patients is lacking.

Further research is needed on the appropriate care parameters for pediatric generalists and subspecialists. Additional research also is needed comparing the quality and cost of care provided to children by pediatric subspecialists versus adult subspecialists, who do not have as much training as pediatric subspecialists in pediatric physiology and human development, and who may not be as familiar with appropriate community resources.

There is growing consensus in the pediatric community that pediatricians in the future will spend an increasing amount of time managing chronic illness, as well as continuing to provide routine illness care and anticipatory guidance. Pediatricians can provide ongoing care for many children with chronic conditions, in collaboration with subspecialists, as demonstrated by the long experience of many childhood cancer programs. Future trends might include the expanded role of academic consultative generalists, to assist primary care providers in linking patients to the appropriate branch of the tertiary system when the clinical situation is not clear.

There are, however, several barriers to the implementation of a collaborative, tiered model of care for pediatric patients:

- Several studies have suggested that parents are not confident with generalists’ level of skill in managing complex illnesses.
- There is no clear consensus as to what types and severity of problems, or what aspect of any given chronic problem, should be managed by primary care pediatricians and what should be the domain of the specialist.
- If a subspecialist is not affiliated with one’s health plan, the out-of-pocket cost for a necessary consultation may be prohibitive for many families.

A number of steps need to be taken to address issues relating to the relationship between subspecialists and pediatric generalists. First, subspecialists should assume the responsibility for educating all residents in the diagnosis and management of diseases traditionally felt to be the domain of the subspecialists. Second, pediatric generalist training programs should increase the content of subspecialty training to prepare the generalist of the future better for the management of low acuity subspecialty patient problems. Also, university pediatric departments and children’s hospitals should move toward the development of comprehensive and integrated service delivery systems that provide telemedicine and consultative services over long distances.

Finally, the added value provided by pediatric
subspecialists should be supported by well-designed, scientific studies. Subspecialty programs and organizations should develop, moreover, informational materials for families, other health care providers, and purchasers of care, detailing the expertise provided by that subspecialty.

Because pediatric subspecialists are the most extensively trained and experienced health care professionals in providing comprehensive and complex care to children, and because they use the most advanced technology available, all children with appropriate medical needs should have access to pediatric subspecialists.

**Future Scope of Activity**

Looking ahead, it is likely that pediatric subspecialists will continue to function in a wide variety of traditional roles in direct patient services, research, and education, as well as assuming new and expanded roles and responsibilities in health administration, public health, and government agencies. Pediatric subspecialists will continue to provide direct patient services that range from isolated consultations, to single disease comprehensive care, to complete care for children with special health care needs. Subspecialists also will continue to provide varying levels of primary care services for children, in addition to functioning as consultants to nonpediatric specialists.

To assume these multiple and varied roles, pediatric subspecialists of the future will not only need to be educated to provide the highest standard of care for children, but also must acquire the skills necessary to conduct independent, funded research, to educate other child health care professionals, and to serve as the principal consultants to all health care providers involved in caring for children with severe, complex, or rare disease.

**Pediatric Subspecialty Education Centers of Excellence**

The education of the subspecialist should be based in high resource centers of educational excellence that can provide core scientific teaching, a critical mass of faculty (both clinical and basic science), and access to required volumes of patients for fellows to develop a full range of cognitive and technical proficiencies. The educational process should be sufficiently broad-based to support lifelong learning, necessary career transitions, and ensure that fellows become competent educators. Pediatric programs should be integrated, whenever possible, with the aim of enhancing quality and reducing equipment and program costs. The numbers of procedures and/or patients followed necessary to qualify for approval should be established through a rational, data-driven process, with appropriate standards being set at the national level. In advocating this concept, however, it is important to recognize its potential implications for access to subspecialty education; specifically, that reducing the number of sites where subspecialty fellowship education is offered might result in a decline in the number of pediatricians able to pursue subspecialty education, because of geographic considerations.

**The Role of the Pediatric Subspecialist in Research**

To date, virtually all physician-generated research related to childhood disorders has occurred in academic medical centers, with support for pediatric-related investigations coming from medical schools, hospital-based foundations, regional and national foundations, governmental agencies, industry, and academic practice plans.

More recently, in some cases, support for clinical research in pediatrics has been developed by collaboration between managed care organizations and academic medical centers. One example of this is the Kaiser-UCLA Vaccine Study Group, which has performed studies on the safety, immunogenicity, and efficacy of bacterial and viral immunization. This and other innovative forms of collaboration, which provide large populations of children for clinical studies, may need to be encouraged in the future, as other sources of financial support for research diminish.

One important mechanism for research support is to integrate pediatrician-scientists with their basic science colleagues programmatically. With this model, it will be important for the pediatrician-scientist to continue the frequent interaction with other pediatricians that permits the opportunities for dialogue that are so valuable to the generation and refinement of research ideas.

In the future, as in the present, the pediatric subspecialist should be prepared and qualified to design and conduct research. There is a clear need, however, for newer technologies and technology-based management approaches to support population-based care delivery and research programs involving both outcomes and molecular biology.

An increased number of competitive investigators in many areas of pediatric medicine are needed to ensure that the potential of molecular and genetic-related research to effect improved health care for children will be realized. During their period of training, fellows should have a significant portion of their time protected during their research rotations, but it should be anticipated that fellowship training alone will not provide a sufficient amount of research training to enable the fellow to compete successfully for external support.

**Reimbursement for Clinical Services**

Another challenge to the financial stability of many pediatric subspecialty programs stems from competition for care of the patient with less acute or complex conditions. It is because reimbursement for these patients is more equitable in terms of effort and real costs. Many pediatric subspecialists, therefore, cross-subsidize the care of complex problems with reimbursement from less complex care. As these patients are increasingly managed by generalists or adult subspecialists, financial support for pediatric subspecialty programs will be destabilized. Providing reimbursement for the true costs of care for complex and serious pediatric problems is needed to ensure continued access to pediatric subspecialty care.
Conclusion

The declining interest in pediatric subspecialization, which has been caused by a variety of factors, is of intense interest and concern. Efforts by medical educators to address these issues will be important in ensuring an adequate supply of pediatric subspecialists in the future. In particular, because the majority of candidates taking ABP subspecialty examinations choose careers in academic settings, it will be essential to identify strategies to enhance the attractiveness of careers in academic medicine. Addressing such issues as the increasing need to generate clinical revenues to support the medical education and research missions should be part of this reassessment. With the shift in the locus of patient care from inpatient to ambulatory settings, educators will need to ensure that the curriculum provides fellows with adequate exposure to a full range of diseases and the full course that such diseases follow, which will mean more attention to ambulatory care settings.

The curriculum should include training in areas that will become increasingly important in the 21st century, such as team leadership, clinical outcomes, and critical pathways. Pediatric educators should also focus on the respective roles of and linkages between generalists and specialists, particularly primary care pediatricians and pediatric subspecialists, because this is an issue that is likely to generate continued discussion in the years ahead. The concept and details of Pediatric Subspeciality Education Centers of Excellence must be pursued. If child health care is to continue to improve, there must be an adequate number of physician-scientists to maintain the advances. A shortage of pediatric subspecialists, therefore, has grave implications for the improvement of child health.

FINANCING PEDIATRIC MEDICAL EDUCATION

The 1978 Task Force Report

The 1978 Report devoted little attention to the financing of pediatric medical education. It recommended moving pediatric care from inpatient to ambulatory settings, with greater emphasis on preventive care, and suggested a corresponding increase in educational activity in ambulatory settings. Acknowledging that these changes were apt to increase the cost of education, it advocated greater financial support, indirectly through better reimbursement for ambulatory preventive services, as well as more direct support by federal agencies.

The 1978 Report noted that delineation of the actual costs of education was lacking, stating that “the costs of educating medical students and pediatric residents are difficult to estimate because of the overlapping of service, research, and teaching in university health sciences centers.” This is no less a feature of the current environment. The 1978 Report also noted that “the future of pediatric education can no longer be dependent on antiquated in-hospital reimbursement mechanisms.” There has also been little change in this situation in the past 20 years.

Current Status of the Funding of Graduate Medical Education

Overview and Immediate Challenges

Before enactment of the legislation creating the Medicare program in 1965, GME was sponsored by hospitals, often in the form of modest payments to residents for room and board. With the creation of Medicare, GME was supported at a level of “true costs.” The costs were termed, “direct costs of graduate medical education” (DGME), defined as the cost of residents’ salaries and benefits, the costs of faculty and staff required to operate the training program, and miscellaneous educational expenses, including allocated hospital overhead costs.

When diagnostic-related groups (DRGs) were instituted in 1983 as a means of determining Medicare prospective payments, policymakers acknowledged that teaching hospitals would be underreimbursed by DGME payments alone. To address this problem, they provided for an additional payment for the “indirect costs of medical education” (IME), paid as a percentage add-on to the DRG-based reimbursement amount.

In FY 1996, IME payments represented approximately two thirds of total Medicare GME payments of almost $7 billion. A key provision of the Balanced Budget Act of 1997 (PL105-33) provides for a reduction in IME payments by almost one third by FY 2002 and a reduction in overall Medicare GME payments by approximately 25%. The result will be either a proportionate decrease in GME or a shift of GME costs to other payers.

Medicare Graduate Medical Education Funding: Consequences for Freestanding Children’s Hospitals

Medicare, through DGME and IME payments, is the largest single source of explicit reimbursement for the costs of GME. Because Medicare DGME and IME costs are paid according to the percentage of inpatient days attributable to Medicare patients, the system provides reimbursement for pediatric GME only in hospitals caring for both adult and pediatric patients. The only Medicare-insured patients in freestanding, corporately distinct children’s hospitals are those receiving chronic renal dialysis. Such hospitals therefore receive only token Medicare GME funds. According to NACHRI (Finance Committee Statement on Graduate Medical Education, March 20, 1997), this represents a serious problem for the future, in that freestanding children’s hospitals train 25% of general pediatric residents and more than 50% of pediatric subspecialty residents, in addition to providing pediatric experiences for residents training in adult-oriented programs.

Underreimbursement for GME means an enormous underinvestment in children’s health care, as children’s hospitals must take from their clinical and research budgets the millions of dollars (assuming GME reimbursement according to the national average) they would otherwise receive in Medicare GME reimbursement. It is also inequitable, because freestanding children’s hospitals are denied a source of
Funding of Medical Student Education

The estimated expense of medical student education includes direct instructional costs, which fall within the relatively narrow range of $40,000-$50,000 per student per year, and total costs (including the costs of providing an educational milieu), which are much more variable, ranging between $72,000 and $93,000 per student per year. The components of an educational milieu include scholarship, research, and professional services, which create an environment that stimulates lifelong learning and professionalism. The sources of revenue to support those costs have changed dramatically in recent years. Thirty-five years ago, just 6% of medical school revenue came from faculty professional services (faculty practice, hospital reimbursements, and service contracts). By 1995, this figure had increased to 50%, with faculty practice income alone accounting for 33% of total medical school revenues. The remainder was supplied by federal grants and contracts (21%), state and local appropriations (10%), tuition and fees (4%), and a combination of industry-sponsorship, foundation grants, gifts, and endowment (15%). Thus, the largest single source of medical school revenue at the current time is faculty practice income; this situation is not expected to change in the early part of the 21st century.

A Dean’s tax and/or department tithe is an obvious use of faculty practice income for educational purposes, but the major way in which practice income supports education is by paying the salaries of full-time faculty whose teaching time is not otherwise compensated. This remains a substantial faculty expense. A recent AAMC study indicated that 28% of faculty practice income is used to subsidize teaching and research, with 8% directly supporting medical student education and the rest supporting graduate medical education, research, and other scholarly activities. Volunteer faculty provided an additional subsidy, equal in dollars to about one fifth of the full-time faculty subsidy.

Because residents and fellows spend a portion of their time supervising and teaching medical students, an additional source of subsidy comes from GME reimbursement. In addition, IME reimbursement covers a variety of the costs of operating a teaching hospital including, by implication, the hospital-associated costs of medical student teaching.

The funding of pediatric medical school teaching will vary with the duration of the pediatric experience, the specifics of the curriculum, and the degree to which community-based faculty will volunteer their time. The reasons for these features are essentially local and often enmeshed in history. The funding that a department receives for teaching may not relate directly to the amount of teaching that is actually conducted.

Effects of Changes in the Health Care Industry

The ongoing transformation of the health care industry is having a number of effects on medical education. First, the increasingly business-like character of medical schools is placing greater pressure on faculty to generate revenues. Also, for medical schools located in competitive managed care markets, there are fewer discretionary funds of the type that traditionally have been used to support medical education.

Second, movement of patients into risk-sharing plans has in many cases meant that Medicare and Medicaid GME reimbursement is incorporated into capitation payments that can move to nontraining settings.

Finally, health care often becomes fragmented in competitive markets. This is a particular problem for
pediatric education, because children comprise only 25% of the general population and because the incidence and prevalence of children’s diseases are low. In order for a comprehensive general pediatric training program to have access to the 500,000 children necessary to support pediatric education, it must have access to a total population of at least 2 million. Some pediatric subspecialties must serve even larger populations. Achieving such numbers can be difficult where there are a number of different payers in a market competing aggressively for a fixed number of patients and, in some cases, providing “carve-outs” to selected facilities.

Having multiple, competing health care systems means that individual systems may lack the spectrum or frequency of disorders needed to sustain the highest standards of pediatric training. Fragmented teaching is unlikely to lead to a comprehensive understanding of a subspecialty. Pediatric specialty education and, particularly, subspecialty education, is best done in regional centers that serve all systems and are able to sustain the volume of patient care necessary to provide a comprehensive educational experience for residents. For this reason, pediatric educators need to develop broad consensus around the features of Pediatric Subspecialty Education Centers of Excellence.

Managed care can also fragment pediatric care within an organization if referral protocols direct only the youngest and most complicated subspecialty problems to pediatric subspecialists. This deprives pediatric subspecialists of less severe conditions for teaching purposes and threatens their financial viability by leaving them with only the most difficult and time-consuming cases, which often are underreimbursed by payers. Finally, managed care tends to fragment general pediatricians among adult-dominated delivery systems, dividing the constituency best able to speak for the health care needs of children and for pediatric education.

Financial Challenges Faced by Departments of Pediatrics

By unhappy coincidence, as resources to support education are decreasing, costs are escalating. More patients are being managed on an outpatient basis, where teaching is more costly, and a broadened curriculum is leading to increased cost.

Education is not the only activity requiring subsidezation in departments of pediatrics. Important children’s health services are underreimbursed. Unlike surgery and many other specialties, moreover, pediatric departments are often asked to share the overhead costs of a major site of practice, in the form of clinic fees or their equivalent. Academic practice plans generally expect departments of pediatrics to find their own solutions to these challenges. What typically happens is that pediatric subspecialists who are reimbursed appropriately must subsidize those who are not. This extensive cross-subsidization, which is virtually unique to departments of pediatrics, limits funds available for education.

If pediatric education programs are to be supported appropriately in the future, they must determine their costs, find stable sources of revenue, and be accountable for the “product” they provide. Separate curricula and resource descriptions should be developed for each stage of pediatric education, from medical students through continuing education, and a cost-construction approach, rather than a cost-allocation approach, should be used by individual training programs to calculate costs and advocate for reimbursement.

Current methods of funding medical student, graduate, and continuing medical education are unsatisfactory. The Medicare model is not consistent with contemporary medical practice or with contemporary concepts of GME, especially because of its emphasis on inpatient days. Moreover, any costs not explicitly reimbursed by Medicare have to be embedded in the cost of patient services. This places all teaching hospitals, but particularly freestanding children’s hospitals, at a financial disadvantage.

The flaw in current governmental funding of medical education is that reimbursement for education is linked to reimbursement for patient care. Ideally, in the future, both medical student education and GME should be funded separately from patient services, with funding coming from the multiple payers who benefit from a well-trained medical workforce.

Continuing Medical Education: Trends and Financing

Trends in Continuing Medical Education

Despite the growing importance of continuing education, its costs, revenues, and outcomes have received little attention. Registration fees for formal courses typically do not reflect true education costs. Moreover, the costs of the considerable amount of continuing education that occurs during one-on-one faculty consultations and routine lectures (eg, grand rounds) have yet to be analyzed.

Looking to the future of pediatrics, CME will need to focus not only on physician and nonphysician child health professionals, but also on patient and community education programs. Departments of pediatrics will need to be involved integrally in these educational activities and will need to work at identifying funding opportunities to support participating faculty.

Financing

The cost-construction approach should be used to define the costs of each step in the CME process, including an initial needs assessment that provides, among other benefits, an assessment of the learners’ scientific knowledge base and specific needs; regional and local profiles of pediatric morbidity and mortality; construction of the curriculum and methodology of delivery; and use of an evaluation methodology to determine the effectiveness of the program. The evaluation should also include feedback to redefine the learning needs and suggest modifications. The costs of any changes should also be analyzed.

The issue of funding CME is likely to continue to be problematic. Ultimately, costs will have to be shared by faculty; learners, both as individuals and through professional organizations and employers;
Implications of Proposals to Regulate the Number of Graduate Medical Education Training Slots

Several groups have suggested that the current system for determining the number of GME training slots should be modified by giving the resident a “voucher.” In a voucher system, funds would follow the graduate to the teaching site(s), rather than going first to a teaching hospital. On the one hand, this approach would place the most power to shape the training experience in the hands of the trainee. However, it carries the risks that resident choice would be susceptible to disruptive fads in training styles, that vouchers might be traded on the open market, and that it would be difficult to discipline a resident if departure meant loss of program funds. Finally, although a voucher system would initially place control in the hands of the graduate, central administration of such a system would be susceptible to political influences and could become progressively inflexible and unresponsive. For all these reasons, it is not currently prudent to give unqualified endorsement to a voucher system.

In summary, the current Medicare model of GME reimbursement does not adequately support pediatric education, because it denies virtually all reimbursement in freestanding children’s hospitals, incompletely reimburses GME costs at nonhospital sites, is tied to patient service rather than to education, excludes contributions from large segments of society that directly benefit from a well-trained medical workforce, and does not fully fund subspecialty resident training. GME funds are directed to hospitals, reinforcing a link between education and hospital-based service that may not always be consistent with the medical education mission. Furthermore, this flow of federal funds has served as an incentive for hospitals to increase the number of residents.

Current HCFA regulations governing billing by teaching physicians are inconsistent with the mission and current financial realities of medical teaching institutions. Educational institutions are placed at a competitive disadvantage, moreover, because education costs not covered explicitly must be embedded in hospital and physician charges.

Furthermore, current funding mechanisms do not support the continuum of pediatric medical education. Support of student education is neither defined nor stable in most schools, thereby jeopardizing prospective program development, and CME is supported by a variety of mechanisms, some of which involve potential conflicts of interest.

In looking to the future, a number of steps should be taken to address the deficiencies in the current model of medical education financing:

- Using validated methodologies to determine the costs of education at all levels.
- Creating a multipayer system to fund the entire spectrum of medical education.
- Supporting medical student education centrally, rather than departmentally.
- Furnishing full support for core pediatric training by a multipayer mechanism, including dual specialty training, for all required years.
- Providing pediatric residents and fellows at freestanding children’s hospitals with the same level of federal support as received by pediatric residents and fellows elsewhere.
- Applying federal formulas for GME reimbursement equally to pediatric residents and subspecialty fellows.
- Developing of additional mechanisms to support research fellowship training in pediatrics.
- Unless funding of medical education can be separated from patient care revenues, modifying HCFA regulations either to allow fellows to bill for medical care or to allow teaching physicians to bill for care given by subspecialty fellows.
- Funding research training in academic fellowships by the NIH and other federal agencies through their established training grant mechanisms and appropriating more research training dollars to meet these demands.

Conclusion

The ongoing changes in health care are having a number of effects on medical education financing. In particular, the business-like character of medical schools is placing greater pressure on faculty to generate revenues. As resources to support education are decreasing, costs are escalating. More patients are being managed on an outpatient basis, where teaching is more costly, and a broadened curriculum is leading to increased cost. If pediatric education programs are to be supported appropriately in the future, they must determine their costs, find stable sources of revenue, and be accountable for the “product” they provide.

Current methods of funding medical student, graduate, and continuing medical education are unsatisfactory. In particular, the Medicare model is not consistent with current medical practice or with contemporary concepts of GME. As a result, all teaching hospitals, particularly freestanding children’s hospitals, operate at a financial disadvantage.

The flaw in current government funding of medical education is that reimbursement for education is linked to reimbursement for patient care. The challenge for the future will be for medical educators and the profession to advocate for a new system, in which medical student education and GME are funded separately from patient services, with funding coming from the multiple payers who benefit from a well-trained medical workforce.

THE EDUCATION OF THE PEDIATRICIAN OF THE FUTURE

Review of the Pediatric Medical Education Section of the 1978 Report

The 1978 Report focused primarily on the content of pediatric medical education at the undergraduate
and graduate levels. It emphasized an appreciation for the unique nature of infants, children, adolescents, and young adults, and called for a broadening of pediatric education to give the practitioner a facility with the diagnosis and treatment of a variety of behavioral and social issues that affect the normative growth and development of the child.

Additionally, special emphasis was placed on the importance of educational approaches that allow the pediatric resident to develop an appreciation for the continuity of the developmental process of each child. The report addressed CME briefly, recommending that pediatric departments assume increasing responsibility for the continuing education of local clinicians. During the past 2 decades, these content recommendations have been key factors contributing to the broadened scope of pediatrics.

The 1978 Report contained little discussion and guidance, however, about the process that should be used to implement its recommendations and to achieve the specific educational goals at each level. In contrast, the following section focuses principally on the process that faculties and organizations should undertake to achieve these objectives, and the structures that will enable them to accomplish them. Although this section discusses how educational content will change over time, the mechanisms by which educational change can be developed, implemented, and evaluated receive much greater attention, because these are likely to have more lasting influence.

**Status of Pediatric Medical Education**

Medical education has advanced considerably in the last 20 years, such that there is a clearer understanding today of the learning processes and components of effective educational systems. Specifically, medical education is now viewed as a multidimensional process that includes:

- Needs assessment of learners, faculty, and program.
- Competencies expected of the learner, defined for learners and faculty.
- Curricula designed to achieve these competencies through a variety of learning opportunities (formal and informal teaching sessions, clinical experiences, self-directed learning).
- Faculty development to enhance educational skills.
- Outcome measures for learners, curricular elements, and overall program.
- Evaluation and feedback for learners, faculty, and overall program.
- Continuous improvement and adaptation based on needs, outcomes, and timely feedback.

Pediatric medical education has advanced with the development of new curricula and evaluation methods. Currently a broad array of organizations play important roles in curriculum design and program and trainee evaluation.

At the undergraduate level, the Council on Medical Student Education in Pediatrics (COMSEP) has become an effective coordinating group for pediatric educators in medical schools, serving as a forum for presenting educational innovations and developing model curricula. COMSEP is financed by and reports to the Association of Medical School Pediatric Department Chairmen (AMSPDC).

At the residency level, The Association of Pediatric Program Directors (APPD) now serves a valuable coordinating role for residency directors in all accredited university- and community-sponsored programs. It has evolved into an important forum for sharing ideas about educational curricula, program structures, and the role of the program director. The Ambulatory Pediatric Association (APA) and the AAP Resident Section (AAP-RS) have also been influential in residency curriculum development. All 3 organizations provided valuable input to the pediatric RRC in its 1996 revision of the Program Requirements, which became effective on February 1, 1997.

At the fellowship level, many new subspecialty boards have been established, with new curricula and board examinations, each under the auspices of its own subspecialty board. A standard duration of 3 years has been established for most programs, to emphasize and encourage research and scholarly activity within the discipline.

At the CME level, the AAP has developed extensive and sophisticated education programs, both regionally and nationally. Through programs like the Pediatrics Review and Education Program (PREP), a comprehensive CME program, the AAP has utilized the core content material developed by the ABP to guide practitioners in their own continuing education. Academic medical centers are increasingly active in providing continuing education, as well. Faculty development has become recognized as an important component of CME for academic and community pediatricians, but as yet has not been a coordinated process under the auspices of either the AAP or the academic community. Of particular importance, the 7-year renewal of certification requirement established by the ABP provides the structure to ensure that pediatricians remain cognizant of their need for continuing education.

Unfortunately, despite progress in many areas, pediatric educational programs continue to suffer from several important shortcomings:

- Many programs lack the resources to incorporate state-of-the-art medical education concepts and technologies.
- There have been few evaluations of the effectiveness of many innovations.
- There is no organizational structure charged with the responsibility to define the core competencies required of pediatricians at all educational levels.
- There is no coordinated process to ensure that curricula are designed and adopted to achieve these competencies, that faculty are trained to teach these competencies, and that program accreditation and certification are closely linked to acquisition of these competencies.
An Educational Framework for Pediatric Education: Proposal for a New Model

Medical education is properly viewed as a continuum, from medical school through residency, fellowship, and continuing education, with variations both in the content and the level at which that content is taught. Therefore, a coordinated and continuous oversight process needs to be established that will involve educators at all levels. The development of core competencies should logically derive from an assessment of the current health status and needs of children within the context of their families and communities. This process should take into account advances in the biomedical and psychosocial sciences and the structure of the medical system in which health care is provided. In turn, these competencies should inform and guide the development of curricula for pediatric medical students, residents, and fellows, and the continuing education of generalists and subspecialists in academics and community practice.

A proposed new educational framework is outlined in Fig 1 below. The model describes a competency-based educational system that is derived from the health care needs of the child, family, and community. In turn, those needs shape educational programs at the medical school, residency, fellowship, and CME levels. The structure of the health care system and advances in the biomedical and psychosocial sciences and technology will influence how those child health needs are translated into roles for pediatricians and providers.

The roles of child health care professionals at each level are defined by the set of core competencies required to address child health needs. These competencies should enable the professional to accomplish the specific tasks and functions required for that role. Because medical education is a complex,
multistep process, competencies for each level of education are needed (medical school, residency, fellowship, and continuing education). Level-specific competencies help to define the outcomes expected of the learner at each stage of learning. Competencies also serve as performance standards for programs, for a successful program is designed to foster the acquisition of competencies by its learners.

Educational programs should be designed to teach these competencies. Curricula should derive from them; goals and objectives should be congruent with them; clinical and nonclinical learning experiences should encourage their attainment; and faculty should be adequately trained and supported to teach those competencies. These competencies also should be used at the continuing education level to establish standards for the credentialing of pediatricians and nonpediatrician providers of care to children.

At the national level, model curricula and faculty development programs should be developed to assist local educational planning. At the local level, curricula should be adopted to meet the specific strengths and resources of the individual program and its learners.

Finally, there must be program and learner evaluation. These evaluations should assess the program's ability to implement curricula effectively and the ability of trainees to achieve the required core competencies. The results of the evaluation process are important in redefining educational standards and, in turn, influencing educational needs assessments. It can be expected that each of those elements will change over time, and therefore, the process will need to be an iterative and ongoing one, incorporating new information and refashioning educational programs, so that they will continue to reflect current child health needs, societal and scientific information, and advances in medical education techniques.

The lead organizations responsible for defining core competencies, developing curricula, and providing evaluation at each educational level are summarized in Fig 2. These organizations should initially work together to define roles for pediatricians, and then chair the process at their respective levels, with active involvement of regulatory bodies, learners affected by these curricula, and other health professionals who provide care to children.

**Review of the Current Status of Medical Student Education in Pediatrics**

At the beginning of this century, American medical education had made a transition from the apprentice model common in the early 19th century to a didactic model that involved little patient contact. After an extensive review of the outcomes of this method, Abraham Flexner proposed a model of medical education that combined and systematized the basic science and clinical education aspects of medical education. This model has changed little since the beginning of this century. The curriculum in the first 2 years of medical school usually consists of a mixture of basic and clinical sciences that are prerequisite to the study of clinical medicine, with lectures being the primary method of instruction. In the third and fourth years, lectures are replaced by supervised clinical clerkships in teaching hospital inpatient services and affiliated ambulatory clinics.

---

**Fig 2.** Responsible organizations at specific educational levels. *National Board of Medical Examiners.*
Ambulatory training is part of the clinical education program in all American medical schools. These preclinical ambulatory primary care experiences may include pediatric practices, although the curricular supervision of these experiences is not always controlled within the academic pediatric department.

Specific pediatric medical education is restricted to a 6 to 8 week rotation during the third and fourth years of medical school. Invariably, these clinical clerkships are under the academic supervision of the pediatric department. During these clerkships, clinical exposure is generally divided between inpatient and outpatient experiences, which are enhanced by specific didactic sessions. Subspecialty rotations in areas such as neonatology and adolescent medicine may be included as aspects of the experience. In keeping with trends in the other primary medical specialties, increasing amounts of time may be devoted to ambulatory experiences.

During the pediatric clerkship, students are expected to gain an appreciation for the processes of human growth and development and their influence on health and disease. Students should also gain an understanding of the uniqueness of the health problems of infants, children, adolescents and young adults. Additionally they should acquire experiences in the management of health problems throughout the pediatric age group.

In most medical schools, the content of the pediatric clerkships places special emphasis on the following pediatric skills and knowledge domains, which were suggested in the 1978 Report and developed by a joint project of the APA and COMSEP (see Table 3).105

Although these curricular elements fulfill several components of the medical education proposed above, there is currently no continuous process of update based on national and local evaluations. There is also no method to ensure that specific pediatric clerkship programs will use the curriculum or engage in a process of local evaluation and program modification. Unlike pediatric residency programs, the pediatric clerkship is not regulated by any national body that routinely evaluates and accredits curricula and educational programs.

<table>
<thead>
<tr>
<th>Skills</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical problem solving</td>
<td>Behavior</td>
</tr>
<tr>
<td>• Taking a detailed history from pediatric patients (infants, children, adolescents, and young adults) and members of their families.</td>
<td>Nutrition</td>
</tr>
<tr>
<td>Clinical diagnostic procedures</td>
<td>Issues unique to the adolescent</td>
</tr>
<tr>
<td>• Physical examination of infants, children, adolescents, and young adults.</td>
<td>Issues unique to the newborn</td>
</tr>
<tr>
<td>• Communication</td>
<td>Therapeutics</td>
</tr>
<tr>
<td>Health supervision</td>
<td>Poisoning/prevention and treatment</td>
</tr>
<tr>
<td>Growth and development</td>
<td>Child abuse</td>
</tr>
<tr>
<td>Prevention and treatment of illness and injury</td>
<td>Child advocacy</td>
</tr>
<tr>
<td>Medical genetics and congenital malformations</td>
<td></td>
</tr>
<tr>
<td>Common pediatric illnesses</td>
<td></td>
</tr>
<tr>
<td>Fluid and electrolyte management</td>
<td></td>
</tr>
<tr>
<td>Pediatric emergencies</td>
<td></td>
</tr>
<tr>
<td>Normal growth and development from conception to adulthood</td>
<td></td>
</tr>
</tbody>
</table>

Future Trends in Medical Student Education in Pediatrics

Several trends are forcing medical schools to review and revise their curricula. Today only the most severely ill children who require the highest levels of care tend to be admitted to hospitals, and those who are admitted rarely remain in the hospital through the whole course of their illness. This same phenomenon, which has been attributed to the effects of managed care, changing patterns of disease, and advances in medical technologies and therapeutics, has also been experienced in the other primary care specialties. As a result, medical students who are trained primarily in teaching hospitals learn a great deal about a limited range of the most complex pathologies. Undoubtedly they are also apt to be exposed to a broad array of complex procedures and medical technologies, which are more common in hospital settings.106 Medical schools are responding to these forces with revisions in the curricular content and enhancements of educational methods.107

Learning Objectives and Educational Goals

In 1932, the AAMC, through the report of the Rappeleye Commission–Final Report of the Commission on Medical Education, called for all medical schools to develop learning objectives for their curriculum.108 During the last 6 decades, several reports have supported this recommendation, and the Liaison Committee on Medical Education (LCME) has added an accreditation requirement that specifically obliges each medical school to “define its objectives and make them known to faculty and students.” However, a recent AAMC review of the status of medical school learning objectives and educational goals found that few medical schools had delineated a coherent and comprehensive set of learning objectives for the medical student education program.109

In response to the deficit, the AAMC developed the Medical School Objectives Project.108 This effort is intended to develop a national set of goals and objectives to guide individual medical schools in the development of objectives for their own programs. If adopted, these objectives will establish for the first time a set of national (and potentially local) competencies that comprise the expected outcomes of medical school education.
Lectures

Lectures continue to be the primary educational method used in the first 2 years of medical school. Increasingly, however, medical schools are decreasing lecture time and replacing it with small group discussions that connect the basic science lectures to clinical applications, which are often related to child health care. The participation of academic pediatric departments in the design of this curricular component is variable.

Computer-assisted Instructional Programs

Computers are being used increasingly to supplement the teaching of basic and clinical science topics. This method has become so popular that the AAMC has produced a catalog that lists and critiques the various software products available. One of the most exciting aspects of this technology is the ability to simulate clinical encounters with patients and to teach diagnostic skills and medical decision-making with a focus on treatment costs and outcomes.

Problem-based Learning

Problem-based education is a unique approach in which basic and clinical science topics are introduced within the context of patient problems. Students are divided into small groups led by a faculty preceptor. Discussions center around illustrative cases, which are supplemented by independent research, reading materials, and occasional lectures and demonstrations. Problem-based learning has proven to be an effective method of teaching skills, such as hypothesis development, deductive reasoning, and interpersonal skills and professional group communication skills. According to the AAMC, approximately 10% of medical schools currently use problem-based learning as an organizing principle for their medical education programs, and many others are using it to supplement and enhance traditional modes of instruction.

Clinical Education in Community-based Settings

Clinical training in community settings is an exciting addition to clinical medical education in primary care specialties such as pediatrics. Traditionally, hospital inpatient services have been the primary sites for the clinical education of medical students. Teaching at the bedside provided an excellent opportunity for clinical observation and discussion. In addition, students had ample time to learn diagnostic and therapeutic techniques under the supervision of residents and faculty.

Although the benefits of “bedside” medical education have not diminished, several trends have significantly limited its efficiency and effectiveness:

- Advances in medical therapeutics and technologies, as well as the patient management systems imposed by managed care organizations, have significantly narrowed the scope of medical conditions to which medical students are exposed in teaching hospitals.
- Patients who are admitted to teaching hospitals are there increasingly for the treatment of illnesses that require the highest acuity of care. Clinical clerks learn a great deal about the care of conditions that are important, and yet affect only a small portion of the total patient population.

- To save costs by further shortening the time patients spend in the hospital, much of the initial diagnostic work-up and posttreatment care of patients occurs in ambulatory, community, or home care settings. Inpatient care has, therefore, been narrowed down to include only the aspect of care that requires the most intensive intervention. Clinical clerks consequently have little time to get to know hospitalized patients, to study their medical conditions, and to follow the course of treatment and care.

Medical schools have responded to these trends with the increasing use of ambulatory and community-based clinical settings as a primary or secondary site for clinical education. In pediatrics this includes hospital-related primary care pediatric practices, physician offices, community health centers, school-based clinics, county health departments, and/or community agencies.

These settings have been found to provide several additional educational benefits. First, the patient population, care management issues, and the scope of illness are more representative of the nature of practice that the clinical clerk will encounter in the real world. Second, the student learns a method of patient care that is more responsive to the patient management requirements of managed care organizations. Third, the student learns more about the community and its interrelationship with health care. Finally, the student gains a greater appreciation for the principles of public health.

Although the use of community education settings is a promising medical educational trend that is likely to gain additional prominence in the future, it has produced several challenges to management supervision:

- Because proper teaching often requires the clinician to see fewer patients, thus sacrificing both time and revenue, the presence of medical students often impedes the efficiency and productivity of the practitioner who is working a full schedule.
- The students and the clinical setting may incur unanticipated and unreimbursed costs. These include items such as transportation and living costs for students, as well as the time commitment of and faculty development costs for the clinical preceptors.
- The academic department has to develop techniques that allow it to supervise and evaluate the quality and content of teaching experiences that are geographically dispersed and outside of the department’s direct control.

Current Status of Pediatric Graduate Medical Education

The 1978 Report emphasized the goal of residency education to train general pediatricians. This goal has been reemphasized in pediatric RRC requirements and in the APA’s Educational Guidelines for
Residency Training in General Pediatrics. According to the RRC program requirements, the goal of residency training in pediatrics is to provide educational experiences that prepare residents to be competent general pediatricians able to provide comprehensive, coordinated care to a broad range of pediatric patients. Residency education should lay the foundation for general pediatric practice and for subspecialty practice.

Although the main goal of residency education has not changed, the content, methodologies, and technologies in training have evolved over time. The RRC requirements were revised in 1996, became effective on February 1, 1997, and are scheduled for revision in 2002. Curricular content and clinical skills necessary for residency training are outlined in detail for general pediatrics and subspecialty pediatrics. Through a graduated 3-year experience, it is expected that residents will gain a broad exposure to the health care of children and substantial experience in the management of diverse pathologic conditions.

The FOPE II Project surveyed the 201 members of APPD to obtain input on the implementation of the 1997 RRC requirements in their respective pediatric residency programs. The questions addressed topics in 4 major categories: time requirements for training in clinical settings, acquisition of 12 new or recently revised competencies mandated by the pediatric RRC, practice settings, and career development. A number of additional open-ended questions were posed to encourage respondents to use their evaluations of current minimum requirements as a basis for recommending optimal requirements and competencies for pediatric residency training programs in the 21st century.

According to a majority of the respondents, the primary challenge for pediatricians in the next century will be to maintain the role of the pediatrician as the primary caregiver to the pediatric population. Indeed, extensive input on this issue identified serious concerns regarding the impact of managed care and other child health providers, such as PNP, PAs and family physicians, on health care delivery and workforce. Respondents communicated a shared conviction, however, that pediatricians are and will continue to be the most competent and appropriate providers of care to children.

Recently, the ACGME developed a series of general competencies, specifying that residency programs must ensure that their residents, by the time they graduate, are competent in the areas of patient care, clinical science, practice-based learning and improvement, interpersonal skills, professionalism, and systems-based practice. Specifically, residency programs must ensure that their residents:

- Provide appropriate, effective, and compassionate clinical care.
- Possess knowledge in established and evolving biomedical and clinical science domains and apply it to clinical care.
- Are able to investigate, evaluate, and improve their patient care practices.
- Can develop appropriate interpersonal relationships and communicate effectively with patients, their parents, families, and professional associates.
- Demonstrate fundamental qualities of professionalism.
- Are aware that health care is provided in the context of a larger system and can effectively call on system resources to support the care of patients.

The pediatric RRC is currently developing the specialty-specific competencies for pediatric residency programs.

Whereas the RRC evaluates programs, the ABP evaluates and certifies individuals. The ABP was established in 1933, and is one of the 24 certifying boards of the ABMS. The ABP awards certificates in pediatrics and in pediatric subspecialties. Program directors must certify that each applicant who has received training under his/her supervision is prepared for independent responsibility as a general pediatrician. In addition, program directors must evaluate their residents in the areas of interpersonal relationships with patients, families, and members of the health care team, work habits and personal qualities, and ethical and moral behavior. The ABP has developed core content statements that detail specific knowledge on which individuals will be tested.

The APA’s Educational Guidelines for Residency Training in General Pediatrics was completed in 1996, with the aim of helping programs improve the way they prepare all residents for the practice of general pediatrics. These guidelines outline educational goals and sample objectives for pediatric residency programs, and offer suggestions about how to use these goals and objectives in planning and conducting educational programs.

Since the 1978 Report, 2 important educational bodies have been formed, the APPD and the AAP-RS. The APPD was formed in 1986 for the purpose of advancing medical education by benefiting and aiding the medical education programs. The AAP-RS was organized in 1989 to provide an educational forum for the discussion of issues and problems relating to pediatric residency and fellowship training, to disseminate information about training issues, and to stimulate interest and involvement in child advocacy issues. The AAP-RS has representation on many pediatric organizations, including the APPD and other AAP committees, and has become a recognized and respected voice for pediatricians in training.

Future Trends in Pediatric Graduate Medical Education

Educational Needs Assessment and Continuous Improvement

The RRC requirements and the APA’s Educational Guidelines for Residency Training in General Pediatrics are the primary guides used by pediatric residency program directors for the development of residency curricula. New methodologies and technologies for residency education are constantly being developed and evaluated. As inevitable changes occur in childhood diseases, demographics, health care delivery, and technology, the competencies, curricula, meth-
odologies, and technologies of residency education must be reevaluated and revised. Educational needs assessment and continuous improvement must be an ongoing deliberative process organized by the pediatric community. The components of this process have been described earlier.

**Length of Residency and Tracking**

The RRC and the ABP currently require 33 months of pediatric residency training, usually completed in 3 years. With the advances in medical and psychosocial science and technology, some have suggested increasing the length of GME training for pediatricians. Those opposed to increasing the length of training raise concerns about financing such additional training time and possible decreases in numbers of medical students entering the field, since other primary care disciplines require 3 years of training. Currently, there is little evidence on which to suggest changing the length of pediatric training.

Some have advocated “tracking” residents during residency to 1 of the 5 practice roles that have evolved as a result of the changing needs and composition of child health care: primary care practitioner, primary care team leader, consultant, hospitalist, and subspecialist. The purpose would be to streamline pediatric education and potentially shorten the length of training. Those opposed to tracking argue that pediatricians have developed a distinct discipline and identity in the health care delivery system that may be threatened by tracking. In contrast, those in favor of tracking feel that residents need time to determine which track to take, as many residents currently combine roles and self-select programs that enhance their individual educational goals.

It is likely that the above roles will evolve over time and that new roles may emerge. The goal of residency training, therefore, should be to emphasize the knowledge, skills, and attitudes necessary for a firm foundation in general pediatrics for all possible roles. Because residency programs cannot possibly teach pediatricians all there is to know in each of these roles, it is important for them to emphasize that medical education is a continuing process and to teach skills that equip residents to continue their own education. Residency programs must ensure that all residents have designed and implemented an individualized professional education plan (CME) by the third year of residency training that incorporates anticipated needs for their future practice.

As roles have evolved, so too have career opportunities and choices. Residency programs should, therefore, develop a process to assess resident priorities, personal and professional goals, and strengths and weaknesses, and then counsel residents about the career choices available.

**Educational Sites**

Early in this century, the Flexner report emphasized that medical education is a process that should be centered in universities and hospitals. Today, however, fewer children are hospitalized and many are being seen in ambulatory and community settings, such as outpatient clinics, primary care practices, schools, and community health agencies. Nevertheless, residents still spend the majority of their time in inpatient settings, usually in a tertiary care hospital.

GME for most specialties remains a hospital-sponsored activity, and residents are most often hospital employees. The underlying assumption has been that work in the hospital is similar to or generalizable to practice, thus making the hospital setting the appropriate principal learning environment. Although this assumption may be reasonable for subspecialty training, it is less true for primary care. Because this assumption is probably least true for pediatrics, it creates a residency-practice training mismatch.112

The Guidelines for Pediatric Education in Community-Based Settings outlines the philosophy and goals of community-based education.113 Transferring the achievement of educational goals to ambulatory and community settings requires a shift in current curricula and objectives and the recruitment, selection, and development of ambulatory/community sites and faculty.

Consistent with the needs of children and families and the changes in the health care system, pediatric care increasingly will need to be provided in ambulatory and community settings. A 1997 AMA survey found that two thirds of pediatricians who have completed training and are involved in patient care are office-based primary care providers.85 It is appropriate, therefore, to ensure that the educational preparation of pediatricians includes a well-thought-out experience in ambulatory and community settings, where the majority of pediatricians will eventually work.

**Pediatric Subspecialty Education**

Pediatric subspecialty training occurs in academic centers, under the general supervision of department chairs, and the direct supervision of subspecialists in the same field. Some fellowship programs share curricula and resources with other subspecialties, especially in the area of research training. Because of the heterogeneous organization of subspecialties, pediatric training programs occur in departments of pediatrics, surgery, radiology, and psychiatry. The majority of subspecialists are board certified (by discipline-specific boards within the ABMS) or have a certificate of added qualifications, but some subspecialties do not yet offer subboards or certification.

Because the heterogeneity of fellowship training programs is likely to endure, pediatricians will not have direct influence over all of the fellowship programs training these physicians. Also, because fellowships will continue to exist without board certification, there will continue to be programs that are not involved with the formal RRC accreditation process, which ensure compliance with certain educational standards. There will also be no ABP certification process to measure the competency of the learner on completion of training.

Despite these organizational limitations, it is important to attain a certain level of competency for all pediatric subspecialty clinicians and researchers and to ensure that subspecialists involved in educational
processes are skilled educators, able to use modern technologies and methods, and cognizant of the needs of learners. Strategies to attain this goal will vary, depending on the nature of the subspecialty and fellowship program. The educational model proposed herein applies most directly to fellowship training under the auspices of departments of pediatrics, accredited by the RRC for pediatric subspecialties, whose graduates are subject to ABP certification processes. For other fellowships, pediatric educational oversight must be advisory, rather than directive.

Continuing Medical Education
Because the body of medical knowledge is expanding constantly, clinicians must accept the challenge of lifelong learning. Consequently, teaching mechanisms to achieve this goal of CME must be in place and readily available. Since the 1978 Report, the human learning process has become an intense area of research, and there has been a broadened understanding of how adults in general, and physicians in particular, learn. The intricate system for educating postresidency physicians that exists today has many strengths, but requires improvement and innovation to meet the challenges of pediatric care in the 21st century.

Teaching Options: General Principles
Traditional methods of providing CME include lectures, seminars, workshops, and similar didactic modalities, as well as medical journals and other written materials. These methods still represent the major components of CME. However, alternative systems have been devised, some relying on newer technology that go far beyond the classic lecture or seminar format.

In planning CME for the future, certain basic principles should be kept in mind:

- Learning styles differ, as do preferences for ways of learning. There must be versatility in the system to allow for those varying styles and preferences.
- Circumstances will shape an individual learner's educational program. A person living in a remote area who must travel a significant distance to reach a teaching center is in a very different situation from an individual living in a city that has several medical schools within an hour's drive.
- Some clinicians will receive generous financing of their education, while others will have to pay for CME themselves.
- The content of CME must respond to the specific and general needs of practitioners. Educators must use effective instruments for establishing the needs of those whom they seek to educate. Using these assessments, they can define the goals and structure of specific CME programs.
- CME must incorporate evaluation tools that are used to determine the effectiveness of the process. The outcomes of these evaluations should also be incorporated into revisions of CME content and methods.

Specific Methods
There currently are a wide variety of CME methods that will likely continue to be utilized in the future, including formal CME, printed materials, audiovisual modalities, patient-mediated interventions, forms that guide, consultation with colleagues, experiential learning, audit with feedback, reminders, and computer-enhanced learning. The relative emphasis each receives within the broad spectrum of CME, however, will change with the introduction and dissemination of new learning technologies.

Evaluation of Effectiveness
The effectiveness of CME teaching methods needs to be evaluated, using tools that critically analyze the outcomes achieved by the individual practitioner. Ideally, the CME experience should be evaluated on 4 levels: attendance at and perception of a course by attendees; changes in physician competence (knowledge, skills, attitudes) measured in a test environment; physician performance or behavior change, measured in a practice setting; and assessments of health care or patient outcomes.

Providers of CME currently require feedback from participants, which is used to enhance their teaching efforts. In most cases, this evaluation is at Level 1. Pretesting and posttesting, as well as subjective judgments about the quality and utility of the course, are the most common evaluation components.

Careful analysis of the many CME teaching modalities currently available has yielded information that should guide both teachers and learners. In general, many of the more recent teaching innovations appear to be significantly more effective than the traditional methods. Reminders, academic detailing, and patient-mediated strategies have shown particular promise. Also, combinations of modalities may provide more benefit than the individual components. For example, a clinical protocol, based on a national practice guideline, that is incorporated into the office routine is more effective in influencing physicians to follow the advice stressed in the guideline than is presentation of the original document in printed form.

Special note should be made of the potential for computer technology to enhance the power of CME. Huge amounts of information can be incorporated into interactive experiences, recreating the process of clinical decision-making and thereby making learning relevant to the practitioner's day-to-day professional life. The capability of the Internet expands this potential further, allowing sponsoring organizations to create programs in which a needs assessment is done for an individual. A customized educational package, filled with audio, video, and interactive features, can then be selected from a large library of teaching materials and dispensed electronically.

Preferences
Clinicians are in a good position to judge which methods appeal to them and which methods are best suited to their individual lifestyle and learning preferences. Recent surveys conducted by the FOPE II
Responsibility for Providing Continuing Medical Education

The Individual Clinician. One critical principle that has emerged from analysis of CME is that self-directed learning is more effective than that imposed by outside forces. One goal of the providers of CME should be to stimulate individuals to participate in the learning experience. If self-directed CME is made relevant and exciting and shown to be effective, the clinician will respond. If barriers of time, distance, and money are reduced, the response will be even greater.

National Professional Organizations. On a national level, professional organizations naturally assume responsibility for providing CME as a function of their overall mission. For pediatricians, the recertification process of the ABP and the educational programs with which that process is linked should be recognized as potential foundations of an individual’s personal educational plan. Not only must these organizations continue their critical role in providing CME, but they must also remain aware of the best ways to teach, and make necessary changes to enhance their programs.

The Academic Department of Pediatrics. The 1978 Report concluded that “pediatric departments must assume increasing responsibility for the continuing education of pediatricians in their geographic areas.” Although there is variability in the way this recommendation has been conducted, in a survey of pediatric department chairpersons that was conducted by AMSPDC for the FOPE II Project, all 94 respondents answered “yes” to the question, “Do you feel that part of the responsibility of your department is to educate pediatric clinicians who practice in your geographic area?” The extent of the perceived geographic area of responsibility varied from “our referral area” to regions encompassing 5 states. This group also made clear that “informal” education, such as telephone consultation between community and department physicians, is a significant component of their department’s contribution to pediatric education. The AAP and local or regional departments of pediatrics were chosen as their major providers of CME by the 1107 respondents to the AAP’s Periodic Survey No. 40.

Financing Continuing Medical Education

Most individual clinicians expect to pay for their ongoing, lifelong educational experiences, but the system cannot be financed solely by the contributions of the students. Just as the individual must view educational expenses as a necessary cost of doing business, so must all segments of the health care sector, including managed care organizations, recognize that the ongoing education of those who provide medical care is critical if quality is to be maintained.

There are a number of ways in which organizations can provide support for CME activities. In the following examples, an increasingly active role is played by the organization, building on a base of the most fundamental support, and moving into a proactive position:

- **Supporting the Individual.** Individual physicians are given a certain amount of paid time off each year to pursue CME activities.
- **Guiding the Individual.** An individualized needs assessment program is implemented to guide each pediatrician’s CME activities.
- **Assessing the Organization’s Needs.** An in-house program is established to monitor the collective needs of the organization’s pediatricians and, then, educational programs are established to meet identified needs.
- **Linking CME Support to Quality Improvement.** The organization sponsors a session in which pediatricians share their experiences from different educational programs on a given clinical issue and, subsequently, conducts an analysis of medical records to determine if there have been any changes in practice patterns.
- **Working with Medical Educators.** The head of the pediatric unit at a health care group consults with faculty members from the department of pediatrics at the local medical center. Formal studies are planned that will facilitate assessment of educational needs and measure outcomes. The health care group pledges a contribution to support the study, considering this expenditure to be an investment in quality improvement and physician satisfaction.

Educating the Practitioner to Be a Teacher

The need for practitioners to be teachers of other clinicians will be a major aspect of practice in the 21st century. This trend brings both exciting opportunities and significant challenges, including the following:

- Ensuring that practitioners are competent teachers.
- Incorporating teaching into practice without interrupting the flow of patient care.
- Compensating practitioners for this extra effort, in terms of both loss of time and loss of income.
It will be imperative in the future for departments of pediatrics to work closely with practitioners in fashioning partnerships that will foster good teaching in the ambulatory setting. The implications of such alliances go far beyond teaching, for they can create an atmosphere that will enhance the level of care in the entire community and open the door to other opportunities, such as clinical research and community advocacy.

An Overview of Continuing Medical Education: Strengths and Problems

Strengths
At the present time, CME is provided by a large number of local and national organizations in literally thousands of locations. Issues of quality, although far from being resolved, are addressed by existing agencies that require adherence to carefully constructed standards for programs that grant CME credits. A wide variety of formats exist, ranging from home-study programs to courses that combine learning with recreation, and from paper and pencil exercises to interactive electronic programs. Efforts continue to make CME more effective and to link teaching methodology to clinical outcomes.

Problems
What is lacking in the current system is oversight and coordination of the myriad CME initiatives and methods. The present situation presents too many options, while not adequately addressing each individual pediatrician’s most important needs. From a wider perspective, duplication of efforts in one sector undoubtedly coexists with inadequate coverage in another.

Another specific problem is the lack of widely accepted needs-assessment instruments. Because the evaluation of an individual’s learning needs is a critical first step in devising an appropriate educational plan, it will be important to devote increased attention to research into and development of standardized tools that can gauge those needs.

A Proposal for Improving Continuing Medical Education in the 21st Century

Principles
It is proposed that a new way of looking at the overall CME system, predicated on the following principles, be considered:

• Medical learning should be considered a lifelong pursuit, with the primary initiative coming from the individual clinician.
• Most individuals will profit from guidance in devising an effective educational program and selecting from the large number of CME opportunities available locally and nationally.
• The self-directed component so necessary for CME should begin during the third year of residency such that the individual would receive guidance and support for CME similar to other aspects of pediatrics.
• In attempting to bring coordination and order to CME efforts, it would be wasteful to create a new bureaucracy. What is needed is a system that uses existing structures and involves organizations that have a history of expertise and efficiency and command the respect of teachers and clinicians.

The “CME Home” Concept and Models
Just as the needs of children are met best when they have an established medical home that can treat them as individuals and provide coordinated, continuous care, so will the educational needs of individual practitioners be met best when they have an established “CME home.” The “CME home” should provide assessment of the educational needs of the individual; provide information on and facilitate access to local and national CME resources; and provide guidance in constructing a professional educational plan unique to each individual pediatrician.

Recognizing that there may be many ways to accomplish this goal, and acknowledging the diverse situations in which pediatricians across the country function, the following 4 models for the “CME home” provide practical examples of how this concept might be implemented:

• Model 1. “CME home” based in a regional department of pediatrics in partnership with AAP chapters. In this model, each pediatric clinician would establish a liaison with an accredited university or community-based academic department of pediatrics to establish a “CME home.” Once the relationship is established, the department would help the clinician determine his or her educational needs and develop an educational plan. One approach would be to designate a faculty member who would serve as partner to a particular clinician. Another option would be to have group sessions (using teleconferencing or computer technology, as appropriate), in which clinicians would be taught principles of needs assessment and made aware of local and national resources. Model 1 has the potential for benefits that the others do not. The symbiotic relationship between the department of pediatrics and community clinicians can lead to improvements not only in education, but also in research, community service, and patient care on all levels.

• Model 2: “CME home” based in a department of pediatrics without regard to location. Just as medical centers are embracing the concept of becoming “centers of excellence” in specific fields, so may individual departments choose to concentrate their efforts in well-defined areas. This model is similar to model 1, but is designed to work at a distance and does not involve the depth of partnership found in a relationship with a regional department of pediatrics. Under this model, the clinician would not have to visit the department physically; mail, telephone, and electronic communications could accomplish the goals.

• Model 3: The national professional organization as “CME home.” Under this model, the AAP or another national organization (eg, the APA) would serve as the “CME home,” using publications, the Internet, CME courses in a variety of formats, and self-assessment curricula to reach pediatricians all over the country.
• Model 4: The commercial educational facility as “CME home.” There are many current examples of good teaching in a variety of formats provided by commercial enterprises, who hire medical experts to produce the content, but supply their own production, business, and marketing support. The publication of medical textbooks is the most obvious example, but the list of resources is long. A commercial company could assume the role of “CME home” to clinicians just as a national professional organization might.

Implementing the “CME Home” Concept

Recognizing that the concept of a specific “CME home” for each individual is a new idea that is still in its formative stages, it is suggested that these models be created in a test situation. A study in which the functioning of the CME Home in its different manifestations could be evaluated, adjusted, and reevaluated over a specific period of time, such as 5 years, would lead ultimately to a real-world understanding of the concept and an assessment of its effectiveness.

Just as it is important to avoid creating a new bureaucracy when planning an educational initiative, it is critical to avoid schemes that will incur significant costs. From the practitioner’s vantage point, CME is a necessary expense that is already part of the professional budget, so it is appropriate for practitioners to pay for the kind of guidance that would be provided by a “CME home”. At the same time, the cost to the practitioner must be reasonable and congruent with costs at the current level, or the scheme will fail.

The concept of a medical education home fits well into the medical education model. After the practitioner has established a “CME home,” the first task is to assess the needs of that individual. Through dialogue and using needs assessment instruments, the clinician defines the core competencies he or she needs to practice in his or her unique situation. The practitioner’s needs are matched with curricula available nationally and locally. As the educational process evolves, adjustment of the curriculum is accomplished. At the same time, feedback from the clinician-student allows refinement of CME efforts, especially on a local level.

Looking at CME from the perspective of the educational system, the roles of the FOPO for oversight and the AAP’s Committee on Pediatric Education (COPE) for operations can parallel their functioning at the levels of medical school and GME. In addition, CME students can benefit from the extensive work of the ABP in writing thousands of core content specifications, on which the Board bases its recertifying examinations.

Because CME is designed in many venues, the establishment of educational standards, the development of faculty, and the creation of curricula should be accomplished on local, regional, and national levels. In aiding these efforts, important roles should be played by the Accreditation Council for Continuing Medical Education (ACCME), the AMSPDC, and the AAP. Ongoing evaluation of the individual should continue to be available through the recertification of the ABP, which requires reexamination every 7 years, and through those curricula that contain self-assessment components. Evaluation of educational programs themselves is currently required at every level; but as stated above, often occurs only superficially. The intensity of program evaluation should be increased, with national oversight organizations playing an active role in encouraging such change.

The Pediatric Education of Nonpediatrician Child Health Care Professionals

In addition to pediatricians, there are numerous physician specialists and nonphysician health care child health care providers who are involved in child health care. Many of the traditional professional groups representing these health care providers have expressed an interest in collaborating with pediatricians in educational endeavors for their own trainees, and some have done so in the past. However, for the most part (PAs being an exception), pediatricians do not have the authority to define standards for the care of children on these groups. Although pediatricians feel particularly knowledgeable and qualified to define educational standards for those who will care for children, it is important to recognize that a collaborative approach will be much more likely to succeed, both in influencing the educational standards of others and in obtaining their input into the education of present and future pediatricians.

A collaborative approach is also more likely to achieve the goal of establishing competency standards that will be recognized by certifying, credentialing, and practicing organizations (eg, hospitals and managed care practices), so that patients and the profession can be assured that those who provide health care services to children are qualified to do so. It would be beneficial, therefore, for pediatricians to forge stronger ties with organizations representing other child health care professionals and to recommend strategies by which they may be involved, rather than specifying the content of what is to be learned.

Conclusion

Several trends are forcing medical schools to review and revise their curricula. For example, today only the most severely ill children who require the highest levels of care tend to be admitted to hospitals, and those who are admitted rarely remain in the hospital through the whole course of their illness. As a result, medical students who are trained primarily in teaching hospitals learn a great deal about a limited range of the most complex pathologies. The trend toward ambulatory, rather than inpatient care, as well as other trends such as an increase in managed care, are similarly affecting residents, fellows, and practicing pediatricians. Medical schools, residency and fellowship programs, and continuing education providers need to respond to these forces with revisions in the curricular content and with enhancement of educational methods.

Medical education is properly viewed as a continuum, beginning in medical school, progressing through residency and, in some cases, fellowship,
and then proceeding into continuing education, with variations both in the content and the level at which that content is taught. Therefore, a coordinated and continuous oversight process should be established that will involve educators at all levels. The development of core competencies should flow logically, based on an assessment of the current health status and needs of children, within the context of their families and communities. These competencies, in turn, should guide the development of curricula for medical students, pediatric residents, and fellows, and the continuing education of all pediatricians in academics and community practice.

Setting the agenda for pediatric education is currently the responsibility of a number of organizations. Fragmentation of the oversight process is an obstacle to achieving the consensus and/or compromise required to fashion a coordinated, comprehensive educational program that can respond to future challenges. Pediatrics is likely to be persuasive on behalf of children’s health care needs only if positions are well-thought out, supported by data, and cogently presented. Achievement of consensus within the pediatric community may only be possible with the creation of a Pediatric Education Commission or the reorganization of existing pediatric groups to address identified needs. If a Pediatric Education Commission were created, its responsibilities could include:

- Recommending public policy vis-à-vis pediatric education and its funding.
- Monitoring workforce needs and making information widely available.
- Formulating requirements for student and resident education, with the objective of ensuring comprehensive training, while allowing curricular flexibility on the local level.

Consensus regarding necessary skills and competencies pediatricians need and core curricular elements for pediatric education must be reached. However, fragmentation of the oversight process for pediatric education at all levels is an obstacle to achieving the consensus required to fashion a coordinated, comprehensive educational program that can respond to future challenges. These initiatives might best be supported with the creation of a Pediatric Education Commission or the reorganization of existing pediatric groups to address identified needs.

To be successful, such a Commission or reorganization would have to represent all major organizations with a stake in pediatric education. It would also require structuring Commission leadership in a way that would foster continuity of purpose.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The Future of Pediatric Education II Task Force was formed to examine the process of pediatric education in the 21st century, particularly in terms of changes in the health care system, workforce requirements, funding for GME, and instructional methods. In examining the changes that are taking place in health care, the Task Force identified and analyzed a number of issues and trends that will impact significantly on the future of pediatric education, including the changing demographics of both patients and pediatricians, the continued shift from inpatient settings to ambulatory settings for increasingly complex conditions, the growth of managed care, continued cost pressures caused by declining reimbursement levels, and declining interest in pediatric subspecialization.

The education of the pediatrician is specifically designed to provide comprehensive training for the health care of infants, children, adolescents, and young adults, as well as the cognitive tools to adapt to the future medical needs of these patients. Pediatrics has the responsibility to take a leadership role in defining optimal health care maintenance and the management of the acutely and chronically ill child. To the extent that nonpediatrician child health professionals receive components of this training, it is appropriate that they complement, supplement or, when necessary, assume major responsibility for the delivery of pediatric care.

Education is a critical factor in this complex, evolving environment. The enlightened pediatrician will need to apply political pressure to demonstrate and to articulate the overall value of pediatric care, to lobby for and gain legislative recognition of the value of enhanced care, and to encourage public officials continuously to support the needs and best care of children.

The Task Force is committed to the necessity of lifelong learning to achieve optimal practices by pediatricians. The pediatric residency can provide a focused environment for learning, particularly in terms of knowledge base, technical skills, and graded levels of responsibility. However, the first few years of practice following a residency or subspecialty fellowship are critical in terms of understanding family dynamics, the progress of chronic disease, the growth and development of the child, and the development of experience in allaying parental fears and comprehending the dynamics of childhood.

One of the most beneficial aspects of joining a pediatric practice, an HMO, or a faculty is the mentoring that occurs in a “real” practice situation. In the future, experienced clinicians will be asked to take on greater responsibility for teaching patient care skills, as well as sharing their expertise on the business skills necessary for a successful practice. The concept of mentoring will take on increased importance in terms of both faculty development and the education of the young, postresidency pediatrician.

The demographics of the United States are in flux. By the year 2020 nearly half of all Americans will be of Latino, African American, Asian American or Native American heritage. Entry into the health professions, in general, and into pediatrics, specifically, is not keeping pace with the changes in the demographics of the United States. Therefore, it is imperative that pediatricians individually and as a profession encourage minority candidates to prepare
themselves for medical school and to be fully aware of the importance of pediatrics and its subspecialties.

The FOPE II Project has responded to the dramatic evolution of health care delivery in the last 2 decades by reasserting its enduring commitment to providing infants, children, adolescents, and young adults with optimal health care in the next millennium. The Project’s commitment has resulted in a dynamic educational plan for lifelong learning that addresses the future roles and education of pediatricians and other child health professionals. This plan defines a mechanism for competency acquisition through educational needs assessment, curriculum development, and outcomes evaluation.

The Project’s Task Force has discovered exciting opportunities for change. Overall, the course of pediatric education has been effective and productive, and yet could benefit from some proactive and futuristic modifications. Lifelong learning must therefore be pursued by making judicious improvements to the present educational system and building on its many successes.

Recommendations

The principles, concepts, and recommendations below, some of which originated in the 1978 Report of the Task Force on the Future of Pediatric Education, are intended to enhance current pediatric educational processes to prepare pediatricians of the future better for the new challenges they will encounter. Most importantly, however, it is hoped that implementation of these recommendations will ultimately benefit patients, whom the pediatric profession is entrusted to serve and protect. Sample implementation strategies for 2 of these recommendations have been provided in Appendix B.

FOPE II: Recommendations

In addition to the recommendations from the 1978 Report, which are being reaffirmed, the FOPE II Task Force offers the following new recommendations. The FOPE II Task Force believes that all of the 34 recommendations are important and deserve both immediate and ongoing consideration, and has decided, therefore, that they should not be prioritized.

- Pediatric medical education at all levels must be based on the health needs of children in the context of the family and community.
- Pediatricians have the most advanced education and training to provide the best care for infants, children, adolescents, and young adults. Whenever possible, they should provide this care directly. However, in many cases, other child health professionals are responsible for providing care to the pediatric population. Therefore, pediatricians should establish the standards for the medical care of children. Nonpediatrician providers must likewise be educated and trained according to these standards. Furthermore, access to pediatricians as consultants should be ensured via direct or distant mechanisms such as telemedicine.
- All children should receive primary care services through a consistent “medical home.” A “medical home” is not a building, house, or hospital, but rather an approach to providing continuous and comprehensive primary pediatric care from infancy through young adulthood, with availability 24 hours a day, 7 days a week, from a pediatrician or a physician whom families trust.
- Pediatrics should take steps to enhance the scientific foundation of pediatric medical education and ensure that its programs (curriculum, teaching, and evaluation methods) are based on this science. Research centers for pediatric medical education should be established to develop and disseminate innovations in medical education, to collaborate with educators in other fields, and to enhance generally the profession’s scientific knowledge about medical education. Faculty leadership in medical education should be encouraged.
- The goal of residency education should be to emphasize the knowledge, skills, experience, and attitudes necessary for a pediatrician in varied roles. Residents should be educated with a core curriculum so that pediatricians have a common foundation that defines the field. Pediatric residency education should remain 3 years in duration. Residency education needs enough flexibility to accommodate a broad range of initial competencies and individual career goals. There should be a future reassessment of the length of training after the development of core competencies and the evaluation of educational outcomes. Residency programs must ensure that all residents have designed and implemented an individualized professional education plan (CME) by the third year of residency training that incorporates anticipated needs for their future practice.
- Pediatrics should assume the leadership in establishing a process by which core competencies for educating pediatricians at all levels are continuously developed, revised, and evaluated. Program requirements, curricula, and evaluation systems, for both programs and learners, should be based on these competencies.
- Determining needed adjustments to the current Residency Review Committee (RRC) requirements must be the focus of all pediatric organizations on an ongoing basis. The duration and depth of training will continue to ensure that pediatricians are sufficiently differentiated from other child health professionals who care for children. Residents should be educated with a core curriculum so that pediatricians have a common foundation that defines the field and are prepared to address a broad spectrum of child health needs in a wide variety of practice settings.
- Pediatric program directors should work with pediatric department chairs to ensure that career counseling and mentorship assume more prominence in training programs.
- Because a pediatric workforce of the highest quality is essential, those residency programs whose graduates do not pass board certification examinations must be monitored carefully. Moreover, those programs where a significant percentage of
The education of the pediatric subspecialist and academic generalist should provide a full range of clinical, teaching, and research experience. In many cases, this will require an extended period of research training and protected research time either before or after the individual attains faculty status.

The Task Force embraces combined residency programs (eg, Med/Peds and psychiatry/child neurology) as a method of enhancing child health care opportunities.

Education of subspecialists should be based in high resource centers of educational excellence, with core scientific teaching and adequate patient volume for fellows to develop a full range of cognitive and technical proficiencies. The educational process should be sufficiently broad-based to support lifelong learning and necessary career transitions and to ensure that subspecialty residents become competent educators.

Every pediatric practitioner should have a “CME home” that will provide assessment of that individual’s learning needs, access to local and national CME resources, and guidance in constructing a professional educational plan. A research project should be undertaken to set up pilot programs of the different models and to assess the efficacy and efficiency of each.

CME programs will need to ensure that pediatricians learn management of pediatric problems within the context of evidence-based medicine and have rapid access to important new developments. The American Academy of Pediatrics (AAP) will need to continue to take the lead in ensuring quality CME programs for both pediatricians and subspecialists and experimenting with new educational strategies.

Validated methodologies for determining costs of education at all levels should be used to estimate accurately the costs of medical student, residency, fellowship, and continuing medical education.

A multipayer system should be created to fund the entire spectrum of medical education. Educational dollars should flow into a national medical trust fund administered by a nonpartisan mechanism.

Medical student education should be centrally (not departmentally) supported at a level that will ensure innovative, comprehensive exposure for all students to the principles of child health care.

Core pediatric residency education, including dual specialty (eg, pediatric neurology) training, should be supported fully for all required years by a multipayer mechanism.

Pediatric residents and fellows at freestanding children's hospitals should receive the same level of federal support as those trained elsewhere.

Federal formulas for GME reimbursement should be applied equally to pediatric core and subspecialty residents. Given the shortage of pediatrician-scientists, the National Institutes of Health (NIH) and other federal agencies, as well as foundations, should develop additional mechanisms to support research fellowship training in pediatrics.

Unless funding of medical education can be separated from patient care revenues, Health Care Financing Administration (HCFA) regulations need to be modified either to allow subspecialty residents to bill for medical care or to allow teaching physicians to bill for care given by subspecialty residents.

Research training in academic fellowships should be funded by the NIH and other federal agencies through their established training grant mechanisms. More research training dollars must be appropriated to meet these demands.

Based on US Census Bureau population data middle (probable) projections, the United States will need 55 800 physicians (not full-time equivalents [FTEs]) in primary care pediatric practice by the year 2010.

To fill the needs of the pediatric workforce, about 3000 pediatric residents should start pediatric training each year. This will require stabilization in the number of pediatric residents in the pipeline at the current level.

As a nation, the United States needs to continue to develop effective mechanisms to increase the pediatrician-to-child population ratio in underserved areas.

The number of pediatrician-scientists is critically low and remedies to increase their number must be implemented as rapidly as possible. Incentives to maintain an appropriate number of pediatrician-scientists should be considered (including federally sponsored loan forgiveness), to ensure that infants, children, adolescents, and young adults of 2010 have access to the knowledge developed by pediatrician-scientists.

Extensive and effective efforts need to be made to increase the percentage of underrepresented minority pediatricians in practice and academic medicine.

There has been a rapid increase in the number of women in pediatrics over the last 2 decades; however, strategies that meet the needs of women pediatricians (eg, mentoring, role modeling, flexible scheduling) are needed to promote the success of women in fellowship training and academia.

Both practices and academic settings should consider coordinated schedules, fair leave policies, quality day care at or near the workplace, and flexibility in academic promotion, advancement and in achieving partnership. Both men and women need multiple points of entry to these settings (including opportunities to reenter the academic track) to maintain an adequate supply of clinicians, researchers, and educators.

Because of its focus on optimal development of children, pediatrics should lead the field of medicine in addressing role conflicts between professional and family responsibilities.

Systems of care must be structured to facilitate rapid, ongoing communication and integration of care between general pediatricians with special interests and pediatric subspecialists. No one individual pediatrician can be expert enough to be

graduates performed poorly on the certification examinations should be closed.
up-to-date on the management of all conditions across the spectrum of subspecialties. Pediatricians have often developed special interests in the management of certain conditions, and this is appropriate.

- Health care delivery systems need to adopt empirically based, data-driven guidelines and quality of care measures developed by respected child health-related organizations. The same performance and outcome standards should apply to all child health professionals within their respective scopes of practice. All providers of children will need to acknowledge and adhere to these guidelines and measures.
- Pediatricians should collaborate with families and other child health professionals to identify and address challenges and barriers to the health and well-being of infants, children, adolescents, and young adults in the communities they serve.
- The FOPE II Task Force recommends that the oversight for implementation of the recommendations in this report be vested in the Federation of Pediatric Organizations (FOPO). The Task Force further suggests that FOPO hire an Executive Director and appropriate staff to coordinate implementation. Additionally, FOPO should consider delegating recommendations from this report to various, appropriate organizations within the pediatric community for implementation and monitoring.

The FOPE II Task Force affirms the following principles, concepts, and recommendations from the 1978 Report.

**FOPE I: Fundamental Educational Principles**

- The pediatric community affirms the importance of education in both ambulatory settings and inpatient services.
- The purpose of undergraduate pediatric education is to help students learn to react with empathy and sound medical judgment in clinical situations involving infants, children, adolescents, and young adults. The student must learn how to do a history and physical examination on pediatric patients. The medical student must understand normal growth and development, the influence of the environment on health, and the principles of health maintenance.
- In the future, pediatricians will continue to manage both acute and chronic health problems of children and adolescents. They will use consultants when appropriate. They will provide or arrange health maintenance services for children and their families. They will educate and counsel families regarding the stages of normal development and identify early those health problems and risk factors, that may adversely affect development.
- Pediatricians will be called on increasingly to manage children with emotional disturbances, learning disabilities, chronic illnesses, and other problems of a developmental, psychological, and social nature. They will provide increased amounts of health care to adolescents. They will be expected to manage their practices efficiently, collaborate with other members of the health care team, and use community resources to enhance the effectiveness of services to children and their families.
- The fundamental components of the pediatric residency remain: inpatient services, ambulatory training, care of the normal newborn, neonatal intensive care, subspecialty rotations, elective experiences, developmental and behavioral pediatrics, adolescent medicine, clinical pharmacology, community pediatrics and training in chronic illness, health maintenance, and medical ethics. These need to continue to be part of the RRC requirements for a pediatric residency.
- Although the incidence of some health problems has declined, others are appearing with increased frequency. There has been a dramatic increase in the recognition of child health problems associated with poverty, a deteriorating physical environment, changing family structures, and other social and psychological factors. There is growing evidence that encouragement of health promotion and changes in lifestyles may become more important than medical intervention in affecting morbidity and mortality.
- The general needs of children remain that they need to be valued, to be born healthy, to undergo optimal growth and development, to be raised in a nurturing environment, to learn the skills necessary for success, and to receive health assessment maintenance and anticipatory guidance.
- Children with serious health risks continue to be those from low-income families, children with handicaps, emotionally disturbed and depressed children, foster children, children of high-risk mothers, children in single-parent families, children of racial minorities, and children of unregistered aliens.

**FOPE I: Concepts**

- Pediatric patients must have access to medical and dental treatment.
- Pediatric patients must also share in the advances made possible by biomedical and biopsychosocial research.

**FOPE I: Recommendations**

- Biopsychosocial and developmental problems, such as early family adjustment difficulties and school failure, adversely affect the health of many children and adolescents. These problems are serious and very widespread. All pediatricians should have the skills to cope with them.
- The health needs of adolescents are being inadequately met. Pediatricians should take the responsibility for improving health care and research for this segment of the population.
- The care provided to children with chronic handicapping conditions continues to be problematic. Although pediatricians are uniquely qualified to
provide this care, too many residency programs underemphasize this aspect of pediatrics. *Reimbursement for this complex care must be available.* (Words in italics were added by FOPE II.)

- **Pediatric practice is essentially office-based primary care,** while pediatric education often centers around inpatient tertiary care experiences. There needs to be continuous emphasis given to excellent ambulatory care experiences during the pediatric residency.

- **In the future, pediatrics will increasingly be practiced in groups,** which emphasize the health team concept. Therefore, pediatricians should be prepared to serve as members, as leaders, and as consultants in such health teams. Contact with nurses, nonpediatrician child health personnel, and other potential team members should be included in pediatric residency programs.

- **All medical students should have a clinical experience of approximately equal length in pediatrics and internal medicine.**

- **Residency in pediatrics should be 36 months.** Learning time should be apportioned on the criterion of the need for competence in both the biomedical and biopsychosocial aspects of pediatrics. The health needs of children and adolescents should be explicitly considered in planning the educational program. There should be increased emphasis on the biosocial aspects of pediatrics and adolescent health.

- **Residency training programs should be flexible and provide for increasing levels of supervisory responsibility as the resident’s medical judgment matures.** Education should take place in a variety of environments, including ambulatory, community, and inpatient settings.

- **Pediatricians must accept responsibility for developing a plan of personal continuing education.** However, department chairs and program directors must recognize the responsibility of the teaching institution to provide continuing education opportunities suited to each pediatrician’s needs.

**APPENDIX A**

**FUTURE OF PEDIATRIC EDUCATION II (FOPE II) PROJECT MEMBERS**

Jimmy L. Simon, MD  
Chairperson, FOPE II Task Force  
Wake Forest University School of Medicine  
Winston-Salem, North Carolina

Russell W. Chesney, MD  
Vice Chairperson, FOPE II Task Force  
University of Tennessee, Memphis

Herbert Abelson, MD  
Member, Pediatric Generalists of the Future Workgroup  
Pritzker School of Medicine  
University of Chicago

Robert Adler, MD  
Member, Financing of GME Workgroup  
Children’s Hospital of Los Angeles, California

Richard Behrman, MD  
Member, FOPE II Task Force  
The David and Lucile Packard Foundation  
Palo Alto, California

Thomas Boat, MD  
Member, FOPE II Task Force  
Chairperson, Financing of GME Workgroup  
Children’s Hospital Medical Center  
Cincinnati, Ohio

Evan Charney, MD  
Member, FOPE II Task Force  
Chairperson Education of the Pediatrician Workgroup  
University of Massachusetts Medical School  
Worcester, Massachusetts

THomas DeWitt, MD  
Member, Pediatric Workforce Workgroup  
Children’s Hospital Medical Center  
Cincinnati, Ohio

Ralph D. Feigin, MD  
Member, FOPE II Task Force  
Vice Chairperson, Pediatric Workforce Workgroup  
Johns Hopkins University School of Medicine  
Baltimore, Maryland

Lewis R. First, MD  
Member, Pediatric Workforce Workgroup  
University of Vermont, College of Medicine  
Burlington, Vermont

Harlan R. Gephart, MD  
Member, Financing of GME Workgroup  
Group Health Permanente  
Seattle, Washington

Alan Gruskin, MD  
Member, FOPE II Task Force  
Vice Chairperson, Pediatric Subspecialists of the Future Workgroup  
Children’s Hospital of Michigan  
Detroit, Michigan

Renee R. Jenkins, MD  
Member, Pediatric Generalists of the Future Workgroup  
Howard University College of Medicine  
Washington, DC

Robert L. Johnson, MD  
Member, FOPE II Task Force  
Vice Chairperson, Education of the Pediatrician Workgroup  
New Jersey Medical School  
Newark, New Jersey

Carden Johnston, MD  
Member, FOPE II Task Force  
Children’s Hospital  
Birmingham, Alabama

Mary Ruth Back  
Health Policy Analyst  
American Academy of Pediatrics  
Elk Grove Village, Illinois

Holly J. Mulvey, MA  
FOPE II Project Director  
American Academy of Pediatrics  
Elk Grove Village, Illinois

Catherine DeAngelis, MD  
Member, FOPE II Task Force  
Vice Chairperson, Pediatric Workforce Workgroup  
Johns Hopkins University School of Medicine  
Baltimore, Maryland

Thomas DeWitt, MD  
Member, Pediatric Workforce Workgroup  
Children’s Hospital Medical Center  
Cincinnati, Ohio

Ralph D. Feigin, MD  
Member, FOPE II Task Force  
Vice Chairperson, Pediatric Workforce Workgroup  
Johns Hopkins University School of Medicine  
Baltimore, Maryland

Harlan R. Gephart, MD  
Member, Financing of GME Workgroup  
Group Health Permanente  
Seattle, Washington

Alan Gruskin, MD  
Member, FOPE II Task Force  
Vice Chairperson, Pediatric Subspecialists of the Future Workgroup  
Children’s Hospital of Michigan  
Detroit, Michigan

Renee R. Jenkins, MD  
Member, Pediatric Generalists of the Future Workgroup  
Howard University College of Medicine  
Washington, DC

Robert L. Johnson, MD  
Member, FOPE II Task Force  
Vice Chairperson, Education of the Pediatrician Workgroup  
New Jersey Medical School  
Newark, New Jersey

Carden Johnston, MD  
Member, FOPE II Task Force  
Children’s Hospital  
Birmingham, Alabama
methodology for accomplishing each of the recommendations, the
beyond the scope of its activities. Rather than dictate a specific
implementation strategies for each of these recommendations was
itized. The Task Force fully recognized that providing specific

tions, including the AMSPDC and the APPD. It is critical that the
of Education in close cooperation with other pediatric organiza-
assess the efficacy and efficiency of each.
undertaken to set up pilot programs of the different models and to
a professional educational plan. A research project should be
will provide assessment of that individual's learning needs, access
ic modules when awarding grants for curriculum and faculty devel-
care, managed care).
priority areas for curriculum development and faculty training
emities, educational standards, and model curricula to educate
oped for curriculum development and faculty training (eg, competencies that are new or difficult to teach, such as advoca-
care, managed care).
Private and federal funding sources should support these pri-
ities when awarding grants for curriculum and faculty devel-
ment. Educational programs at the local level must use core com-
encies, educational standards, and model curricula to educate
residents. National and regional train-the-trainer programs and
on-site consultation should be encouraged to help programs im-
plement and evaluate curricula.
Evaluation tools should measure the competencies developed.
Evaluation of graduate medical education training must include
program evaluation by the program itself, periodic survey of resi-
dents, RRC accreditation, and learner evaluation by individual
feedback and resident certification.

FOPE II Task Force Recommendation:
Pediatrics should assume the leadership in establishing a pro-
cess by which core competencies for educating pediatricians at all
levels are continuously developed, revised, and evaluated. Pro-
gram requirements, curricula, and evaluation systems, for both
programs and learners, should be based on these competencies.

Possible Implementation Strategy
Core competencies should form the foundation of educational
standards. Definition of competencies should be completed for
incorporation into new RRC program guidelines slated for 2002.
Model curricula and faculty development must be developed
based on core competencies and program requirements. The
APPD, AMSPDC, and other organizations should work together
to assess the needs of current training programs and identify
priority areas for curriculum development and faculty training
(eg, competencies that are new or difficult to teach, such as advoca-
care, community health, the multicultural dimensions of health
care, managed care).

Private and federal funding sources should support these pri-
encies when awarding grants for curriculum and faculty devel-
ment. Educational programs at the local level must use core com-
encies, educational standards, and model curricula to educate
residents. National and regional train-the-trainer programs and
on-site consultation should be encouraged to help programs im-
plement and evaluate curricula.
Evaluation tools should measure the competencies developed.
Evaluation of graduate medical education training must include
program evaluation by the program itself, periodic survey of resi-
dents, RRC accreditation, and learner evaluation by individual
feedback and resident certification.

FOPE II Task Force Recommendation:
Every pediatric practitioner should have a “CME home” that
will provide assessment of that individual’s learning needs, access
to local and national CME resources, and guidance in constructing
a professional educational plan. A research project should be
undertaken to set up pilot programs of the different models and to
assess the efficacy and efficiency of each.

Possible Implementation Strategy
A pilot project of 3 to 5 years should be initiated to test the
feasibility of the “CME home” concept and to refine its method-
ology. This project should be organized by the AAP Department
of Education in close cooperation with other pediatric organiza-
tions, including the AMSPDC and the APPD. It is critical that the
AAP and the department chairs consider this concept a shared
responsibility and assume joint ownership from the outset.
"CME home" pilot project sites should involve programs in different parts of the country, and be initiated in locations in which there already exists a strong relationship between practitioners and academic departments of pediatrics. An evaluation of the "CME home" pilot project should be conducted to determine the success of the model and the value and feasibility of the program and, if successful, the method by which the concept could be extended to all practicing pediatricians.

To summarize, while comparably implementation strategies could be developed for each of the remaining recommendations, the Task Force strongly believes that the pediatric community could best delineate these strategies working in a collaborative fashion.

REFERENCES

21. Sanders JH. Presidential address presented at the Annual Meeting of American Telene Medicine Association; April 4, 1997, Atlanta, GA
48. American Academy of Physician Assistants. Physician Assistant Pro-
The Future of Pediatric Education II: Organizing Pediatric Education to Meet the Needs of Infants, Children, Adolescents, and Young Adults in the 21st Century

*Pediatrics* 2000;105;163

The online version of this article, along with updated information and services, is located on the World Wide Web at:
/content/105/Supplement_1/163.full.html