ABSTRACT. 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. Its primary goal was to proactively provide direction for pediatric education for the 21st century. To achieve this goal, 5 topic-specific workgroups were formed: 1) the Pediatric Generalists of the Future Workgroup, 2) the Pediatric Specialists of the Future Workgroup, 3) the Pediatric Workforce Workgroup, 4) the Financing of Pediatric Education Workgroup, and 5) the Education of the Pediatrician Workgroup. The FOPE II Final Report was recently published as a supplement to Pediatrics (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(suppl):161–212). It is also available on the project web site at: www.aap.org/profed/fope1.htm This report reflects the deliberations and recommendations of the Pediatric Generalists of the Future Workgroup of the Task Force on FOPE II. The report looks at 5 factors that have led to changes in child health needs and pediatric practice over the last 2 decades. The report then presents a vision for the role and scope of the pediatrician of the future and the core attributes, skills, and competencies pediatricians caring for infants, children, adolescents, and young adults will need in the 21st century. Pediatrics 2000;106(suppl):1199–1225; pediatrics, medical education, children, adolescents, health care delivery.


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The report presented here is the Final Report of the Pediatric Generalists of the Future Workgroup. Members of the Pediatric Generalists of the Future Workgroup included Dr Rappo, Chairperson; Dr Leslie, Vice Chairperson; Dr Abelson; Dr Sewall; and Dr Jenkins.

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OVERVIEW

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.1 To establish 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, continuing medical education, and board renewal of certification are also in place to assure quality lifelong learning.

The 1978 Task Force on the Future of Pediatric Education report accurately anticipated the need to increase 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. New forces have emerged in pediatrics since 1978, however, that could not have been foreseen by the authors of the 1978 report. The outcomes of these ongoing changes are not predictable and the role of the generalist pediatrician in the 21st century is unclear. Some pundits have actually questioned whether there will be a role for the generalist pediatrician in the future. What is clear is that the generalist pediatrician’s role will not remain static.

The FOPE II Task Force was convened in 1996 to address changes that have occurred over the past 2 decades, to speculate on factors that may alter the role of the pediatrician over the next 20 years, and to provide direction for pediatric education. This report is a product of the Pediatric Generalists of the Future Workgroup of the Task Force. The Generalist Workgroup was charged with defining the role and scope of practice of the generalist pediatrician—including case mix, severity of illness, and the delivery of preventive, acute, and chronic care services. Also under consideration was the impact of managed care, both in private health plans and under Medicaid, on practice trends.

This report looks at 5 factors that have led to changes in child health needs and pediatric practice over the last 2 decades. These factors include: 1) new patterns in morbidity and mortality stemming from a combination of changing disease patterns, technological advances, and sociodemographic trends for children and families in the United States; 2) advances in
molecular biology and genetics; 3) the changing sociodemographic and educational makeup of the available pool of health care providers for children; 4) computer technologic advances leading to new capabilities for data management and communications systems; and 5) paradigm shifts in the financing and delivery of child health services. The report then presents a vision for the role and scope of the pediatrician of the future and the core attributes, skills, and competencies that pediatricians caring for children will need in the 21st century.

**CHANGES IN PEDIATRIC CARE IN THE LAST TWO DECADES**

**New Patterns in Morbidity and Mortality**

The role of the generalist pediatrician is intimately connected with the health care needs of children. These needs are evolving as disease patterns change, diagnostic and management innovations are introduced, and the sociodemographic makeup of children and families in the United States alters. Historically, child health during the first half of this century was characterized by high rates of infant mortality and infectious diseases. The development of vaccines and antibiotics in the 1940s and 1950s significantly reduced infectious causes of pediatric morbidity and mortality. In addition, strides were made in neonatal and obstetrical care, further decreasing mortality rates for children <1 year of age.

As infectious diseases decreased both in prevalence as well as in severity, many of the chronic problems children faced were more easily recognized. The 1960s and 1970s were a time of growth in the science of pediatric physiology and pathophysiology and led to an increasingly sophisticated subspecialty care system for children with chronic medical conditions. This era witnessed the introduction of pediatric ventilatory assistance, multidisciplinary oncology care, and pediatric surgical and transplantation services, to mention but a few. Pediatric primary care also evolved during this period; Haggerty and colleagues2 at the University of Rochester introduced the term “new morbidity” in the 1970s to describe the increasing number of health-related problems children experience secondary to emotional, social, economic, and demographic factors. Adolescent medicine developed as a unique field dedicated to adolescent preventive health and illness needs. The school setting became increasingly seen as a site where children’s medical, social, and educational needs overlapped, leading to the development of school-based health centers and the passage of Public Law 94–143. Lastly, children living in poverty were identified as uniquely vulnerable to multiple factors leading to decreased access to health care services and poor health status.

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 rotavirus 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 of the Bright Futures guidelines and the American Academy of Pediatrics’ (AAP) periodicity schedule by third-party payers. Despite these successes and advances, 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 over 1 year of age (Table 1) and a major challenge to those persons concerned about the health and well being of children and youth.

**Advances in Molecular Biology and Genetics**

Over the last 2 decades, the sciences of molecular biology and genetics have made a number of breakthroughs that have the potential to alter child morbidities and mortalities and, by extension, the practice of pediatrics. The success in these arenas led to the establishment of the Human Genome Project in 1990. The goal of the project is to determine the entire sequence of the human genome by the year 2005, and it seems to be far ahead of schedule, finishing, perhaps, as early as 2001.3 The project holds potential applications that will improve the prevention, diagnosis, management, and treatment of pediatric conditions. It also will raise ethical issues.

### TABLE 1. Five Leading Causes of Death for Persons 0 to 24 Years of Age in the United States, 1997

<table>
<thead>
<tr>
<th>Ranking of Cause of Death</th>
<th>0 to 1 Years of Age Rate: 7.1 in 1000</th>
<th>1 to 4 Years of Age Rate: 3.8 in 10 000</th>
<th>5 to 9 Years of Age Rate: 1.8 in 10 000</th>
<th>10 to 14 Years of Age Rate: 2.3 in 10 000</th>
<th>15 to 19 Years of Age Rate: 7.3 in 10 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Congenital anomalies</td>
<td>Unintentional injury</td>
<td>Unintentional injury</td>
<td>Unintentional injury</td>
<td>Unintentional injury</td>
</tr>
<tr>
<td>2</td>
<td>Short gestation and low birth weight</td>
<td>Congenital anomalies</td>
<td>Malignant neoplasms</td>
<td>Malignant neoplasms</td>
<td>Homicide</td>
</tr>
<tr>
<td>3</td>
<td>Sudden infant death syndrome</td>
<td>Congenital anomalies</td>
<td>Congenital anomalies</td>
<td>Congenital anomalies</td>
<td>Homicide</td>
</tr>
<tr>
<td>4</td>
<td>Respiratory distress syndrome</td>
<td>Heart disease</td>
<td>Heart disease</td>
<td>Malignant neoplasms</td>
<td>Malignant neoplasms</td>
</tr>
<tr>
<td>5</td>
<td>Newborn affected by maternal complications of birth</td>
<td>Heart disease</td>
<td>Heart disease</td>
<td>Homicide</td>
<td>Malignant neoplasms</td>
</tr>
</tbody>
</table>

The Changing Makeup of Child Health Professionals

Another advance over the last several decades that has allowed pediatricians to better manage the changing health care needs of children has been the growth in allied health practitioners. Pediatricians have pioneered the use of a variety of providers and extenders in their practice. Alliances of allied health practitioners and pediatricians have allowed for some opportunities for the integration of children’s health care and related services over the last 20 years. Nurses have played a vital role by tracking care for children with chronic illnesses, providing acute care services for children, guaranteeing office follow-up and coordination, and developing case-management services. The reasons for working with a variety of allied professionals are many, including the realities of: 1) dealing with large number of patients who require frequent visits; 2) performing multiple procedures on a daily basis (immunizations, vision screening, hearing screenings, laboratory analyses, developmental screenings, and blood pressure monitoring); 3) triaging large numbers of telephone queries; and 4) interacting with a variety of private and public agencies providing services to children.

Pediatricians in primary care practice have also long been dependent on a variety of other professionals and health workers to allow them to provide care and services to their patients. 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 children, including family physicians, emergency department physicians, psychiatrists, and pediatric subspecialists. These relationships are likely to continue for the foreseeable future.

New Capabilities for Data Management and Communication

Several other advances over the last 2 decades have improved the ability of pediatricians to better manage the health-related needs of children. Changes in computer and media sciences have revolutionized many areas in Western culture, including medicine. In the world of 1978, computers, as they are used today, did not exist. The 1980s witnessed the arrival of faster processors, the explosion of computer memory, and the development of user-friendly interfaces. Today, a medical office without a computer is an exception. Demographic data, immunization records, and lists of recent diagnoses are sources of information that are accessible in current office management systems. In addition, many physicians routinely use electronic media and the Internet for communicating and collecting data and information. Electronic media and web pages are already in use by offices for giving health information to families and eventually may be commonly used for other functions, such as scheduling. Computer advances are helping to improve and monitor quality of care, increase efficiency, and enhance communication among the various levels of the health care delivery system.

Changes in the Financing and Delivery of Child Health Services

Political and financial forces have also driven change in pediatric practice at a remarkable pace. Employers and legislators, the primary purchasers of health care in the second half of this century, have demanded restructuring in the financing and organization of health care to control escalating health care costs. The recent widespread adoption of managed care as a panacea for skyrocketing health care costs has occurred in both the private and public sectors. Much like private insurance purchasers, state Medicaid programs are looking toward managed care to cut costs, expand preventive services, and decrease emergency department and hospital use. As state and federal coverage for children increases, the continued role of managed care will likely increase. The widespread implementation of managed care has led to some salutary improvements in the health care system—including some progress in the elimination of waste and redundancy, a greater focus on health promotion and disease prevention, decreased hospitalization without obvious decline in quality of care, and initial decline in employers’ health care costs. Negative effects of managed care have included limited access to certain necessary services, such as specialists, and shorter visits with primary care providers.

Health insurance coverage provided through public sector services is particularly important in pediatrics for several reasons. First, approximately one fifth of all US children 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 children under 21 years of age were enrolled in the Medicaid program at some time during 1995. Second, employer-based coverage for children has steadily decreased over the last decade, while the number of uninsured children has risen. This decrease in health care coverage for children 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 poor families not eligible for Medicaid. As SCHIP is implemented nationwide, it is hoped that over 8 million children—approximately three quarters of all uninsured children—will be found eligible for either SCHIP or expanded programs in Medicaid.

Although analysts cannot accurately predict how health insurance will evolve in the 21st century, most conclude that the implementation of managed care strategies in both private and public sectors will continue over the next few decades. Managed care may need to change, however, to survive.
The last 2 decades have been a time of turbulent change for child health needs, biomedical technology, computer and media technology, pediatric health care provider characteristics, and the financing and organization of health care services. The task of the Generalist Workgroup of the FOPE II Project was to attempt to define the role of the pediatrician in the 21st century within this historical context. In the next section, we address each of these 5 factors, speculating on their impact on the role and scope of practice of the generalist pediatrician in the 21st century.

PROJECTIONS FOR THE 21ST CENTURY
The Generalist Pediatrician: The Impact of New Patterns in Morbidity and Mortality

Any speculation on the future role and scope of the generalist pediatrician must first and foremost address child health needs. In this section, we have arbitrarily broken the scope of pediatrics into discrete categories—well-infant, -child, and -adolescent care, acute care, chronic care, adolescent health, and projected new morbidities.

• Well-Infant, -Child, and -Adolescent Care

Currently, 15% of visits to pediatricians are for screening exams, preventive care services, and anticipatory guidance. Prevention is a core value for pediatricians. Pediatricians spend much of their time in this activity, which has evolved over the years from the so-called physical to the health maintenance visit. In addition to being a vehicle for focusing on immunizations, these visits allow pediatrician to: 1) promote healthy lifestyle choices (safety and nutrition), 2) monitor for physical and behavioral pathology, 3) provide age-appropriate and individualized anticipatory guidance to avert risk-taking behavior patterns, and 4) understand a child within the context of the family and community. With improvements in living standards has come the relative decline in infectious morbidities and micronutrient deficiencies that were a previous focus of pediatric prevention; other preventable issues should now become our major challenge. As knowledge of the importance of early brain development continues to grow, preventive care needs to include measures to restore and enhance developmental potential. Much of pediatric preventive care today also focuses 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.

Families in the United States today also face a number of challenges not as common in the early 1970s, and the agenda addressed in well visits will need to take these into account. First, the increasing geographic mobility of our society leads to a consequent lack of social connections. On average, 1 of every 5 families in the United States 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. Now, 60% of all mothers of children <6 years of age are in the labor force, and thus number will undoubtedly rise under welfare reform. Parents are trying to balance multiple roles, often in isolation from neighbors, community institutions, and extended family. Well-child care will need to address the emotional needs of children and parents, as well as their time limitations for accessing clinical visits. Pediatricians caring for children will also need thorough training in child health and development issues related to time spent in day care for young children and after-school program attendance for youth and early adolescents.

Well-child care will also need to take into account the changing sociodemographic characteristics of children in the United States. In 1978, the year of the first Task Force report, there was an estimated 3.4 million children (17.5%) younger than 6 years of age living in poverty; in 1996, ~13.9 million (20%) of all children were living in poverty. Children younger than 18 years of age continue to represent a large proportion of the poor population (40%), although they make up only one fourth of the total population. Children in single parent households are at particular risk. In 1996, 59% of children younger than 6 years of age resided in single parent, female-headed households with incomes below the federal poverty level, while only 12% of children younger than 6 years of age lived in married-couple families with incomes below the federal poverty level. Children of color are disproportionately represented in poor, single parent homes; nearly 40% of black children and 40% of Latino children live with single mothers whose incomes fall below the poverty level, compared with 10% of white, non-Latino children. Economic status and race/ethnicity affect health status in critical ways. Issues, such as infectious diseases, adequate housing, 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 early 1970s. Many children currently spend their childhood in step, blended, sequential, homeless, or foster families. Marital instability and higher rates of out-of-wedlock births have led to an increase in the number of children living in single parent households. In 1978, 11,710,000 children (18.5%) younger than 18 years of age lived with only 1 parent, compared with 19,799,000 (27.9%) children in 1997.22 Divorce affects over 1 million children each year, and an equal number of infants are born to unwed mothers.23 In addition, nearly 500,000 US children are in foster care at any single point in time.24

Cultural and ethnic diversity have also increased over the past 20 years and are projected to increase even more by the year 2000, when the Census Bureau projects that 33% of the population younger than 19 years of age will be from racial and ethnic minorities.25 Further projections estimate that by 2020, 48% of US children younger than 18 years of age will be black, Latino, Asian American, or Native American. Latinos will surpass blacks as the largest minority group, and Asians will more than double their representation (Table 2). Increased rates of immigration are only partially responsible for these expected trends. These changing demographics may have implications for service use 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 require sensitive attention from the providers who care for them.

Well-child care will thus continue to be an important part of the pediatrician’s responsibilities. In fact, parents seem to want more information and support on many issues.26 The growth of allied health professions and technological innovations may, however, radically alter its form. Pediatricians may free up their personal time by supervising others who perform the direct patient contact and by making use of media and the Internet for patient education. These advances would serve the purpose of keeping preventive care available, affordable, accessible, and culturally appropriate to the needs of families. The pediatrician will need to continue to be the director and coordinator of such care.

### TABLE 2. Percent Distribution of US Children Younger Than 18 Years of Age by Race/Ethnicity: 1960–2020

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>86</td>
<td>85</td>
<td>82</td>
<td>80</td>
<td>79</td>
<td>78</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>White, non-Latino</td>
<td>—</td>
<td>—</td>
<td>74</td>
<td>69</td>
<td>67</td>
<td>64</td>
<td>58</td>
<td>54</td>
</tr>
<tr>
<td>Black</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Latino</td>
<td>9</td>
<td>12</td>
<td>14</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Asian American</td>
<td>—</td>
<td>—</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Native American</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
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Note: *Numbers may not add up to 100% related to how people are requested to identify themselves and on what parameters. For example, Latinos can be identified as either Latino by ethnicity or white by race.


### Pediatric Acute Care

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 pneumococcal vaccine, respiratory syncytial virus monoclonal antibody, rotavirus vaccine, 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.

Pediatric acute care also involves treating minor trauma and managing children who present with acute deterioration in their health status. Of paramount importance is the ability of the provider to determine the severity of the child’s presentation, stabilize his or her condition, and intervene or refer to critical care in a timely manner. These skills help to assure quality pediatric care. Pediatric training in the past has excelled in providing residents with these vital skills and must continue to do so in the future.

### Chronic Conditions

Although pediatricians in past decades spent much of their time dealing with acute illnesses, the care of children with chronic conditions is now beginning to dominate many practices. Current estimates of the number of children with chronic illnesses and other disabilities vary somewhat, depending primarily on the breadth of definition one uses. Approximately 2 million children meet stringent definitions based on the level of severity of the condition.27 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.28 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 to severe psychiatric disorders. A wide range of chronic physical conditions make up the other half, with moderate and severe asthma accounting for nearly one third of such conditions. 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, including asthma and acquired immunodeficiency syndrome, 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 prematurity, organ failure, and childhood cancer. Currently, estimates are that over 95% of children with severe chronic conditions survive to young adulthood (J. M. Perrin, personal communication, February 1998). Some of these children are permanently dependent on complex medical interventions, and many experience serious developmental or emotional morbidity. Pediatrics must address the long-term complications of their diseases and treatment, as well as the unique developmental and behavioral needs of these children. Long-term survivors of prematurity and childhood malignancies are altering the profile of pediatric health care, and decisions will need to be made about who will provide care as they 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 9 and 17 years of age at 9% to 13%. If subthreshold disorders are included, the number might range as high as 40%. Rarely does a 3-year training program afford enough experience with the spectrum of developmental behavioral disorders to make the new graduate expert. At the same time, infectious disease experts warn that a number of chronic infectious diseases potentially present problems for children in the future. Tuberculosis and acquired immunodeficiency syndrome rates have 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 may emerge and require more complex treatment regimens and up-to-date information on community resistance trends for effective therapy. The generalist pediatrician can thus expect that 1 of 10 children will have a moderate to severe long-term health condition. Of this group, nearly one 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, 5 chronic conditions occur in children with relatively high frequency: asthma, recurrent otitis media, adolescent depression, attention deficit hyperactivity disorder, and developmental disabilities (primarily mental retardation and cerebral palsy). Other conditions occur so infrequently that an individual pediatrician may have little experience with that disease (J. M. Perrin, personal communication, May 1998). These figures have important implications for pediatric training. With respect to developmental psychological pathologies, practitioner surveys have identified a lack of confidence in ability to identify and treat these problems as a major barrier to care. The evolution of new tools, including symptom checklists and the Diagnostic and Statistical Manual for Primary Care, along with postgraduate education in this area, can allow pediatricians to become knowledgeable members of a team of providers managing these cases. Families of children with chronic medical needs have reported variable access to care and confidence in their specialty providers and have also commented on inadequate attention to parental concerns by primary care providers. Clearly, improved partnerships among families, pediatricians, and pediatric subspecialists (medical and surgical) must be developed. Pediatricians will need sufficient training in the unique requirements of children with special needs. Evaluation and management of children with chronic conditions take time and flexibility away from a physician’s productivity requirements; reimbursement and time constraints remain a major impediment to managing these important health-related needs of children. Other barriers also exist including delay in activation of health care benefits with changes in coverage and restrictions for needed services, including durable medical equipment and mental health care.

- Adolescent Health Needs

Three types of data are commonly used to identify the projected health needs of adolescents. First, the prevalence of high-risk behaviors is the most frequently quoted set of statistics for the adolescent population. Second, important quantitative measures of adolescent health service use, such as hospital discharge data and ambulatory care/physician data, are more difficult to access but reflect key indicators. Third, the trends in adolescent health behaviors that serve as adult precursors for adverse health outcomes, such as obesity, cigarette smoking, and alcohol and drug abuse, are also important in directing preventive health efforts. With respect to the prevalence of high-risk behaviors, the trends in outcomes related to early sexual activity, substance use, violent behavior, and deaths secondary to unintentional injuries are more readily accessible than data that reflect trends in mental health behaviors, with the exception of suicide. Teen births negatively impact both the mother and child by limiting the mother’s educational and employ-
ment opportunities, increasing the likelihood they will need governmental support, and ultimately affecting the overall development of the child. Although the adolescent birth rates steadily declined between 1960 and 1985 (89.1 to 51.0 per 1000), the trend reversed briefly from 1985 to 1991 (62.1 per 1000) and then moderately declined after 1991 to 52.9 per 1000 by 1997. Measures of substance use vary by specific substance and the age group of the adolescent. During the 1990s, there was an overall increase in the percentages of 8th, 10th, and 12th grade students who smoked daily, drank heavily, or used illicit drugs. Males and females are equally likely to be frequent smokers according to 1993 data. Marijuana use almost tripled among 8th graders (from 3.2% to 9.1%) and more than doubled among 10th graders (from 8.7% to 17.2%) between 1991 and 1995. For teens 15 to 19 years of age, homicide accounted for 10% of all deaths and unintentional injury accounted for 46% of all deaths,40; gun-related injuries and unintentional injuries including automobile-related injuries continue to be major causes of morbidity as well. Data addressing the suicide rate for adolescents demonstrate that the suicide rate for adolescents from 15 to 19 years of age doubled from 5.9 to 10.8 per 100,000 between 1970 and 1990. Since 1990, the overall suicide rate has stabilized at 11 per 100,000.

Both type of conditions and quantitative impact must be examined with respect to measures of health care utilization. Data published in 1998 indicate that injury and poisoning, mental disorders, and pregnancy and childbirth represent 43% of the top 5 hospital discharges for young adolescents, 85% for older adolescents, and 87% among young adults. Ambulatory care visits involved relatively straight forward conditions for nearly 25% of the visits, and included colds and sore throats, ear infections, skin and vision problems, hay fever, and allergies. Younger adolescents had more visits for general exams and asthma, whereas older adolescents had more visits for skin problems, urinary tract disorders, and contraceptive management. From 1986 to 1996, the rates of hospitalization for 15 to 24 year olds dropped by nearly 30%; hospital care of adolescents for conditions other than trauma will probably continue to decrease. Ambulatory visits for conditions related to at risk behaviors will increase as access to care improves.

Obesity and tobacco use are examples of the conditions during adolescence associated with increased health risk in adulthood that could be positively influenced by intervention strategies in recent preventive guidelines. Obesity (or weight excess) can be exhibited in childhood and tracked into adolescence. Data from national surveys indicate that adolescent obesity is increasing with as many as 26% of white females and 25% of black females determined to be obese by skin fold thickness. Obesity is not only a major risk for cardiovascular diseases in adulthood but is independently correlated with hypertension, hypercholesterolemia, diabetes mellitus, gallbladder disease, arthritis, and gout. Cigarette use is increasing for most age and gender groups after some evidence of reduction in 1992 and has been linked to chronic diseases in adulthood, such as cardiovascular disease, various cancers, and chronic obstructive lung disease.

• Beyond the New Morbidities

Although the term new morbidity was not quoted in the 1978 report, the biopsychosocial and developmental aspects of pediatrics were addressed. The need for pediatricians to have the skills to deal with injury prevention, child abuse, suicide attempts, birth of a disabled infant, and other common behavioral disorders was specified. The critical importance of good interviewing techniques, systematic observation, and communication with parents and children was stated, but the reports stopped short of specific recommendations in the area of counseling and recognition of specific mental disorders. Evidence since 1978 indicates that pediatricians will be called on to do more in these areas. The trends in several of the biopsychosocial issues of concern have shown an increase; for example, the rate per thousand children experiencing child abuse under 18 years of age has increased from 11/1000 in 1990 to 15/1000 in 1995. (E. Wood, personal communication, 1998). A number of surveys suggest that pediatricians still express low comfort and confidence in certain skills necessary to address biopsychosocial and developmental care. There is still much to do in the education of pediatricians and parents relative to the new morbidities.

It is also true that the new in the new morbidity will continue to change. In the 1990s, the medical–social epidemics of cocaine/crack use, homelessness, poverty, urban violence, and human immunodeficiency virus disease are among the newest challenges to pediatric care. The previous concerns for developmental and behavioral problems in young diabetic, asthmatic, and nephrotic children have been expanded to encompass chronically ill children and young adults with chronic conditions. The impact of a shortage of quality day care for all US children continues to be a problem and will increase as more mothers enter the workforce under welfare reform. Although it is impossible to anticipate which morbidities will be added in the next millennium, the early years of the next century will be spent responding to the challenges of these changes.

Summary: The Impact of New Patterns in Morbidity and Mortality

Children will continue to need well-child health care, including screening histories and physicals, immunizations, and anticipatory guidance. Effective strategies and attention to behavioral and developmental issues will be essential to address many of the causes of morbidity and mortality in children and adolescents. These interventions will need to occur during well, acute, and chronic care visits and in a child’s family and culture. There will be fewer visits for common current acute care conditions like otitis media, diarrheal diseases, and other infections for which vaccines will be available. There will still be
febrile episodes and other acute illness conditions, which will require evaluation. Chronic care visits will become more prominent, reflecting the increasing numbers of children with ongoing physical, developmental, and emotional problems. Changing sociodemographics of US society will alter the agenda of the preventive visits, as well as compel adjustments in the hours and settings in which care to children and families is provided. Projections are that by the year 2020, over half of the nation’s children will consist of traditionally underrepresented minorities. Attention must be given to the recruitment and support of minority pediatricians.

The Generalist Pediatrician: The Impact of Molecular Advances in Biology Genetics

Technological advances are rapidly changing the scope of molecular genetics in the diagnosis and treatment of childhood illnesses and it is unclear at this time what the impact of these advances will be on the health care needs of children in the next 2 decades. The impact of the new biology currently is far-reaching, including the use of polymerase chain reactions in the diagnosis of infectious diseases, advanced chromosome techniques for many syndromal diagnoses, and genetic probe tests for some metabolic defects. This section describes recent advances in molecular biology and genetics addressing recent scientific and technological advances and the impact of genomics on the role of the generalist pediatrician.

• Scientific and Technological Advances

Important scientific and technological advances will be forthcoming from the Human Genome Project. The US Human Genome Project began in 1990, as a coordinated effort of the US Department of Energy and the National Institutes of Health, to identify all the estimated 80,000 genes in human DNA and to determine the sequences of the 3 billion chemical bases that make up human DNA. In addition, this information will be stored in databases from which it can be retrieved for interpretative analysis. A unique aspect of the project has been that funds have been earmarked to address the ethical, legal, and social issues, which will inevitably rise from this new information.

The goals of the project are to produce a comprehensive genetic map based on pedigree analysis, then a physical map of the distances between genes, followed by a map of the location of genes in the human genome, and finally a determination of the complete DNA sequence. To date, over 50,000 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. The physical mapping goal is to establish a marker or sequence tag every 1,000,000 bases across each chromosome or approximately 30,000 markers per chromosome. Because of the development of automated sequencing machines and DNA chip technology, the process of gene mapping occurs much more rapidly.

When completed, the detailed DNA information will help us fully understand the structure, organization, and function of DNA in chromosomes. Genes involved in many diseases will be found and analyzed as either direct or indirect contributors to pathophysiology. Medical practice will have access to rapid and accurate diagnostic capabilities for both extant disease processes and susceptibilities. This will allow much greater emphasis on prevention because we will be able to identify individuals predisposed to a particular disease and, therefore, have the opportunity to intervene, whether by gene therapy techniques, avoidance of environmental comorbid factors, the development of new therapeutic agents, or other mechanisms.

• The Role of the Generalist Pediatrician in Counseling Families

Rapid advances in technology and understanding over the next 2 decades will continue to dramatically alter our understanding of the pathogenesis, diagnosis, and treatment of many different kinds of childhood cancer. In addition, improved diagnosis of infectious diseases will increase the speed and precision with which we are able to identify specific infections. Many other conditions in pediatrics are amenable to diagnostic molecular genetic technologies, eg, sickle cell anemia, thalassemia, Duchenne muscular dystrophy, cystic fibrosis, as well as many others, as the human genome project continues to identify new candidate genes.

Generalist pediatricians will need to understand the uses and limitations of these tools and be able to clearly discuss them with children and their families. Many health care providers have limited genetics training and are incompletely prepared to deal with the complexity of the emerging information. Medical training in genetics has lagged far behind scientific advances. Both medical schools and training programs must develop courses and faculty to cope with the rush of new information. The rapidity of advances will compel physicians to continually update their knowledge and strain the limits of printed information to be current. Thus, access to computerized databases as reference tools will be essential.

As techniques for genetic testing of children for adult-onset diseases develop, pediatricians will also need to be advocates for children. The psychological, economic, and physical risks that might result from genetic testing must be balanced against the benefits of earlier detection. Our understanding of molecular genetics technically is much further along than our understanding of its ethical implications, especially in the areas of autonomy, privacy, and justice. Ethical implications of these principles must be examined in the areas of genetic testing, carrier identification, prenatal diagnosis, gene therapy, and insurability.

Summary: The Impact of Molecular Advances in Biology and Genetics

Advances in molecular biology and genetics are occurring at a rapid rate and promise to substantially
effect the diagnosis, treatment, and understanding of a number of pediatric conditions. Pediatric training in human genomics currently is inadequate, both in terms of updating physician knowledge as well as understanding ethical implications. This must be remedied in the future. The ultimate impact of this technology and related issues on medicine in general and on the practice of pediatrics in particular will be of great importance.

The Generalist Pediatrician: The Changing Makeup of Child Health Professionals

Another factor potentially affecting the role and scope of the generalist pediatrician in the 21st century is the changing demographic and educational makeup of the available pool of health care providers caring for children. In the following section, we discuss a variety of provider groups, speculating on their partnerships in the future with generalist pediatricians. Interactions with other health care providers offer opportunities to improve both access to and quality of care for children; they may also lead to competition for patients, negatively affecting care. These challenges are discussed below. The potential impact of the increasing number of women entering pediatrics was also considered.

- Traditional Extenders: Nurses and Medical Office Workers

Future opportunities for nurses and medical office workers in the context of the pediatric practice are multiple. These traditional extenders will be used to expand opportunities to improve practice efficiencies. They will, for example, ensure compliance with treatment, collect data on quality of care and patient outcomes, and survey patients around satisfaction measures, as well as assure compliance with government regulations and assist patients with accessing care and services in an increasingly regulated environment.

- Allied Professionals

Practitioners partnering in the care for children with generalist pediatricians include child psychologists; masters of social work; 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 concerning 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 generalist pediatrician. Likewise, the use of nutritionists in pediatric practice for issues around dietary counseling, weight control, food fadism, and nutrition for special populations in pediatrics is a natural extension of primary care. The direct integration of occupational, physical, and speech therapy specialists into pediatric practices is also desirable. Clearly, the types of health-related problems these providers address are common and anticipated to increase in the future.

Changing reimbursement patterns must allow for creative use of an extended network of providers to better meet the needs of children. Large groups will have to develop subcontracts with these allied providers if they can not be supported within the practice setting. Research will need to be performed to demonstrate the effectiveness of these partnerships and to address the necessary ratio of providers to available patients. Alternatively, if reimbursement for pediatric services is priced too low to cover costs or there is no mechanism for receiving reimbursement for specialized services, financial barriers could be erected, affecting access to needed services.

- Nurse Practitioners

Pediatric nurse practitioners (PNPs) have a major responsibility for providing direct patient care with a strong focus on primary care. Approximately 77.5% of PNPs work in urban areas with populations over 50 00054 and function in a variety of settings including hospitals, clinics, health maintenance organizations, private practices, and school and community clinics. Most children seen by PNPs are younger than 12 years of age and come from families with low educational attainment and of limited financial resources.55 PNPs have also been providers in alternative delivery systems including school-based health clinics, day care centers, foster care, and juvenile detention.56

Collaborators with pediatricians for the past 3 decades, the opportunities for cooperation between pediatricians and nurse practitioners should increase in the future. Although nurse practitioners have engaged in many of the facets of care performed by pediatric generalists, many opportunities to carve out specialized competencies in practice exist. PNPs are already acknowledged as particularly skilled in health promotion activities.56 Expanding opportunities could target educational programs for families, patients, and staff; coordinate case management for patient populations like children with asthma and lead poisoning; provide gynecologic and contraceptive services; and perform longitudinal follow-up for children with chronic illness.

- Physician Assistants

Because of training biases, preferences, and reimbursement issues, physician assistants have tended to be incorporated primarily in the hospital setting in the past but increasingly are making their way into the office setting. Since the nature of their training directs that they must practice in a regulated environment under direct physician supervision, they offer the pediatrician an attractive alternative means to expand the scope and range of services provided. In this perspective, it is also clear that physician assistants, depending on their background, might be particularly useful in expanding the diverse nature of practice from a social, cultural, ethnic, and medical perspective. However, there is discussion in the physician assistant field to reclassify physician assistants with >6 years of practice experience as physician associates. This possibility would tend to suggest a...
movement toward independent practice, similar to some nurse practitioners, with the same potential for interdisciplinary strife.

- Family Physicians

The overlap between the roles of primary care pediatrician and family physician certainly creates the potential for competition in areas with physician oversupply. Pediatricians have increased training time both in the pediatric outpatient and pediatric inpatient setting. Health policy research has not proven conclusively that there is a consistent measurable difference in behavior between the 2 groups.

Pediatricians in rural settings have described a variety of models for cooperation with family physicians in areas where physician undersupply promotes cooperation. First, the presence of a pediatrician in a relatively remote area improves the standard of care for common pediatric illnesses, as the pediatrician educates local family physicians about new standards of pediatric care. Second, pediatricians are often subsidized by rural hospitals to provide neonatal services and, in turn, train a cadre of interested family physicians to share the call burden. Third, rural pediatricians act as intermediaries between local family physicians and pediatric subspecialists, playing a consultant role to save the families the expense and difficulty of traveling a long distance for what might be a simple problem.

None of these benefits are applicable to a suburban location with large numbers of primary care physicians, specialists, emergency departments, and sophisticated hospitals. The American Academy of Family Physicians calls for 1 generalist per 2849 persons. This does not take into account the presence of the increasing numbers of internists and pediatricians choosing primary care; we can then expect an oversupply. Pediatricians in a crowded environment will need to compete both with each other and with other types of providers based on measurable competence, cost-effectiveness, and patient satisfaction. National organizations will need to work together to improve distribution of physicians, while controlling oversupply, establishing practice guidelines to define quality of care, and fostering improvements in the child health components of training programs.

- Psychiatry

As mentioned previously, the mental health care needs of children and adolescents are substantial. Responding to this projected and currently unmet need will require adequate training in the diagnosis and management of mental health needs and will necessitate a workforce capable of responding to those needs. There is growing concern, however, that managed care may negatively impact access to mental health services for children. First, mental health visits may be limited to relatively few visits, which may not be appropriate given an individual child’s level of functioning. Second, the numbers of child and adolescent psychiatrists are limited and their role is increasingly relegated to prescribing and monitoring the use of psychotropic medication for seriously ill children (D. R. DeMasco, personal communication, 1997). Lastly, appropriate specialty care may not be available within a given managed care network. Clearly, the mental health needs of children and adolescents necessitate more service than is currently being provided. Generalist pediatricians must work in concert with psychiatrists, pediatrician–psychiatrists, behavioral and developmental pediatricians, and other mental health providers to advocate for access to these services.

- Internal Medicine/Pediatrics (Med-Peds) Combined Residency

Over the past decade, nearly 20% of pediatric residents have chosen the Med-Peds combined residency pathway. The impact of 400 graduates annually entering the workforce of child health care is not fully understood. Nonetheless, it is highly likely that Med-Peds graduates will be important in the care of children.

The scope of practice and skills of Med-Peds graduates, as well as local needs, will determine the precise role of these physicians in the care of children. The duration and rigor of training and other factors including graduate medical education funding may limit entry into Med-Peds residencies, possibly leaving this group to play a lesser role relative to other primary care disciplines that care for children. In addition, the maturation of individual Med-Peds practices may influence practitioners to focus on age-related different components of their knowledge base and skills as their careers mature. How the effect of that transition and the quality of practitioners that the discipline will attract will ultimately affect the quality of care children receive is uncertain.

Currently 15% of students choosing pediatrics as a career select a Med-Peds residency. Hence, Med-Peds will remain a significant proportion of those physicians intensively trained to care for children. An indirect impact of Med-Peds will be to help maintain interdisciplinary integration within medical centers. The discipline offers the opportunity to create new collaborative bridges with other fields outside the customary domain of pediatrics. Thus far, Med-Peds has created a legacy that pediatric departments can use to increase their familiarity with access to other areas of excellence within their own institutions. The discipline can also develop models and mechanisms to improve the probability that the morbidities pediatricians strive to prevent will not be underemphasized as children transition to adult care. Collaborative models will need to be fostered, as competition and compartmentalization threaten the cohesive integrity of medicine.

The operative factors will be the expanded skill set of Med-Peds practitioners, an evidence-based approach to generalist care across the age spectrum, a unique perspective, and the prevailing emphasis on primary care. As recognition of the discipline as a viable alternative for students continues to increase, Med-Peds cannot help but enhance the esteem of total generalist care. The expanded skill set of Med-Peds practitioners will permit new combinations of...
areas of clinical emphasis for generalists in multiple practice sites. There are multiple other examples in which a dual-discipline perspective may influence management orientation. The overall minority position of Med-Peds in the entire domain of generalists may somewhat minimize the impact, although their uniqueness may provide them some enhanced visibility and influence.

Med-Peds has the potential to become important for practitioners of certain subspecialties whose existence is currently challenged, such as pediatric rheumatology. In other specialties and subspecialty niches, the Med-Peds graduate may represent an ideal practitioner, eg, in areas such as adolescent medicine and transitional diseases, such as cystic fibrosis, survivors of congenital heart disease, and sickle cell disease. They are likely to participate to the degree that they need to be considered in planning workforce needs, in areas such as infectious disease, gastroenterology, nephrology, and pulmonology. A subspecialty area that is not likely to be affected is neonatology. Limitations of Med-Peds program graduates entering subspecialty training include the length of time required, the challenge of developing dual-discipline integration at a fellowship level, the expense of initial and continued dual-discipline certification, and the need to declare a primary departmental home in most academic medical centers.

In conclusion, selection of the Med-Peds pathway by pediatric residents continues. The obvious advantages of this pathway are the potential of a dual-board-certified generalist physician with an understanding of adult transitional care and the capability to follow patients for long periods of time. Disadvantages are the length of training and the relative uncertainty of public acceptance of this discipline.

- Pediatric Subspecialists

Similar to the situation with PNs and family physicians, the possibility of physician oversupply has encouraged discussion between primary care pediatricians and pediatric subspecialists about the roles of generalists and subspecialists and the linkages between the 2. Research in internal medicine on the outcomes and quality of care provided by generalists and subspecialists is limited and conflicting. Several studies have shown that generalists treating certain conditions have equivalent outcomes to subspecialists but consume fewer resources. Other studies have shown better process and outcome measures when conditions have been managed by subspecialists. Research is needed in pediatrics addressing appropriate care parameters for generalists and subspecialists. Research must also be undertaken to ascertain whether pediatric subspecialists provide better quality care to children, compared with adult subspecialists who lack sufficient training in child physiology and developmental stages and knowledge of appropriate community resources.

There is growing consensus in the pediatric community that primary care pediatrics in the future will continue to provide routine illness care and anticipatory guidance, but an increasing amount of time will be spent managing chronic illness. Episodes of care that begin with visits to a primary care clinician as opposed to other sources of care are associated with reductions in expenditures. 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. In most locations, generalist pediatricians will continue to provide both newborn care and some inpatient services. 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 several barriers to the implementation of the collaborative, tiered model. First, several studies have suggested that parents are not confident with generalists’ level of skill in managing complex illnesses. Second, 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. Third, time and productivity pressures under managed care seem to be generating increased practitioner referrals to subspecialists of children with normal variations in physiology, at least in the field of cardiology. Fourth, 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.

- The Changing Gender of Pediatrics

The changing makeup of child health professionals also includes the rapid influx of women into pediatrics. Data collected by the American Board of Pediatrics identify that 64% of 1998–1999 first-year pediatric categorical residents are female. This is the highest percentage of women residents in any specialty. Although women have chosen pediatrics as a profession for many years, women pediatricians in general are a young group. Data collected by the AAP Department of Research identify that although 49% of active AAP members are women, 61% of female pediatricians are <40 years old, compared with 37% of male pediatricians. Thus, the pediatrician of the future is most likely to be female. Similar to women in other professions, juggling child care, household needs, and care of elderly parents still tends to be the responsibility of women pediatricians. The pediatrician of the future may be sharing a position or having office hours or time commitments that reflect other priorities and interests. Thus, she is more likely to have a better appreciation of parenting problems and family dynamics. She has, however, the potential of being undervalued, underpaid, and exploited—particularly if she chooses to work part-time.

Recent surveys have pointed out that younger male and female physicians are both 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 and female physicians also report...
making career changes because of their marriage or children, although female physicians were more likely to have made changes for their children.\textsuperscript{71} Pediatrics, thus, must not only consider the needs of the number of women entering the field but those of the young dual career couples with 1 or both partners practicing medicine and attempting to balance multiple roles. As Fletcher and Fletcher\textsuperscript{72} so succinctly state, society can “expect physicians to be unusually responsible, educated, and hard-working. But the old way of demanding single-minded dedication to the profession needs to be recast because it depended on a full-time backup for the rest of life’s activities.”

Medicine as a profession needs to grapple with the issues surrounding the balance between work and family as other professions are beginning to do. But pediatrics, because of its changing demographics, urgently needs to face these issues and pave the way for change. The increase in large group practices may make some of these changes easier. Pediatric practices also need to consider the importance of coordinated schedules, fair leave policies for childbirth and child-rearing, quality day care at or near the workplace that helps parents address the issue of sick or vacationing children, and nontraditional work hours. Flexible approaches for the recruitment of pediatricians, academic promotion and/or advancement, and achieving partnership in practice must also to be considered. Fees for membership to medical organizations may need to be adjusted to take into account part-time positions or couples who do not need 2 copies of every mailing. True job-shares need to be developed with flexible benefit packages. The needs of dual-career families may be particularly important in rural underserved areas; anecdotal reports by young women physicians in rural areas stress the importance of recruiting that takes into account their partner’s occupational needs as well. Many of these changes may also improve patient care. Increased evening and weekend hours, use of electronic media and telecommunications, and a heightened sensitivity to family issues may offer more opportunities for women pediatricians as well as better access to care for working families.

Summary: The Impact of the Changing Makeup of Child Health Professionals

Allied professionals will be important for addressing the future health care needs of children, but integration may be difficult given changing reimbursement strategies. The specter of provider oversupply must be considered and ongoing dialogues with the National Association of Pediatric Nurse Associates and Practitioners, the American Academy of Physician Assistants, and the American Academy of Family Physicians must continue. Primary care providers must fight their battles cooperatively, over issues such as adequate time with patients, access to appropriate subspecialty care, and provider authority for decisions about patient care. Physicians must, however, continually stress the added value that they bring to an encounter with a child and his or her family. This includes their detailed knowledge of child health and physiology within the context of developmental stages, their expertise in managing both ambulatory and critical care conditions, and their focus on the child within the context of the family. In addition, generalist pediatricians can be expected to manage children with chronic conditions, especially those with lower acuity. Adequate training during residency in subspecialty outpatient care, effective continuing medical education programs, and strong linkages to pediatric subspecialists will be essential. Lastly, the impact of the changing gender of pediatricians must be addressed. The pediatrician of the future is likely to be female and to be balancing career and home life. At a time when generalist pediatricians need broader capabilities and when workforce issues among a variety of health care professionals could either lead to collaboration or competition in the care of children, issues of gender and commitment must be transformed into strengths and not allowed to undervalue the discipline of pediatrics.

The Generalist Pediatrician: The Impact of New Capabilities for Data Management and Communication

Advances in computer technology and electronic media also hold promise for allowing the pediatrician to better care for children and their families and are reviewed below.

- The Patient–Physician Encounter

Computers have the potential for strengthening the physician–patient encounter. For example, templates that guide providers through a directed history and examination of patients with specific categories of conditions not only improve documentation, but also promote appropriate physician action. Templates can be individually modified and customized, as experience and new knowledge change the clinical relevance of different data items. Similarly, computers have the potential to help with diagnostic decision-making. Their ability to quickly search through reams of information and consider thousands of possibilities provides an outline to the practitioner, delivering sensitivities and specifics of clinical and laboratory features of the conditions under consideration, expanding the differential diagnosis, and allowing the clinician to quickly explore myriad possibilities.\textsuperscript{73} Yet templates and guidelines can only elicit knowledge that already exists in the mind of the practitioner, helping him or her to make new connections. Pediatricians will need the skills to use templates and algorithms without being dependent on them and have the knowledge base to address how to improve the capabilities of the computerized encounter.

Computers also have a role to play in therapeutic decision-making. The medication prescription is often the final pathway of the clinical interaction and one that can make the difference between success and failure. Computerized prescription writing (linked to information from the patient record) affords the possibility of eliminating common errors involved in this process, such as prior allergic reac-
tions, or not considering drug interactions in patients with complex problems on multiple medications. Computer systems also provide the practitioner with information on the cost of alternative medications and with a list of those medications on formulary with an individual patient’s insurance plan. Incorporation of computer-guided therapeutics into the training regimen will be commonplace in the future. Hospitals are increasingly using electronic ordering,74 and computerized anti-infectives-management programs have been shown to reduce costs and to improve the quality of patient care for critically ill patients.75

Computers and electronic media also have the potential to add efficiency to the patient–physician encounter through computerized previsit-screening questions, visit reminders, and anticipatory guidance tips.76 The office of the future will have computers in the waiting or examination rooms to allow patients to create part of the history before seeing the provider. Some of this information may also be acquired using the Internet before a visit, moving a portion of the patient–physician encounter out of the office setting. The Internet also provides a tool for sharing information and concerns between pediatricians and families. It is likely that medical practices will each have their own web page, where patient queries can be addressed via preformed statements or personal replies.

Telemedicine applications show clear relevance for nonroutine patient encounters involving the management of the complex medical problems of children with chronic illnesses or in emergency situations, particularly in rural settings.77,78 The rapid transfer of detailed clinical information and images will enhance the phone consultations that traditionally have linked physicians with geographically distant specialists. Already, academic medical centers are using technology to consult with subspecialty experts. Electrocardiograms, ultrasounds, and other information could also be instantaneously provided to experts or transport coordinators to provide for appropriate management and consultation. In addition, visual and physiologic measurements from patients can be relayed using telemedicine application.

Computerized technology holds promise for physician education, both generic and patient-specific. Continuing medical education will need to use these technologies given the rate of change anticipated in the future and the need to rapidly disseminate new information. Professional chat-lines (including the AAP site, the developmental–behavioral pediatrics site, and others) can be a vehicle for active learning and sharing of experience.

• The Use of Technology in Office Management

The world of billing has become more complicated, and the computer holds many advantages from a billing perspective. The physician of the future, even in a salaried position, will have his or her compensation tied somewhat to productivity, however that is measured. Knowing how to manipulate scheduling programs can make the difference between a reasonable or unreasonable pace to the day. In addition, computers that accurately record the details of a physician’s interactions will allow the pediatrician of the future to properly assess the quality of his or her care and to mold a practice environment that ultimately improves care.79 In the past, quality goals were ill-defined and usually measured by chart review, subject to multiple data error problems. Quality measures in the future will have a defined numerator and denominator, all accessible electronically.

Use of the computer provides pediatricians with the capability of profoundly reducing the typical errors that occur daily in practice.80 Visits that are missed, lab tests that are not followed up, lost opportunities for immunizations—these are all part of the daily lives of practitioners. Computers can improve access to selected information and avoid reliance on many persons’ memories. Computer-generated patient reminders are a typical example, with a financial payoff for fewer missed appointments. Analogous physician reminders can include pending lab results, immunization gaps, or any miscellaneous data that need follow-up—and can easily be programmed to appear on the encounter record to remind the clinician of their importance.

• Challenges of Advances

The legal issues involving confidentiality have become increasingly complex, however, since medical information stored electronically, in theory, can be accessed by anyone with the appropriate skills. All the advantages of electronic forms described above make the information easier to invoke and use for nonmedical purposes.81 For example, employers could discover confidential material that could lead to discriminatory decisions. Computers also have the potential to be used to promote conformity to a lower standard of care if financial considerations are paramount over clinical concerns and the emphasis is on tracking the productivity of physicians, as measured only by number of patients (or relative value units), as opposed to improving quality of care. Lastly, communication through computers lacks many of the nuances of visual cues and voice inflection that must not be lost in the doctor–patient–family relationship.

Summary—The Impact of New Capabilities for Data Management and Communication

In the future, computers will become indispensable tools for the primary care pediatrician for use in the patient–physician encounter, rapid communication with patients, families and subspecialty services, management in the office setting, and the pursuit of new knowledge and training. These technologies also have their dangers. The pediatrician of the future must, therefore, be comfortable with computers and cyberspace.

The Generalist Pediatrician: The Impact of Changes in the Financing and Delivery of Child Health Services

Perhaps the least predictable and the most troubling factor affecting pediatrics care at this time is the
impact of the widespread adoption of managed care over the last decade. The financing of health care strongly influences the organization and delivery of health care services. Predictions for the role of the generalist of the 21st century must take into account current reimbursement trends for health services and anticipate how public and private sector initiatives in the financing and organization of child health care services will affect child health care in the future. For the next decades, the pediatric community must also closely monitor several trends to assure that the quality of health care services to children is maintained, if not improved. These trends are described below and include the implications of anticipated changes on: 1) the structure of the health care system, and 2) the provision of preventive services to children, and 3) adequate, high quality care for children with chronic conditions.

- Impact of Anticipated Changes on the Structure of the Health Care System

While managed care has dominated the 1990s, no 1 clear vision of the future system for the financing and organization of health care services in this country has emerged. There are several new players emerging in the health care field including provider-based integrated delivery systems, community networks, and new large physician group practice arrangements. In addition, some large purchasing groups of employers have indicated interest in contracting directly with large provider units bypassing managed care plans. Most analysts conclude only that the pace of change can be expected to continue at an unprecedented rate over the next several decades.

It is anticipated, however, that the incorporation of small groups and solo pediatricians into larger pediatric or multispecialty groups will continue. This consolidation affords some economies of scale in the provision of health care, greater flexibility in the range of services offered, and more access for negotiations with health care plans and purchasers. It also offers pediatricians the opportunity to develop new models for the provision of health care services to children that build on our profession’s current strengths and better addresses changing morbidity patterns.

Pediatricians will need to have an active voice, however, to assure the flexibility necessary to improve health care for children and families. Pediatricians will need to advocate for the critical analysis of productivity report cards that only recognize standard models of providing and measuring quality care, such as the number of office visits. Strategies that use a capitated reimbursement scheme to provide needed preventive care, anticipatory guidance, and behavioral and developmental counseling should be encouraged. Pediatric participation with school-based health centers, evening parent-education classes, and other health-focused community service organizations should also feed into the reimbursement equation. In addition, reimbursement rates must provide physicians with an adequate income, so that the practitioner’s medical decisions on utilization are not influenced by personal economic considerations. In return, pediatricians will need to be efficient stewards of the health care resources attributed to children and demonstrate the added value of pediatricians in the provision of general health care services to children.

In addition, no matter what form or forms the financing and organization of children health services take in the future, the era of accountability has arrived. Cost-containment strategies including utilization review, primary care gatekeepers, risk sharing, and capitated reimbursement are increasingly used to hold health care providers accountable for costs. Clinical practice guidelines provide the background for devising some performance measures and allow managers to quantify whether appropriate decision-making occurs and to determine whether new information is being incorporated into practice patterns. Physician profiling, patient satisfaction surveys, and performance measures are also used to provide a means of determining the worth of health care services purchased. As families become increasingly more comfortable with their role as consumers, health care will also need to be accountable for the needs and desires of families.

Some consensus on what defines appropriate care will need to be an increasing part of the agendas of medical professional organizations. Tools to assure accountability for the quality of the product employers and legislators purchase will continue to develop. These are sorely needed, for in some geographic areas, market forces are driving down health care expenditures toward the threshold where quality of care can no longer be maintained. Practical measures for quality of care for children must be developed and propagated. Quality measures being developed by the National Commission on Quality Assurance, the Pacific Business Group on Health, the Foundation for Accountability in Health Care, the Joint Commission on Accreditation of Health Care Organizations, RAND, and others, while in their infancy, provide such methodologies. Consumers, providers, and child health advocates will need to assure that tools developed adequately measure the quality of services provided to children and resulting outcomes. These tools will assist in monitoring the impact of business decisions.

- Impact of Anticipated Changes on the Delivery of Preventive Services

A second major area of concern over the next several decades will be the role of health care plans in addressing both prevention as well as the biopsychosocial needs of children with chronic conditions. While older models, primarily staff or group model health maintenance organizations often stressed preventive care, many of the looser organizational models prevalent in managed care today do not share that focus. Preventive care, particularly in pediatrics, may have cost-saving advantages, but these are, for the most part, long-term. Many child health advocates caution that some managed care plans, with an unbalanced focus on profits and the use of capita-
tion, negatively affect access to preventive care services. From a business perspective, preventive services may seem to be a poor investment given an average length of stay in a health plan of \(~18\) months.85

Pediatricians, with their in-depth knowledge of the health care needs of infants, children, and adolescents and their strong sense of advocacy, have an important role to play in assuring the delivery of preventive services as health care systems evolve over the next several decades. As mergers and consolidations of managed care organizations continue, pediatricians will need to advocate for cooperation between these plans for the covered lives in their community, highlighting the potential quality of care and financial benefits to these plans of cooperating with each other to promote a strong focus on preventive care. Employers who purchase health coverage may also play a role in promoting preventive services, because employers are increasingly calling for outcome measures that address employee absenteeism related to family illness.

- Impact of Anticipated Changes on Services for Children With Chronic Conditions

Some models of managed care have created multiple disincentives and barriers to the provision of appropriate, quality care for the large numbers of children with chronic illnesses and/or disabilities, including mental health problems. Pediatricians, by virtue of their expertise, have always attracted higher proportions of children with chronic illness and disabilities into their practice panels compared with other providers. In the past, a primary care pediatrician who accepted care responsibility or case coordination responsibility for children with special health care needs was penalized only in terms of time lost from practice and inadequate reimbursement for services provided. In the present environment, children with special health care needs further penalize primary care practitioners as office productivity, referral profiling, and capitation models are increasingly used without reference to the numbers of children with chronic illness or disability in the physician panel. Given the increasing number of children with chronic illness, pediatricians must advocate strongly for enhanced models of care, appropriate time, practice flexibility, and adequate compensation with risk adjustment mechanisms.

Pediatricians will need to learn techniques from their internal medicine colleagues to appropriately use strategies that allow for flexibility in managing children with special needs. Risk assessment, risk adjustment, and carve-out methodologies are still in their infancy and there is no universally accepted method for determining fiscal risk when caring for these patients. Developing valid tools for case-mix adjustment becomes an essential task. Ideal risk adjusters should include age, gender, diagnosis, comorbidity, poverty, language barriers, technology dependence, need for durable medical equipment, education needs, and a history of patient or family mental illness. Pediatricians in the new environment will depend on case-adjustment to continue to manage children with chronic health needs as well as children living in poverty, who are demographically at risk for a variety of physical, behavioral, and developmental problems.

Pediatricians will also need to be vocal advocates for children with chronic illness and disability during this era of unprecedented change in the organization of health care. Quality care for children with special needs requires unique constellations of staff and adequate time for health supervision. Compensation must cover time spent in the coordination of care with other health professionals, schools, and community groups; health education, as well as the management of acute medical complications. A particularly underserved area for children with special health care needs is the provision of mental health, behavioral health, and psychosocial services. Proactive case coordination, disease state management, access to appropriate pediatric subspecialty services, and the efficient use of community-based resources will be essential pieces in the future in the care of these children. The pediatrician of the future should commit to achieving the national agenda for children with special health care needs enunciated in the “Healthy People 2000 Report” (Table 3). Recent progress with these aspects of high quality care for children with chronic illness and disability is threatened currently and must not be allowed to be lost.

In addition, although initiatives like SCHIP are to be applauded as important steps toward guaranteed health insurance benefits for all children, many child health advocates caution that barriers to care will continue in the future. First, SCHIP and Medicaid combined still leave a large pool of children without adequate health insurance coverage. Lack of health insurance has been associated with poor access to care, a reduction in ambulatory care and preventive services, and avoidable morbidity.86 Second, although medical coverage will theoretically be more available for children through SCHIP and Medicaid reforms, families must still apply for coverage. There are multiple as yet unaddressed barriers that prohibit families from taking advantage of public sector health care services for children. Third, recent legislative initiatives limit medical coverage for certain categories of legal and undocumented immigrants.

**TABLE 3. Healthy People 2000 Report Agenda**

| 1. Sustaining the national consensus for building community-based family-centered systems of care for children with special health needs. |
| 2. Stimulating professional preparation programs to provide new skills to providers to change delivery systems. |
| 3. Supporting the development of models that resolve cost and utilization issues for children with special health care needs. |
| 4. Providing leadership in the establishment of quality assurance programs for children with special health care needs in managed care settings. |
| 5. Identifying and supporting the implementation of models of family participation in managed care settings. |
| 6. Developing strategies for improving access to data and evaluating activities to monitor their success. |
| 7. Integrating managed health care programs with the community system of services. |
Already, ethnicity has been shown to contribute to disparities in access to health care, with Latino children at particular risk. Interpretations of the recent welfare reform legislation by minority families, whether correct or incorrect, may further limit minority children’s access to health care. Finally, some SCHIP programs may enroll children and then inadequately reimburse providers for their services. Pediatricians must continue their advocacy efforts toward universal coverage for all children, as well as assuring the survivability of providers who care for the uninsured.

Summary: The Impact of Changes in the Financing and Delivery of Child Health Services

Both public and private managed care initiatives are changing the financing and organization of health care services for children. These changes hold potential, as well as peril, for high quality service delivery to children and will require careful monitoring and intervention by child health advocates.

Potential Scenarios for the Generalist Pediatrician in the 21st Century

The changes detailed in the preceding sections may radically impact the role and scope of general pediatrics in the 21st century. The outcomes of these changes, which are all still ongoing, are not known. The practical implications of the Human Genome Project, the future organizational financing features of medical practice under managed care, and the impact of technologic advances in the computer and media industries on the provision of patient care are examples of the diversity of areas whose future holds much promise as well as potential peril. Regional demographics, culture, and economics will also influence how pediatrics evolves in different geographic areas. Several assumptions, however, seem relatively clear at this time.

- The diagnosis, management, and treatment of behavioral–developmental problems, adolescent health risks, and chronic conditions must play an increasing role in general pediatrics if pediatricians are to address the common morbidities of childhood.
- Prevention, a core facet of pediatrics, will need to focus on issues related to the enhanced physical and developmental potential of the child, incorporating advances in molecular genetics as well as techniques that guide or modify parental and child behaviors to improve outcomes.
- Sociodemographic, cultural, and economic characteristics of children and families will continue to diversify.
- Children, adolescents, and families will assume more responsibility for their care and obtain information from multiple sources. The generalist pediatrician will assume the role of consultant or coach, and the family will function more as the primary care provider.
- The predicted biomedical, computer, and media advances will alter practice patterns over the next 2 decades.
- Medical care will continue to move from inpatient settings to ambulatory settings for increasingly complex conditions. Practices will continue to congregate and organize into larger, vertically and horizontally integrated delivery systems potentially allowing for innovations in the delivery of pediatric services.
- Accountability regarding the provision of cost-efficient, quality care to patients will be of paramount importance, and the role for cost-effective, quality primary care providers will continue to expand. Demonstration of the added value of care provided by pediatricians is essential.
- The pediatrician of the future will be primarily female in gender, balancing multiple roles.
- Reimbursement for necessary services for children, given their changing morbidities, will prove challenging and will need to be addressed.

What is unclear, however, is the role and scope of the generalist pediatrician within the context of these changes. In our opinion, 3 possible scenarios for the role of the generalist pediatrician in the 21st century exist and are described below.

Scenario 1: The focus of general pediatrics would narrow to well-infant and -child care and the management of acute care problems. Under this scenario, economic pressures under managed care, such as time and productivity requirements and reimbursement carve-outs for specific chronic conditions, would make it difficult for generalist pediatricians to manage more labor-intensive problems in the office setting. These would be primarily managed by pediatric subspecialists.

Two major issues arise with this scenario. First, this scenario holds the potential for poor coordination of care for children with chronic conditions, especially those whose disease manifestations cross subspecialties. Integrated networks of generalists and subspecialists with timely, succinct communication of patients’ needs among them would be absolutely necessary.

A second major concern is the gradual dis-cription in the range of generalist practice activities. The potential decrease in acute illnesses norm-ally managed in the pediatrician’s office with the improved technologies and vaccines forecasted above could mean that a significant percentage of childhood illnesses currently cared for by pediatricians would not require a physician to intervene. Pediatricians already care for, at best, one half of the children in this country. The remainder of children are cared for by a combination of family physicians, nurse practitioners, subspecialists, physicians assistants, hospitalists, and alternative medicine practitioners or receive little or no health care. Growth in the number of trainees in adolescent medicine, emergency medicine, neonatology, combined internal medicine/pediatrics, and internal medicine could further lessen the need for generalist pediatricians. Taken to extreme, if the generalist pediatrician becomes too dependent on providing routine care, the role of the generalist...
The loss of a role for the generalist pediatrician would not, however, be acceptable to employers and families. The Managed Care Task Force of District IX of the AAP has recently completed surveys of employers, health maintenance organizations, and consumers investigating opinions about child health providers. Access to pediatricians was viewed as mandatory by both employers and consumers. Substitution by a nurse practitioner for routine care, as long as a pediatrician was involved in a supervising role, was very acceptable to consumers; several commented that nurse practitioners were often more accessible and approachable than pediatricians. Consumers, however, did not want to lose access to pediatricians and expressed dissatisfaction in the substitution of family physicians for their pediatricians.89

Generalist pediatricians also set important standards of care for their communities. Their residency training and continuing medical education emphasize in-depth knowledge of child development, physiology, and pathophysiology, as well as pediatric technical skills. The limited research available has shown that pediatricians respond more rapidly to changes in standards of care and adhere more to published guidelines than other providers.90,91 Thus, efforts must be made to assure that economic forces do not limit the scope of care provided by the generalist pediatricians.

Technology transfer has resulted in the survival of many children with complex congenital and acquired disorders. The pediatric subspecialist will play an important role in the care of these children.

Scenario 2: Pediatrics would become more of a subspeciality. Routine care would be taken over by allied health professionals; generalist pediatricians would serve as consultants to other child health providers, provide evaluation and treatment of lower acuity subspecialty problems, and coordinate the day-to-day management of complex subspecialty patients in concert with an academic subspecialist or subspecialty center. This scenario would mirror the desires of employers and consumers for pediatricians to be involved in the care of children, but in a consultative generalist role, similar to the Canadian model. To survive under this scenario, however, generalists would need better and probably longer training in a broad range of subspecialty problems. In addition, generalists and specialists would need to come to mutual agreement regarding which subspecialty problems could be initially evaluated and/or managed on a longitudinal basis by a pediatric generalist.

The subspecialist, facing competition from general pediatricians and other pediatric providers, will focus on a more complex group of patients. The common disorders of each subspecialty will be cared for by general pediatricians and non-pediatric providers.

Scenario 3: The generalist pediatrician would survive and thrive but function in a multiplicity of roles, depending on the needs of his or her community and the pediatrician’s ability to acquire new, needed skills. It is our belief that the generalist pediatrician plays a unique and important role in meeting children’s health needs that must be capitalized on as the health care delivery system changes. Generalist pediatricians are well grounded regarding a broad range of health-related issues. They are cognizant of the need to care for the whole child within the context of the family, culture, and community. Their proficiency in the up-to-date management of pediatric health problems sets standards for the care of children in their communities. Generalist pediatricians also perceive their role as moving beyond the office setting to be advocates for children politically as well as within the community to establish and coordinate services.

Yet, the current practice situation needs to be adjusted. As the health care needs of children change, the generalist pediatrician will need to take on more management of chronic conditions at varying levels depending on his or her geographic area’s needs. In addition, the generalist pediatrician will need to seize the opportunities possible with the current changes in technology and reimbursement to creatively develop more effective methods for meeting the health-related needs of children and their families.

Because the current access of all children to medical care is limited, efforts at universal coverage of children, such as SCHIP, may increase demand for pediatric care. The impact of these measures on the need for additional pediatric trainees is uncertain.

THE ROLE AND SCOPE OF THE GENERALIST PEDIATRICIAN OF THE FUTURE

To survive and thrive, pediatricians for the 21st century will need to expand their role to accept a number of new functions during this time of change. Below we provide some examples of possible roles generalist pediatricians will fill in the next 20 years. Most of these roles for generalists will require creative development of new, sustainable funding mechanisms. These examples are meant to be illustrative, not comprehensive.

• Primary Care in the Managed Care World

Physicians currently could be described as scholars trained in the scientific method whose practice decisions are anecdotally based. As medical decisions increasingly become outcome driven and reimbursement is based on such outcomes, the individual or group or network that will thrive will be able to understand, adapt to, and capitalize on this new evidence-based approach. Increasingly, computerized technology will need to be used to communicate with patients, their families, other health care providers, and community organizations, as well as for quality assurance management. General pediatricians will need to function as both clinicians and resource and information managers. Pediatricians in this setting will also need to explore creative mechanisms for communicating, teaching, evaluating, and treating children within the context of their family and community.92,93 This may involve use of strate-
gies including group visits, electronic media for screening, prevention and anticipatory guidance, as well as contracting with industry to provide child health-related resources and information directly to employees.94

• Pediatricians as Consultants

Pediatricians in rural practice currently function as consultants to allied professionals, obstetrician–gynecologists, and family physicians. Such consultants are also common in the Canadian pediatric model. In the future, these pediatricians will exist for practice networks, at academic medical centers, and in rural areas. They will initiate evaluations for complex problems and provide consultative backup for pediatricians as well as other child health care providers. Academic pediatricians will need increased knowledge in neurology, behavioral and developmental pediatrics, genetics, hematology, rheumatology, and infectious diseases, because these issues are often part of the differential diagnosis in the evaluation of complex presentations. This may require 1 or more years of additional training. It may also be important for pediatric consultants to not have patient panels of their own, reducing the perceived risk by referring physicians of losing their patients to the consultative pediatrician.

• Hospitalists

The phenomenon of pediatric generalists providing in-hospital services increased during the 1980s in roles as diverse as level II nursery coverage, in-house admission coverage, continuing hospital care, and the administration of pediatric education programs and/or community pediatric departments. Internal medicine services are increasingly covered by hospital-based physicians who specialize in similar activities, and it is expected that growth in the hospitalist field within pediatrics will also be significant.95 A pediatric hospitalist is a pediatrician who, by experiencing and training, should be able to manage a high level of acuity. The concept of a hospitalist is in an early stage of development and, therefore, varies widely in its operationalization by geography and type of delivery systems. Once successful systems have been established, criteria for type and scope of certification parameters should be defined. It is likely, however, that the hospitalist will provide the best care for children only if linked with a child’s medical home, as well as with a pediatric center of educational excellence, to assure maintenance of beneficial critical care skills and appropriate backup.

• Community Consultative and Practicing Generalists

Linkages with community institutions, including day cares, schools, juvenile halls, foster care systems, and others that care for children, will be required for the pediatrician of the future to be effective in advancing health status. First, pediatricians will need to be located in such settings to address infectious, chronic health, safety, and behavior and developmental problems of children there. Second, these sites provide access to children who may be difficult to reach, allowing for important preventive and educational interventions. Third, managed care organizations may be graded in the future on outcomes of care for preventive services, enrollment of hard-to-reach patients, and care for children with chronic conditions like asthma, all which can be improved with linkages to public and private community institutions (P. R. Nader, personal communication, 1997). Fourth, because nearly one quarter of children are living in poverty, integrated systems of care must be developed with strong collaborations built between health, education, and human services, focusing on the child and family (C. J. Sia, personal communication, 1997). Pediatricians may serve either as consultants or primary care providers for children in these settings.

• School-Based Generalist Pediatricians

School-aged children and adolescents represent a significantly underserved population of patients. Provision of services around vaccinations, prevention of sexually transmitted disease, pregnancy prevention, counseling around issues of substance use and abuse, determination of rational policies for school athletic participation, and developmental and mental health screening and evaluation would be natural extensions of a school health mission. It is highly likely that some primary care pediatricians will have a significant portion of their practice in school facilities. Models for coordination of services between school-based providers and health plans will need to be examined to assure continuous and comprehensive care.

• Home Health

Pediatricians have witnessed the transition of progressively higher levels of acute and chronic illness from the inpatient to the outpatient setting. Increasingly, this care will move from the outpatient to the home setting. Pediatricians are undereducated about the realities and possibilities of home health opportunities and are often not reimbursed for these services as medical care managers. 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, much of well-child and acute care may be transferred to the home setting. With current and future technologies available to parents and pediatricians, pediatricians and families will be able to communicate about upcoming visits and anticipatory guidance recommendations. Pediatricians will also be able to evaluate acute care conditions to determine whether a child needs to be seen.

• Population-Based Community Medicine

In 1982, Rogers96 commented that “(N)o one in modern society can believe that a physician working in isolation, and simply treating those who came to him on a one-on-one basis, can produce a healthy society.” It is likely that municipalities, in conjunction with state and national governmental agencies and industry, will use physicians to integrate com-
ommunity health primary care needs with case management issues, public health promotion, performance measurement, and quality of care initiatives. This area, which is virtually untapped, offers enormous opportunities for evolution. The challenge will be to balance a population-based, public health focus with individual advocacy for a patient.

- Administrative Medicine

The increasing acceptance of managed care and prospective payment systems demand the integration of primary care pediatricians into corporate structures, because they are best able to understand the issues that are relevant to the actual care for children. Areas of specialization will include case management, provider education, patient education in the context of managed care, performance measurements, quality improvement programs, the application of epidemiologic principles for the improvement of patient needs, resource management, the development and implementation of useful clinical guidelines, and the appropriate development of parameters for ethical resource allocation. Pediatricians must be the leaders in these areas in their continuing role as advocates for children.

- Child Health Services Research

During this era of accountability and information technology, an important role for pediatricians to undertake will be researching access to, utilization of, and quality of child health care services. As outcome measures are developed, these will need to be used to assess the adequacy and appropriateness of pediatric care. This research not only will be conducted by researchers affiliated with academic medical centers and policy groups but also by pediatricians in practice settings. Research in the office setting will include collaborative practice-based research networks, quality improvement activities in large subspecialty groups, and office investigations funded through programs like the AAP Fund for Research in Pediatric Practice. These studies will require highly trained investigators to coordinate these efforts; the Robert Wood Johnson Clinical Scholars program is an example of the type of training that will be required. Additional key areas of research include methodology for monitoring individual physician practice patterns and for the studies that evaluate the quality of care given by difference provider types.

- General Pediatrics in Rural Settings

Rural pediatric practice has always presented unique challenges. In addition to mastering all the skills necessary for economic survival in an urban or suburban environment, the rural pediatrician must function as neonatologist, intensivist, or pediatric specialist until the arrival of a transport team when a child is critically ill. Management of chronic illnesses, including inpatient treatment, is another aspect of the rural pediatrician’s role. Given the absence of local support, the rural pediatrician also needs to be facile at recognizing and managing severe behavioral problems, often with only phone assistance from mental health experts. Although computerized technology may modify some aspects of rural pediatrics, these challenges will still exist. In addition, rural pediatricians are called on to play a leadership role in community organizations. The local pediatrician often becomes the public health expert in the community, acting as advisor to schools, day care, Supplemental Nutrition Program for Women, Infants, and Children, and other types of committees. All these roles take time, and the physician needs to forge links with the major local institutions (generally the hospital) to receive funding for the time spent on these activities.

Summary

The numerous changes occurring in medicine currently offer tremendous potential for creative definitions of the role and scope of the generalist pediatrician that will more appropriately address the predicted health care needs of children and their families in the 21st century. Generalist pediatricians have an extremely valuable role to play in the provision of health care to children. Future practice opportunities for the pediatrician are limited only by the pediatrician’s imagination and vision.

CORE ATTRIBUTES, SKILLS, AND COMPETENCIES OF THE GENERALIST PEDIATRICIAN FOR THE FUTURE: IMPLICATIONS FOR RESIDENCY TRAINING AND CONTINUING MEDICAL EDUCATION

In the section that follows, we present our conceptualization of the core attributes, skills, and competencies of the generalist pediatrician of the future (Table 4). This conceptualization rests on 6 key principles:

- The pediatrician is the best trained professional to provide quality health care services to infants, children, adolescents, and young adults within the context of their family, community, and environment.
- Pediatric training should continue to emphasize in-depth knowledge of normal development,

### TABLE 4. Core Attributes, Skills, and Competencies of the Generalist Pediatrician of the Future

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<tr>
<th>Attributes</th>
<th>Skills</th>
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<tr>
<td>Kindness and compassion</td>
<td>Technical/procedural skills</td>
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<tr>
<td>Professionalism</td>
<td>Medical practice management skills</td>
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<tr>
<td>Commitment to children and families</td>
<td>Computer and Internet skills</td>
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<td>Self-knowledge</td>
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<th>Competencies</th>
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<tr>
<td>Diagnostic and clinical acumen</td>
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<tr>
<td>Critical thinking ability</td>
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<tr>
<td>The individual and population perspectives</td>
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<tr>
<td>Fiduciary and stewardship responsibilities</td>
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<tr>
<td>Practice of collaborative care</td>
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<tr>
<td>Provision of culturally effective care</td>
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<td>Community service</td>
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<td>Advocacy for children</td>
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childhood disease processes, evidence-based management, and technical skills but should additionally embrace new areas that mirror the changing health care needs of children.

- 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. Systems of care, however, must be structured to facilitate rapid, efficient communication, and integration of care among general pediatricians with special interests and pediatric subspecialists.

- Given the varied occupational opportunities for pediatricians and the geographic maldistribution of pediatric health care providers, career counseling and mentoring around the development of those skills and competencies necessary for a resident’s career goals should be a major focus of each residency training program over the entire 3-year training period. Physician mentors from the community should be routinely used to help residents plan for and transition into generalist pediatric practice.

- Consistent with the requirements of patient care and of education, it is important that we create an environment for learning in our graduate medical education programs that reinforces rather than detracts from the kinds of attributes and competencies outlined in Table 4.

A 36-month pediatric residency is only part of the continuum of learning for pediatrics; continuing medical education and highly developed computer skills will play an increasingly important role for pediatricians, given the multiplicity of advances forecasted for the future.

- Core Personal Attributes

Residency training must encourage the development and enhancement of core personal attributes for the pediatrician of the future, namely: 1) kindness and compassion, including empathetic communication skills; 2) professionalism; 3) a commitment to children and families; and 4) self-knowledge. The attributes of kindness and compassion for others, as well as empathetic listening abilities, are essential for understanding individual child and family needs. Professionalism embodies ethics, honesty, integrity, and prioritization of the health-related interests of patients and society. Pediatricians must also have a strong appreciation for and enjoyment of the child as a unique individual who is also a part of a family, community, and broader environment. Lastly, pediatricians must have a strong base of self-knowledge that allows them to acknowledge their own interpersonal strengths and weaknesses and to identify any hidden values or unacknowledged conflicts that may affect their ability to provide care to diverse families. Although residents entering pediatric training should possess the foundation for these 4 personal attributes, training programs must encourage and facilitate their further development. Programs should encourage the development of these attributes through evaluation processes, discussions, and workshops. Faculty should also model these personal attributes in their interactions with families, health care professionals, staff, and residents. The pediatric education community must develop curricula that address these areas using published guidelines like those developed by the American Academy on Physician and Patient.

- Core Skills

In order for the general pediatrician of the future to be successful, she or he must acquire core skills during residency training and through continuing medical education activities. We have conceptualized those necessary skills: 1) technical/procedural skills; 2) medical practice management skills; and 3) computer technology skills.

Technical/Procedural Skills

Residents must be assured excellent training in the stabilization of neonates and critically ill or injured children to manage those children’s problems appropriately in the delivery room and acute care setting. This requires: 1) sufficient nursery experience to give the physician expertise in the supervision of neonatal resuscitation, neonatal airway management, and hemodynamic stabilization; and 2) sufficient experience with critical care medicine in older infants and children to be able to provide leadership to a team stabilizing a critically ill patient. Facility with common procedures (intubation, intravenous lines, umbilical artery catheters, laboratory procedures, and chest tubes) is crucial. A working knowledge of pediatric advanced life support and advanced pediatric life support techniques and algorithms, in addition to the knowledge base to construct a differential diagnosis for further care, is essential. Physicians actively involved in the stabilization of neonates and critically ill or injured children will need to maintain and update these skills. In addition, the physician should be able to review and critique written policies and procedures for newborn and critical care.

Medical Practice Management Skills

Generalist pediatricians will need to be adequately trained to take effective responsibility for the management of a medical practice or other ambulatory setting. As part of residency training and continuing medical education, pediatricians need exposure to practice management, coding and billing issues, and principles of quality improvement to survive and flourish within the demanding and ever-changing health care system.

Computer and Internet Skills

Residency training must incorporate an understanding of the basics of database operations for information acquisition and communication. The pediatrician must be able to manage clinical information using current information and technology to its full advantage. In addition, computerized systems for shared decision-making and the Internet will empower patients to take an active part in their care,
enhancing their confidence. How these systems will impact practices in the near future depends on provider willingness to allow the traditional doctor–patient roles to become more reciprocal. These are behaviors that will need to be modeled for physicians-in-training.

• Core Competencies

Pediatric residency training and continuing medical education should encourage the development of core competencies to meet the needs of the generalist pediatrician of the future. We have currently conceptualized these as competencies in: 1) diagnostic and clinical acumen; 2) critical thinking ability; 3) individual and population perspectives; 4) fiduciary and stewardship responsibilities; 5) the practice of collaborative care; 6) the provision of culturally effective care; 7) community service; and 8) advocacy for children.

Diagnostic and Clinical Acumen

Generalist pediatric training must continue to provide exemplary training in well-infant, -child, and -adolescent care and preventive services, including counseling and anticipatory guidance, to optimize child and adolescent health outcomes. Residency training should address the limitations in training articulated in recent surveys of physician graduates. Residency programs should also stress primary care fundamentals including phone triage, lactation counseling, the evaluation of the potentially abused and neglected child, and the management of the health and illness concerns of children in day care.

Residency programs need to further emphasize history taking, physical examination, and empathic/listening skills to maximize the generalist pediatrician’s ability to diagnose and manage patients in an efficient manner in the ambulatory setting.

A comprehensive, biopsychosocial approach to children’s problems must be modeled during residency training. This should include exposure to perspectives from fields such as psychology, anthropology, sociology, epidemiology, bioethics, and law. Residents need to develop the clinical skills that create and sustain the doctor–child–parent relationship, maximize outcomes for children, and address the many unmet needs of children that require social/environmental and public policy interventions.

Residents will need more exposure to subspecialty ambulatory care to provide early detection of serious disease and to manage more children with higher acuity conditions. Training must not produce generalists who can only deliver routine and preventive care. Residents will need to experience a predetermined core series of common subspecialty problems; if these are not available through direct clinical care, the curriculum will need to be supplemented with simulated patients or computerized encounters. Programs also need to reevaluate month-long subspecialty rotations and flexibly schedule longitudinal outpatient subspecialty experiences. However, it must be realized that few training programs are currently positioned to deliver this kind of curriculum.

Two areas of critical import for greater inclusion in residency training and continuing medical education programs were also identified by the workgroup: 1) neurodevelopmental and behavioral pediatrics, and 2) molecular medicine and genomics. Given the high prevalence of developmental and behavioral disorders in children of all ages, exposure to research and practice regarding early brain development and developmental and behavioral pediatrics is essential. Extra training in children’s mental health must be provided, particularly with respect to the initial assessment, diagnosis, and treatment of common childhood psychiatric conditions and the use of pharmacotherapy and other modalities. Likewise, thorough training in molecular medicine and genomics must also be increasingly incorporated into teaching seminars, grand rounds, and other forums to prepare pediatricians for predicted changes in care.

Critical Thinking Ability

Critical thinking encompasses many competencies under its rubric. First, pediatricians must understand the issues associated with evidence-based medicine and its relationship to patient outcomes. Second, pediatricians must develop basic research skills that allow them to pose and critique research questions about the care they deliver. Third, pediatricians will need to develop strategies for self-evaluation and lifelong learning during residency.

Evidence-based medicine can be defined as a state of mind and a commitment to excellence requiring new skills concerning literature searches and the interpretation and evaluation of literature. It emphasizes anecdotal experience, intuition, and nonrigorous approaches to data evaluation and places emphasis on traditional scientific authority and adherence to standard approaches including biostatistics, epidemiology, and study design. Training programs have incorporated these concepts in the past but to highly variable degrees. The paradigm shift to accountability means that physicians will need to know what kind of evidence is available for management decisions and how to use the available literature to guide medical practice. Programs will need to teach residents to tolerate the uncertainty of realizing how few of our medical treatments have been subject to rigorous scientific assessment and how to cope with a changing evidence base as new studies emerge and issues of information overload are confronted. Residents will need exposure to consensus models of developing standards of care for health and management when the available evidence is limited. Residents will also need to be trained with the expectation that practitioners must be involved in the generation of new knowledge through research in the office setting.

Individual and Population Perspectives

Pediatric resident training will need to introduce residents to the concept of managing the dichotomy between patient-based and population-based perspectives through increased exposure to public health issues. Because the day-to-day activities of pediatrics are rooted in the clinical encounter, most
pediatricians are conscious of the patient-based perspective toward health. We consider ourselves the servants of the children and families we treat and obtain a sense of accomplishment by our ability to meet their specific needs. We feel confident that the sum of all the deeds we perform daily improves the quality of life of our patients, both by preventing morbidity through our educational efforts and by dealing with diseases. As clinicians, the population perspective is an abstraction, formulated by persons who usually are unaware of the challenges we face and overcome, and sometime unappreciative of the personal cost to us in time and stress. However, understanding the population perspective has become increasingly important for the generalist pediatrician. As medical practice reorganizes into integrated health systems and pediatricians assume responsibility for large panels of patients through contractual relationships with managed care organizations, pediatricians must balance the individual focus against the new perspectives of population-based risk. In addition, the complete pediatrician has to understand the limitations of the ability of clinical medicine to impact disease, no matter how astute and concerned the physician. The population-based or public health perspective stems from understanding that factors that shift society’s bell-shaped curve in the correct direction may do more to promote health than clinical medicine is able to accomplish. By promoting prevention, where many people receive a small benefit, the total benefit to society may be large. These 2 perspectives need not be in competition, because they both have the same goals.100,101

**Fiduciary and Stewardship Responsibilities**

Our fiduciary responsibility as clinicians is to be effective advocates and trusted physicians for each of our patients and must remain our central goal as professionals who care for children. One of the principle attributes of the pediatrician has been his or her interest in the patient’s welfare, particularly in the clinical domain. However, the new managed care environment has brought the question of fiscal responsibility and fiscal accountability squarely into the equation. In the past, the use of health services has been driven by the pediatrician’s perceptions of a child’s health needs, as well as parental concerns and/or requests. In the new patient environment, however, managed care has introduced a degree of restraint over such negotiations and the physician has been asked to balance his or her fiduciary responsibility with his or her stewardship responsibility. Effective and intelligent use of these dual responsibilities clearly offers the opportunity for the physician to be both in a position of authority and in the position of an effective advocate for the individual patient. However, these fiduciary and stewardship responsibilities carry the possibility of significant ethical conflicts for the pediatrician depending on the fiscal environment in which she or he practices. The central goal of serving as an effective caregiver and advocate for children and their families must not be lost.

**The Practice of Collaborative Care**

The pediatrician for the 21st century must have the leadership skills necessary to know when to direct, when to facilitate, and when to work under others, both when interacting with other health professionals, schools, and/or when working with families. The 1970s model for patient interaction gave autonomy to the physician, who acted alone to direct patient care. Rare conditions went to the medical center, where communication with the primary care doctor was limited. Four factors have altered this dynamic: 1) the development of the medical home concept, 2) the economic domination of managed care making better specialist-to-pediatrician communication essential, 3) the increasing empowerment of parents and patients as consumers, and 4) the growing awareness of the interrelationship between patient education and health outcomes for children. Pediatricians will increasingly function as members of teams of providers collaborating with other pediatric subspecialists, allied health professionals, schools, hospitalists, and families. Team skills come naturally to some physicians but need development in others. Training programs need to recognize their importance to the pediatrician of the future and provide role models and experiences to their trainees.

**Competency in the Provision of Culturally Effective Care**

Although residency and continuing medical education programs cannot offer extensive information about the multiplicity of cultures in the United States, pediatricians should be trained to be aware of the importance of cultural differences. Secondary language skills and training in the effective use of translators should also be encouraged. These recommendations are a natural outgrowth of the increasing cultural, economic, and ethnic diversity in the United States. Physicians moving to a community during and after training will need to learn about the specific practices and assumptions of their patients and families and incorporate their belief systems and cultural norms. Even physicians who practice in homogeneous communities learn quickly that belief systems about health and disease can vary by subgroup and social class. If the clinician is not sensitive to these differences, communication becomes distorted. When possible, the astute clinician will blend the conclusions yielded by the differing perspectives into a set of recommendations that are feasible and congruent with both worlds. The generalist pediatrician must also be willing to adapt his or her practice style, location, and service menu to patients needs. Cultural change in an environment may be abrupt; the practitioner will need to be able to respond rapidly and effectively.

**Community Service**

Residents will need exposure to models of community service, as well as experience in determining how to find appropriate services for their patients’ families in an efficient and reproducible way. The voice of the pediatrician in the community and the services she or he provides are highly valued. Pedi-
Advocacy for Children

Especially during this time of turbulent change, advocacy must be acknowledged as a key competency for generalist pediatricians to acquire and use to the benefits of their patients. Although the amount of advocacy each pediatrician engages in will vary, generalist pediatricians will need to know how to monitor health care financing and organizational decisions and lobby effectively in partnership with other advocates for children’s needs.

One of the attributes of the pediatrician has been his or her willingness to be a strong and effective advocate for his or her patients. In the past, these attributes have included speaking out on health care, legislative, social, and educational issues that have had an impact on children. The history of pediatrics as a discipline is replete with examples of the strong advocacy roles that individual pediatricians have played to benefit their patients, both on a personal level, as well as in the legislative arena. Challenges for the generalist pediatrician of the future will include advocating for children within an aging society, addressing the growing proportion of children living in poverty, and responding to the new fiscal environment. Just as generalists must be good stewards of health care resources, generalists must also advocate that those resources are adequate to provide health care for all infants, children, adolescents, and young adults. Educators will need to prepare residents to deal with ethical dilemmas that will undoubtedly arise as health care systems evolve, particularly around issues concerning the balance between cost-containment and quality of care. Advocacy skills can be learned through problem-based learning and experiences within the context of published frameworks. The AAP should also expand its leadership development programs, particularly for young members and families.

CONCLUSION

Multiple forces are changing general pediatrics. As pediatricians try to anticipate and meet the health needs of America’s children, we need to remind ourselves of the lessons of the past. Our profession has a history of clinical excellence melded with a sense of social responsibility and a tradition of advocacy. Although pediatricians in training need to acquire a wide range of medical skills to fill the role of the generalist, the training experience should also help residents develop their vision of a better future for children. New forms of reimbursement, new technolo-

ogy, new demographics, and new forms of organization all have altered how we must face this challenge, but the challenge remains the same.

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