ogists, pathologists, and many others can do research on development. The pediatrician’s clinical orientation, however, marks his uniqueness.”

As our understanding of the complexity of human development has grown, our appreciation of the range of variables that can affect the health and well-being of children has increased. Indeed, greater knowledge has both augmented the pediatrician’s effectiveness and underscored his or her present limitations. As we contemplate the full scope of child health challenges in our society, we realize the extent to which pediatric clinical expertise is necessary but not sufficient to address them fully. As we confront the requirement for greater knowledge about the determinants of human health and development, we highlight the responsibility of pediatricians to ensure that future research focuses on the right questions. As Richmond charged: “We stand on the threshold of achieving the best health record for children the world has ever known. Whether we cross this threshold will depend upon the imagination, industry, and resourcefulness with which we expand and apply our knowledge of child development.” The need for creative pediatric leadership is clear. And, as was true more than 3 decades ago, the time is now.

**SUGGESTED READINGS**


**COMMENTARY**


Comments by Robert A. Hoekelman, MD

**ABSTRACT OF ORIGINAL ARTICLE.** The increase in population of the United States is occurring at a much more rapid rate than the increase in medical and nursing personnel available to maintain health services at an optimum level. Unless the pattern of furnishing health care, particularly to lower socioeconomic groups in both urban and rural areas, is drastically improved, these groups will suffer from increasingly inadequate health supervision. This paper describes an educational and training program in pediatrics for professional nurses (the “pediatric nurse practitioner” program), which prepares them to assume an expanded role in providing increased health care for children in areas where there are limited facilities for such care.

**COMMENTARY**

This article describes the first pediatric nurse practitioner (PNP) training program. It was established in 1965 at the University of Colorado’s Schools of Medicine and Nursing. The authors were Henry K. Silver, MD, Professor of Pediatrics, Loretta C. Ford, EdD, Professor and Chair of Public Health Nursing, and Susan G. Steary, MS, the first student enrolled in the program.

The impetus for preparing nurses to assume an expanded role in providing primary health care services for children was the need to serve more children, especially those of lower socioeconomic status. At the time, there was a shortage of physicians and predictions of a greater shortage in the decades ahead, particularly of primary care physicians available to children. This was compounded by 1) expansion of medical knowledge, resulting in an increasing number of treatable diseases and survival rates for diseases that require more maintenance health care, and 2) an increased demand for medical services, resulting from a growing awareness by the public of the advantages of comprehensive and preventive health care, the ability to pay for it, and urbanization. In 1930, a child averaged two visits to a physician; by 1967 this number had risen to five.

The PNP was one solution to meeting the challenge of providing primary health care services to all children. There were two others proposed by Dr Silver:

1. In 1968, he launched the Child Health Associate Program at the University of Colorado Medical Center. It prepares persons who have 2 to 3 years of college education in a 3-year training program to be a physician assistant (PA) who focuses on providing primary health care services to children. The program continues today and has prepared 50% of the 800 to 900 pediatric PAs currently working in the
United States (G. B. Merenstein, personal communication, January 24, 1998). Only 3% to 4% of the 26,000 PAs practicing in the United States in 1996 specialized in pediatrics; 40% to 50% worked with family medicine clinicians, 10% with general internists, and the rest with surgeons and medical subspecialists; currently 75% of PA students and 48% of all practicing PAs are women. Child Health Associate training programs have not been replicated elsewhere.

2. In 1970, he conceived the School Nurse Practitioner Program, which was sponsored and implemented by the Schools of Medicine and of Nursing at the University of Colorado and the Denver Public Schools. School nurses were prepared to provide comprehensive well-child care and to identify and assess the factors that may produce learning disorders, psychoeducational problems, perceptive-cognitive difficulties, and behavior problems, as well as those causing physical disease. The school would serve as a principal setting for comprehensive primary and continuing health care services because it is the one place where children between the ages of 5 and 18 years are regularly and readily accessible. He believed that effective use of a large number of the then 16,000 school nurses nationwide could result in a major modification of the health care system by using the school as the setting where a significant portion of health care for children is provided. In 1995, 25 years later, there were six school nurse practitioner (SCHNP) training programs in schools of nursing, representing just 1.14% of all nurse practitioner educational programs. According to the National Association of School Nurses, the University of Colorado’s Office of School Health, and the American Nurses Credentialing Center, there are approximately 2250 certified and 2000 noncertified SCHNPs currently in practice. However, it is not likely that there are very many who are functioning in the ways that Dr Silver envisioned, because boards of education and school taxpayers in the nation’s 16,000 school districts are reluctant to assume the costs involved in providing the full spectrum of primary health care services to students.

On the other hand, the PNP concept has endured and grown. There currently are 82 masters degree PNP educational programs in the United States accredited by the National Certification Board of Pediatric Nurse Practitioners and Nurses. The PNP of today practices pretty much the way Dr Silver and Dr Ford envisioned—as a member of an interdependent health care team caring for pediatric patients in a variety of ambulatory settings. PNPs relate to pediatricians as colleagues sharing responsibilities for all aspects of child health care. They provide comprehensive well-child care, appraise, and manage most acute minor illnesses, and contribute to the care of chronic conditions. Their role is accepted by parents, pediatricians, and third-party payers, and the quality of the care that they provide within their areas of competence is comparable to that provided by physicians. Furthermore, the care they provide is efficient and cost-effective.

The University of Colorado program to prepare PNPs enrolled baccalaureate degree and public health master’s degree nurses in a 4-month training period at the Medical Center, followed by a 20-month period of continued training in the community. Other PNP training programs that were established soon after enrolled diploma school registered nurses as well. Today, however, largely due to Dr Ford’s influence, virtually all PNP training occurs at schools of nursing in master’s degree or postmaster’s degree programs, with a baccalaureate degree in nursing being a prerequisite.

The article describing the first PNP training program reviewed herein has had, in my view, greater impact on the practice of primary care pediatrics than any other ever published in Pediatrics. PNPs working with pediatricians in private practices, community health centers, and hospital outpatient departments have not only expanded the role of nursing in primary care pediatric practice, especially in underserved areas, but have enabled pediatricians to spend more time with patients who have complex illnesses. The quality of care rendered by teams of pediatricians and PNPs has been shown to be higher than that provided by pediatricians working alone.

The number of PNPs practicing in the United States is not known. The National Certification Board of Pediatric Nurses Practitioners and Nurses has certified 6470 PNPs to date, and the American Nurses Credentialing Center has certified 2678 more. However, some states do not require PNPs to be certified to practice, and some certified PNPs are not in practice. The number in practice could be anywhere from 10,000 to 15,000, or more.

The impact of the University of Colorado’s PNP Program on pediatrics beyond primary care practice and on the practice of all medical disciplines has been enormous because it “opened the door” to the advanced education of nurses in essentially every field of health care. Although the initial prototypes of advanced practice nurses (APNs) evolved 1) in 1877, when nuns administered anesthesia at St Vincent’s Hospital in Erie, Pennsylvania, 2) in 1925, when an American nurse trained in midwifery in Great Britain established a practice in Appalachia, Kentucky, and 3) somewhere in between 1877 and 1925, when public health nursing had its origins, these APNs were created outside the mainstream of nursing education with no national accreditation of training programs or certification of their graduates. The University of Colorado’s PNP program changed the focus of advanced practice nursing education (including that for nurse anesthetists, nurse midwives, and public health nurses), placing that focus on schools of nursing and on national accreditation of master’s degree educational programs and certification of their graduates. The University of Colorado’s PNP program changed the focus of advanced practice nursing education (including that for nurse anesthetists, nurse midwives, and public health nurses), placing that focus on schools of nursing and on national accreditation of master’s degree educational programs and certification of their graduates. What followed in the 33 years since 1965 has been a plethora of new APNs and the Nurse Training Act, which has provided sustained federal funding for the education of APNs in master’s degree programs in schools of nursing.

Beyond PNPs prepared for primary care practice, the field of pediatrics has seen the arrival of nurse practitioners (NPs) and clinical nurse specialists (CNSs) in
virtually every pediatric subspecialty. Each has a master’s degree in nursing that has prepared them for practice in a specific area.13 Their knowledge and skills have improved inpatient and ambulatory care for infants, children, and adolescents who have every illness imaginable. The number of NPs and CNs in the pediatric subspecialties is unknown.

The University of Colorado’s PNP prototype also has led to the generation of APNs who work in all health care fields and are graduates of schools of nursing master’s degree programs for their specialty and are certified by national nursing credentialing organizations. They include, among others, family NPs, gerontological NPs, woman’s health NPs, public health nurses, certified registered nurse anesthetists, clinical nurse midwives, adult NPs, acute care NPs, occupational NPs, and psychiatric NPs. In 1995, there were 527 primary care and specialty master’s and postmaster’s degree programs in nursing schools throughout the United States according to a survey conducted by the National Organization of Nurse Practitioner Faculties.9 The survey obtained an 80% response rate from these schools, which also indicated that for 1995 there were 7926 students enrolled in and 3105 graduates of the 527 programs. The total number of APNs practicing in these health care fields is unknown.

The most recent impact of the expanding role of nurses in health care (first legitimized by the University of Colorado’s PNP program) is the substitution of NPs for physician residents in teaching hospitals. This has occurred because 1) NPs have demonstrated their ability to provide safe, efficient, care in an acute care environment, 2) some states have mandated reductions in the number of residents training and the number of hours residents in-training can work each day and each week, 3) there is concern that residents cannot meet the service needs of hospitals and their own educational needs simultaneously, and 4) NPs assigned to one inpatient unit for long periods can provide better continuity in patient care than can residents whose rotating assignments to inpatient units are short-term.14 In pediatrics, the neonatal NP has been utilized most, with great advantage to all.15 The expanded role of nurses in health care has revolutionized the practice of medicine in both primary care and subspecialty arenas. One wonders how much more will change because of the ripple effect of the PNP program launched in 1965 and initially reported in 1967 in Pediatrics.

REFERENCES

7. Cowley JF. Physician assistants. JAMA. 1997;277:1094

COMMENTARY


Comments by H. Eugene Hoyne, MD, FAAP

ABSTRACT OF ORIGINAL ARTICLE. Amniotic fluid cells obtained by transabdominal amniocentesis at various stages of pregnancy were cultivated successfully. The intrauterine detection of Down syndrome, galactosemia, and mucopolysaccharidosis was established using the cultured amniotic fluid cells. The use of this procedure increases the precision of genetic counseling and should stimulate the development of new approaches for the intrauterine management of genetic defects. However, until considerably more experience is gained with these techniques, the procedures should be considered experimental.

COMMENTARY

This article by Nadler marks one of the milestones in the development of the field of modern medical genetics.1 Compared with many of the subspecialties of pediatrics, genetics became applicable to clinical medicine relatively late, with the
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The online version of this article, along with updated information and services, is located on the World Wide Web at:
/content/102/Supplement_1/245.full.html