Task Force 3: Partnerships in Delivery of Cardiovascular Care

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Introduction

Partnerships in cardiovascular care exist under the umbrella of health care in which multiple disciplines collaborate to provide comprehensive, quality patient care. Many individual health care specialists participate in the comprehensive cardiovascular health care team: cardiologists, advanced practice nurses, physician assistants, pharmacists, nutritionists, physical therapists, behavioral medicine specialists, technologists and others. These specialists all contribute to the quality health care provided to the patient. Descriptions of all of these specialists is beyond the scope of this task force. This report specifically addresses the role of the registered nurse, the advanced practice nurse and the physician assistant in cardiovascular care.

Nonphysicians are taking an expanded role in areas of health care in which physicians are relatively unavailable for reasons of time, geography or priorities. The relative unavailability of physicians may be temporal, as when coronary care unit nurses defibrillate patients during the night; geographic, as when physician assistants or nurse practitioners provide medical care to patients in sparsely settled rural settings or underserved inner cities; or due to differing priorities, as when specially educated nurses oversee risk factor modification and chronic disease management in settings in which physicians are focused on acute care.

The structure of health care delivery is rapidly changing in response to the economic forces operating in our current health care system. The role of nonphysician providers is likely to expand if large numbers of previously uninsured (estimated at 37 million) and underinsured individuals are provided access to medical care under pending health care reform proposals (1,2). Physicians and hospital administrators are already anticipating a new reimbursement system, and states are beginning to draft their own health care legislation. Schools of medicine and nursing and physician training programs and in increasing numbers of physician assistants and nurses prepared at an advanced level to care for patients with potential or actual cardiovascular disease. Ultimately these changes will result in increasing partnerships between physicians and nonphysician practitioners. On the basis of past experience, these partnerships have the potential of improving both the economics and outcome of cardiovascular care. In fact, much of the progress observed in acute hospital-based medical care during the past 20 years is directly attributable to the efforts of nonphysician health care providers (nurses and physician assistants) working in coronary care units and other specialty units. In general, these providers developed and refined detailed management guidelines. Documenting the efficacy of these guidelines has provided a solid scientific basis for nonphysician participation in acute care (6).

The role of nonphysicians in outpatient areas of cardiovascular practice is much more limited than in acute care for two reasons. First, acute cardiologic care is largely hospital based, whereas subacute and chronic disease care are largely office based. Staffing a single hospital with nonphysicians is generally easier and more cost-effective than staffing the dozens or scores of physicians' offices from which hospital referrals originate. Second, the breadth of cardiac conditions encountered in outpatient practice is greater than that encountered in inpatient practice. This diversity limits the effective participation of nonphysicians because treatment guidelines are much less well developed for outpatient than inpatient practice. For these reasons, the
efficacy of nonphysician participation in the outpatient care of patients with cardiovascular disease is less well documented in clinical studies than for inpatient practice. Current plans for health care reform call for expansion of the role of nonphysicians into such outpatient-based tasks as chronic disease management and coronary risk factor management. However, this expansion will be hindered by the lack of documentation of efficacy and legislative barriers.

Consolidation and Standardization of Medical Practice

Two evolutionary forces—consolidation and standardization—are changing contemporary medical practice in the United States (7). Both provide increasing opportunities for nonphysician health care personnel to offer services previously provided solely by physicians. The first, consolidation of medical practice, is the increasing tendency of larger organizational units to incorporate smaller ones. This trend is apparent in the recent proliferation of health maintenance organizations (HMOs) that provide outpatient as well as inpatient care in the same facility. Whereas allocation of tasks among physicians and nurses has traditionally relied on physician initiative, administrators and planners employed by large health care providers are taking increasing initiative in the allocation of such tasks. For example, allocation of tasks in cardiac risk factor modification among physicians and nonphysicians in the future is likely to have an even stronger economic basis than in the past; if both can do risk factor counseling equally well, and the nonphysician can do it more cheaply, the nonphysician is likely to provide the service.

The second evolutionary force is standardization of medical practice, that is, the increasing tendency of medical practice to become more systematic through the influence of practice guidelines and administrative and financial devices, such as diagnostic-related groups. These influences have decreased much of the variation in treatment practice. Standardization of practice facilitates allocation of tasks to nonphysicians, as seen in the treatment of patients in nurse-managed hypertension clinics (8).

Approximately 1,300 medical guidelines have been written and published since the first guideline was published in 1938 by the American Academy of Pediatrics (9). Guidelines have been developed by physician organizations, public agencies and private researchers. More recently, the Agency for Healthcare Policy and Research has convened 20 interdisciplinary panels (usually composed of physicians, nurses and consumers) to identify science-based appropriate diagnosis and care for a variety of conditions (e.g., heart failure, unstable angina and cardiac rehabilitation) that could be used by nonphysicians as well as physicians.

Topics are chosen for guideline development when they have the following characteristics:

- The problem has a high incidence of occurrence
- Treatment of the problem varies among practitioners
- A potential exists for inappropriate care
- The problem entails high economic cost
- A wide range of outcomes have been documented
- Sufficient research has been conducted to support standards of practice (10,11)

Guidelines have the potential for improving the quality of health care delivered to the patient with cardiovascular disease. Because guidelines are built on science-based knowledge, following specific recommendations about the diagnosis and treatment of a clinical problem tends to foster appropriate care (12).

Physician/Nonphysician Partnerships

The current debate on health care reform, coupled with the movement toward consolidation and standardization, has engendered much concern among physicians about the organization of and reimbursement for medical care. Specifically, physician organizations have expressed concern that the increasing use of nonphysicians is economically motivated and that the public will suffer if less well trained personnel provide care (13). However, the results of research conducted over the past two decades have demonstrated repeatedly that quality, cost and access are enhanced by the participation of nonphysician practitioners in health care (14–18). The nation’s health can be advanced by a collaborative partnership between physicians and nonphysicians (2).

As managed care becomes a reality, a variety of nonphysician practitioners will be increasingly utilized in primary and acute care settings. Nonphysician practitioners representing varied disciplines (e.g., clinical pharmacists, nutritionists, physical therapists and exercise physiologists) bring important talents and perspectives to the interdisciplinary team. However, nurses and physician assistants are the two categories of health care providers that are most likely to provide care for patients with cardiovascular disease in conjunction with physician specialists. A 1993 American College of Cardiology (ACC) Adult Cardiologist Work Force Survey revealed that 85% of respondents did not work directly with advanced practice nurses or physician assistants. Hence, it is important to describe their differing roles, education and credentialing.

Advanced Practice Nurses

Description of the role. The term ‘‘advanced practice nurse’’ is an umbrella term given to a registered nurse who has met advanced educational and clinical practice requirements beyond the 2 to 4 years of basic nursing education required of all registered nurses. It includes nurse practitioners, clinical nurse specialists, certified nurse midwives and certified registered nurse anesthetists.
Approximately 30,000 nurse practitioners work in clinics, hospitals or office settings (19). They are qualified to handle a wide range of basic health problems. They take physical and psychosocial histories, conduct physical exams, order and interpret laboratory examinations, diagnose and treat common acute and chronic illness and counsel and educate patients. Nurse practitioners have prescriptive authority in 43 states; in 22 states nurse practitioners can prescribe independently (i.e., without a physician's signature) (20). A 1968 national survey of nurse practitioners (19) found that 67% practice in ambulatory settings and 27% in the hospital setting; 88% were in primary care, and only 7% were self-employed. Nurse practitioners tend to locate predominantly in medically underserved areas—both rural communities and inner cities. Approximately 20% of nurse practitioners practice in rural areas, whereas close to 50% practice in inner cities (19). Some medical specialties (e.g., pediatrics and obstetrics) have had extensive experience with physicians and nurse practitioners working in professional practice groups, both in private practice and in HMOs (21-23). Cardiologists and cardiac surgeons have generally had little experience with this model, although anecdotal reports of such partnerships have been positive (24). In many states, nurse practitioners are reimbursed by third-party payers (20).

Clinical nurse specialists number ~40,000. They are registered nurses with advanced nursing degrees, either masters or doctoral, who work in a clinical specialty, such as pediatric or adult cardiology or cardiac surgery. Besides delivering direct patient care, clinical nurse specialists work in a variety of consultative, research, education or administrative roles. They are employed predominantly in specialty practice in acute, often tertiary hospitals. Seventy-one percent practice in hospitals, whereas 25% practice in ambulatory settings (19). Although both nurse practitioners and clinical nurse specialists may see patients autonomously, their emphasis is different. In general, “nurse practitioners focus on differential diagnosis and medical management, whereas clinical nurse specialists focus on patient and family education and assisting the patient to adapt to the disease.

Educational preparation and credentialing. All clinical nurse specialists hold a masters degree in a clinical area of nursing. Approximately 50% of nurse practitioners hold masters degrees, and all are certified by the state in which they practice. At least 36 states require nurse practitioners to be nationally certified by the Credentialing Center of the American Nurses Association or a specialty nursing organization as well. Individual states legislate the content of their nurse practitioner certification programs, and all require ~500 h of clinical activity supervised by a physician or certified nurse practitioner before certification.

As the clinical nurse specialist and nurse practitioner roles become more blended, a trend that is reflected in current nursing school graduate programs across the United States, it is likely that a masters degree will be required of all nurse practitioners. In general, masters programs in nursing are 24 months in length and require a masters thesis or comprehensive examination, or both, as well as required course work.

Nurse practitioner programs historically have focused on primary care, where federal training dollars and job opportunities were primarily available. More recently, schools of nursing have responded to the rapidly expanding market for nurse practitioners in acute care settings by implementing masters programs designed to prepare nurse practitioners to function in acute care (25-27). These programs include in their curriculum experience in acute care procedures, such as endotracheal intubation, insertion of pulmonary artery catheters and management of parenteral fluids. Graduate students learn to manage specific aspects of medical therapeutics through clinical rotations with physician preceptors and through collaborative development of treatment guidelines.

As distinguished from physician assistants, nurse specialists practice within the scope of their professional nursing licenses. Collaborating physicians should not bear any legal liability for the independent professional judgments of advanced practice nurses. Liability should only arise if an individual (a nurse or another physician) is under the direct control of a physician and is following a clear directive. Erroneous assumptions concerning legal liability of the advanced practice nurse/physician relationship probably stem from the so-called captain of the ship doctrine, which has been universally rejected in courts of law when applied to medical malpractice cases (28). Physicians may fear that they will be sued if a nurse practitioner in their employment makes a clinical error, but “a physician is not responsible for a nurse specialist’s actions that were not in fact directed by the physician” (28).

Physician Assistants

Description of the role. The role of the physician assistant originally was conceived by physicians to mobilize existing health manpower to augment health care. Individuals with previous experience in a medical role were provided an educational tract utilizing the medical model, prepared to perform many intellectual and functional tasks identical to their physician counterparts and allowed to function under the delegatory agency of a supervising physician responsible for a defined patient population. Since its inception, the role of the physician assistant has remained constant.

The essential role of the physician assistant is to provide health care services with the direction and responsible supervision of a doctor of medicine or osteopathy. The physician assistant is prepared to perform diagnostic, therapeutic, preventive and health maintenance services in any setting in which the physician renders care. These include eliciting a history, performing physical examinations, ordering and interpreting laboratory tests, recognizing abnormal conditions or disease states, determining treatment plans, assisting in surgery, seeing patients in clinic or making patient care rounds and, in the majority of states, prescribing medica-
clinical laboratory science, microbiology, biochemistry) and educated alongside their physician counterparts. Presently, to 153 weeks for the latter. Physician assistants are often training and is similar in structure, albeit shorter, than the supervision of a supervising physician. The two may be in different locations because most jurisdictional laws allow for telephonic communication or remote site practice, or both. However, readily available and accessible consultation with the supervising physician(s) is a necessary requirement of the physician assistant practice. This dependent relationship extends to the issue of reimbursement for services because physician assistants are not directly compensated by third-party carriers. Reimbursement for physician assistant services is made to the supervising physician or practice unit itself. A physician assistant may exercise a certain element of autonomy in the care of patients. However, the supervising physician is ultimately responsible for the care of the patient and, as such, for any acts or decisions made by the physician assistant. Consequently, the relationship between the physician and a physician assistant must be one of mutual trust and reliance.

The ~25,000 physician assistants certified in the United States today are found in virtually every specialty and subspecialty and in every type of practice setting. The Armed Forces, federal and state penal systems and governmental programs, such as the National Health Service Corps, have actively incorporated physician assistants in their health care structures. Faced with dwindling resources, many hospitals are employing physician assistants as medical and surgical house staff.

Educational preparation and credentialing. The educational preparation of the physician assistant reflects the medical model of the profession’s role and practice. Education of physician assistants is modeled after physicians’ training and is similar in structure, albeit shorter, than medical school; 102 weeks is the average amount of time to complete curriculum requirements for the former as opposed to 153 weeks for the latter. Physician assistants are often educated alongside their physician counterparts. Presently, there are 57 physician assistant programs located at medical colleges and universities, teaching hospitals and in the Armed Forces.

Typically, physician assistant programs are 24 months in length. The first phase, which is devoted to didactic experience, focuses on instruction in the basic medical sciences (anatomy, physiology, pharmacology, pathophysiology, clinical laboratory science, microbiology, biochemistry) and preclinical preparation (fundamentals of clinical medicine, physical diagnosis, medical ethics, emergency medicine). The second phase, which is devoted to clinical clerkships, focuses on internal medicine, general surgery, pediatrics, obstetrics/gynecology, family medicine and emergency medicine.

All physician assistant programs offer a certificate on graduation, and the majority offer a bachelor’s degrees. Presently, nine programs offer a master’s degree as the terminal degree. In general, programs require applicants to have at least 2 years of college education and experience in health care. The typical physician assistant student in 1993 has a bachelor’s degree and >4 years of health care experience before admission.

In almost every phase, physician assistant credentialing is similar to that of physicians, including a national credentialing examination and the regulatory requirements for state and local practice. Graduates of an accredited physician assistant program are eligible to sit for the national credentialing examination administered by the National Commission on Certification of Physician Assistants (NCCPA). The NCCPA develops physician assistant certification criteria and procedures and administers the Physician Assistant National Certifying Examination (PANCE). The PANCE is developed by the National Board of Medical Examiners, the agency responsible for all licensure and many certification examinations for physicians. The examination is a 2-day, three-component instrument comprising a General Multiple Choice examination, a practical component (Clinical Skills Problems) and two extended core examinations (Primary Care and Surgery). Certification requires passing General Multiple Choice and Clinical Skills Problems examinations and at least one of the two extended core components. Successful examinees are entitled to use the designations Physician Assistant-Certified, or PA-C.

Credentialing requirements at the state level universally resemble those of physicians, and, in fact, in the large majority of states physician assistant credentialing is performed by the same agency that regulates physicians (e.g., the Board of Medical Examiners). Because physician assistants must work under the supervision of physicians, applications are considered as a practice unit with both parties subject to individual and combined scrutiny. In hospitals or similar practice settings, practice privileges are requested jointly by the physician and the physician assistant, with the physician assistant subject to the same credentials committee review as the physician.

Effectiveness of Nonphysician Providers

The effectiveness of nurse practitioners and physician assistants has been studied for the past two decades. In general, researchers have used clinical outcomes, patient satisfaction and cost as evaluation end points. A study done in 1981 by the Health Services Research Center of the Kaiser-Permanente Medicare Care Program for the Division
of Medicine, Bureau of Health Manpower (16) found that 75% of adult care and 90% of pediatric care could be provided by nurse practitioners and physician assistants, with a significant reduction in cost. In 1986, the Office of Technology Assessment (17) conducted a comprehensive review of the studies to date, in which the effectiveness of nurse practitioners, physician assistants and certified nurse midwives was compared, using physicians in primary care as the comparison. It concluded that the nurse practitioners and physician assistants who were studied encompassed most of the primary care services provided by their physician counterparts and that the care was equivalent to that of care provided by physicians. They also attempted to quantify the impact of nonphysician practitioners and determined that “productivity studies indicate that nurse practitioners and physician assistants working under physicians’ supervision can increase total practice output by some 20–50%” (17). The Office of Technology Assessment concluded that nurse practitioners can satisfy the medical needs of 50% to 90% of the ambulatory patient population.

Most recently, Brown and Grimes (18) conducted a meta-analysis of 38 research studies conducted over the past two decades to document the outcomes of nurse practitioner practice. The majority of practice settings were community-based ambulatory care or hospital-based ambulatory care located in urban locations. The primary specialties of both the nurse practitioner and physician groups were internal medicine, family/general practice or pediatrics. The following results were noted: nurses and physicians ordered drugs at equivalent rates; nurses ordered more laboratory tests than physicians, but the average laboratory cost was 8% less for the patients seen by nurses; nurses scored slightly higher on quality of care measures than did physicians; nurses achieved higher scores than physicians on resolution of pathologic conditions, patient satisfaction, functional status and patient compliance; patient knowledge was equivalent between groups; the average number of visits per patient were equivalent, but, on average, nurses spent 25 min, whereas physicians spent 16.5 min; the average cost per patient visit was 40% higher for physicians; and patients managed by nurse practitioners experienced slightly fewer hospital admissions than did patients managed by physicians. Although these studies suggest that nurses prepared at an advanced practice level can deliver safe and cost-effective care, many of the studies lacked scientific rigor. More germane to the present discussion, the majority of patients were seen in a general practice setting (either internal medicine or family practice). The applicability of these findings to complex patients with cardiovascular disease has not been established.

**Potential Areas for Practice**

**Primary Health Care Setting**

Preventing disease is a relatively high priority in a managed care environment. The educational value of nonphysician providers in teaching patients the techniques to prevent heart disease by reducing hyperlipidemia, hypertension, obesity and smoking will increase in the managed care environment and elsewhere. The ability of physician assistants and advanced practice nurses to function in these settings with a high degree of independence has been established (14–18). Nurses who provide risk factor counseling in primary health care settings are adept because they tend to be perceived as less authoritarian and judgmental than physicians and because they are oriented to involving the family in all education and counseling efforts. They also schedule the necessary time to provide effective risk factor counseling, which entails orientation of patients to the rationale and methods for risk factor modification; systematic follow-up to ascertain patients’ current status; midcourse corrections, including the provision of further information or support in a nonjudgmental manner; and long-term maintenance of behavior change.

Health care professionals are most effective in risk factor modification when they are provided explicit guidelines (29). For example, patients tend to relapse to smoking not at random, but in specific, individually determined circumstances. Effective smoking relapse prevention entails strengthening of patients’ self-efficacy (confidence) to resist smoking in the circumstances in which they are most likely to relapse. Among postinfarction patients, this approach has yielded a biochemically documented 1-year smoking cessation rate of 71% compared with a 45% rate in usual care (30).

In coronary risk factor modification, the nonphysician professional’s role is complementary to that of the physician. Physicians are effective in exhorting the patient and stressing the risks of continued smoking, but experience shows that they do not take time to provide the detailed counseling necessary to achieve long-term smoking cessation (30). Nurses are effective in providing the detailed counseling and systematic follow-up, often by phone, required to achieve long-term smoking cessation (29,30). It is not sufficient for the health care professional to exhort the patient not to smoke; a structured behavioral intervention is required. Studies to measure the cost-effectiveness of these practices need to be accomplished, but the results will always be subject to interpretation based on local patterns of practice.

The physician/nurse team approach has also proved successful in drug therapy for hyperlipidemia. In one study (29), nurses operating under well defined guidelines achieved a high degree of patient compliance with a regimen of lipid-lowering drugs that reduced the plasma low density lipoprotein cholesterol levels of postinfarction patients to 107 ± 30 mg dl, a level that has been associated with regression of coronary atherosclerosis. More than 90% of encounters were successfully managed by nurses under guidelines. The remaining 10% required consultation with a nurse coordinator or physician lipid specialist. Consultation with the physician lipid specialist was usually necessitated by complex interactions between lipid-lowering drugs and comorbid con-
ditions or concurrent medications or by blood chemistry abnormalities or the appearance of medical conditions possibly attributable to the drug therapy. This division of labor between physician and nurse enabled the delivery of well tolerated, efficacious therapy in a cost-effective manner. Moreover, a substantially larger proportion of patients came under therapy consistent with National Cholesterol Education Program guidelines.

Outpatient Clinics and Offices

Nurses have facilitated systematic long-term monitoring of anticoagulation (31) and antihypertensive drug therapy (8). The effectiveness of nurses in these roles has been facilitated by computer routines that facilitate data entry and display, report generation and prompting. These computer functions ensure that critical tasks are performed in a timely manner and prompt the nurses to contact patients in case of missed laboratory or clinic visits.

Much of the burden of risk factor modification and chronic disease management is logistic. For example, simply ascertaining what drugs and what doses a patient is taking for a chronic disease is often difficult, especially when patients have multiple chronic diseases or take multiple medications. Computer routines that accurately track patients' medications over an extended period contribute substantially to the safety and efficacy of drug therapy. Long-term compliance to medications often begins with a successful short-term experience in which side effects are minimized or obviated, and efficacy is demonstrated. Nurses, supported by computer routines, have demonstrated their effectiveness in establishing and maintaining long-term patient adherence to medications (29).

Acute Care

If the number of cardiology fellowship programs is to be reduced to address the need for more generalists and fewer specialists, the hospital services currently provided by residents and fellows will need to be provided by nonphysicians. Published data support the view that physician assistants, nurse practitioners and clinical nurse specialists are educated to provide many of the services historically performed by cardiology fellows (17,32-34). With special education and experience, nonphysician practitioners can provide endotracheal intubation, insertion of pulmonary artery catheters and arterial lines and manage other aspects of medical care.

Unfortunately, the role of nonphysician practitioners in critical care is poorly described in published reports, and the extent to which nonphysicians function in those situations is unknown. The small number of reports that do exist are largely descriptive or editorial in nature (25-27) and are not generally applicable because the data may not be generalizable. Differences in practice patterns, funding, cost-accounting, patient volume and physician and physician extender supply and income from one setting to another further limit the generalizability of these data.

The available reports do suggest that in a proper environment, nonphysician practitioners can be used to deliver highly technical and complex care. Knickman et al. (32) studied the potential of nurse practitioners and physician assistants as physician substitutes under two models of care delivery. In the traditional model, in which the physician was the sole manager of care, 12% of the resident's time was spent in activities that could have been performed by nurses or physician assistants. In the collaborative model, in which physicians practiced in conjunction with midlevel practitioners, 38% of the resident's time was spent in activities that could have been performed by nurses or physician assistants. Physician assistants have functioned in the hospital setting, including cardiac critical care units, since the inception of the role. In one study, a broad array of techniques and procedures were developed for the provision of care in an intensive care unit, with acceptance by patients and satisfactory outcomes as defined by complication rates and length of patient stay (33). Physician assistants have also performed in emergency departments without complications and in a cost-effective manner (34).

More recently, studies have been conducted to determine the efficacy of nonphysicians in performing diagnostic tests traditionally performed by physicians. For example, Mots et al. (35) evaluated the feasibility of physician assistants performing coronary arteriography. The complication rate and facility in performing the procedure was compared with that of cardiology fellows. The procedure and fluoroscopy times were similar, and, most important, the mortality rate was zero. Other complication rates were favorable when compared with published standards. Additional experience with this same model and two additional physician assistants includes >1,000 patients, with no mortality and low complication rates (De Mots H, personal communication, November 1993).

The advantages of involving nonphysician providers in the care of cardiology patients are usually portrayed in economic terms. Even highly technical procedures may be performed safely and expeditiously by physician assistants or advanced practice nurses, especially if there is a high volume of procedures and little fiscal or other pressure for cardiologists to perform the procedures. If health care delivery continues its trend toward consolidation of providers into large cooperatives caring for patients in a capitated manner, physicians will be rewarded for managing care in ways that optimize outcomes and minimize costs. Cardiologists may then expend the majority of their effort in determining patient care strategy rather than in performing technical procedures.

On the other hand, practice patterns may change as cardiac laboratories become cost centers rather than revenue centers. In this case the frequency of procedures will decline or fail to increase in the face of increasing numbers of cardiologists. Market forces may make care by cardiologists so readily available that it can be obtained at a cost that is not significantly different from that delivered by nonphysi-
In underserved areas, there is a shortage of physicians, especially cardiovascular specialists. An expanded role for nonphysician practitioners should be considered for underserved areas. The training period for advanced practice nurses and physician assistants is shorter than medical specialists in served areas. The training period for advanced practice practitioners should be considered for underserved areas, especially cardiovascular specialists. An expanded role for nonphysician practitioners may be an effective answer to the physician shortage.

Pediatrics

Pediatric cardiologists commonly depend on the skills of a nurse specialist knowledgeable in congenital heart disease. In fact, many pediatric cardiology programs exemplify the kind of partnerships described previously. Often, these nurse specialists are trained initially as pediatric nurse practitioners and later develop skills specifically related to the care of young patients with congenital and acquired heart disease. In other instances, these nurses join a pediatric cardiologist from the ranks of hospital staff (e.g., from the pediatric or cardiovascular intensive care units). Nurses with a background in pediatric critical care who subsequently learn the broader perspective of outpatient evaluation and follow-up can often provide families with special insight into the problems encountered during their child’s hospital stay for surgery or special procedures.

Most large clinical pediatric cardiology programs employ several advanced practice nurses. Many such programs organize outreach or regional clinics, and an experienced nurse specialist can be invaluable in the management of such ambulatory activities. They may complete initial clinical evaluations before the physician’s examination, and they may play a more comprehensive role in routine postoperative checkups. The nurse is often the unifying force for families who may be seen by several different cardiologists and as such can be important in ensuring good continuity of care and effective communication.

Nurse specialists experienced in history taking and physical examination are effective in managing screening clinics for congenital heart disease. They can provide important support to public health and school nurses as well. Their effectiveness, however, is dependent on open, collaborative relationships with pediatric cardiologists and physician support at each level.

The role of a nurse specialist in a pediatric cardiology program may thus extend from the “routine” management of phone calls, prothrombin times and scheduling to comprehensive clinical assessment and patient/family education in regional ambulatory settings. As the pediatric cardiologist’s time with patients becomes more compressed, the nurse’s role as communicator becomes increasingly important.

Underserved Areas

In underserved areas, there is a shortage of physicians, especially cardiovascular specialists. An expanded role for nonphysician practitioners should be considered for underserved areas. The training period for advanced practice nurses and physician assistants is shorter than medical training, and there are larger numbers of potential nonphysician enrollees. Expanded use of nonphysician providers may be an effective answer to the physician shortage.

In a fully integrated health care system in which primary care is part of the continuum of care, nonphysician providers can make an important contribution to underserved populations. Programs to increase the numbers of physician assistants and advanced practice nurses must be coupled with greater efforts to increase the total number of nurses working in underserved areas.

Issues and Recommendations

Changes in health care, including the ways in which physicians and other health care professionals practice, are inevitable. Changes are projected in the way health care is financed, in the regulations that direct practice and in the traditional roles and activities of physicians, physician assistants and nurses (2,36).

Research conducted over the past two decades supports the belief that the delivery of health care by nonphysician personnel can result in decreased costs and improved clinical outcomes in various settings (14-18,37,38). Unfortunately, little of this research has been conducted in cardiovascular patient populations, and some of it has been sponsored by individuals or groups that could benefit from a positive comparison, such as health maintenance organizations, which raises the issue of researcher bias. However, despite any methodologic limitations, the consistency of the findings supports the opinion that increasing partnerships between physicians and nonphysicians can enhance access to and quality of health care for cardiovascular patients.

The development of effective and satisfying partnerships between physicians and nonphysicians is constrained by numerous regulatory, legal, reimbursement and attitudinal factors. These constraints are disappearing as states respond to federal initiatives in health care reform (20). The following recommendations concern the increased use of nonphysicians in the delivery of cardiovascular care.

Recommendations


Changes in the organization and reimbursement of medical care will place a greater premium on identifying the tasks that may be safely and effectively undertaken by nonphysician practitioners. Practice guidelines facilitate a clear delineation of the standard of care and enhance collaboration and communication. Practice guidelines also facilitate assessment of the quality of care, which is receiving increased attention. Guidelines need to be developed for both the inpatient and outpatient management of cardiovascular disease.

2. Encourage expansion of interdisciplinary models and team approaches for delivery of care to prevent and treat cardiovascular disease.
Collaborative models of practice have been demonstrated to increase the quality of care for people with cardiovascular disease (8,24). Physicians, advanced practice nurses and physician assistants should collaborate in delivering high quality, cost-effective care.

3. Enable physician assistants and advanced practice nurses to assume some of the clinical responsibilities created by the predicted reduction in cardiology fellowship positions.

Decreasing the number of cardiovascular specialists over the next two decades, as most experts recommend (3), requires reducing the number of specialty fellowship positions (38). Changes in financing arrangements will be required to broaden the role of nurse practitioners and physician assistants on cardiology and cardiovascular surgical services. Academic medical centers that have relied on fellows for the performance of technical procedures and patient management may choose to form partnerships with nurse practitioners and physician assistants to perform these tasks.

4. Enhance collaborative, team practice in organizations, modifying licensure and liability legislation as necessary.

There is no intention that nonphysician providers will independently provide cardiovascular specialty care to individual patients. However, they will play an essential role in preventive cardiology, risk factor modification and medical management of certain cardiovascular diseases. The few remaining legislative barriers to nonphysician practice need to be removed. In the majority of states, nurse practitioners have prescriptive privileges and are certified by state boards of nursing. However, in several states, legislative limits exist with regard to the ability of nonphysician providers to collaborate with physicians.

5. Encourage research to evaluate the effectiveness of different models for the delivery of care.

The vast majority of research evaluating the effects of using physician/nonphysician partnerships or nonphysicians as care providers has been conducted in primary ambulatory settings. Findings may not apply to the hospital-based care of complex cardiac patients. Research needs to be conducted to identify the clinical, behavioral, social and fiscal consequences of having nonphysician personnel provide health care to patients with cardiovascular disease.

6. Encourage graduate education programs in the health professions to develop interdisciplinary teaching, practice and research programs for the prevention and care of cardiovascular disease.

Interdisciplinary experiences promote appreciation of the competencies and contributions of other professions. Integrating biomedical expertise with other disciplines of inquiry (e.g., anthropology and economics) will further contribute to comprehensive approaches for meeting the cardiovascular health needs of communities and patients.

References

Introduction

Adult cardiovascular diseases constitute a frequent indication for both inpatient and outpatient medical care and are a major component in the practice of a family practitioner or general internist. Although many conditions are recognized to be within the scope of the generalist, other conditions, such as severe and life-threatening manifestations of both common and rare cardiovascular diseases and cases refractory to usual management, may benefit from the diagnostic techniques, therapeutic interventions and judgment based on experience provided only by the cardiovascular specialist. The point at which the generalist should consult the specialist is often indistinct and has profound implications for the quality and cost of health care, and hence the workforce needs.

This issue demands examination from two perspectives to define the interactions between the generalist and the cardiovascular specialist. The knowledge and skills in the care of cardiovascular diseases that the generalist possesses should allow definitions of the threshold for referral to the specialist. Conversely, the knowledge and skills that the adult cardiologist should have in general medicine should define the threshold for referral from the cardiologist to the generalist. A two-way interchange is ideal, in which patients receive care from the physician who can provide the most favorable outcome at the lowest cost.

Definition of the Generalist and the Cardiovascular Specialist

The Generalist

In an era of increasing specialization, the role of the generalist who provides first-contact, broadly based, continuous and coordinated care for nonreferred and undifferentiated patients has become increasingly recognized as an important issue in health care delivery. Concern about the boundaries between specialization and generalism within medicine has been prevalent throughout the 20th century. The following editorial comments appeared in JAMA in 1900 (1):

In these days of specialization, the field of the general practitioner has become greatly restricted. . . . at the same time as the value and the need of genuine specialists in medicine is fully recognized and established, there cannot be too strong a warning uttered against a tendency noticeable in some quarters to carry specialization to the degree of refinement beyond all reason.