

New Developments in Primary Care Practice

Warren P. Newton, MD, MPH, C. Annette DuBard, MD, and Thomas H. Wroth, MD, MPH

The great paradox of modern American medicine is the coexistence of stunning achievement in biomedical knowledge and technology, alongside our failure to meet the basic healthcare needs of a substantial proportion of the population.

As the bridge between technical advances in medicine and the real lives of patients, primary care physicians find themselves stretched thin by patient demand for greater responsiveness to urgent care needs, lack of time to deliver preventive services, and the increasing complexity of chronic disease management. Communities in North Carolina and throughout the country are facing a relentless escalation of healthcare costs, with an alarming rise in the proportion of the population without health insurance.

Simultaneously, the physicians serving these communities face increasing costs and decreasing reimbursement, with mounting pressure to see more patients in less time, or to limit the types of patients they care for, in order for their practices to survive.¹

The Aim of this Issue of the Journal

In response to these challenges, primary care is rapidly evolving, as healthcare providers explore new ways of responding to patient needs while also making their practices more efficient and effective. These innovations are the foci of this issue of the *North Carolina Medical Journal*.

Revisiting the history of general practice in North Carolina offers insight into contemporary primary care delivery, and

allows us to examine whether the structure of primary care that has evolved in our communities is adequately equipped to address the needs of the population being served. Our own review of this history suggests that primary care practice requires

“...physicians serving these communities face increasing costs and decreasing reimbursement, with mounting pressure to see more patients and less time, or to limit the types of patients they care for, in order for their practices to survive.”

substantial systematic change to remain viable and to provide adequate access to quality healthcare. Against the background of this historical overview, we will present ways in which practices across the state are rising to the challenge of improving access and quality while decreasing costs, and discuss implications for future strategic initiatives, policies, and research.

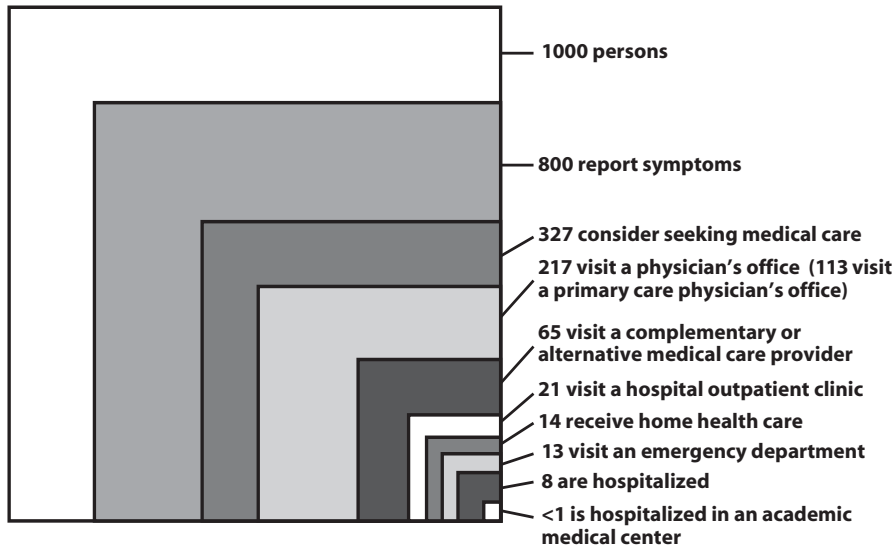
It is well-established that community-based primary care practices play a key structural role in the care of the population. Kerr White, T. Franklin Williams, and Bernard Greenberg first established this with their classic 1961 paper on “The Ecology of Medical Care,” derived from their work here in North Carolina, which demonstrated that the vast majority of patient care takes place in community-based outpatient practices, substantially distinct from care received in hospitals and academic

Warren P. Newton, MD, MPH, is the William B. Aycock Professor and Chair of Family Medicine at the University of North Carolina at Chapel Hill. His major interest is in the organization and effectiveness of care. He can be reached at warren_newton@med.unc.edu or CB 7595 Chapel Hill, NC 27599. Telephone: 919-966-5600.

C. Annette DuBard, MD, is a family physician practicing with Piedmont Health Services, Inc. and a preventive medicine resident in the Department of Social Medicine, UNC School of Medicine. She can be reached at annetedubard@hotmail.com or CB 7240, Chapel Hill, NC 27599-7240. Telephone: 919-643-1674.

Thomas H. Wroth, MD, MPH, is a family physician and preventive medicine resident at UNC School of Medicine. He can be reached at tomwroth@mindspring.com or Department of Family Medicine, CB 7595, Chapel Hill, NC 27599. Telephone: 919-966-3711.

Figure 1.
Results of a Reanalysis of the Monthly Prevalence of Illness in the Community and the Roles of Various Sources of Healthcare



Each box represents a subgroup of the largest box, which comprises 1000 persons. Data are for persons of all ages.

Source: Green, et al., 2001.³

health centers.² Larry Green more recently updated and confirmed this conclusion (see Figure 1).³

It is further evident that the strength of the organization of primary care has a major impact on the health of the population. Barbara Starfield conducted a series of studies in the early 1990s to measure the integration and impact of primary care systems around the world, and found that countries where primary care is most firmly established as the foundation of the care delivery system have not only the best health outcomes for the population, but the least expensive care.⁴⁻⁹ Within the United States, counties with more primary care providers have lower mortality rates.¹⁰ Similarly, states with higher ratios of specialists to the population have both higher healthcare expenses and lower-quality care for the Medicare population, while states with more generalists have lower spending and use more effective care.¹¹ The structure and processes of community-based primary care practice in North Carolina, then, warrant a closer look.

Looking Back: A History of Community Practice in North Carolina

Today's community-based primary care practices have evolved from a model that dates back at least a half-century. In 1952, there were just over 2,000 general practitioners in North Carolina, with a ratio of approximately 5,000 patients per primary care physician.¹² The health status of North Carolinians was poor at the time: 40% of whites and 60% of blacks were found unfit for the military draft during the World War II—the highest percentage of draft rejections of any state in the country. Leading causes of death included cancer, stroke, and heart attack; but deaths from tuberculosis, accidents, and

premature births were also much more common.¹³

In 1953, 75% of North Carolina physicians were in solo practices. Most primary care physicians offered hospital care and obstetrics, and one-in-ten performed major surgeries. Most physicians practiced out of small offices—often in a drug store or in a practice facility attached to their home—offering preventive care and treating respiratory infections, injuries, cardiovascular and infectious diseases, and other conditions. Fifty-two percent offered walk-in care, sometimes without appointment systems. Office staff was minimal, with perhaps a single nurse or assistant, and less than half of practices had their own x-ray and electrocardiogram (EKG) equipment. Record-keeping was sporadic; 11% did not keep clinical records and 47% kept notes that consisted only of the diagnosis or treatment.¹⁴

Community clinicians in 1953 worked 50 hours-a-week seeing patients in the office, not including on-call and after-hours work. Most had office hours on Saturdays, and a remarkable 11% also kept Sunday hours. In addition, most doctors visited patients in the hospital and made house calls. Fees were low, about \$3 per visit, contributing to an annual salary of about \$16,000.¹⁴

The population of North Carolina has nearly doubled in the last 50 years. While the number of family physicians today is only slightly more than the number of general practitioners in the 1950s, the addition of internists, pediatricians, and obstetricians to the primary care ranks has netted a ratio of about 1,200 patients to each primary care practitioner.¹⁵ As Table 1 shows, the mortality of influenza/pneumonia, non-vehicular accidents, premature births, and tuberculosis have all decreased substantially over the past half-century. Deaths due to cancer have increased dramatically, as have deaths due to chronic lung disease, chronic diabetes, and Alzheimer's disease.¹⁶ This explosion of chronic disease has had a large impact not only on mortality, but on the distribution of demand for patient care. While preventive care visits are still common, the proportion of visits for chronic conditions, such as cardiovascular disease, diabetes, and musculoskeletal disorders, has risen considerably (see Figure 2).¹⁷

The organization of primary care practice has also changed dramatically. Solo practices, which once accounted for three-quarters of all community practices, have largely been replaced by group practices. While health insurance only covered about 12% of patients in 1950, 73% of patients today are covered by Blue Cross Blue Shield, Medicare, Medicaid, or health maintenance organizations.¹⁸ As a consequence of changing needs of

Table 1.
Leading Causes of Death in North Carolina, 1952 and 2002

The past half-century has witnessed a disappearance of premature births and tuberculosis as leading causes of death, while cancer and chronic diseases have risen in dominance.

1952	Deaths per 100,000	2002	Deaths per 100,000
Heart disease	251	Heart disease ▼	222
Vascular lesions affecting CNS	98	Cancer ▲	194
Malignant neoplasms	80	Cerebrovascular disease ▼	63
Influenza and pneumonia	31	Chronic lower respiratory diseases ▲	44
Accidents (except motor vehicle)	30	Diabetes mellitus ▲	27
Motor vehicle accidents	30	All other intentional injuries ▼	24
Premature births	22	Alzheimer's disease ▲	24
Nephritis and nephrosis	17	Influenza and pneumonia ▼	23
Tuberculosis	15	Motor vehicle injuries ▼	20
Diseases of arteries	14	Nephritis and nephrosis	17

▼ Conditions for which mortality rates have decreased ▲ Conditions for which mortality rates have increased

Sources: *Division of Epidemiology Biennial Report, NC State Board of Public Health, 1952; and NC State Center for Health Statistics, Detailed Mortality Statistics, 2002.*

the population, the dramatic development of office-based technology, and the spread of insurance reimbursement, staffing ratios have gone up dramatically. The ratio of one nurse or assistant to one physician in the 1950s increased to an average ratio of 4:1 or 5:1 by 2004. The resulting increase in overhead is a key feature of the business model of modern primary care. Today's community clinicians have cut their office hours down to about 44 hours-a-week or less, with weekend hours much less extensive and house calls exceptional. The number of patients seen each week has dropped from an average of 170 to 95. Fees have risen to a mean of \$71 per office visit,¹⁹ while the median salary of all primary care physicians is now \$153,231²⁰—both representing dramatic increases far beyond inflation.

What are the lessons of this history? First, the primary care practices of the past were designed for short, problem-focused visits that addressed acute infectious disease, trauma, and well-person care. Consequently, practices were organized around rapid triage for relatively simple problems, with short appointments emphasizing diagnostic tests, brief treatments, and education. Most of the care delivered was provided by the doctor. In contrast, primary care practices of the future need to provide chronic disease management in addition to acute care and more comprehensive preventive services. In order to do chronic care well, Wagner and colleagues at Group Health Cooperative of Puget Sound have argued for an emphasis on patient self-management support, planned regular visits with care-giving teams, linkages to community resources, and evidence-based clinical decision support,²¹⁻²⁴ all of which require system redesign on an organizational level, rather than merely motivating behavioral change on the part of individual providers. It must be recognized, however, that the role of primary care is not limited to chronic disease. A key element of primary care's contribution

to the health of the population and to cost control is its multiple missions—to provide preventive services and urgent care as well as chronic care.

Second, the traditional business model for primary care is failing. Public demand and the broad penetration of health insurance (compared with the 1950s) has allowed a great expansion of practice costs related to staff and clinician salaries, spurred by increases in office technology and the need to capture reimbursement from a complex array of payers. The last decade has seen great additional increases in overhead costs, in terms of staff salaries, Health Insurance Portability and Accountability Act (HIPPA) and other regulatory compliance, and now electronic health records. Reimbursement has not kept up with these expenses, and sectors of practice that were previously critical to financial viability, such as office laboratories, have been tightly restricted. Primary care practices have always had to attend closely to overhead costs; now they must rethink their overhead radically and look for innovative ways to maximize clinical efficiencies through technology and the reorganization of care systems.

Looking Around: A Broken Primary Care System

It is important to understand that many aspects of our current primary care system—and thus the bulwark of the health of the population—are broken. Despite dramatic economic growth since 1990, North Carolinians are finding it increasingly difficult to access regular and continuous primary healthcare services. According to the 2004 North Carolina Behavioral Risk Factor Surveillance System, almost one-in-five adults in North Carolina lack health insurance, with rates of insurance coverage much lower among racial and ethnic minorities. Twelve percent of insured adults and 51% of uninsured adults report not having

“...practices across the state are rising to the challenge of improving access and quality while decreasing costs...”

a personal physician or other healthcare provider. Approximately 17% of all North Carolina adults report that they could not get needed medical care at some point during the last 12 months due to cost.^{25,26} Concomitantly, the health status of the population is worsening. Those without health insurance or a usual source of care receive fewer preventive services²⁷ and experience higher mortality rates and worse clinical outcomes for chronic conditions.²⁸

The national Institute of Medicine (IOM) has argued persuasively that the quality of American healthcare falls far short of expectation.^{29,30} While much attention has been given to patient safety and quality of care in inpatient settings, there is ample evidence of a quality chasm in primary care as well. In a recent random sample, only slightly more than half of adults received recommended care for prevention, acute episodes, or treatment of chronic conditions.³¹ Similarly, more than half of patients with diabetes,³² hypertension,³³ high cholesterol,³⁴ congestive heart failure,³⁵ chronic atrial fibrillation,³⁶ asthma,³⁷ depression,³⁸ and tobacco addiction³⁹ are managed inadequately.⁴⁰

Nationwide, disparities in healthcare access and quality related to race, ethnicity, and socioeconomic status are pervasive. Disparities have been well documented in preventive, acute, and chronic care across many clinical conditions; and across many care settings, including primary care.⁴¹ In North Carolina, African Americans have persistently higher death rates from heart disease, stroke, and diabetes than whites;⁴² conditions which are largely preventable with early detection of risk factors and good chronic disease management. Disparities may be attributable, in part, to differential access to quality primary care. A recent study showed that among Medicare patients, 80% of visits for African American patients in this country represent care provided by only 22% of physicians.

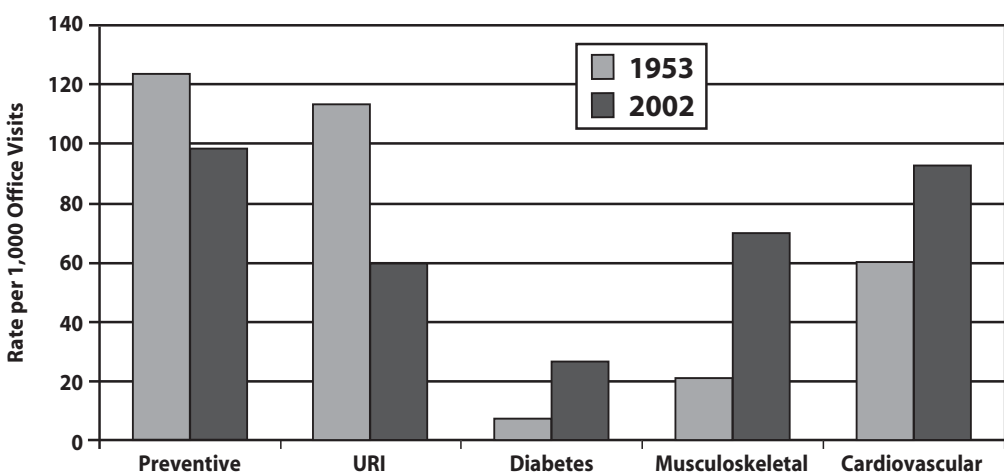
Physicians caring for African American patients are less likely to be board-certified, and less likely to have access to specialty consultation, diagnostic imaging, and arrangements for non-emergency hospital admissions.⁴³

As concerning as these trends are, there is reason to believe that conditions will worsen. While advances in medical technology, such as organ transplantation, thrombolytic therapy, or anti-HIV pharmaceuticals receive wide publicity and acclaim, the prevalence of key health conditions, such as diabetes, hypertension, high cholesterol, obesity, and sexually transmitted disease, continues to rise.⁴⁴⁻⁴⁶ Furthermore, the healthcare safety net itself is in danger. Often unrecognized is that primary care practices form a huge component of the safety net for the poor and uninsured. Nationally, nearly two-thirds of the uninsured report a private practice physician as their regular source of care,⁴⁷ a far greater number than traditional “safety net” institutions such as academic health centers, community health centers, and county health departments. As primary care practices fight for survival, there will be a tendency to jettison patients with a relatively less desirable source of reimbursement—the uninsured or, increasingly, Medicare and Medicaid.

Looking Ahead: Innovations in Primary Care

During the last few years, the leading professional organizations in family medicine,⁴⁸ general internal medicine,⁴⁹ and pediatrics^{50,51} have performed substantial studies of what the future of their disciplines will hold. The Future of Family Medicine project⁴⁸—a broad scope effort which involved all family medicine professional organizations, conducted extensive

Figure 2. Office Visits¹ for Common Diagnoses in North Carolina, 1953 vs. 2002



1 Preventive visits include well child care, well adult care, prenatal care. URI includes upper respiratory infection, pharyngitis, bronchitis, sinusitis. Musculoskeletal includes arthropathy, spinal disorders, rheumatism. Cardiovascular includes coronary heart disease, hypertension, congestive heart failure, hypercholesterolemia.

Sources: Peterson et al, *An analytical study of NC general practice 1953-1954*. *J Med Educ*, 1956; and Woodwell et al, *National Ambulatory Medical Care Survey: 2002 summary*, CDC.

survey research, obtained substantial participation from employers and insurers, and tested its economic model—has attempted to define a “New Model of Practice”—including the scope, philosophy, organization, and business model of practice. Table 2 contrasts the New Model of Practice to Traditional Practice.

Practices that include all features of the “New Model of Practice” do not yet exist—nor is there consensus that all elements of the new model are necessary. There have been, however, great efforts to develop and test new models of primary care that respond to the changing needs of the population and the demands placed on practices. This special issue of the *North Carolina Medical Journal* highlights examples of recent developments in the delivery of primary care from our own state that show promise in advancing access to quality care or enhancing the financial viability of community practices. Our experience is that many of the innovators are working in relative isolation, often below the radar of academic medical centers traditionally focused on improving the efficacy of care. We believe that broader networking and public discourse will help move the process along. It is the intent of this Journal issue to spur dialogue, not about whether primary care needs fundamental change, but rather how to do it in such a way that access and quality of care are improved while ensuring a viable primary care delivery system.

It is important to set some bounds on the discussion. A premise of this issue is that it is unrealistic to look to individual physicians alone to rectify the pervasive issues of access and quality in primary care. Work from the Duke University Department of Community and Family Medicine has illustrated quite clearly the impossibility of incorporating all evidence-based preventive and chronic care guidelines into our current modes of practice. To fully achieve current recommendations for an average panel of 2,500 patients, a physician would have to dedicate 7.4 hours per working day to preventive services alone (to the exclusion of acute and chronic care).⁵² As emphasized in the IOM Quality Chasm Report, “Trying harder will not work. Changing care systems will.”²⁹

A second premise of this issue is that our focus is limited to office-based primary care in community settings. Dentistry and public health have been largely excluded from the American concept of primary care for at least two generations, and the marketplace has further “carved out” a large component of mental healthcare in recent years. The rapid spread of hospitalists, especially in urban centers, also has potential to fundamentally alter relationships between primary care practices, hospitals, and communities. Finally, entities outside of primary care, notably large businesses and insurers, are increasingly developing programs of disease management that overlap with initiatives

Table 2.
Traditional versus New Model of Practice

Traditional model	New model
Systems often disrupt the patient-physician relationship	Systems support continuous healing relationships
Care is provided to both sexes and all ages; includes all stages of the individual and family life cycles in continuous, healing relationships	Care is provided to both sexes and all ages; includes all stages of the individual and family life cycles in continuous, healing relationships
Physician is center stage	Patient is center stage
Unnecessary barriers to access by patients	Advanced Access by patients
Care is mostly reactive	Care is both responsive and prospective
Care is often fragmented	Care is integrated
Paper medical record	Electronic health record
Unpredictable package of services is offered	Commitment to providing directly and/or coordinating a defined basket of services
Individual patient oriented	Individual and community oriented
Communication with practice is synchronous (in person and by telephone)	Communication with practice is both synchronous and asynchronous (e-mail, Web portal, voicemail)
Quality and safety can be assumed	Processes are in place for ongoing measurement and improvement of quality and safety
Physician is the main source of care	Multidisciplinary team is the source of care
Individual physician-patient visits	Individual and group visits involving several patients and members of the healthcare team
Consumes knowledge	Generates new knowledge through practice-based research
Experience-based	Evidence-based
Haphazard chronic disease management	Purposeful, organized chronic disease management
Struggles financially, undercapitalized	Positive financial margin, adequately capitalized

Source: Reproduced with permission from 'Annals of Family Medicine, vol. 2(suppl 1), ' March/April 2004. Copyright © 2004 American Academy of Family Physicians. All Rights Reserved.

presented in these articles. Though rarely acknowledged, the implications of these trends are substantial, and have been only partially evaluated. We recognize, but cannot address fully, the need for further dialogue about the role of practices in these larger issues of public health promotion, prevention, and disease management.

Addressing the Business Model: Low-Overhead Models of Practice

In recent years, much attention has been given to the rapid spread of practices developed to counter the failing business model of traditional primary care. Examples include hospitalist practices, in which the hospital bears the vast majority of costs of staff and systems, exclusive nursing home practices, and niche practices limited to home care. In this issue, Dr. Brian Forrest's practice provides a representative example of the concept of dramatically reduced overhead extended to traditional primary care office practice.⁵³ Traditional primary care practices have among the highest overhead rates of any office-based medical practice—often exceeding 50-60%. Dr. Forrest and others have been able to demonstrate the practical consequences of reducing overhead

“...it is unrealistic to look to individual physicians alone to rectify the pervasive issues of access and quality in primary care.”

below 25% of total costs: appointment lengths of 30 minutes, with greater time to address prevention and chronic disease, improved patient satisfaction, and the opportunity to see people who can not afford traditional care. The expense break-even point of three-to-five patients per day is remarkable, and Dr. Forrest's attention to the sources of overhead, from staffing to facility maintenance, is instructive to anyone working in a traditional environment. Given the rapid escalation of copays and deductibles, the experience of Dr. Forrest's patients is instructive: they pay less out-of-pocket for a history and physical exam, as well as standard and screening tests than would be required for copays under many insurance companies. It is important to note that Forrest and others do not yet offer data about overall cost and quality of care over time. Still, the experience of his practice and others like it raises the question of the incremental value of oversight and quality interventions that insurers provide—how much does it cost and how much is it worth?

Low-overhead practices are not yet for everyone, however. While Forrest and others have been successful in specific settings, with favorable demographics and a charismatic clinical leader, other primary care providers attempting to adopt the model have failed. It is important to learn what factors influence success, and how such practices can be integrated into a larger local health systems, including hospitals and specialty care. Similarly,

it will be important to develop the model further with more explicit attention to chronic disease management and care outcomes. The most important priority, however, is to explore the viability of the model among more disadvantaged populations. Dr. Steven Crane describes early experience with low-overhead practices targeting indigent patients, and discusses challenges to implementing this model in underserved communities.⁵⁴

Advanced Access Scheduling: Doing Today's Work Today

Advanced Access, also known as Open Access, refers to a way of organizing a practice to allow much improved access to care. The basic premise is that patients should be able to get an appointment the same day that care is needed. This requires a fundamentally different approach to patient scheduling—practices must anticipate demand to assure that enough open slots are available for same-day requests. The transition to Advanced Access is challenging—requiring substantial changes to clinician templates, front-desk routines, and telephone protocols, with a difficult period of “working down the backlog” in which both previously scheduled appointments and same-day appointments are being seen.^{55,56} Successful practices report a significant reduction of missed appointments, improved financial performance, and significant improvements in patient and physician satisfaction. In this issue of the Journal, Drs. John Anderson and Carlos Sotelango provide a case study of the transition to Advanced Access in a family medicine practice, with an illustration of the use of metrics and

iterative process improvement methods key to successful implementation.⁵⁷ Dr. Greg Randolph's commentary addresses potential advantages and problems in extending the Advanced Access model to subspecialty practice.⁵⁸

Several unanswered questions remain, however, about the feasibility of Advanced Access scheduling in varied settings. First, how robust is the business model? How long do financial benefits last? Advanced Access requires specific and potentially costly infrastructure—can the practice environment afford it? Will local insurers pay for combined services, such as preventive and acute care, provided at the same visit? Such features, while appreciated by physicians and patients alike, are not sustainable without reimbursement. A second issue is the incorporation of chronic disease care into Advanced Access. Patient-driven appointment scheduling may improve patient satisfaction, but patients with chronic disease and other conditions need regularly scheduled visits—whether or not the patient takes the initiative to ask for them. We may need to move beyond Advanced Access to a concept of organized access, to incorporate both patient-demanded access and practice-initiated visits for focused chronic disease care.

Disease Management in the Primary Care Setting

Recognition that the majority of patients with chronic illness do not receive optimal treatment has motivated the redesign of primary care around improved chronic disease management in recent years. The chronic care model, as envisioned by Edward Wagner and colleagues at Group Health Cooperative of Puget Sound, posits that higher-quality care necessitates “system reform in which informed, activated patients interact with prepared, proactive practice teams.”²³ Innovation in chronic care disease management has six interrelated components: support for more effective patient self-management beyond traditional didactic patient education; clinical information systems to include patient registries and treatment planning reports, delivery system redesign with coordination of multidisciplinary caregivers; clinician decision support through evidence-based practice tools; healthcare organizational support for chronic disease improvement; and integration of community resources.⁵⁹

Several practice models for improving chronic disease management have emerged in recent years, traditionally focusing on high-cost diseases such as diabetes, congestive heart failure, and asthma. Many disease-specific chronic care management initiatives have been shown to improve clinical outcomes and reduce healthcare costs or lower the use of more costly healthcare services.^{24,60,61} Successful models can be found in a wide variety of practice settings, including integrated delivery systems (such as Group Health Cooperative of Puget Sound in Washington, or Kaiser Permanente of Northern California), private practices, and community health centers.²³ Such initiatives typically emphasize patient self-management support, and may involve case management or interdisciplinary team approaches, group visits, or planned disease-focused visits, reminder systems and physician performance feedback, and enhanced clinical decision support through technology.^{23,62-65}

Despite these promising examples, chronic care model components have not been widely adapted into individual practice settings. Internal and external obstacles to practice redesign, related to time and money, present major challenges to community practices. Additionally, a focus on a single chronic disease state may be both counter-intuitive and counter-productive in community practice. Primary care patients typically arrive with multiple concerns unrelated to their chronic disease and often have multiple co-morbidities that influence care and outcomes, such as coexisting disease, poverty and underinsurance, and language difficulties or illiteracy. Unlike targeted disease management programs, family physicians are faced with the management, on average, of more than three problems per encounter (with an average of 4.6 problems per encounter for diabetic patients).⁶⁶ It is important to recognize, then, that tailoring disease management programs to patients seen by community-based primary care practitioners, rather than by specialty groups or academic centers, will require further research and refinement.⁶⁷

For this issue of the Journal, Drs. Thomas Wroth and Joseph Boals have provided a commentary⁶⁸ that focuses on improvement of asthma in a community pediatric practice, and illustrates

how a rapid cycle quality improvement approach can significantly improve both process and outcome measures of quality. Dr. Samuel Weir reviews the experience of Sandhills Pediatrics and describes the broader lessons learned for developing disease management programs in primary care.⁶⁹

Electronic Health Records

The paper medical record utilized by the vast majority of primary care providers has many disadvantages, including illegibility, inaccessibility to multiple providers of care at the time and place needed, and segmentation with multiple volumes and multiple storage sites. Comprehensive electronic health records (EHR) include not only the clinical record (with problems, medication lists, health maintenance information, reminder systems, and population health improvement capacity), but also scheduling systems and support for billing and electronic communication with insurers, pharmacies, and patients. Electronic health records hold great promise for improving both quality of care and clinical efficiency.^{70,71}

Other countries have implemented highly successful national programs to promote EHR use. In Australia, 70% of general practitioners used computers in their consulting rooms in 2000 compared to 15% in 1997. In England, 98% of general practitioners have access to EHR; nearly all use it for prescription refills, and 30% report that their practices are paperless.⁷² There are signs that similar transitions are coming in the United States. The American Academy of Family Physicians (AAFP) and its Center for Health Information Technology has led a national initiative to promote electronic health records, leading to a dramatic change in the market for EHRs, including falling costs and market recognition that transition costs are substantial, national efforts to develop standards for EHRs among vendors, and the Center for Medicare and Medicaid Services' initiatives regarding the nature of the continuity record and the development of pay for performance reimbursement. The AAFP currently estimates that 12% of their members use EHRs, and that this will rise to 50% within two years. The use of EHR is beginning to grow in other specialties as well.

It is important to note that the comprehensiveness of the computerized record is key to its cost-effectiveness. Replacing dictation cost and filing clerks reduces the expense structure in the practice; facilitating Advanced Access scheduling and pay for performance premiums also add income. As a part of the Future of Family Medicine initiative, the Lewin group was commissioned to assess the economic feasibility of a “New Model Practice.” In an economic analysis of the new model of practice compared with best available estimates for current private practices, the EHR accounted for the single greatest positive change to clinician compensation, and most of the income gain that made the new model practice financially vigorous.⁷³

It is also important to understand that current technology is clearly transitional; there is a great divide between office-based systems (and their vendors) and large hospital-based systems of care. Substantial organizational, regulatory and technical barriers to bridging this gap exist. Early efforts to raise the technical

standards of communication between office and hospital systems have been seen, but it will be impossible to fully track outcomes without easy-to-use interfaces between offices and many other sources of data relevant to patient care, such as hospitals, nursing homes, pharmacies, insurers, and health departments.

The front-end costs of implementing an electronic health record present an insurmountable barrier to many community practices, despite the promise of long-term cost savings for most practices and an eventual decrease in total United States healthcare costs with widespread application of this kind of information technology.⁷³ The national Institute of Medicine has argued that government and large private purchasers of healthcare should provide incentives to practices to make such changes, and such initiatives are becoming more common.⁶²

Dr. Karen Smith's commentary in this issue of the *Journal*⁷⁴ describes the transition to an EHR in her practice, in a relatively poor, largely African-American rural community. It is clear that the transition to EHR is a major event in the lifecycle of a practice, and that the costs are large, both in direct expenses and in organizational efforts. Dr. Smith currently serves as the President of the North Carolina Academy of Family Physicians, and she has made adoption of EHRs the focus of her presidential efforts across the state. Dr. Edward Ermini provides further perspective on the development of EHRs and the creation of a national health information network.⁷⁵

Electronic Communication with Patients and Payers

Rapid advances in information technology now allow integration of the electronic health record with common practice management activities and billing systems, including electronic communication with payers, leading to considerable reduction in practice administrative costs. In a similar way, communication with patients via e-mail offers an attractive way to enhance patient-centered care and to improve access and timeliness of interventions. E-mail communication between patients and providers allows for closer surveillance of disease status or response to therapy, tracking of the receipt of clinical preventive services or consultative care, and rapid feedback of test results.

Applying such technology, however, incurs substantial costs to the clinical practice and to the individual practitioner. The acquisition of equipment that can make it possible for physicians and office staff to interact through e-mail with patients from multiple locations, and perhaps through wireless connectivity, requires the investment of resources and the acquisition of minimal skills in the use of such technology. Perhaps more importantly, it remains unclear how physicians can be reimbursed for the time required to respond to and document patient-initiated e-mail correspondence. Similar issues arose as communication with patients via telephone expanded dramatically.

Dr. Spencer's commentary in this issue of the *Journal*⁷⁶ describes the initial experience of establishing a web-based interface with patients in a family medicine setting. His report makes it clear that setting up e-mail communication is much more involved than just having e-mail contact with patients. In

addition to privacy issues, many different functions must be served by the interface, such as arranging appointments, referrals, and pharmacy refills, which are most effectively addressed by non-physician staff. Dr. Komives serves as the Senior Medical Director for Network Services at Blue Cross and Blue Shield of North Carolina. Her commentary discusses advances in electronic communication between clinicians and patients.⁷⁷

New Delivery Models for Community-Based Care

Beyond practice-based clinical and administrative initiatives, an increasing number of primary care providers are participating in external initiatives to improve comprehensive disease management or reduce barriers to care in their communities. Individual practices, especially solo or small group practices and rural or community health centers, often lack sufficient internal resources to conduct major quality improvement initiatives or evaluate and adapt new innovations for their practice settings. In recent years, federal and state agencies have developed programs through which health centers or practices can participate in collaborative networks addressing specific issues in patient care. The intent is to build strategic partnerships and develop infrastructure and expertise for the incorporation of new evidence-based models of care into clinical practice. The federal Bureau of Primary Health Care collaboratives, targeting community health centers serving underserved populations, have focused on preventive services and chronic disease management (cancer screening, diabetes, depression, asthma, and cardiovascular diseases) as well as center operation (Advanced Access and patient flow redesign).⁷⁸ Similarly, the state-based North Carolina Chronic Disease Management Collaborative has assisted private and not-for-profit primary care practices in implementing comprehensive diabetes and cardiovascular disease management models, achieving substantial improvements in evidence-based clinical processes and clinical outcomes since January of 2003.⁷⁹

An extension of these ideas has led to the development of regional networks involving all primary care clinicians, county health departments and hospitals in particular geographic regions. The stimulus for these initiatives has come from the North Carolina Medicaid Program in the North Carolina Department of Health and Human Services (NC DHHS). Over the last ten years, the Division of Medical Assistance in the NC DHHS has developed models of regionalized care focused on quality improvement and cost control. Currently, 3,000 physicians throughout North Carolina are participating in the Community Care of North Carolina (CCNC) initiative. This program provides community infrastructure and management tools to allow providers to more effectively implement evidence-based clinical care and more efficiently utilize community resources. With the involvement of all providers in a region, these networks provide an opportunity for substantial changes in the organization of care in a community, such as increased after-hours care availability in private offices and centralized immunization programs at the local health department. An external evaluation

of the overall community care model by Mercer estimated approximately \$120 million of savings to Medicaid as the result of community-based population management.⁸⁰ A savings of \$4.6 million in savings were realized between 2000-2002 from the asthma and diabetes disease management programs alone.^{81,82} CCNC programs have demonstrated clearly that it is possible to improve patient care and decrease costs.

Dr. Allen Dobson's commentary in this issue of the Journal⁸³ describes the development of the CCNC pilot program in Cabarrus County, underscoring the new organizational structures necessary to re-organize care in a community, the challenges to organizing care in this way and the early outcomes in that county. Dr. Charles Willson, President-Elect of the North Carolina Medical Society, describes the development of a similar CCNC model in Pitt County.⁸⁴ CCNC programs are now being implemented in every county in North Carolina.

The Outlook for Primary Care

Community-based primary care clinical practice appears to be at a crossroads in its history, resulting from the simultaneous demands of a rapidly increasing population of patients in need of timely acute, preventive, and chronic care; and the pressure to operate within ever narrower bounds of financial accountability and cost constraint. Add to these pressures the growing expectation that physicians will provide the very best, evidence-based diagnostic and therapeutic interventions, and one has a recipe for extreme frustration among primary care specialties whose financial margins are already minimal. Despite the commitment of primary care physicians to the provision of high-quality care to their patients, deficiencies in healthcare access and quality are widespread and pervasive, and the long-term viability of current practice models may be in question. Hence, innovative ideas about how to redesign certain basic aspects of primary care practice, and how to combine the resources of healthcare providers at the community level, are worthy of serious examination.

In this issue of the Journal, several contributing authors have offered illustrations of recent developments addressing the organizational aspects of primary care practice. Examples range from narrowly focused, practice-based improvements in patient flow or communication, to comprehensive, clinical quality improvement initiatives, to sweeping community-wide reorganization of care. What these innovations share is a recognition of the critical need for fundamental changes in primary care, and a commitment to better serve patients and communities.

While visionary clinical leaders are critical to the successful negotiation of current challenges to primary care, primary care practices do not shoulder the responsibility for addressing the needs of the population alone. There is a great need for health research to move beyond the traditional questions of efficacy and effectiveness to questions of population health impact,

which requires attention to the development, dissemination, implementation, and maintenance of improved practice arrangements. Active planning for the diffusion of valid research findings into routine clinical practice is necessary to close the gap between the academic generation of knowledge and the clinical care of the patient.^{85,86} Conversely, it has been said that "to obtain more evidence-based practice, we need more practice-based evidence."⁸⁷ Until a solid evidence base exists for clinical and administrative primary care practice innovations, progress toward the goals of improved quality and access to care for communities, and improved operational margins for practices, is likely to be slow and sporadic.

Policymakers and other stakeholders in health system costs, such as employers, hospitals, private insurers, Medicare, and Medicaid, also have an interest in improving primary care systems. Creating a favorable business case for innovation in primary care requires that the long-term cost savings that result from improved preventive and chronic care accrue to the organization paying for the improvements.²⁴ Any substantial innovation in healthcare practice requires an initial investment of time and money. Clinical information systems, which play a central role in streamlining administrative efficiencies and providing a framework for improved preventive services delivery, chronic disease management, and practice-based continuous quality improvement, are particularly expensive and difficult to implement for many practices. Community practices need a financial environment that helps them to implement positive change. Arguably, third-party payers and other stakeholders who invest in primary care practice innovation, by offsetting start-up costs or rewarding superior performance with increased reimbursement rates, will reap the rewards through improved health status of the population served and decreased dependence on more costly care for avoidable complications.

Conclusions

Community practices today are the direct descendants of general practice in the 1940s and 1950s, although the health and healthcare problems faced by today's communities are quite different. Primary care must change radically to survive the financial pressures of today's healthcare environment while addressing widespread systematic deficiencies in healthcare access and quality. Visionary clinical leaders have demonstrated innovative ways to improve the financial margins of their practices, improve access to timely care for their patients and communities, and deliver higher quality care for patients with chronic disease. Refinement and diffusion of such innovations will require greater investments of both research and capital, with the active and creative engagement of all of us who desire better health for our communities. **NCMedJ**

REFERENCES

- 1 Dobson LA MM, Makey SL. Who will care for our communities? A quiet crisis. Executive Summary Report of the NCAFP WHO II Task Force, April 2001.
- 2 White KL, Williams TF, Greenberg BG. The ecology of medical care. *N Engl J Med* 1961;265:885-892.

- 3 Green LA, Fryer GE, Jr, Yawn BP, Lanier D, Dovey SM. The ecology of medical care revisited. *N Engl J Med* 2001;344(26):2021-2025.
- 4 Starfield B. Primary care and health. A cross-national comparison. *JAMA* Oct 23-30 1991;266(16):2268-2271.
- 5 Starfield B. Is primary care essential? *Lancet* Oct 22 1994;344(8930):1129-1133.
- 6 Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998. *Health Serv Res* 2003;38(3):831-865.
- 7 Starfield B, Shi L. The medical home, access to care, and insurance: a review of evidence. *Pediatrics* 2004;113(5 Suppl):1493-1498.
- 8 Shi L, Macinko J, Starfield B, Politzer R, Xu J. Primary care, race, and mortality in US states. *Soc Sci Med* Jul 2005;61(1):65-75.
- 9 Shi L, Macinko J, Starfield B, Politzer R, Wulu J, Xu J. Primary care, social inequalities and all-cause, heart disease and cancer mortality in US counties: a comparison between urban and non-urban areas. *Public Health* Aug 2005;119(8):699-710.
- 10 Starfield B, Shi L, Grover A, Macinko J. The effects of specialist supply on populations' health: assessing the evidence. *Health Aff* March 15 2005.
- 11 Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff* 2004;Suppl Web Exclusive:W184-197.
- 12 Division of Epidemiology Biennial Report. July 1950-June 1952. Raleigh, NC: North Carolina State Board of Public Health; 1952.
- 13 North Carolina Good Health Association. The Good Health Campaign of North Carolina: American Hospital Association; 1947.
- 14 Peterson OL AL, Spain RS et. al.. An analytical study of north carolina general practice 1953-1954. *J Med Education* 1956 Supplement;1-142.
- 15 The NC Health Professions Data System. North Carolina Health Professions 2003 Data Book. UNC Chapel Hill. 2004.
- 16 North Carolina State Center for Health Statistics. Detailed mortality statistics, 2002. Available at: <http://www.schs.state.nc.us/SCHS/deaths/dms/2002/>. Accessed September 2004.
- 17 Woodwell DA, Cherry DK. National Ambulatory Medical Care Survey: 2002 Summary. Advance Data from Vital Health and Statistics. Centers for Disease Control. Number 346: August 26, 2004.
- 18 Kovner AR, Jonas S. Healthcare Delivery in the United States. 6th Edition. Springer Publishing, Inc. 1999.
- 19 American Academy of Family Physicians. Facts about family practice. Available at: <http://www.aafp.org/x530.xml>. Accessed June 21, 2005.
- 20 American Medical Association. Available at: www.ama-assn.org/amednews/2004/09/20/bil10920.htm. Accessed September 27, 2004.
- 21 Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff* 2001;20(6):64-78.
- 22 Rothman AA, Wagner EH. Chronic illness management: what is the role of primary care? *Ann Intern Med* 2003;138(3):256-261.
- 23 Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA* 2002;288(14):1775-1779.
- 24 Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, Part 2. *JAMA* 2002;288(15):1909-1914.
- 25 North Carolina State Center for Health Statistics. Results from the 2004 N.C. Behavioral Risk Factor Surveillance System (BRFSS) Survey. Available at: <http://www.schs.state.nc.us/SCHS/brfss/2004/highlights.html>. Accessed May 10, 2005.
- 26 Buescher PA. Uninsured and Underinsured Adults in North Carolina. *NC Med J* March/April 2005 2005;66(2):165.
- 27 Fryer GE, Dovey SM, LA G. The importance of primary care physicians as the usual source of healthcare in the achievement of prevention goals. *Am Fam Physician* 2000;62:1968.
- 28 Institute of Medicine. Uninsured Facts and Figures: The Uninsured are Sicker and Die Sooner. Washington, DC 2004.
- 29 Institute of Medicine. Crossing the Quality Chasm: A New Health System for the Twenty-first Century. Washington, DC: National Academy Press; 2001.
- 30 Berwick DM. A user's manual for the IOM's 'Quality Chasm' report. *Health Aff* 2002;21(3):80-90.
- 31 McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med* 2003;348(26):2635-2645.
- 32 Clark CM, Fradkin JE, Hiss RG, Lorenz RA, Vinicor F, Warren-Boulton E. Promoting early diagnosis and treatment of type 2 diabetes: the National Diabetes Education Program. *JAMA* 2000;284(3):363-365.
- 33 Institute of Medicine. Priority Areas for National Action: Transforming Health Care Quality. Washington, DC: National Academy Press; 2003.
- 34 McBride P, Schrott HG, Plane MB, Underbakke G, Brown RL. Primary care practice adherence to National Cholesterol Education Program guidelines for patients with coronary heart disease. *Arch Intern Med* 1998;158(11):1238-1244.
- 35 Ni H, Nauman DJ, Hershberger RE. Managed care and outcomes of hospitalization among elderly patients with congestive heart failure. *Arch Intern Med* 1998;158(11):1231-1236.
- 36 Samsa GP, Matchar DB, Goldstein LB, et al. Quality of anticoagulation management among patients with atrial fibrillation: results of a review of medical records from 2 communities. *Arch Intern Med* 2000;160(7):967-973.
- 37 Legorreta AP, Liu X, Zaher CA, Jatulis DE. Variation in managing asthma: experience at the medical group level in California. *Am J Manag Care* 2000;6(4):445-453.
- 38 Young AS, Klap R, Sherbourne CD, Wells KB. The quality of care for depressive and anxiety disorders in the United States. *Arch Gen Psychiatry* 2001;58(1):55-61.
- 39 Perez-Stable EJ, Fuentes-Afflick E. Role of clinicians in cigarette smoking prevention. *West J Med* 1998;169(1):23-29.
- 40 Institute of Medicine. The Chasm in Quality: Select Indicators from Recent Reports. Available at: <http://www.iom.edu/subpage.asp?id=14980>. Accessed May 11, 2005.
- 41 Agency for Healthcare Research and Quality. 2004 National Healthcare Disparities Report. Rockville, MD: U.S. Department of Health and Human Services; 2004. AHRQ Publication No. 05-0014.
- 42 Racial and Ethnic Health Disparities in North Carolina: Report Card 2003. Raleigh, NC: Office of Minority Health and Health Disparities State Center for Health Statistics North Carolina Department of Health and Human Services.
- 43 Bach PB PH, Schrag D et. al. Primary Care Physicians Who Treat Blacks and Whites. *New Engl J Med* 2004;351(6):575-584.
- 44 The N.C. Program for Women's Health Research. 2003 North Carolina Women's Health Report Card. 2003.
- 45 National Center for Health Statistics. Health, United States, 2004. With chartbooks on trends in the health of Americans. Hyattsville, MD 2004.
- 46 Centers for Disease Control and Prevention. 2003 State Health Profiles. Atlanta, GA: US Department of Health and Human Services, CDC; 2003.
- 47 Reed MR, Cunningham PJ, Stoddard, J. Physicians pulling back from charity care. Issue brief no. 42. Washington, DC:

- Center for Studying Health System Change, August 2001.
- 48 Martin JC, Avant RF, Bowman MA, et al. The Future of Family Medicine: a collaborative project of the family medicine community. *Ann Fam Med* 2004;2 Suppl 1:S3-32.
 - 49 The future of general internal medicine. Council on Long Range Planning and Development in Cooperation with the American College of Physicians, the American Society of Internal Medicine, and the Society of General Internal Medicine. *JAMA* 1989;262(15):2119-2124.
 - 50 Policy Statement: Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children. American Academy of Pediatrics. Medical Home Initiatives for Children With Special Needs Project Advisory Committee. *Pediatrics* 2004;113:1545-1547.
 - 51 The Pediatrician's role in community pediatrics. American Academy of Pediatrics. Committee on Community Health Services. *Pediatrics* 1999;103(6 Pt 1):1304-1307.
 - 52 Yarnall KS, Pollak KI, Ostbye T, Krause KM, Michener JL. Primary care: Is there enough time for prevention? *Am J Public Health* 2003;93(4):635-641.
 - 53 Forrest BR. Access Healthcare: A model to provide improved access to high-quality and affordable healthcare. *NC Med J* 2005;66(3):206-209.
 - 54 Crane SD. Low-overhead practice models and the uninsured: Harnessing the power of small-scale to address large unmet health needs. *NC Med J* 2005;66(3):203-205.
 - 55 Murray M, Berwick DM. Advanced access: reducing waiting and delays in primary care. *JAMA* Feb 26 2003;289(8):1035-1040.
 - 56 Murray M, Bodenheimer T, Rittenhouse D, Grumbach K. Improving timely access to primary care: case studies of the advanced access model. *JAMA* 2003;289(8):1042-1046.
 - 57 Anderson JB, Sotolongo CA. Implementing advanced access in a family medicine practice: A new paradigm in primary care. *NC Med J* 2005;66(3):219-220.
 - 58 Randolph GD. Where next for advanced access: Will it be embraced by specialties. *NC Med J* 2005;66(3):224-226.
 - 59 Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff* 2001 2001;20(6):64-78.
 - 60 McAlister FA, Lawson FM, Teo KK, Armstrong PW. A systematic review of randomized trials of disease management programs in heart failure. *Am J Med* 2001;110(5):378-384.
 - 61 Norris SL, Nichols PJ, Caspersen CJ, et al. The effectiveness of disease and case management for people with diabetes. A systematic review. *Am J Prev Med* 2002;22(4 Suppl):15-38.
 - 62 Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA* 2003;289(4):434-441.
 - 63 Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. *JAMA* 2002;288(19):2469-2475.
 - 64 Grumbach K, Bodenheimer T. Can health care teams improve primary care practice? *JAMA* 2004;291(10):1246-1251.
 - 65 Masley S, Sokoloff J, Hawes C. Planning group visits for high-risk patients. *Fam Pract Manag* 2000;7(6):33-37.
 - 66 Beasley JW, Hankey TH, Erickson R, et al. How many problems do family physicians manage at each encounter? A WReN study. *Ann Fam Med* 2004;2(5):405-410.
 - 67 Bodenheimer T. Disease management—promises and pitfalls. *N Engl J Med* 1999;340(15):1202-1205.
 - 68 Wroth TH, Boals JC. Application of quality improvement methods in a community practice: The Sandhills Pediatrics Asthma Initiative. *NC Med J* 2005;66(3):216-218.
 - 69 Weir S. Disease management in primary care: Rapid Cycle Quality Improvement of asthma care. *NC Med J* 2005;66(3):219-220.
 - 70 Becher EC, Chassin MR. Improving quality, minimizing error: making it happen. *Health Aff* 2001;20(3):68-81.
 - 71 Weingarten SR, Henning JM, Badamgarav E, et al. Interventions used in disease management programmes for patients with chronic illness—which ones work? Meta-analysis of published reports. *Br Med J* 2002;325(7370):925.
 - 72 Bates DW, Ebell M, Godlieb E, Zapp J, Mullins HC. A proposal for electronic medical records in US primary care. *J Am Med Inform Assoc* 2003;10(1):1-10.
 - 73 Spann SJ. Report on financing the new model of family medicine. *Ann Fam Med* 2004;2 Suppl 3:S1-21.
 - 74 Smith KL. Transforming a dinosaur: Revising healthcare documentation. *NC Med J* 2005;66(3):214-215.
 - 75 Ermini EB. Creating a national health information network: The importance of individual provider participation. *NC Med J* 2005;66(3):210-213.
 - 76 Spencer DC. Innovations in the practice of primary care: Communicating with patients through e-mail. *NC Med J* 2005;66(3):239-241.
 - 77 Komives E. Physician-patient e-mail communication: Challenges for reimbursement. *NC Med J* 2005;66(3):236-238.
 - 78 Bureau of Primary Health Care Health Disparities Collaboratives. Health Resources and Services Administration. Available at: <http://bphc.hrsa.gov/quality/Collaboratives.htm>. Accessed May 2005.
 - 79 About the North Carolina Chronic Disease Management Collaborative. North Carolina Primary Health Care Association. Available at: <http://www.ncphca.org/collaborative/about.htm>. Accessed May 2005.
 - 80 ACCESS Cost Savings—State Fiscal Year 2004 Analysis. Letter to Mr. Jeffrey Simms, Assistant Director of Managed Care, NC Division of Medical Assistance, NC Department of Health and Human Services. Mercer Government Human Services Consulting, Phoenix, AZ. March 24, 2005.
 - 81 Community Care Fact Sheet: Community Care At a Glance: Community Care of North Carolina; 2005.
 - 82 Ricketts T, Greene S, Silberman P, Howard H, Poley S. Evaluation of Community Care of North Carolina Asthma and Diabetes Management Initiatives: January 2000-December 2002. Raleigh NC: North Carolina Rural Health Research and Policy Analysis Program, The Cecil G. Sheps Center for Health Services Research; April 15, 2004.
 - 83 Dobson LA, Wade TL. Cabarrus County: A study of collaboration. *NC Med J* 2005;66(3):232-235.
 - 84 Willson CF. Community Care of North Carolina: Saving the state money and improving patient care. *NC Med J* 2005;66(3):227-231.
 - 85 Rogers E. Diffusion of Innovations. 4th edition ed. New York: Free Press; 1995.
 - 86 Oldenburg B, Parcel G. Diffusion of innovations. In K Glanz, FM Lewis, & B Rimer, (eds.) Health behavior and health education: Theory, research, and practice, 2nd ed., San Francisco: Jossey-Bass Publishers. Pp. 312-334. 2002.
 - 87 Dietz W. Shrinking America's waistline: Do we know how to get there from here? Oral presentation at: Preventive Medicine; February 17, 2005; Washington, DC.