

Understanding the Underlying Drivers of Inpatient Cost Growth: A Literature Review

Mireille M. Goetghebeur, PhD; Sharon Forrest, MSc;
and Joel W. Hay, PhD

Background: After the declining growth in inpatient hospital spending that occurred from 1994 through 1998, the recent trend in increased spending has been of concern to many. Understanding the underlying reasons for this new growth will aid decision makers in finding best means to manage inpatient costs.

Objective: To identify potential contributors to recent growth in inpatient spending.

Study Design: Literature review.

Methods: Healthcare and economic databases, prominent Web sites, and key journals were searched to identify potential drivers for the 1999-2001 rise in inpatient spending. Initial literature review and state-level regression analyses published in a companion paper were used to identify key explanatory factors, which were further explored.

Results: Although many of the contributors to the rise in inpatient costs overlap and are interrelated, the major cost drivers were identified as (1) workforce shortage; (2) new technology; (3) less tightly managed care; and (4) shifting hospital business directions. Underlying factors such as legislation, quality of care, limited access to noninpatient care, pressures on the safety net, population aging, and increasing chronic illness prevalence were found to influence the contributors and healthcare spending in general.

Conclusions: Future trends in inpatient spending will depend on the response of the healthcare system to these cost drivers and underlying factors. Potential avenues to control inpatient spending include expanding access to primary care, encouraging cost-effective technology and more efficient hospital market structures, and developing incentives for the healthcare workforce.

(*Am J Manag Care* 2003;9:SP3-SP12)

Between 1994 and 1998, per-capita hospital inpatient spending declined by 0.2% to 5.3%. Since that period, however, per-capita hospital inpatient spending has grown. For example, in 2001 it rose by 7.1%, representing a 3-fold increase in growth over the preceding year.³ This recent renewed growth in national health and hospital care spending has been a concern for policy makers and payers in light of the size of the inpatient component of care.^{4,5} From 1998 to 2001, hospital inpatient expenditures comprised 34.2% of the growth of total healthcare expenditures, slightly outstripping pharmaceutical and outpatient spending as the most important contributor to healthcare cost increases.⁶

Although a downward trend in inpatient utilization has predominated during the past decade, partly attributed to an increase in ambulatory surgery and reduction in length of stay (LOS), indications of increased utilization emerged even during the 1994 to 1998 period.^{7,8} Since the early 1990s, the number of inpatient admissions has increased and the decline of hospital admissions per 1000 has leveled off. In the elderly population, signs of change have been stronger; between 1990 and 2000 the number of discharges per 1000 in this population increased from approximately 330 per 1000 to 370 per 1000.^{8,9}

Growth of inpatient utilization and associated expenditures is particularly important because inpatient services comprise such a large proportion of

© Medical World Communications, Inc.

In 2001, US healthcare expenditure was \$1.4 trillion, representing 14.1% of the gross domestic product (GDP).¹ Expenditures are projected to grow at an annual rate of 7.3% to reach \$3.1 trillion or 17.7% of the GDP by 2012.² With this growth and current healthcare system stress, costs associated with inpatient hospital spending are under intense scrutiny.¹

From BioMedCom Consultants Inc, Montreal, Quebec, Canada (MMG, SF); and the Department of Pharmaceutical Economics and Policy, University of Southern California, Los Angeles, Calif (JWH).

This study was supported by a grant from Blue Cross and Blue Shield Association, Chicago, Ill.

Address correspondence to: Mireille M. Goetghebeur, PhD, BioMedCom Consultants Inc, 6700 Cote-de-Liesse, Montreal, Quebec, Canada H4T 2B5. E-mail: mireille_goetghebeur@biomedcom.org.

total healthcare spending; of the \$1.4 trillion spent on healthcare in 2001, \$451.2 billion was spent on hospital care, and hospital care accounted for 51% of healthcare spending growth in that year.^{2,10} As a result, even relatively small rates of growth can have a large absolute effect on expenditure.⁶ Higher prices for care and increased use of services, representing, respectively, 38% and 62% of the increase in hospital spending growth from 2000 to 2001, have been identified as key elements of growth change.¹¹

Whether this recent increase will be short-lived,¹² or will continue indefinitely,⁶ understanding the underlying reasons for the recent inpatient cost growth and future influences will aid decision makers in finding the best means of managing inpatient costs.

The objective of this review was to identify the forces that may be driving increased hospital costs in the United States using published studies that describe these forces. Factors considered were healthcare labor force, quality of care, new technology, healthcare coverage, economic activity, hospital market structure and finances, legislation, and changes in demographics.

METHODS

An extensive review of the healthcare literature was undertaken to identify potential contributors to the recent growth in inpatient spending. Healthcare and economic databases (MEDLINE, EconLit) were searched using keywords such as hospital, inpatient, utilization, discharges, LOS, cost, spending, economic, drivers, demographics, labor, workforce, safety, medication errors, legislation, technology, drugs, managed care, uninsured, Medicare, Medicaid, mergers, antitrust, liability, disease, morbidity, and mortality. Prominent healthcare Web sites were explored for relevant reports and datasets, including National Academies Press (<http://www.nap.edu/>), the National Center for Health Statistics (<http://www.cdc.gov/nchs>), the American Hospital Association (<http://www.aha.org>), the US General Accounting Office (<http://www.gao.gov>), the Centers for Medicare and Medicaid Services (<http://www.cms.hhs.gov>), the Department for Health and Human Services (<http://www.hhs.gov>), and the Agency for Healthcare Research and Quality (<http://www.ahrq.gov>). Key journals such as *Health Affairs*, *Journal of Health Care Finance*, and *JAMA*, were hand-searched. In addition, bibliographies of retrieved articles were screened to identify additional publications.

Articles were selected based on their timeliness and relevance to inpatient hospital costs (1999 to the present). A total of 192 articles and Web sites were selected, including 146 studies from peer-reviewed journals. Every attempt was made to report data and information extracted from peer-review articles or from reports and sets of data from highly reliable Web sites. Other sources of information were used to supplement this body of research with most recent data on relevant issues surrounding inpatient cost growth.

An initial literature review was prepared and used to establish classes of potential explanatory variables for the empirical state-level regression analysis for the 1999-2001 time period.⁶ The state-level regression analyses established the primary importance of specific categories of explanatory factors: healthcare labor force, new technology, economic activity, and hospital market structure. The literature review was further narrowed to focus on these factors and recent legislative policy changes for the purposes of this article.

RESULTS

Healthcare Labor Force and Quality of Care

According to Blue Cross Blue Shield, workforce costs represent 50% of hospital operating expenses.¹³ Payroll growth is a key source of rising costs within the hospital sector, as demonstrated by a regression analysis reported in another article in this special issue.⁶ Nursing and other personnel costs have increased faster than revenues (**Figure 1**).³ Hospital payroll growth rose from 3.7% in 2000 to 8.6% in 2001, reaching levels not seen since the early 1990s.³

Nursing staff shortages are increasingly problematic for hospitals.^{12,14} In 2001, about 126 000 positions for registered nurses (RNs) were vacant, with a mean 13% vacancy at any given hospital.^{15,16} Nurse cost-center direct costs represent approximately 44% of the direct costs of inpatient care, payroll representing 80% of these costs.¹⁷ Due to the size of the nursing segment, even small changes in salary have large effects on hospital payroll. Nursing cost-center payroll increases in 2000 represented 47% of the 2.8% increase in inpatient costs during that year.¹⁷ Workforce shortages are costly; high demand has led to salary increases of up to 10% for full-time nurses, and hospitals spent \$71 million in 2001 using agency and traveling nurses to fill vacant slots.¹⁸ Similar to the nursing shortage, pharmacy workforce shortages

have led to annual salary increases of up to 13%.¹⁸

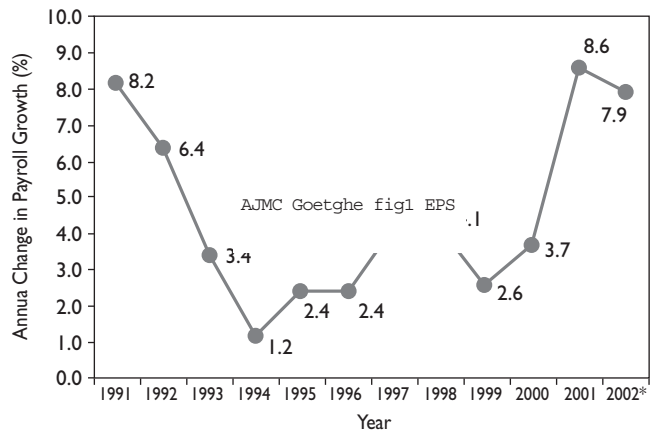
Annual growth in expenditure for physician services during the past 3 decades was on the downward trend, but in 2001 began to rise again.² Although this growth declined somewhat in 2002, physician costs are still relevant to hospital spending.⁵ Many factors may contribute to the growth in physician costs, including administrative burdens placed on physicians and an emerging physician shortage.¹⁹ The recent rise of expenditures for physician services may have contributed to the growth in inpatient spending.

Whereas a shortage in the healthcare workforce has a direct effect on hospital cost, via higher salaries, it is also causing a crisis in quality healthcare and patient safety.^{15,20} In 2002, 2 major studies demonstrated the association between adverse outcomes and nurse understaffing.^{16,21} In a study assessing 5 million discharges, higher RN presence resulted in better outcomes such as shorter LOS (-3.5%), fewer urinary tract infections (-9%), less upper gastrointestinal bleeding (-5.1%), less hospital-acquired pneumonia (-6.4%), and less septic shock or cardiac arrests (-9.4%).¹⁶ Another study showed that each additional patient per nurse resulted in a 7% increase in the likelihood of dying within 30 days of admission and a 7% increase in the odds of failure to rescue (death of patient with complications).²¹ Two recent studies including more than 1 million patients showed that complicated cases had higher LOS and hospital costs than uncomplicated cases.^{22,23}

The problem of medication errors in the hospital setting was identified in the 1960s, prompting hospital pharmacists to develop new tools to make medication use safer.²⁴ By preventing drug-related adverse events, in-hospital pharmaceutical services, which include patient-level interaction, have been demonstrated in many studies to be highly cost saving.²⁵ However, the decline of registered pharmacists in hospitals between 1989 and 1998, concomitant with the rise of pharmacy technicians and clerical pharmacy staff,²⁶ suggests a trend toward limiting the role of pharmacy personnel to drug distribution rather than the provision of pharmaceutical services. A decrease in provision of those services may lead to increasing hospital costs through decreases in the quality of care and increases in drug interactions and adverse drug events.

Although medical error is a long-standing issue, adverse events associated with current workforce

Figure 1. Annual Change in Hospital Payroll and Hourly Wage



*Data through June 2002 are compared with corresponding months in 2001. Adapted from reference 3.

shortages and understaffing may have put some additional pressure on inpatient expenditures and contributed to increasing costs. In 2000, the cost of drug-related morbidity and mortality was estimated at \$177.4 billion, with hospital admissions accounting for \$121.5 billion.²⁷ The extent of the effect of adverse events due to workforce shortage and understaffing on inpatient expenditures remains to be estimated.

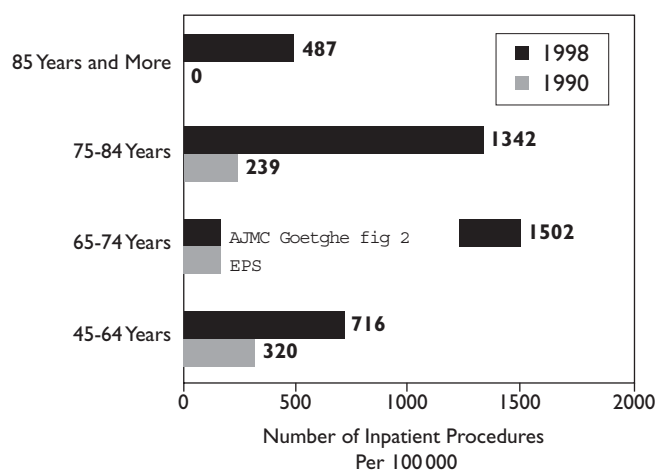
New Technology and Consumer Demand

New technology is defined as new knowledge regarding the delivery of care; this idea includes new equipment, pharmaceuticals, and procedures, as well as using existing services in new ways.²⁸ A number of peer-reviewed studies published before 1999 have reported that new technology is a major determinant in the rise of healthcare expenditures.^{28,29}

Recent reports also suggest that one of the most important influences of healthcare costs is new technology, including devices, pharmaceuticals, surgical procedures, organizational tools, and informatics.³⁰⁻³² Although new technology exerts both upward and downward pressures on healthcare spending, overall new technology is estimated to represent 22% of the increase in healthcare spending between 2001 and 2002.³³ In the hospital sector, the push toward new technology is frequently driven by availability of higher-cost, more sophisticated products; increased patient demand; and the need to optimize return on investment and remain competitive.⁹

The replacement of older technologies with costly, more advanced technologies contributes to rising

Figure 2. Trends in Rate of Use of Inpatient Coronary Angioplasty Between 1990 and 1998



Adapted from reference 37.

inpatient costs. For example, x-ray machines costing \$175 000 are replaced with computed tomography (CT) scan machines, which cost \$1 million and then by positron emission tomography (PET) and single photon emission-computed tomography imaging machines costing more than \$2 million each.¹⁸ Growth in the use of radiology has increased by 8% to 9% per year, much of the increase due to use of new magnetic resonance imaging, PET, and CT technologies.³³ New drugs emerging onto the market also tend to be more expensive, as supported by trends in retail drug spending; the shift to higher-cost drugs accounted for a third of the 18.8% increase from 1999 to 2000.³⁴ Technology that supports hospital infrastructure and operations (diffuse technology), such as computer-based information networks, were reported to increase annual hospital expenditures by 1.8%.³⁵

The cost impact of new technology is also affected by its increased utilization. New technology leading to better, safer treatments increases the number of patients treated by decreasing the threshold for performing procedures.^{30,31} For example, the technology used for angioplasty is evolving rapidly, and major changes such as use of glycoprotein IIb/IIIa and drug-eluting stents are opening the door for treatment to many patients, resulting in more such procedures being performed each year.³⁶ The use of coronary angioplasty increased dramatically between 1990 and 1998; the increase was particularly dramatic for older patients, with 3.9 more procedures

per 100 000 individuals in 1998 compared to 1990 figures (Figure 2).³⁷ An analysis of Medicare claims indicates that technological change, largely through extension of new treatments to new patients, accounted for 45% of the increase in the cost per heart attack observed between 1984 and 1998.³⁰ As well, advances in diagnostics often increase detection, diagnosis, and treatment rates (eg, the prostate-specific antigen test for prostate cancer) that may require inpatient services and exert upward pressure on certain hospital costs.^{30,38}

Consumer demand for the best and latest treatments encourages spending on cost-enhancing new technology. High technology tests are increasingly marketed directly to the public, triggering patients to request them from their physicians.³⁹ In the case of electron-beam computed tomography to detect coronary artery disease, absence of proven benefit and high false-positive rates are likely to result in inefficient healthcare spending.³⁹ Studies have shown that Americans strongly support medical innovation and are willing to pay for it.³¹

Some new technology reduces hospital use through increased outpatient procedures, such as outpatient chemotherapy and less invasive techniques.¹² One Tufts study proposed that appropriate pharmaceutical therapies might moderate inpatient treatment.⁴⁰ Recent history suggests that prescription drug spending growth is inversely related to hospital spending growth.³ Possibly, the recent deceleration of prescription drug spending may be contributing to the rise of inpatient costs.

Healthcare Coverage, Economic Activity, and Access to Care

Managed care is a dominant force in American private healthcare. Despite the almost universal adoption of its methods in both private and public healthcare, dissatisfaction with managed care is widespread.^{41,42} Managed care has been credited with slowing the adoption of new technology,^{31,43} which has been credited as a major determinant in the rise of healthcare expenditures (see section above). In the mid-1990s, managed care, particularly the most restrictive plan type, the health maintenance organization (HMO), significantly reduced hospital cost growth through controls and limitations on care.⁴⁴ A 44% less rapid hospital spending growth was reported in areas of high HMO penetration compared with areas of low HMO penetration.⁴⁵ A recent analysis of the peer-reviewed literature

published between 1997 and 2001 reported lower use of hospital resources in HMO plans compared with non-HMO plans.⁴²

In the wake of such action, consumers decried HMO restrictions, and began to demand less restrictive plans such as preferred-provider organizations (PPOs) from their employers.⁹ In 1996, 44% of the employed population was enrolled in HMOs, 28% in PPOs, and 27% in fee-for-service plans.⁴⁶ In 2000, the breakdown was 44% for PPOs, 33% for HMOs, 16% for point-of-service, and 8% for traditional indemnity.⁴⁷ By 2001, consumer protection legislation limiting managed-care restrictions was in place in almost every state.⁹ The retreat from managed care dampened attempts to maintain cost efficiency by limiting payer ability to rationalize its use. The backlash against managed care has contributed to rising healthcare costs and increased inpatient hospital use.⁹

Representing 45% of national healthcare expenditure, public healthcare spending grew by 9.4% in 2001 compared with 7.5% in 2000.^{1,2} This increased growth was largely due to Medicaid enrollment growth and increased Medicare payments to providers associated with the Balanced Budget Refinement Act (BBRA) of 1999 and the Benefits Improvement and Protection Act (BIPA) of 2000.² In 2001, for example, Medicare allocated an additional \$2.6 billion for inpatient care.¹ Although BIPA addressed the major cuts of the Balanced Budget Act and increased payments to home care agencies and nursing homes, home care underservice is still a problem.⁴⁸ Reduced access to home health or a skilled nursing facility leads to delays in discharge and longer hospital stays,^{9,18,49,50} thereby increasing inpatient spending. The Medicare component of public spending is expected to slow in 2002 due to the expiration of BBRA and BIPA and the lowered reimbursement per service for physicians through the sustainable growth rate system. Even with a potentially lowered growth rate, public funds represent a major source of hospital funding⁵¹ and any increased spending will likely contribute to increased hospital expenditures.

Uninsured adults are less likely to receive preventive care and appropriate care to manage chronic illnesses than are those who have health insurance.⁵² Because the uninsured have difficulty accessing primary and outpatient care, the growing numbers in this group place enormous pressure on the safety net in general and hospitals in particular.^{53,54} After a decline between 1997 and 1999, the number of Americans lacking insurance began to rise and rep-

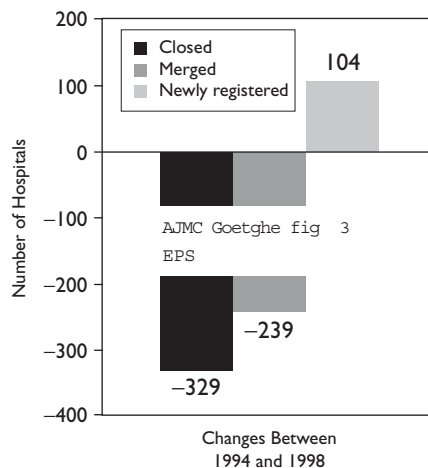
resented 14.6% of Americans or 41.2 million persons in 2001.⁵⁵ Uninsured individuals typically delay treatment and seek uncompensated care via emergency departments (ED), which are required by law to treat people regardless of their ability to pay.³² In 2000, 12% of ED visits led to hospital admission.⁵⁶ Between 1980 and 1998, rates of avoidable hospitalization for patients older than 65 years rose by 157%, suggesting decreased access to ambulatory care during that period.⁵⁷ Although ED use is an important source of hospital revenue, which further complicates the issue,⁵⁸ growing numbers of uninsured individuals may have contributed to overall growth in inpatient spending.

Various forces influence the relationship between economic activity and hospital spending. As reported in a companion paper in this supplement, at the state level between 1998 and 2002, each 1% increase in per capita disposable income and hospital and physician wage was associated with 2% increase in inpatient costs.⁶ However, at the national level, hospital discharges for patients younger than 65 years and below the poverty level were 3.4 times that for patients with family incomes at least twice the poverty level (non-poor).⁴ In the current economic downturn, individuals who lose jobs and health insurance may have no source of healthcare other than the ED, a factor that will likely increase inpatient spending. The recent recession coupled with sharp increase in health coverage premiums will likely continue to boost the numbers of uninsured.³² Annual percent growth in premiums for employment-based insurance increased from 4.8% in 1999 to 11% in 2001.¹²

Hospital Market Structure and Finances

Because of financial pressures, hospitals may become economically unstable and close or merge; there were 6467 registered hospitals in 1993 compared with 6021 in 1998.⁵⁹ Based on financial statements, 31% of hospitals were economically unstable between 1994 and 1998.⁵⁹ During that period, about 40 hospitals closed each year and another 40 hospitals merged and experienced a discontinuation of services at a merged location (**Figure 3**).⁵⁹ When 2 competing hospitals merge, prices tend to rise regardless of hospital ownership (profit or non-profit).⁶⁰ Some merged hospitals raised prices by 20% to 40%, contributing to the increased inpatient cost.⁶¹ An 47% increase in the amount invested in hospital expansions and renovations between 1998 and 2000¹³ is also a likely contributor to increased spending. Strategic hospital business ori-

Figure 3. Changes in Registered Hospitals Between 1994 and 1998



Adapted from reference 59.

entations including expansion of profitable service lines such as cardiac and orthopedic services⁶² also likely contributed to inpatient spending growth.

Like mergers, conversion of hospitals from non-profit to for-profit leads to increased prices (generally, for-profit hospitals charge higher prices because of higher costs for equity capital and income taxes).⁶⁰ In Florida, conversion of public hospitals to for-profit hospitals resulted in a significant decrease in their rate of uncompensated care (9.1% before conversion to 6.8% after conversion, $P < .05$),⁶³ putting pressure on remaining public hospitals to treat nonpaying patients. One meta-analysis reported that for-profit hospitals were associated with an increased risk of patient mortality compared with nonprofit hospitals.⁶⁴ For-profit hospitals face the challenge of meeting shareholders expectations while providing affordable care.⁶⁴

Professional liability insurance premiums are rising rapidly and are becoming prohibitively costly for many providers.¹⁸ Malpractice premiums have increased 20% to 100% and legal costs are swelling uncontrollably.³³ This situation makes it difficult and expensive for hospitals to purchase coverage and contributes to rising costs. Liability issues have also led to the practice of "defensive medicine," whereby a physician prescribes unnecessary treatments and tests to avoid litigation.⁶⁵ The cost of defensive medicine has been estimated to be \$50 billion annually.⁶⁵

Future Cost Trends

While population demographics and morbidity

will affect hospital inpatient expenditures over the long term, these factors have contributed little to the recent rise in hospital costs.⁶ Their consideration is nonetheless relevant to interpretation of the identified cost drivers and to projections for the future. A 1% increase in total population has been estimated to produce a 1% increase in inpatient days.⁹ Between 1990 and 2000, the US population increased by 13.1%.⁹ During the same period, the population older than 75 years expanded by 27%, about double the growth rate of the general population.⁹ The fastest-growing segment of the elderly population, those older than 85 years, is projected to represent 14.5% of the aged population by 2010.³⁷ Increased life expectancy, from 79.3 years in 1960 to 82.8 years in 1998, is fundamental to the aging of the population.³⁷ As people age, they use more hospital services; in 1999, persons older than 65 years used 3 times the number of hospital days per 1000 than the general population and persons older than 75 years used 4 times more.⁹ In 1970, 20% of hospital discharges and one third of hospital days were for elderly persons; in 2000, the elderly comprised 40% of the discharges and almost one half of the hospital days.⁸

In looking at subcomponents of the population with the potential to affect inpatient costs, it is critical to remember that 5% of the US population accounted for more than 50% of healthcare expenditures in 1977, 1987, and 1996.⁴⁶ National hospital discharge statistics between 1999 and 2000 indicated that heart failure was the most important reason for inpatient utilization, accounting for 21.2 million to 20.7 million days of hospitalization, respectively.^{7,8} For the same year, psychoses ranked second with 10.9 to 11.3 million days; followed by delivery (9.5-9.3 million days); neoplasms (9.1-8.0 million days); pneumonia (8.4-7.7 million days); and fractures (5.8-5.5 million days).^{7,8} The continuing epidemics of obesity and diabetes, which prevalence increased by 61% and 49%, respectively, between 1991 and 2000,⁶⁶ are also likely to affect inpatient utilization. Although currently a minor cost contributor, utilization related to diseases affecting the growing ranks of the elderly such as heart failure has the potential to exert upward pressure on inpatient costs.

A report suggested that LOS may not be a major factor contributing to hospital costs. For example, the average total charge for treating a heart attack increased from \$20 578 in 1993 to \$28 663 in 2000, concurrent with a 26% decrease in the LOS, from 7.4 to 5.5 days.⁶⁷ A more detailed analysis of the relationship between demographics, LOS, and hospital

costs will likely reveal a larger influence of disease on future hospital costs.

To assess the long-term value of new technology, both cost and health outcomes must be considered. A report evaluating 5 specific conditions indicated that, assuming a value of \$100 000 per year of life, the benefit of technological change far outweighs its cost for heart attacks, low-birth-weight infants, depression, and cataracts. For breast cancer, costs and benefits were found to be of equal value.³⁰ However, case studies of 9 emerging technologies indicated that “cost-saving” technologies frequently spread costs through increased utilization and that new technologies exert their influence through both volume and price effects.³¹ However, although these technologies tend to increase cost, they also tend to improve health outcomes.³¹ More research is warranted to estimate the global value of new technology and its net effect on inpatient expenditures.

One step toward containment of hospital costs is intensifying price competition between hospitals.^{44,68} However, greater hospital competition seems to be effective in controlling costs only in regions of high managed-care penetration.⁴⁴ Moreover, 69% of hospitals in less competitive markets had a sustainable financial performance compared with 29% for those in highly competitive markets.⁶⁹ It has been predicted that the combination of a highly competitive marketplace and a heavy regulatory and legislation burden will result in widespread hospital closures.⁷⁰

The rise of physician-owned ambulatory surgical centers and specialty hospitals is placing heavy competitive pressure on community hospitals.^{71,72} Sharp decreases in outpatient volume were reported in a full-service acute care hospital after the opening of an ambulatory surgical center owned by physicians who were also on the hospital staff.⁷¹ In Oklahoma City, community hospitals estimate that \$50 to \$60 billion is going to the physician-owned specialty hospitals.⁷² Because community hospitals support services such as burn units, trauma care, and social services through more remunerative areas such as cardiac services and neurosurgery, new competitors taking away the most profitable services are putting community hospitals in jeopardy of closing.⁷² Hospital administrators have recognized the advantages of specialization, which can lead to savings as well as improved quality.⁷³ This trend could bring hospital costs down overall; however, the movement will likely lead to increased pressure on the remaining full-service hospitals, and possibly to decreased quality of care and poorer outcomes. Full-service hospitals would be likely to charge more for

unprofitable services, thus placing upward pressure on certain hospital costs. The net effect of competitive pressures on inpatient cost growth remains to be evaluated.

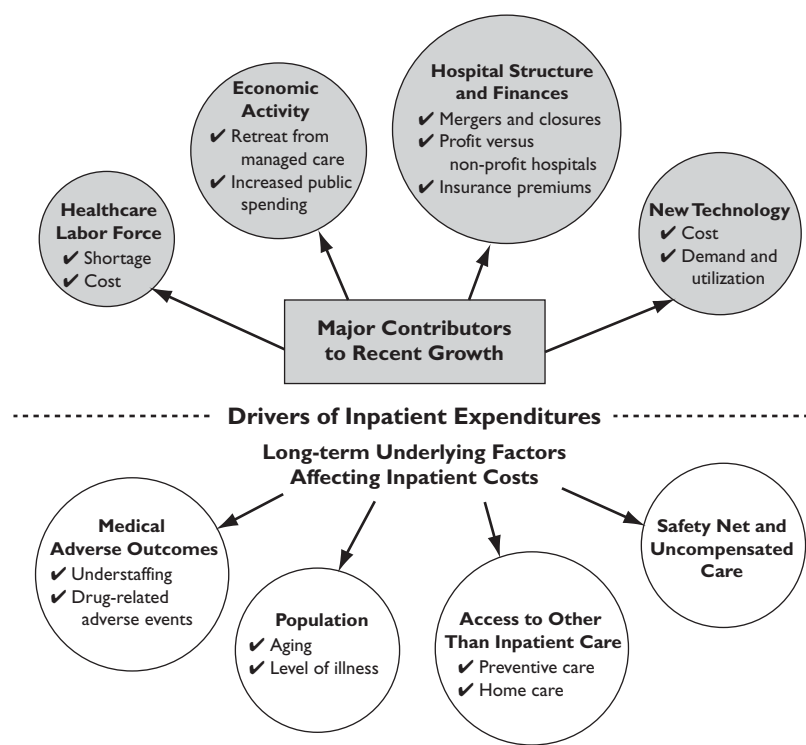
Insufficient reimbursement for inpatient services for Medicare and Medicaid patients, along with uncompensated care, threatens hospital financial viability, which in the long term will affect inpatient spending. In 2000, Medicare paid 1% less than the cost of treating Medicare patients.¹⁸ According to the American Hospital Association, 58% of hospitals lose money treating Medicare patients and 34% of hospitals lose money treating just the inpatient needs of these patients.¹⁸ Medicaid payments are also well below the cost of provision of care.¹⁸ In 2000, hospitals nationwide provided \$21.6 billion of uncompensated care.¹⁸ In New York, intensified financial pressures have left most of the safety-net and small community hospitals near bankruptcy and threatening to limit access to care.⁷⁴ In New York, the most financially distressed hospitals saw their uncovered costs for uncompensated care jump from \$9 million in 1997 to \$36 million in 1999.⁷⁴ Difficulties hospitals experience in obtaining reimbursement for services provided to nonpaying patients, and the associated risks of financial failure for providing those services, may limit access to care for these patients, affecting long-term inpatient spending for these categories of patients.

Finally, some legislative efforts may wield downward pressure on hospital costs. Use of generic drug formulations has the clear potential to reduce drug spending in hospitals and generally; the US Senate recently voted to adopt a bill that would make entry of generic drugs into the market easier.⁷⁵ Finally, in an attempt to address the costly nursing shortage, the House and Senate passed the Nurse Reinvestment Act to make nursing a more rewarding and inviting profession.⁷⁶ Concerned about rising medical costs, the Federal Trade Commission is increasing resources in its antitrust efforts in healthcare, including hospital mergers and groups of physicians.⁶¹ The effect of these legislative efforts on future inpatient expenditures will need to be assessed.

.....
DISCUSSION

Although many of the contributors to increasing inpatient costs overlap, this review identified 4 major cost drivers for this recent rise, including (1) workforce shortage and costs; (2) new technology

Figure 4. Contributors to the Recent Rise in Inpatient Spending and Underlying Factors



AJMC Goetghe fig 4 EPS

costs (including drugs) and underlying consumer demand; (3) retreat from tightly managed care; and (4) shifts in hospital business directions (eg, mergers, increased negotiating strength with private plans) (Figure 4). Underlying factors such as legislation changes related to public and private healthcare spending, medical adverse outcomes, limited access noninpatient care, pressures on the safety net, population aging, and increased burden of illness influence the identified cost drivers and healthcare spending in general.

Some suggest that the current growth in hospital costs will be short-lived,⁵ and that technological evolution will ultimately support a move away from hospitalization and toward outpatient care.¹² Others suggests that inpatient costs will continue to escalate if the current pace of medical technology adoption is allowed to continue unchecked.⁶ Because economic activity is strongly related to inpatient spending,⁶ the current economic slowdown is likely to relieve some of the pressure, and pave the way to new approaches in cost-containment strategies. A multifaceted policy approach will be required to deal with inpatient expenditure growth.

Potential avenues include expansion of cost-effective primary care, outpatient care, and special programs to minimize unnecessary inpatient admissions,⁷⁷⁻⁸⁰ integrating concepts of evidence-based care into medical professionalism to make optimal use of limited resources,³⁹ and educating the public concerning healthcare and healthcare decision-making. Development of initiatives that improve inpatient hospital efficiency,^{81,82} encouraging cost-effective hospital market structure and finances, and developing incentives to enhance the supply and flexibility of hospital labor supply, particularly nurses, are other potential approaches to control inpatient expenditure growth. Given the major effect of new technology on healthcare expenditure, global technology assessment will be needed to make optimal healthcare decisions. Investing in cost-effective technology and innovations that address current and future needs in healthcare, and using

reimbursement mechanisms to discourage medical technologies that do not have demonstrated cost effectiveness, may help control the costs of new technology. With managed care reaching a turning point in its evolution, developing decision-making mechanisms that consider the preferences of both providers (supply side) and consumers (demand side) is essential for sustainable rationalized allocation of healthcare resources.⁴¹

Acknowledgments

The authors thank Karen Fitzner, PhD, from Blue Cross and Blue Shield Association and Donna Rindress, PhD, from BioMedCom Consultants Inc for their helpful comments and suggestions.

REFERENCES

1. Centers for Medicare and Medicaid Services. Report details national health care spending increases in 2001. January 8, 2003. Available at: <http://cms.hhs.gov/media/press/release.asp?Counter=693>. Accessed February 20, 2003.
2. Heffler S, Smith S, Keehan S, Clemens MK, Won G, Zezza M. Health spending projections for 2002-2012. *Health Aff (Millwood)* [serial online]. 2003;suppl. web exclusive:W3-W54. Available at:

- http://www.healthaffairs.org/WebExclusives/Heffler_Web_Excl_020703.htm. Accessed May 21, 2003.
3. **Strunk BC, Ginsberg PB, Gabel JR.** Tracking health care costs: growth accelerates again in 2001. *Health Aff (Millwood)* [serial online]. 2002;suppl. web exclusive:W299-W310. Available at: http://www.healthaffairs.org/WebExclusives/Strunk_Web_Excl_092502.htm. Accessed May 21, 2003.
 4. **National Center for Health Statistics.** *Health, United States, 2001 with Urban and Rural Health Chartbook*. Hyattsville, Md: National Center for Health Statistics; 2001. DHHS publication (PHS) 01-1232. Available at: <http://www.cdc.gov/nchs/products/pubs/pubd/hs/2010/2010.htm>. Accessed May 21, 2003.
 5. **Heffler S, Smith S, Won G, et al.** Health spending projections for 2001-2011: the latest outlook. Faster health spending growth and a slowing economy drive the health spending projection for 2001 up sharply. *Health Aff (Millwood)*. 2002;21(2):207-218.
 6. **Hay JW.** Hospital cost drivers: an evaluation of 1998-2001 state-level data. *Am J Manag Care*. 2003;9(suppl):SP13-SP24.
 7. **Popovic JR.** 1999 National Hospital Discharge Survey: Annual Summary with Detailed Diagnosis and Procedure Data. Hyattsville, Md: National Center for Health Statistics; 2001. DHHS publication (PHS) 2001-1722. Available at: http://www.cdc.gov/nchs/products/pubs/pubd/series/sr13/160-151/sr13_151.htm. Accessed May 21, 2003.
 8. **Hall MJ, Owings MF.** 2000 National Hospital Discharge Survey. Hyattsville, Md: National Center for Health Statistics; 2002. DHHS publication (PHS) 2002-1250. Available at: <http://www.cdc.gov/nchs/products/pubs/pubd/ad/321-330/ad329.htm>. Accessed May 21, 2003.
 9. **The American Hospital Association and the Lewin Group.** Forces driving inpatient utilization. *TrendWatch*. 2001;3(3):1-8.
 10. **Center for Studying Health System Change.** Spending on hospital care drives double-digit jump in health costs. September 2002. Available at: <http://www.hschange.com/CONTENT/476/>. Accessed February 20, 2003.
 11. **Center for Studying Health System Change.** Increased use of services and higher prices fuel 2001 hospital spending increases. June 2002. Available at: <http://hschange.org/CONTENT/448/>. Accessed August 27, 2002.
 12. **Strunk BC, Ginsburg PB, Gabel JR.** Tracking health care costs. *Health Aff (Millwood)* [serial online]. 2002;suppl web exclusive: W39-W50. Available at: http://www.healthaffairs.org/WebExclusives/Strunk_Web_Excl_92601.htm. Accessed May 22, 2003.
 13. **Blue Cross Blue Shield Association.** Hospital costs: inpatient and outpatient. 2002. Available at: http://bcbshealthissues.com/cost/drivers_hospital.pdf. Accessed August 27, 2002.
 14. **US General Accounting Office.** *Nursing Workforce: Emerging Nurse Shortages Due to Multiple Factors*. Washington, DC: US General Accounting Office; 2001. Publication GAO-01-944. Available at: <http://www.gao.gov/new.items/d01944.pdf>. Accessed May 22, 2003.
 15. **Steinbrook R.** Nursing in the crossfire. *N Engl J Med*. 2002;346:1757-1766.
 16. **Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K.** Nurse-staffing levels and the quality of care in hospitals. *N Engl J Med*. 2002;346:1715-1722.
 17. **Siegrist RB Jr, Kane NM.** Exploring the relationship between inpatient hospital costs and quality of care. *Am J Manag Care*. 2003;9(suppl):SP43-SP49.
 18. **American Hospital Association.** White Paper: the state of hospitals' financial health. 2002. Available at: www.hospitalconnect.com/aha/advocacygrassroots/advocacy/advocacy/content/Wp2002HospFinances.doc. Accessed May 29, 2002.
 19. **Cooper RA, Getzen TE, McKee HJ, Laud P.** Economic and demographic trends signal an impending physician shortage. *Health Aff (Millwood)*. 2002;21(1):140-154.
 20. **Jackson M, Chiarello LA, Gaynes RP, Gerberding JL.** Nurse staffing and healthcare-associated infections: proceedings from a working group meeting. *J Nurs Adm*. 2002;32:314-322.
 21. **Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH.** Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA*. 2002;288:1987-1993.
 22. **Young DS, Sachais BS, Jefferies LC.** Effect of disease complications on hospital costs. *Clin Chem*. 2002;48:140-149.
 23. **Dominguez TE, Chalom R, Costarino ATJ.** The impact of adverse patient occurrences on hospital costs in the pediatric intensive care unit. *Crit Care Med*. 2001;29:169-174.
 24. **Schneider PJ.** Five worthy aims for pharmacy's clinical leadership to pursue in improving medication use. *Am J Health Syst Pharm*. 1999;56:2549-2552.
 25. **Schumock GT, Meek PD, Ploetz PA, Vermeulen LC, the Publications Committee of the American College of Clinical Pharmacy.** Economic evaluations of clinical pharmacy services—1988-1995. *Pharmacotherapy*. 1996;16:1188-1208.
 26. **Bond CA, Raehl CL.** Changes in pharmacy, nursing, and total personnel staffing in US hospitals, 1989-1998. *Am J Health Syst Pharm*. 2000;57:970-974.
 27. **Ernst FR, Grizzle AJ.** Drug-related morbidity and mortality: updating the cost-of-illness model. *J Am Pharm Assoc*. 2001;41:192-199.
 28. **Chernew ME, Hirth RA, Sonnad SS, Ermann R, Fendrick AM.** Managed care, medical technology, and health care cost growth: a review of the evidence. *Med Care Res Rev*. 1998;55:259-288.
 29. **Newhouse JP.** An iconoclastic view of health cost containment. *Health Aff (Millwood)*. 1993;12(suppl):152-171.
 30. **Cutler DM, McClellan M.** Is technological change in medicine worth it? *Health Aff (Millwood)*. 2001;20(5):11-29.
 31. **Mohr PE, Mueller C, Neumann P, et al.** The impact of medical technology on future health care costs: final report. 2001. Available at: http://www.projectchope.org/CHA/pdf/newtech_final.pdf. Accessed February 28, 2002.
 32. **Toner R, Stolberg SG.** Decade after health care crisis, soaring costs bring new strains. *The New York Times*. August 11, 2002;sect 1:1-12.
 33. **PriceWaterhouseCooper.** The factors fueling rising healthcare costs. 2002. Available at: <http://www.aahp.org/InternalLinks/PwCFinalReport.pdf>. Accessed May 22, 2003.
 34. **The National Institute for Health Care Management.** Prescription drug expenditures in 2000: the upward trend continues. Available at: <http://www.nihcm.org/spending2000.pdf>. Accessed May 22, 2003.
 35. **Bryan S, Buxton M, Brenna E.** Estimating the impact of a diffuse technology on the running costs of a hospital. A case study of a picture archiving and communication system. *Int J Technol Assess Health Care*. 2000;16:787-798.
 36. **Mayer CE Jr, Kandzari DE, Goldschmidt-Clermont PJ, Phillips HR.** The complementary use of glycoprotein IIb/IIIa inhibitors and drug-eluting stents in contemporary percutaneous coronary intervention. *J Invasive Cardiol*. 2002;14(suppl E):36E-47E.
 37. **Lubitz J, Greenberg LG, Gorina Y, Wartzman L, Gibson D.** Three decades of health care use by the elderly, 1965-1998. *Health Aff (Millwood)*. 2001;20(2):19-32.
 38. **Ganz PA, Litwin MS.** Prostate cancer: the price of early detection. *J Clin Oncol*. 2001;19:1587-1588.
 39. **Lee TH, Brennan TA.** Direct-to-consumer marketing of high-technology screening tests. *N Engl J Med*. 2002;346:529-531.
 40. **Survey: prescription drug spending cuts hospital costs.** *Boston Business Journal*. March 12, 2002;Latest news. Available at: <http://www.bizjournals.com/boston/stories/2002/03/11/daily20.htm>. Accessed May 22, 2003.
 41. **Rosenthal MB, Newhouse JP.** Managed care and efficient rationing. *J Health Care Finance*. 2002;28(4):1-10.

42. Miller RH, Luft HS. HMO plan performance update: an analysis of the literature, 1997-2001. *Health Aff (Millwood)*. 2002;21(4):63-86.
43. Baker L. Managed care, medical technology, and the well-being of society. *Top Magn Reson Imaging*. 2002;13:107-113.
44. Bamezai A, Zwanziger J, Melnick GA, Mann JM. Price competition and hospital cost growth in the United States (1989-1994). *Health Econ*. 1999;8:233-243.
45. Miller RH, Luft HS. Does managed care lead to better or worse quality of care? *Health Aff (Millwood)*. 1997;16(5):7-25.
46. Berk ML, Monheit AC. The concentration of health care expenditures, revisited. *Health Aff (Millwood)*. 2001;20(2):9-18.
47. William M. Mercer, Inc. *15th Annual Mercer/Foster Higgins National Survey of Employer Sponsored Plans*. 2000. Available at: <http://www.imercer.com/us/imercercommentary/BB-final.pdf>. Accessed August 10, 2002.
48. US General Accounting Office. *Medicare Home Health: Payments to Health Agencies Are Considerably Higher Than Costs*. Washington, DC: US General Accounting Office; 2002. Publication GAO-02-663. Available at: <http://www.gao.gov/new.items/d02663.pdf>. Accessed May 22, 2003.
49. Hogan C, Lunney J, Gabel J, Lynn J. Medicare beneficiaries' costs of care in the last year of life. *Health Aff (Millwood)*. 2001;20(4):188-195.
50. Haupt BJ. *An Overview of Home Health and Hospice Care Patients: 1996 National Home and Hospice Care Survey*. Hyattsville, Md: National Center for Health Statistics; 1998. DHHS publication (PHS) 98-1250. Available at: <http://www.cdc.gov/nchs/data/ad/ad297.pdf>. Accessed May 21, 2003.
51. Center for Medicare and Medicaid Services. Hospital care expenditures aggregate and per capita amounts and percent distribution, by source of funds: selected calendar years 1980-2001 [Table 5]. 2002. Available at: <http://cms.hhs.gov/statistics/nhe/historical/t5.asp>. Accessed May 21, 2003.
52. Committee on the Consequences of Underinsurance, Board on Health Care Services, Institute of Medicine. *Care Without Coverage: Too Little, Too Late*. Washington, DC: The National Academy of Sciences; 2002. Available at: <http://www.nap.edu/catalog/10367.html>. Accessed May 21, 2003.
53. Velianoff GD. Overcrowding and diversion in the emergency department: the health care safety net unravels. *Nurs Clin North Am*. 2002;37:59-66.
54. Committee on Rapid Advance Demonstration Projects: Health Care Finance and Delivery Systems, Board on Health Care Services, Institute of Medicine. Corrigan JM, Greiner A, Erickson SM, eds. *Fostering Rapid Advances in Health Care: Learning From System Demonstrations*. Washington, DC: The National Academy of Sciences; 2002. Available at: http://www.nap.edu/catalog/10565.html?onpi_newsdoc1192002. Accessed May 21, 2003.
55. US Census Bureau. *Health Insurance Coverage: 2001*. Washington, DC: US Department of Commerce, Economics and Statistics Administration, US Census Bureau; 2002. Available at: <http://landview.census.gov/prod/2002pubs/p60-220.pdf>. Accessed May 21, 2003.
56. McCaig LF, Ly N. *National Hospital Ambulatory Medical Care Survey: 2000—Emergency Department Summary*. Hyattsville, Md: National Center for Health Statistics; 2002. DHHS publication (PHS) 2002-1250. Available at: <http://www.cdc.gov/nchs/data/ad/ad326.pdf>. Accessed May 21, 2003.
57. Kozak LJ, Hall MJ, Owings MF. Trends in avoidable hospitalizations, 1980-1998. *Health Aff (Millwood)*. 2001;20(2):225-232.
58. Sacchetti A, Harris RH, Warden T, Roth S. Contribution of ED admissions to inpatient hospital revenue. *Am J Emerg Med*. 2002;20:30-31.
59. Prince TR, Sullivan JA. Financial viability, medical technology, and hospital closures. *J Health Care Finance*. 2000;26(4):1-18.
60. Melnick G, Keeler E, Zwanziger J. Market power and hospital pricing: are nonprofits different? *Health Aff (Millwood)*. 1999;18(3):167-173.
61. Abelson R. U.S. to step up antitrust effort on health care. *The New York Times*. August 9, 2002; sect A:1.
62. Nevers RL. A financial argument for service-line management. *Healthc Financ Manage*. 2002;56(12):38-42.
63. Needleman J, Lamphere J, Chollet D. Uncompensated care and hospital conversions in Florida. *Health Aff (Millwood)*. 1999;18(4):125-133.
64. Devereaux PJ, Choi PT, Lacchetti C, et al. A systematic review and meta-analysis of studies comparing mortality rates of private for-profit and private not-for-profit hospitals. *CMAJ*. 2002;166:1399-1406.
65. Coble YD Jr. Liability reform is everybody's business. *American Medical News* [serial online] August 19, 2002. Available at: http://www.ama-assn.org/sci-pubs/amnews/amn_02/edca0819.htm. Accessed August 19, 2002.
66. Mokdad AH, Bowman BA, Ford ES, et al. The continuing epidemics of obesity and diabetes in the United States. *JAMA*. 2001;286:1195-1200.
67. Agency for Healthcare Research and Quality. AHRQ data show rising hospital charges, falling hospital stays. 2002. Available at: <http://www.ahrq.gov/news/press/pr2002/rishosp.htm>. Accessed August 10, 2002.
68. Mukamel DB, Zwanziger J, Bamezai A. Hospital competition, resource allocation and quality of care. *BMC Health Serv Res*. 2002;2(1):10.
69. Kane NM. Analysis of hospital strategy and financial health. at: <http://bcbshealthissues.com/costpressconf/analysisofhospitalstrategy.doc>. Accessed May 29, 2003.
70. Harrison MG, Montalvo CC. The financial health of California hospitals: a looming crisis. *Health Aff (Millwood)*. 2002;21(1):118-126.
71. Lynk WJ, Longley CS. The effect of physician-owned surgicenters on hospital outpatient surgery. *Health Aff (Millwood)*. 2002;21(4):215-221.
72. Voelker R. Medical news & perspectives: specialty hospitals generate revenue and controversy. *JAMA*. 2003;289:409-410.
73. Eastaugh SR. Hospital costs and specialization: benefits of trimming product lines. *J Health Care Finance*. 2001;28(1):61-71.
74. Salit S, Fass S, Nowak M. Out of the frying pan: New York City hospitals in an age of deregulation. *Health Aff (Millwood)*. 2002;21(1):127-139.
75. Hawryluk M. Bill would ease access to generic drugs. *American Medical News* [serial online] August 19, 2002. Available at: http://www.ama-assn.org/sci-pubs/amnews/pick_02/gvsb0819.htm. Accessed August 19, 2002.
76. Bernstein MJ. Congress acts to ease nursing shortage. *American Medical News* [serial online] August 12, 2002:1-4. Available at: http://www.ama-assn.org/sci-pubs/amnews/pick_02/gvsb0812.htm. Accessed May 21, 2003.
77. Basu J, Friedman B, Burstin H. Primary care, HMO enrollment, and hospitalization for ambulatory care sensitive conditions: a new approach. *Med Care*. 2002;40:1260-1269.
78. Conaghan PJ, Figueira E, Griffin MA, Ingham Clark CL. Randomized clinical trial of the effectiveness of emergency day surgery against standard inpatient treatment. *Br J Surg*. 2002;89:423-427.
79. Blumberg SH. Crisis intervention program: an alternative to inpatient psychiatric treatment for children. *Ment Health Serv Res*. 2002;4(1):1-6.
80. Fletcher K, Painter V. Building a dream: creating an oncology day/evening hospital. *Can J Nurs Leadersh*. 2002;15(2):10-13.
81. Wachter RM, Goldman L. The hospitalist movement 5 years later. *JAMA*. 2002;287:487-494.
82. Palmer HC, Halperin A, Elnicki M, et al. Effect of a patient care partnership project on cost and quality of care at an academic teaching hospital. *South Med J*. 2002;95:1318-1325.