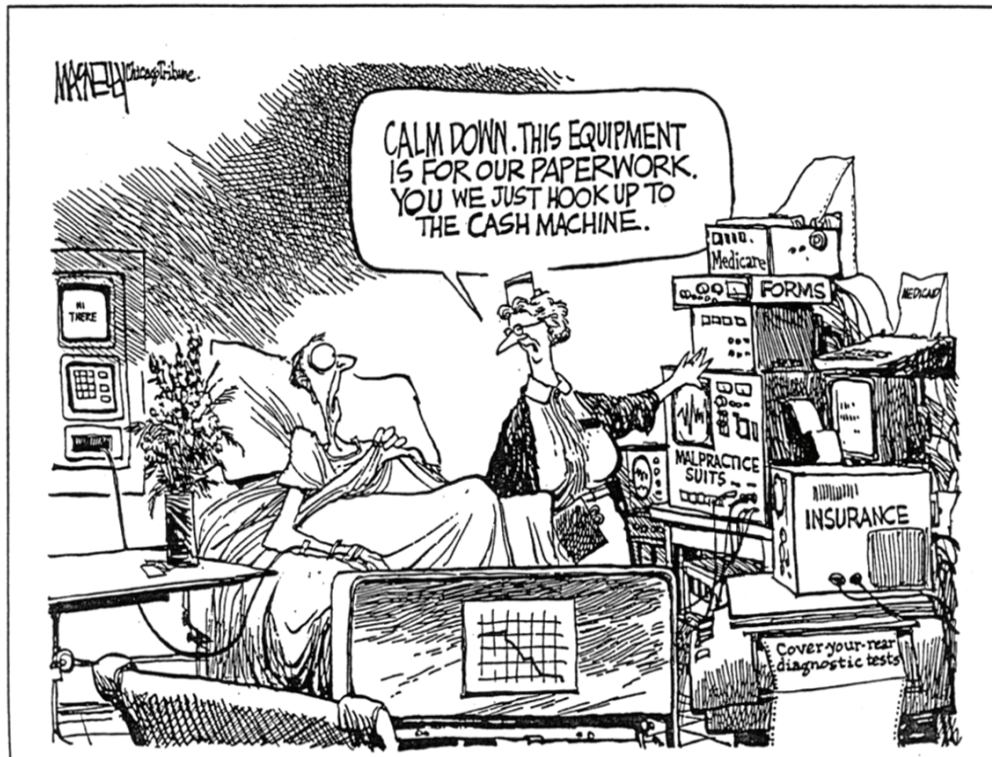


Controlling health care costs

Talking Point 14

Computerized medical records and chronic disease management do not save money.



University Daily Kansan / Thursday, November 14, 1991

OPINION

Refer to Talking Point 6 for:

Schiff, G.D. & Young, Q.D. (2001). "You Can't Leap a Chasm in Two Jumps: The Institute of Medicine Health Care Quality Report." *Public Health Rep*, 116, 396-403.

Hospital Computing and the Costs and Quality of Care: A National Study

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ABSTRACT

BACKGROUND: Many believe that computerization will improve health care quality, reduce costs, and increase administrative efficiency. However, no previous studies have examined computerization's cost and quality impacts at a diverse national sample of hospitals.

METHODS: We linked data from an annual survey of computerization at approximately 4000 hospitals for the period from 2003 to 2007 with administrative cost data from Medicare Cost Reports and cost and quality data from the 2008 Dartmouth Health Atlas. We calculated an overall computerization score and 3 subscores based on 24 individual computer applications, including the use of computerized practitioner order entry and electronic medical records. We analyzed whether more computerized hospitals had lower costs of care or administration, or better quality. We also compared hospitals included on a list of the "100 Most Wired" with others.

RESULTS: More computerized hospitals had higher total costs in bivariate analyses ($r = 0.06$, $P = .001$) but not multivariate analyses ($P = .69$). Neither overall computerization scores nor subscores were consistently related to administrative costs, but hospitals that increased computerization faster had more rapid administrative cost increases ($P = .0001$). Higher overall computerization scores correlated weakly with better quality scores for acute myocardial infarction ($r = 0.07$, $P = .003$), but not for heart failure, pneumonia, or the 3 conditions combined. In multivariate analyses, more computerized hospitals had slightly better quality. Hospitals on the "Most Wired" list performed no better than others on quality, costs, or administrative costs.

CONCLUSION: As currently implemented, hospital computing might modestly improve process measures of quality but does not reduce administrative or overall costs.

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KEYWORDS: Hospital costs; Hospital quality; Information systems

Enthusiasm for health information technology spans the political spectrum, from Barack Obama to Newt Gingrich. Congress is pouring \$19 billion into it. Health reformers of many stripes see computerization as a painless solution to the most vexing health policy problems, allowing simultaneous quality improvement and cost reduction.

Such optimism is not new. In the 1960s and 1970s, 16-mm films from IBM and the Lockheed Corporation touted hospital computing systems as a means to reduce paperwork and improve care.^{1,2} By the 1990s, opinion leaders confidently predicted the rapid adoption and substantial benefits of computerized patient records,^{3,4} including massive administrative savings.^{5,6}

In 2005, one team of analysts projected annual savings of \$77.8 billion,⁷ whereas another foresaw more than \$81 billion in savings plus substantial health gains⁸ from the nationwide adoption of optimal computerization. Today, the federal government's health information technology website states (without reference) that "Broad use of health IT will: improve health care quality; prevent medical errors; reduce health care costs; increase administrative efficiency."

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cies; decrease paperwork; and expand access to affordable care.”⁹

Unfortunately, these attractive claims rest on scant data. A 2006 report prepared for the Agency for Healthcare Research and Quality,¹⁰ as well as an exhaustive systematic review,¹¹ found some evidence for cost and quality benefits of computerization at a few institutions, but little evidence of generalizability. Recent Congressional Budget Office reviews have been equally skeptical, citing the slim and inconsistent evidence base.^{12,13} As these reviews note, no previous studies have examined the cost and quality impacts of computerization at a diverse national sample of hospitals.

MATERIALS AND METHODS

Data Sources

We analyzed data from 3 sources: the Healthcare Information and Management Systems Society (HIMSS) Analytics annual survey of hospitals’ computerization; the Medicare Cost Reports submitted to the Centers for Medicare and Medicaid Services; and the 2008 Dartmouth Health Atlas, which compiles Centers for Medicare and Medicaid Services data on the costs and quality of care that hospitals deliver to Medicare patients.

We used HIMSS surveys for the years 2003 to 2007 to assess the degree of hospital computerization. The survey’s methods underwent changes in 2005. It annually queries approximately 4000 hospitals on the implementation of specific computer applications. It is the largest and most comprehensive longitudinal source of information regarding hospitals’ adoption of information technology.

To quantify each hospital’s computerization, we created a score (range, 0-1.00) by summing the number of computer applications reported as fully implemented and dividing by the number of applications for which data were available (a maximum of 24 applications for 2005-2007, 21 applications for 2003-2004). We used similar methods to calculate 3 subscores indicative of the degree of computerization in 3 domains: clinical, patient-related administration, and other administration. Finally, we examined the impact of 2 individual applications generally thought key to improving quality and efficiency: electronic medical records and computerized practitioner order entry. Table 1 displays a list of all applications in the HIMSS surveys and our subscore classification scheme.

We used Medicare Cost Reports available from Centers for Medicare and Medicaid Services as of January 1, 2009, to calculate hospitals’ administrative costs for each year from 2003 to 2007 and to establish hospitals’ ownership (nonprofit, investor owned, or public), type (eg, acute care,

psychiatric), location by state, urban/rural location, and teaching status. We calculated administration’s share of each hospital’s total costs as previously described.^{14,15} The 0.18% of hospitals whose cost reports showed implausible figures (<5% or >80%) for the proportion spent on administration were treated as missing values.

The 2008 Dartmouth Atlas¹⁶ reports 4 quality scores based on Medicare patients cared for from 2001 to 2005 with pneumonia, congestive heart failure, or acute myocardial infarction,¹⁷ as well as a composite quality score. It also includes data on each hospital’s average costs, both inpatient and outpatient, for Medicare patients during the last 2 years of life. The methods used to develop these estimates have been described.¹⁸

We linked our 3 data sources using Medicare Provider Numbers. Table 2 displays the number of hospitals included in the HIMSS and Dartmouth data for each year, as well as the

CLINICAL SIGNIFICANCE

- Hospital computerization has not, thus far, achieved savings on clinical or administrative costs.
- More computerized hospitals might have a slight quality advantage for some conditions.
- No reliable data support claims of cost-savings or dramatic quality improvement from electronic medical records.

Table 1 Computer Applications Used to Construct Overall Computerization Score and Subscores, 2003-2007

Clinical applications subscore (8 applications)
Clinical data repository
Computerized practitioner order entry ^b
Data warehousing and mining, clinical ^a
Electronic medical record ^b
Laboratory information system
Nursing documentation
Order entry
Physician documentation
Administrative applications (patient-related) subscore (4 applications)
Nurse acuity ^a
Nurse staffing scheduling
Patient billing
Patient scheduling
Administrative applications (other) subscore (12 applications)
Budgeting
Case mix management
Cost accounting
Credit collections
Eligibility
Data warehousing and mining, financial ^a
Electronic data interchange
Executive information system
General ledger
Materials management
Personnel management
Staff scheduling

^aCategory not included in 2003 and 2004 HIMSS surveys.

^bApplications also were analyzed individually.

Table 2 Number of Hospitals Included in Healthcare Information and Management Systems Society Survey of Computerization and Dartmouth Atlas Cost/Quality Data, and Numbers Matched with Medicare Cost Reports, 2003-2007

Year	HIMSS Survey*	HIMSS + Medicare Cost Report†	Dartmouth Cost and Quality Data‡	Cost and Quality Data + HIMSS§	Dartmouth Cost and Quality Data + Medicare Cost Report
2003	3803	3486	NA	NA	NA
2004	3881	3724	NA	NA	NA
2005	3816	3565	3089	2641	3010
2006	4025	3620	NA	NA	NA
2007	4744	2596¶	NA	NA	NA

HIMSS = Healthcare Information and Management Systems Society; NA = not available.

*Number of hospitals with valid data available from HIMSS survey.

†Number of hospitals with valid data available from both HIMSS survey and Medicare Cost Report.

‡Number of hospitals with valid quality and cost of care data from Dartmouth Health Atlas.

§Number of hospitals with valid data available from both Dartmouth Health Atlas and HIMSS survey.

||Number of hospitals with valid data available from HIMSS survey and Medicare Cost Report and Dartmouth Health Atlas.

¶Centers for Medicare and Medicaid Services had released data from 2007 Medicare Cost Reports for approximately half of all hospitals by January 1, 2009.

number that we were able to match to a Medicare Cost Report. The hospitals included in the computerization (HIMSS) and cost/quality databases (Dartmouth Atlas) were more likely than other hospitals to be urban, teaching, and nonprofit; virtually all were short-term general hospitals. Hospitals in the Dartmouth database were larger than average.

Finally, we compared costs and quality of hospitals at the cutting edge of computerization (as indicated by their inclusion on the “100 Most Wired List” compiled by *Hospital and Health Networks* magazine for 2005 and 2007^{19,20}) with those of other hospitals.

Statistical Analyses

We first examined bivariate (Pearson) correlations between each hospital’s overall computerization score (as well as each of the 3 computerization subscores and the adoption of electronic medical records and computerized physician order entry individually) and the proportion of spending devoted to administration (calculated from Medicare Cost Reports) for each year from 2003 to 2007. To assess lagged effects, we examined whether computerization in 2003 was correlated with administrative costs in 2007. Finally, we determined whether longitudinal changes in any measure of computerization between 2003 and 2007 correlated with changes in administrative costs. We also analyzed the correlation between each hospital’s measures of computerization in 2005 and its quality scores and Medicare costs.

We then used multiple linear regression to ascertain predictors of hospital administrative costs for each year between 2003 and 2007 and the change in administrative costs between 2003 and 2007, as well as quality scores and Medicare costs (2005 only). In these analyses, we controlled for hospital ownership and type, bed size, teaching status, urban/rural location, and location by state. The parameter estimates from these analyses estimate the change in cost,

quality score, or administration’s share of hospital spending if a hospital moved from no implementation of the computer application(s) to complete implementation. Given the large number of comparisons, we consider findings significant only if the *P* value is less than .01.

RESULTS

Hospital computerization increased between 2003 and 2004 and from 2005 to 2007. Data discontinuity precluded analysis of changes between 2004 and 2005. By 2007, the average hospital in the HIMSS survey had implemented 64% of the 24 surveyed computer applications, although only 23% had implemented computerized physician order entry. Larger urban and teaching hospitals were more computerized, whereas public hospitals were less computerized. As expected, hospitals on the “Most Wired” lists reported higher than average computerization in the HIMSS survey ($P < .0001$ in both years).

Hospitals’ administrative costs increased slightly but steadily, from 24.4% in 2003 to 24.9% in 2007 ($P < .0001$). Higher administrative costs were associated with for-profit ownership, smaller size, non-teaching status, and urban location. Psychiatric hospitals had higher administrative costs than acute care hospitals. There was no association between administrative costs and any quality measure. Higher administrative costs weakly predicted higher total Medicare spending ($r = 0.09$, $P < .0001$), inpatient spending ($r = 0.06$, $P = .0007$), and outpatient spending ($r = 0.07$, $P < .0001$).

The average composite quality score for US hospitals was 86.1, whereas the average scores for acute myocardial infarction, congestive heart failure, and pneumonia were 92.3, 86.9, and 78.5, respectively. Larger hospitals and those with teaching programs scored higher on quality, and for-profit hospitals scored lower.

Table 3 Relationship Between Each Hospital's Level of Computerization and Administrative Costs as a Share of Total Costs, 2003-2007

	2003	2004	2005	2006	2007	Change, 2003-2007 ^a
Bivariate correlations with proportion spent on administration (<i>P</i> value)						
Overall computerization score	−0.005 (.75)	−0.04 (.02)	−0.02 (.20)	−0.03 (.12)	−0.009 (.66)	0.09 (<.0001)
Subscores:						
Clinical systems	−0.02 (.25)	−0.04 (.02)	−0.03 (.04)	−0.05 (.004)	−0.02 (.25)	0.06 (.014)
Administrative systems (patient related)	−0.01 (.39)	−0.06 (<.0001)	−0.007 (.69)	−0.01 (.49)	−0.009 (.66)	0.03 (.21)
Administrative systems (other)	0.01 (.47)	−0.02 (.35)	−0.005 (.77)	−0.008 (.96)	−0.02 (.39)	0.08 (.0005)
Multivariate parameter estimates (and <i>P</i> values) for relationship between computerization and proportion spent on administration ^b						
Overall computerization score	−0.003 (.71)	−0.009 (.15)	−0.003 (.67)	0.001 (.86)	0.01 (.24)	0.02 (.002)
Subscores:						
Clinical systems	−0.005 (.18)	−0.006 (.14)	−0.002 (.71)	−0.006 (.13)	0.006 (.26)	0.005 (.22)
Administrative systems (patient related)	0.005 (.44)	−0.01 (.14)	0.001 (.81)	−0.0006 (.91)	−0.003 (.64)	0.005 (.34)
Administrative systems (other)	0.001 (.81)	−0.003 (.52)	−0.002 (.71)	0.008 (.15)	0.009 (.21)	0.02 (.0008)

^aRelationship between change in administration's share of hospital's total costs and change in its computerization score, 2003-2007.

^bControlling for teaching status, number of beds, urban/rural location, ownership (for-profit, private nonprofit, or public), state, and hospital type (eg, acute care, psychiatric).

Administrative Costs and Computerization

Table 3 displays the bivariate and multivariate relationships between computerization and administrative costs for each year, as well as the longitudinal relationship between change in computerization and change in administrative costs.

In bivariate analyses, overall computerization score showed no correlation with administrative costs ($P > .02$ for comparisons in each of the 5 years). None of the 3 computerization subscores or 2 individual applications (electronic medical records or computerized physician order entry, data not shown) were consistently associated with administrative costs. However, in 2004 alone, one subscore, patient-related administrative tasks, was associated with lower administrative costs ($r = -0.06$, $P < .0001$), as was the use of computerized physician order entry in 2004 ($r = -0.06$, $P = .001$), 2005 ($r = -0.05$, $P = .002$), and 2006 ($r = -0.05$, $P = .002$); greater computerization of clinical functions in 2006 ($r = -0.05$, $P = .004$); and electronic medical records in 2006 ($r = -0.048$, $P = .004$). Between 2003 and 2007, a more rapid increase in computerization was associated with a faster increase in administrative costs ($r = 0.09$, $P = .0001$).

In multivariate analysis, neither overall computerization nor any of the subscores were associated with administrative costs in any year. The use of electronic medical records was associated with higher administrative costs in a single

year, 2007 (parameter estimate = .004, $P = .007$). In contrast with the bivariate findings, the use of computerized physician order entry was nonsignificantly associated with higher administrative costs in all years. As in the bivariate longitudinal analysis, between 2003 and 2007, a more rapid increase in computerization was associated with a faster increase in administrative costs. We found no evidence of lagged effects; computerization in 2003 did not predict administrative costs in 2007 ($P = .71$). Administrative costs of hospitals on the "Most Wired" list did not differ from those of other hospitals in 2005 ($P = .96$) or 2007 ($P = .78$).

Quality Measures and Computerization

In bivariate analyses, higher overall computerization scores correlated with better quality scores for acute myocardial infarction ($r = 0.07$, $P = .003$) but not for congestive heart failure or pneumonia, or for the composite quality score.

On multivariate analysis (Table 4), there was a trend toward computerization predicting higher quality. Hospitals with higher overall computing scores had slightly better composite quality (parameter estimate = 2.365, $P = .013$), as did hospitals with higher subscores for clinical systems, and patient-related administrative systems. Both the use of electronic medical records and computerized order entry predicted higher composite quality scores. More computerized hospitals scored higher on care of acute myocardial infarction, but not on pneumonia or heart failure. Hospitals

Table 4 Relationship of Hospitals' Computerization to Quality Scores, Total Costs, and Administrative Costs in Multivariate Models, 2005

Computerization Variable	Total Cost Parameter Estimate (P Value)	Administration as Share of Hospital Budget Parameter Estimate (P Value)	Composite Quality Score Parameter Estimate (P Value)	Pneumonia Quality Score Parameter Estimate (P Value)	Congestive Heart Failure Quality Score Parameter Estimate (P Value)	Acute Myocardial Infarction Quality Score Parameter Estimate (P Value)
Overall computerization score	\$612 (.69)	−0.0027 (.67)	2.36 (.013)	1.36 (.34)	1.93 (.15)	3.29 (.0007)
Clinical systems subscore	\$1154 (.24)	−0.002 (.71)	1.39 (.02)	0.45 (.61)	1.77 (.04)	1.82 (.003)
Administrative systems (patient-related) subscore	−\$4764 (<.0001)	−0.001 (.81)	1.57 (.02)	1.51 (.13)	0.96 (.31)	2.00 (.004)
Administrative systems (other) subscore	−\$243 (.85)	−0.002 (.71)	1.12 (.17)	1.05 (.39)	0.13 (.91)	1.62 (.054)
Electronic medical record	\$134 (.50)	0.001 (.25)	0.32 (.008)	0.38 (.04)	0.35 (.04)	0.24 (.055)
Practitioner order entry	\$284 (.28)	0.0009 (.44)	0.41 (.009)	0.032 (.89)	0.95 (<.0001)	0.51 (.002)

Models control for teaching status, number of beds, urban/rural location, ownership (for-profit, private nonprofit, or public) and state.

on the “Most Wired” list showed a weak trend toward higher composite quality (parameter estimate = 1.032, $P = .08$).

Overall Costs and Computerization

In bivariate analysis, overall computerization score was associated with higher total Medicare spending ($r = 0.06$, $P = .001$), as well as spending for imaging ($r = 0.09$, $P < .0001$), outpatient care ($r = 0.13$, $P < .0001$), and diagnostic testing ($r = 0.09$, $P < .0001$).

In multivariate models (Table 4), overall computerization was not associated with overall Medicare spending (parameter estimate = \$612, $P = .69$) or individual components of spending (data not shown). The computerization subscores were inconsistently associated with expenditures. Costs at hospitals on the “Most Wired” list did not differ from those at other hospitals (parameter estimate = \$324, $P = .77$).

DISCUSSION

We found no evidence that computerization has lowered costs or streamlined administration. Although bivariate analyses found higher costs at more computerized hospitals, multivariate analyses found no association. For administrative costs, neither bivariate nor multivariate analyses showed a consistent relationship to computerization. Although computerized physician order entry was associated with lower administrative costs in some years on bivariate analysis, no such association remained after adjustment for confounders. Moreover, hospitals that increased their computerization more rapidly had larger increases in administrative costs. More encouragingly, greater use of information technology was associated with a consistent though small increase in quality scores.

We used a variety of analytic strategies to search for evidence that computerization might be cost-saving. In cross-sectional analyses, we examined whether more computerized hospitals had lower costs or more efficient administration in any of the 5 years. We also looked for lagged effects, that is, whether cost-savings might emerge after the implementation of computerized systems. We looked for subgroups of computer applications, as well as individual applications, that might result in savings. None of these hypotheses were borne out. Even the select group of hospitals at the cutting edge of computerization showed neither cost nor efficiency advantages. Our longitudinal analysis suggests that computerization may actually increase administrative costs, at least in the near term.

The modest quality advantages associated with computerization are difficult to interpret. The quality scores reflect processes of care rather than outcomes; more information technology may merely improve scores without actually improving care, for example, by facilitating documentation of allowable exceptions.

Recent reviews have concluded that custom-built systems at 3 academic centers and at Veterans Administration

hospitals have improved quality and decreased use (mostly of diagnostic tests).^{10,11} In contrast, they found less evidence for positive effects beyond these 4 institutions and no reliable data to support claims for savings on costs or clinician time. Some decision support systems have improved practitioner performance, but their impact on patient outcomes remains uncertain.²¹

A recent study of 41 Texas hospitals found that hospitals with computerized physician order entry had lower mortality for coronary artery surgery but not for other conditions.²² Facilities with automated decision support had lower costs. The impact of computerization on complication rates and length of stay was inconsistent. At Kaiser Permanente in Hawaii, implementation of an electronic medical record increased operational efficiency, defined as a decrease in outpatient visits and increase in phone and e-mail consultations.²³

In other settings, computerization has yielded mixed results.²⁴ In a national study, electronic medical records were not associated with better quality ambulatory care.²⁵ Prescribing errors were no lower at outpatient practices with computerized prescribing,²⁶ and adverse events from medication errors persisted at a highly computerized hospital with computerized physician order entry.²⁷ A leading computerized physician order entry system sometimes facilitated medication errors,²⁸ and the introduction of such a system was linked to an increase in mortality at one children's hospital²⁹ but not at another.³⁰

Although optimal computerization probably improves quality, it remains unclear whether the systems currently deployed in most hospitals achieve such improvement. Even the business case for hospital computerization is uncertain. On the plus side, a 2001 study found that hospitals with integrated information systems were more profitable.³¹ Florida hospitals using more information technology had higher revenues and incomes, but higher expenses.³² A literature review found that the use of an electronic medical record often increases billings but reduces provider productivity by increasing time spent on documentation.³³ Error reduction was inconsistent, and the author found no evidence for savings or decreased malpractice premiums.

The data we used for our analysis appear reasonably robust. Our total cost measure sums expenditures across sites, outpatient and inpatient, for patients who received the bulk of their care at each hospital. Thus, they should reflect any savings from improved coordination of care and the avoidance of duplicate tests, the type of waste that computerization might be expected to curtail.

Medicare Cost Reports provide reliable and detailed hospital financial data covering most non-federal US hospitals and are subject to extensive audit. Estimates of administrative expenses based on these cost reports jibe well with labor-force data³⁴ and regulatory data from California.³⁵

The HIMSS survey provides the only available longitudinal data on computerization for a large sample of US hospitals. Its sponsoring organization is the largest health information technology professional group, reinforcing re-

spondents' motivation to provide accurate data. Moreover, HIMSS scores correlated highly with inclusion on the "Most Wired" list in both 2005 and 2007. A 2008 cross-sectional survey that used more stringent definitions of computerization adoption found lower levels of implementation.³⁶ Even if the HIMSS survey provides an imperfect measure of computerization, the lack of cost and efficiency differences between hospitals at the extremes of computerization suggests that its salutary effects cannot be large.

Why has information technology failed to decrease administrative or total costs? Three interpretations of our findings seem plausible. First, perhaps computerization cannot decrease costs because savings are offset by the expense of purchasing and maintaining the computer system itself. Although information technology has improved efficiency in some industries (eg, telecommunications), it has actually increased costs in others, such as retail banking.³⁷

Second, computerization may eventually yield cost and efficiency gains, but only at a more advanced stage than achieved by even the 100 "Most Wired" hospitals.

Finally, we believe that the computer's potential to improve efficiency is unrealized because the commercial marketplace does not favor optimal products. Coding and other reimbursement-driven documentation might take precedence over efficiency and the encouragement of clinical parsimony. The largest computer success story has occurred at Veterans Administration hospitals where global budgets obviate the need for most billing and internal cost accounting, and minimize commercial pressures.

CONCLUSIONS

Whatever the explanation, as currently implemented, health information technology has a modest impact on process measures of quality, but no impact on administrative efficiency or overall costs. Predictions of cost-savings and efficiency improvements from the widespread adoption of computers are premature at best.

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Disease Management: Panacea, Another False Hope, or Something in Between?

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ABSTRACT

Disease management is being promulgated by many policy makers, legislators, and a burgeoning new disease management industry as the next major hope, together with information technology and consumer-directed health care, to bring cost containment to runaway costs of health care. Many expect quality improvement as well. The concept is being aggressively marketed to employers, health plans, and government in the wake of managed care's failure to contain costs. There is widespread confusion, however, about what disease management is and what impact it will have on patients, physicians, and the health care system itself. In this article I give a current snapshot of disease management by briefly addressing (1) its rationale and growth, (2) its track record concerning costs and quality of care, and (3) its impacts on primary care.

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RATIONALE AND GROWTH OF DISEASE MANAGEMENT

It is currently estimated that about 125 million Americans have 1 or more chronic diseases, one half of whom have 2 or more chronic illnesses. Although chronic conditions cut across all age-groups, they are most common among the elderly.¹ The care of chronic illness accounts for almost 75% of total health care expenditures each year.² Just 5 chronic diseases—hypertension, heart disease, diabetes, asthma, and mood disorders—account for almost one half of US health care spending.³ As our population ages and the prevalence and costs of chronic disease increase, it is becoming increasingly clear that our current health care system, oriented as it is to acute care, is ill-suited to the optimal care of chronic conditions, where care instead of cure is the major goal.

The management of disease has long been a central goal of medicine. The term *disease management*, however, is a new buzzword, confusing to many, that has arisen in response to the economic and societal burden incurred by the care of chronic illness and the need to improve the quality of care for the growing populations of patients who have chronic disease.⁴ An additional driver of disease management, especially during the last 15 years, has been aggressive marketing by a growing commercial disease management industry seeking profits in a new market. The pharmaceutical industry, especially pharmacy benefit management companies (PBMs), has spearheaded this development since the early 1990s.

There are two basic types of disease management programs—those based on primary care and integrated within a managed care organization (eg, Group Health Cooperative and Kaiser Permanente), and commercial vendors to which employers and health plans may outsource their disease management functions. The former has been well accepted within the medical community as an important advance in the care of chronic disease. Group Health Cooperative and Kaiser Permanente have pioneered new

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approaches to chronic disease management based upon a new paradigm, the Chronic Care Model.⁵ For example, primary care teams are provided support in the form of electronic diabetes registries, evidence-based guidelines, patient self-management support, and decentralized on-site consultation with a diabetes expert team (a physician and a nurse specialist).⁶

Commercial disease management programs are quite different. As carved-out programs, they are not integrated with primary care, are for-profit ventures, and are marketed to employers and health plans primarily as a cost-containment strategy. With sophisticated information systems, disease management companies focus on patient education and more-effective patient self-management, especially by use of telephone calls, mailings, and the Internet.⁷ Commercial disease management programs often provide minimal communication with primary care physicians, and reception of these programs by physicians is frequently antagonistic. Physicians may at times receive telephone calls from several nurses in distant call centers about the same patient with multiple chronic conditions.

Early commercial disease management programs were designed to identify high-risk patients with a single disease and then to sell a program of patient education and self-management to employers and managed care organizations. Although these programs were marketed as strategies to contain costs and improve the quality of care of patients with chronic diseases (such as diabetes or asthma), pharmaceutical manufacturers could expect to gain increased profits in several ways. Disease management programs could support their own product lines, increased sales could be leveraged by pharmacy benefit management companies contracting with employers and managed care organizations, and patients not yet taking medications could be identified.⁸

Whereas early disease management programs were directed mainly at enlarging target populations for drug therapy and increasing patient compliance with drug regimens, second-generation disease management programs have evolved in recent years toward a broader, population-based approach. A large commercial disease management industry has emerged that utilizes claims data to identify patients with selected chronic diseases. Commercial disease management vendors increasingly sell their programs for multiple diseases. Although participation in a disease management program has remained voluntary for patients, the trend in the disease management industry is to include all patients with selected chronic diseases unless they opt out of the program.⁹

Although some health plans develop their own disease management programs, many contract with private vendors to provide this function. A health plan or employer contracting for a disease management

program will pay a per-member-per-month fee for a package of services, such as patient and clinician education, patient self-management, reminders, and alerts. The vendor agrees to specific performance guarantees, such as a certain percentage of cost savings and perhaps some health outcome measures. Fees may be at risk if performance goals are not met, but vendors are not obligated to pick up any added treatment costs and avoid clinical risk or responsibility for patient care.⁹

Two thirds of employers with 200 or more employees in 2005 had a disease management program in their job-based insurance plans; more than one half of all workers with employment-based insurance had a disease management program. The most common disease management program is for diabetes, closely followed by asthma, hypertension, and high-cholesterol programs.¹⁰ On the public sector side, more than 20 states are contracting for one or another kind of disease management programs for their Medicaid enrollees,¹¹ and Medicare has already signed up 100,000 beneficiaries for disease management programs through 8 companies.¹²

DOES DISEASE MANAGEMENT CUT COSTS AND IMPROVE QUALITY OF CARE?

Evaluations of disease management programs are methodologically challenging, and most studies are limited by not having a control group or data on longer-term outcomes. The evidence to date is stronger for quality improvement in such programs than for cost savings, and many studies do not factor in the full costs of the disease management interventions themselves. To date, there are no studies that directly compare the outcomes of disease management programs integrated in primary care settings with outcomes of commercial programs.¹³

Some institutions that have introduced disease management programs based on a Chronic Care Model have achieved improved quality of care as a result, sometimes with modest short-term cost savings. One example is at Group Health Cooperative in Seattle, which adopted the Chronic Care Model in 1995. During the next 2 years overall costs went down by 11% for 15,000 diabetic patients (except for pharmacy costs, which went up by 16%), and both specialty visits and hospital admissions were reduced by 25%¹⁴; at the same time, quality improved as measured by sustained reductions of glycosylated hemoglobin (HbA_{1c}) levels.¹⁵ Another example is a Kaiser Permanente program in Northern California, where substantial quality improvement, but no cost savings, was achieved in a multidisciplinary disease management program for coronary artery disease, heart failure, diabetes, and asthma during a 6-year period from 1996 to 2002.¹⁶ In a later summary of 39 studies of outcomes from use of

the Chronic Care Model, positive patient outcomes and/or care processes were found in 32 studies, with outcomes depending on how many of the 4 Chronic Care Model components were used (self-management, decision support, delivery system design, and clinical information system).¹⁷

Results are more ambiguous when one looks at the overall track record of all disease management programs, including those of the growing number of commercial vendors largely disconnected from primary care. There are 3 recently published meta-analyses to draw upon. Tsai and colleagues¹⁸ examined 112 studies involving disease management programs based on the Chronic Care Model for asthma, congestive heart failure, diabetes, and depression. They found beneficial results across all these conditions, but noted mixed effects on quality of life (no benefit for asthma and diabetes), as well as publication bias for congestive heart failure and some asthma studies. Krause¹⁹ evaluated 67 studies involving more than 32,000 patients with diabetes, concluding that disease management programs are more effective when provided to severely ill enrollees and that even though a small to moderate positive impact was found, further study of comorbidity and costs incurred by enrollees is needed. A third meta-analysis was recently reported by Neumeyer-Gromen and colleagues for disease management programs for depression.²⁰ On the basis of 10 randomized controlled trials in the United States, they found significant improvements in quality of care at acceptable costs ranging from \$9,051 to \$49,500 per quality-adjusted life-year.

There are many smaller studies, especially those reporting experience by commercial disease management vendors, that show lower costs by such measures as hospitalizations and emergency department visits. One recent example is a 1-year report of telephonic nursing disease management for elderly patients with congestive heart failure, which resulted in a 10% cost saving after accounting for intervention costs.²¹

Several other recent outcome assessments cast doubt on disease management as a cost-containment strategy.

- A 2006 analysis of the number needed to decrease costs calculated that disease management programs will need to decrease hospital admissions by 10% to 30% to cover program fees alone.²²
- The Congressional Budget Office stated in 2004 that "there is insufficient evidence to conclude that disease management programs can generally reduce overall health spending..."²³
- A 2005 report by David Eddy and colleagues on the long-term effect of disease management on cost savings in diabetes concluded, "Even for the most optimistic picture—a 30-year horizon and assuming no turnover (patients stay with the same plan for 30

years)—the net effect on diabetes-related costs would be an increase of about 25%."^{24(p261)}

DISEASE MANAGEMENT AND PRIMARY CARE

The expanding disease management industry has emerged as a result of deficits in the quality of chronic disease care in many primary care settings across the country. Many factors account for this problem, including inadequate design of office practice for team management of chronic illness, underreimbursement of chronic disease care, lack of time, and lack of enabling information technology.²⁵

Disease management programs based on the Chronic Care Model and integrated with primary care have shown promising results, likely to be lasting, for quality improvement.

Group Health Cooperative has taken its expertise and lessons on the road in an effort to train primary care teams in other parts of the country. With funding from a federal grant, disease management experts from Group Health have worked with more than 1,100 teams in more than 500 community clinics across the country to implement the Planned Care Model for management of diabetes, cardiovascular disease, depression, asthma, and obesity. After 13 months of training and collaboration, 82% of the pilot sites reported decreases in patients' average HbA_{1c} levels in diabetes from 8.4% to 7.6%, and combined cardiac risk reduction scores showed an absolute risk reduction of 2.4%.¹⁴

These excellent results require commitment, expertise, and adequate funding, together with an infrastructure that includes electronic medical records, disease registries, decision-support systems, patient reminders, and self-management materials. Those needs are not available in most primary care practices across the country, which are already grossly underreimbursed by private and public payers for the challenge of improving coordination and quality of chronic disease care.

Optimal management of chronic conditions is complex, particularly for patients with multiple chronic diseases. It is best done by well-trained primary care physicians working closely with other health professionals on a team basis. Management decisions are often difficult and must be individualized to each patient and family in a continuity of care relationship. How would it be possible, for example, for a nurse working with a commercial disease management vendor from a distant call center, without a relationship with the patient and primary care physician, to decide how to proceed in calibrating dosages of β -blockers, angiotensin-converting enzyme inhibitors, antidiabetes drugs, and antidepressants in a frail elderly patient on Medicare?

Table 1. Basic Types of Disease Management Programs

Characteristic	Integrated	Nonintegrated
Ownership	Not-for-profit managed care organizations	For-profit commercial vendors
Locus	Institutional-based	Outsourced
Linkage to primary care physicians	Strong	Weak to none
Patient participation	System-based for all	Optional
Program horizon	Long-term	Short-term
Motivation	Quality-oriented	Profit-oriented

More often than not, disease management today is being bought and sold between health plans, employers, and commercial vendors, without any real connection to the primary care system. Table 1 displays some major differences between not-for-profit institutional disease management programs and their commercial nonintegrated counterparts.

Disease management on a Chronic Care Model based in primary care is an important advance in the care of a growing part of the population. With training, reengineering of practice functions, and adequate funding, the elements of this model can be adapted to many primary care settings, as Group Health Cooperative has already shown in many community health centers across the country. With a strong link to primary care, quality of care can be improved, but cost savings cannot be assumed. Costs may actually increase as better quality of care is provided to patients previously undertreated for chronic conditions. There is no solid evidence yet that commercial for-profit disease management vendors will save money and improve care of chronic illness on a long-term basis. It is much more likely that the current enthusiasm among employers and insurers for outsourced disease management programs will end up as just one more policy failure, undermining primary care and delaying increasingly urgent health care reform.

To read or post commentaries in response to this article, see it online at <http://www.annfammed.org/cgi/content/full/5/3/257>.

Key words: Disease management; managed care programs; comprehensive health care; delivery of health care; primary health care

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Talking Point 15

Immigrants and emergency department visits by the uninsured are not the cause of high and rising health care costs.

CLOSE TO HOME



"You've got two options. We can treat you right now, or you can wait until five more people come in with broken arms and get our group discount."

Health Care Expenditures of Immigrants in the United States: A Nationally Representative Analysis

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The United States is a nation of immigrants. In 2000, the immigrant population of the United States was 28.4 million, 10.4% of the total population.¹ In one of the most comprehensive analyses to date on the costs and benefits of immigrants to the US economy, the National Research Council concluded that immigrants add as much as \$10 billion to the economy each year and that immigrants will pay on average \$80 000 per capita more in taxes than they use in government services over their lifetimes.² The Social Security Administration estimates that workers without valid social security numbers contribute 8.5 billion dollars annually to Social Security and Medicare. Such workers, most of them immigrants, usually receive no eligibility credits for their contributions.³ Taxpayers and politicians in states such as New York, California, Texas, Arizona, and Florida have expressed concern about the potential extra burden immigrants place on their states' health care systems,⁵⁻⁸ particularly state welfare and Medicaid programs.⁹

Researchers from the Center for Immigration Studies have concluded that because immigrant labor has "limited value . . . in an economy that increasingly demands educated workers," providing insurance to immigrants is "at the taxpayer expense."¹⁰ These views have resulted in legislative initiatives such as California's Proposition 181, which attempted (before it was ultimately overturned in court) to bar undocumented immigrants from receiving nonemergency health services.¹¹ Similarly, the 1996 Personal Work and Responsibility Reconciliation Act made most legal immigrants who entered the United States after 1996 ineligible for Medicaid for 5 years after entry.¹²

Although more recent surveys suggest that public attitudes toward immigrants' contributions, particularly with regard to economic impact, are becoming more positive,¹³ public fears after September 2001 may reverse this trend.

Objectives. We compared the health care expenditures of immigrants residing in the United States with health care expenditures of US-born persons.

Methods. We used the 1998 Medical Expenditure Panel Survey linked to the 1996-1997 National Health Interview Survey to analyze data on 18 398 US-born persons and 2843 immigrants. Using a 2-part regression model, we estimated total health care expenditures, as well as expenditures for emergency department (ED) visits, office-based visits, hospital-based outpatient visits, inpatient visits, and prescription drugs.

Results. Immigrants accounted for \$39.5 billion (SE=\$4 billion) in health care expenditures. After multivariate adjustment, per capita total health care expenditures of immigrants were 55% lower than those of US-born persons (\$1139 vs \$2546). Similarly, expenditures for uninsured and publicly insured immigrants were approximately half those of their US-born counterparts. Immigrant children had 74% lower per capita health care expenditures than US-born children. However, ED expenditures were more than 3 times higher for immigrant children than for US-born children.

Conclusions. Health care expenditures are substantially lower for immigrants than for US-born persons. Our study refutes the assumption that immigrants represent a disproportionate financial burden on the US health care system. (*Am J Public Health.* 2005;95:1431-1438. doi:10.2105/AJPH.2004.044602)

In this study, we used nationally representative data to compare the health care expenditures of immigrants and US-born individuals.

METHODS

Survey Instrument

We analyzed data from the Agency for Healthcare Research and Quality's 1998 Medical Expenditure Panel Survey (MEPS). This survey is designed to provide nationally representative estimates of expenditures and health services for the US civilian noninstitutionalized population.¹⁴ To provide estimates for specific priority populations, MEPS oversamples low-income families and ethnic minorities. MEPS data are compiled through information obtained from the Household Component, the Medical Provider Component, and the Insurance Component of MEPS. In the MEPS Household Component, respondents use a computer-assisted program to report sociodemographic characteristics, health and functional status, use of medical care ser-

vices, health insurance coverage, income, and employment. The MEPS Medical Provider Component supplements and validates information on medical care events reported in the Household Component by contacting providers and facilities identified by household respondents. The Medical Provider Component includes expenditure data from hospitals, outpatient medical providers, home health agencies, and pharmacies.

We analyzed total health expenditures during 1998, including expenditures for several specific population subgroups and categories of health care. MEPS defines expenditures as the sum of payments for care provided during 1998. This figure includes payments such as out-of-pocket payments, insurers' payments, and imputed payments for free care received in public hospitals or clinics. The Agency for Healthcare Research and Quality uses weighted sequential hot-deck imputation¹⁵ for any missing values (for a respondent with missing data, values are imputed from the nearest preceding respondent in the sequence

who has similar characteristics and complete information).¹⁶ MEPS combines facility and physician expenses when tabulating emergency department, hospital-based outpatient, and inpatient expenditures. Payments for over-the-counter drugs and for alternative medicine (e.g., acupuncture, chiropractic care) are not included in MEPS. MEPS expenditure estimates exclude costs for health care administration and institutionalized care. However, after adjustment for these omissions, MEPS estimates of national health expenditures substantially agree with those of the US Department of Health and Human Services' National Health Accounts.¹⁷

MEPS expenditure data include estimates of free care and bad debt in public hospitals or clinics. These imputed expenditure data are designed to account for payments, made from government budgets, that are not tied to specific patients. However, MEPS expenditure data do not cover uncollected liabilities, negotiated discounts, bad debt, and free care associated with private providers.¹⁵ By some estimates, US hospitals (public and private) write off as much as \$2 billion a year in unpaid medical bills to treat illegal immigrants.¹⁸ Therefore, we performed a separate confirmatory analysis of MEPS total charges (rather than expenditures) for health care, which include free care delivered at any site. Charge variables should be interpreted with caution, because they do not represent actual dollars exchanged for services or the resource costs of those services.¹⁵

To obtain data on the immigration status of respondents, we combined the Household Component file of the 1998 MEPS with the 1996–1997 National Health Interview Survey (NHIS), which asked respondents about their place of birth. Each year, MEPS draws a new panel from the previous year's NHIS sample. The NHIS includes self-reported data on place of birth as well as on a variety of other sociodemographic and household characteristics not included in the MEPS. As described elsewhere,¹⁹ NHIS and MEPS data sets can be linked. In 1998, MEPS sampled 24 072 individuals and assigned positive person-level weights for 22 953 individuals. We were able to link 21 241 individuals in the MEPS sample (18 398 US-born persons and 2843 immigrants) with the NHIS sample.

Individuals sampled in MEPS were not linked with the NHIS sample (or did not receive a person-level weight) if they were not a member of an NHIS household at the time of the 1996–1997 NHIS interview but had entered the household by the time of the MEPS interview (e.g., newborns; those returning from military service, college, or travel; those newly married or moving into a new household).

We found that when these files were linked, 7.4% of the MEPS sample was omitted. This factor remains a limitation of the MEPS–NHIS merge, because no weighting adjustment was made for these missing individuals. Despite this limitation, the merging of these 2 national data sets is an accepted methodology.²⁰ An individual was defined as US born if he or she was born in one of the 50 states or the District of Columbia. All others were classified as foreign born. Foreign-born persons included naturalized citizens, permanent residents, visa holders, refugees, and undocumented immigrants. However, data on specific resident categories were not provided in the NHIS. For the purposes of this study, the terms “foreign born” and “immigrant” were considered to be synonymous.

Statistical Analysis

To obtain nationally representative estimates, we used person-level weights (which reflect population distributions and account for each household's probability of selection), ratio adjustment to national population estimates at the household level, and adjustment for nonresponse. Because population estimates may be unstable if cells have fewer than 100 respondents, we combined such small cells with other subgroups for our analyses.²¹ To obtain estimates of variability, we used a Taylor Series estimation approach with the SUDAAN software package.²² We performed χ^2 analyses to examine the distribution of categorical variables among immigrants and US-born persons. We used *t* tests to compare mean per capita health expenditures among groups.

To obtain estimates of health expenditures adjusted for potential covariates, we used the Rand Health Insurance Experiment 2-part regression model.^{23–25} This model is used to analyze heteroscedastic and highly skewed data such as health care expenditures (many peo-

ple report no health care expenditures). The model uses an initial multivariate logistic regression to predict the probability of having any expenditure. This probability is multiplied by the predicted log-transformed expenditure of any individual with nonzero expenditures (as determined from a multivariate linear regression model of individuals with nonzero expenditures). For this 2-part model, we used SUDAAN statistical software, which allows adjustment for complex survey design.

Covariates in the 2-part model included the following: age (analyzed as both a continuous and a categorical variable), gender, race/ethnicity, family income (dichotomized as either <200% or ≥200% of the federal poverty level [FPL]), education, insurance status, self-reported health status, residence in a metropolitan statistical area, and geographic region. In preliminary models, we found that after adjustment for other covariates, gender, education, geographic region, and metropolitan statistical area were no longer significant predictors of health care expenditures, nor did they improve the model fit. They were therefore excluded, leaving the following covariates in the final regression models to predict expenditures: age (as a continuous variable), race/ethnicity, insurance status, family income, and self-reported health status. Additionally, we explored the possibility of interactions of the covariates with immigrant status. We found a significant interaction between immigrant status and race/ethnicity, and therefore included an interaction term in the multivariate regression analyses.

As in other studies,^{26,27} we used smearing factors to retransform the final estimates^{28,29} and calculated standard errors for predicted expenditures, using bootstrapping with 2000 iterations.³⁰ We also conducted a stratified regression analysis of health care expenditures by insurance status and income, again controlling for the other covariates in the model. We opted to perform these stratified analyses because income and insurance status are important predictors of health service use.

We also performed a subgroup analysis of government payments (Medicare, Civilian Health and Medical Program of the Uniformed Services of the United States [CHAMPUS], Civilian Health and Medical

TABLE 1—Demographic and Health Characteristics of US-Born Persons and of Immigrants Residing in the United States: 1998

	US-Born Persons, % (n = 18 398) ^a	Immigrants, % (n = 2843) ^b	P
Age, y			<.0001
Birth–11	16.7	3.0	
12–17	9.7	4.4	
18–44	38.8	55.5	
45–64	22.0	25.9	
≥ 65	12.9	11.3	
Gender			NS
Male	48.5	49.7	
Female	51.5	50.3	
Race/ethnicity			<.0001
White	77.4	28.4	
Black	13.1	6.0	
Hispanic	7.8	42.6	
Asian/Pacific Islander	1.1	23.0	
Insurance status			<.0001
Any private	74.9	58.1	
Public only	15.0	17.3	
Uninsured	10.0	24.6	
Family income as % of federal poverty level			<.0001
Poor (<100)	12.0	16.1	
Near-poor (100 to <125)	4.0	5.7	
Low (125 to <200)	12.7	17.8	
Middle (200 to <400)	32.7	29.9	
High (≥ 400)	38.6	30.6	
Health status			.03
Excellent	35.1	29.2	
Very good	31.2	30.4	
Good	22.9	27.6	
Fair	7.8	9.7	
Poor	3.1	3.2	
Education (among adults)			<.0001
<Grade 8	4.8	18.3	
Grades 8–12	46.8	38.1	
>Grade 12	48.2	43.2	
Region of country			<.0001
Northeast	18.4	24.9	
Midwest	25.1	9.3	
South	36.3	23.0	
West	20.2	42.8	
Residence in metropolitan statistical area			<.0001
Yes	78.9	95.1	
No	21.1	4.9	

Note. NS = nonsignificant. Data are from the 1998 Medical Expenditure Panel Survey and the 1996–1997 National Health Interview Survey.

^aTotal US-born population = 229 million.

^bTotal immigrant population = 25 million.

Program of the Veterans Administration [CHAMPVA], Tricare, Medicaid, and other public hospital/physician coverage) by using a 2-part multivariate regression model similar to that described in this section.

Because children's health care use differs from that of adults and is of particular policy interest,^{26,31,32} we performed separate analyses comparing immigrant children (n = 276) with US-born children (n = 5657) younger than 18 years. For children, we also used a 2-part model regression analysis similar to that described in this section, controlling for age, race/ethnicity (including a term capturing the interaction of race/ethnicity with immigrant status), poverty level, insurance status, and functional status. In our model for children, we included 2 variables that have been used as surrogates for a child's functional status^{20,26}: (1) whether a child resists illness well (reported by a parent) and (2) whether a child performs age-appropriate tasks (also reported by a parent).

RESULTS

In 1998, immigrant health care expenditures were \$39.5 billion (SE = \$4.0 billion), or 7.9% of the US total. This figure included \$25.0 billion (SE = \$3.4 billion) in payments made by private insurers on behalf of immigrants, \$2.8 billion (SE = \$0.4 billion) paid directly by immigrants, and \$11.7 billion (SE = \$1.7 billion) paid by government sources. US-born individuals (90% of the population) accounted for 93% of private insurer expenditures and 92% of both government and out-of-pocket payments.

We found that immigrants differ from US-born persons in demographics, unadjusted per capita health expenditures, and adjusted health expenditures. Demographic data are presented in Table 1. Immigrants overall were younger, although the immigrant population contained a lower proportion of children than did the US-born population. In addition, compared with US-born persons, immigrants had lower incomes and educational attainment and lower self-reported health status, and were more likely to live in the West, the Northeast, and urban regions.

Unadjusted per capita total health care expenditures were lower for immigrants than

TABLE 2—Unadjusted Per Capita Health Care Expenditures of US-Born Persons and Immigrants Residing in the United States: 1998.

	Per Capita Expenditures, \$	
	US-Born Persons (SE)	Immigrants (SE)
Age, y***		
0-11***	573 (34)	291 (66)
12-17***	932 (65)	220 (51)
18-44*	1408 (61)	994 (158)
45-64**	2716 (105)	1833 (196)
≥ 65	5247 (222)	4776 (745)
Gender***		
Male**	1703 (67)	1244 (131)
Female	2290 (71)	1916 (246)
Race/ethnicity***		
White	2153 (59)	2351 (338)
Black	1632 (136)	1539 (374)
Hispanic	1184 (109)	1233 (150)
Asian/Pacific Islander	1776 (853)	1295 (347)
Insurance status***		
Any private	1906 (54)	1711 (213)
Public only	3447 (192)	2749 (364)
Uninsured	629 (59)	459 (66)
Family income as % of federal poverty level		
<200***	2189 (100)	1419 (180)
≥ 200	1932 (57)	1687 (206)
Health status***		
Excellent/very good/good*	1469 (38)	1167 (124)
Fair/poor**	6449 (298)	4465 (730)
Education (adults only)***		
<Grade 8	5186 (535)	1804 (261)
Grades 8-12***	2479 (95)	1483 (190)
>Grade 12	2184 (86)	1831 (287)
Region of country*		
Northeast	1971 (161)	1650 (242)
Midwest	2034 (74)	1550 (564)
South	2,032 (94)	1758 (216)
West	1952 (68)	1454 (271)
Residing in metropolitan statistical area ***		
Yes*	1964 (57)	1563 (155)
No	2158 (105)	1935 (499)
Total sample, mean expenditures***	2005 (50)	1582 (149)

Note. Data are from the 1998 Medical Expenditure Panel Survey and the 1996-1997 National Health Interview Survey.

* $P < .05$; ** $P < .01$; *** $P < .001$ (for comparison between immigrants and US born).

with government insurance had lower expenditures than did the poorer US born and the US-born publicly insured.

In Figure 1, we present percentile distributions of total health care expenditures, comparing US-born persons and immigrants. Total health care expenditures for both groups were highly skewed. The median total expenditure for health care was \$1563 for US-born persons versus \$1163 for immigrants ($P < .0001$). For all deciles shown, health care expenditures for US-born individuals were significantly higher than those for immigrants. In the lowest 3 deciles of health care expenditures, immigrants had no reported expenses. In the top decile, US-born individuals had expenditures that were \$1342 higher than those for immigrants in 1998.

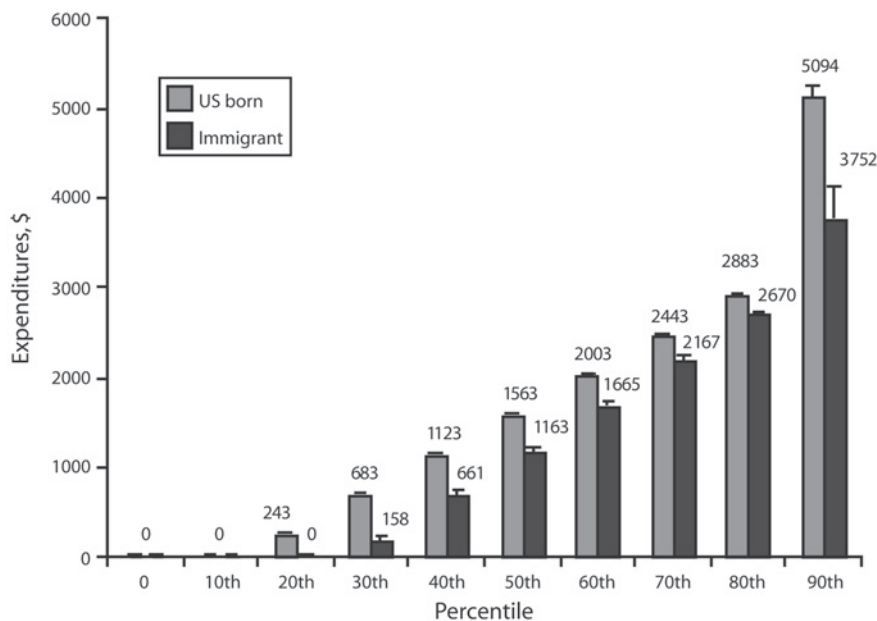
In our 2-part multivariate logistic regression model, immigrants had a lower probability of expenditures and a lower probability of expenditures for emergency care, office-based visits, and prescription medications than US-born persons (data not shown).

Adjusted expenditures were lower for all immigrants than for all US-born persons across all expenditure subgroups (Table 3). Health care expenditures for immigrants averaged \$1139 per person in 1998, compared with \$2546 for US-born persons ($P < .0001$). Immigrants also had lower adjusted expenditures for emergency care, office-based visits, outpatient visits, inpatient visits, and prescription drugs. Our confirmatory analysis of charges rather than expenditures found virtually identical trends (data not shown).

We also performed a multivariate analysis of health care expenditures stratified by insurance status and income. Per capita total expenditures of insured immigrants (those with any private or public insurance) were 52% lower than those of insured US-born individuals; expenditures for uninsured immigrants were 61% lower than those for the US-born uninsured. In a subgroup analysis limited to persons with public coverage, per capita expenditures of publicly insured immigrants were 44% lower than those of US-born persons who were publicly insured (\$2774 [SE=\$231] vs \$4963 [SE=\$189]; $P < .0001$). Expenditures of higher-income immigrants (those with incomes $\geq 200\%$ of the FPL)

for the US born across all age groups (the difference for those 65 years and older was not statistically significant) (Table 2). For example, per capita expenditures of immigrant children younger than 12 years were 49% lower than those of US-born children, and ex-

penditures of immigrant children aged 12 to 17 years were 76% lower than those of US-born adolescents. The differences in expenditures between immigrants and nonimmigrants were substantially greater for men than for women. Poorer immigrants and immigrants



Note. Dollar figures are for median total health care expenditures within each decile.

FIGURE 1—Percentile distributions of total 1998 health care expenditures of US-born persons and immigrants residing in the United States in 1998.

were 53% lower than those of higher-income US-born persons; health care expenditures of lower-income immigrants (those with incomes <200% of the FPL) were 60% lower than those of lower-income US-born individuals. Similar patterns were seen in analyses of expenditures for emergency care, office-based visits, outpatient visits, inpatient visits, and prescription drugs stratified by insurance and income status.

Immigrant children were much more likely than US-born children to be uninsured (29% vs 9%, $P<.0001$) or publicly insured (31% vs 20%, $P<.0001$). However, immigrant children's rates of public coverage were disproportionately low compared with the same children's poverty rates; 43% of immigrant children lived in low-income families, compared with 23% of US-born children ($P<.0001$).

Results of the unadjusted and adjusted models for children are shown in Table 3. Expenditures for total health care, office-based visits, outpatient visits, inpatient visits, and prescription drugs were markedly lower for immigrant children than for US-born children. However, per capita emergency department

expenditures were more than 3 times higher among immigrant children than among US-born children.

We performed a stratified analysis by insurance status and income of children's health care expenditures. Health care expenditures for insured immigrant children were 60% lower than those for insured US-born children. Health care expenditures for uninsured immigrant children were 86% lower than those for uninsured US-born children. Expenditures among higher-income immigrant children were 53% lower than those among higher-income US-born children. Expenditures of immigrant children in lower-income brackets were 84% lower than those of lower-income US-born children.

We also estimated health care expenditures among all US-born persons and immigrants according to race/ethnicity. As shown in Table 4, after multivariate adjustment, non-Hispanic Whites had the highest per capita expenditures, whereas Hispanics and Asians had the lowest per capita expenditures. Health care expenditures were similar for US-born and immigrant Asians. In contrast, adjusted health expenditures for immigrant non-

Hispanic Whites, non-Hispanic Blacks, and Hispanics were lower than those for US-born individuals from these groups.

DISCUSSION

Immigrants have less access to health care and less health care use than do US-born individuals, as reflected in their lower health care expenditures. Studies have shown that insurance coverage increases access to care and thus utilization of care, as well as improving health outcomes.^{33–35} In our study, we found that per capita health care expenditures for immigrants in 1998 were far lower than expenditures for the US born. In addition, among adults and children enrolled in publicly financed insurance programs, immigrants had lower per capita publicly-financed health care expenditures than did the US born. We also found grave disparities in expenditures among most racial/ethnic groups, particularly among immigrants who were non-Hispanic White, non-Hispanic Black, or Hispanic.

When stratified by age, immigrants in every age group but 65 years and older had health care expenditures that were 30% to 75% lower than those for US-born persons. Disparities among children were greatest, particularly among adolescents 12–17 years old. Combined with our finding of higher per capita emergency department expenditures for immigrant children, our data suggest that access to routine and ongoing care may be especially problematic for immigrant children. These findings are consistent with those of a 1999 study using NHIS data³⁶ that showed foreign-born children were 5 times more likely than US-born children to lack a usual source of health care.

Ku and Matani³⁷ found that noncitizen children were less likely than citizen children to have made both ambulatory and emergency department visits. Like Ku and Matani, we found a significantly lower mean number of emergency department visits among immigrant children than among US-born children (data not shown); however, per capita emergency department expenditures for immigrant children were significantly higher because immigrant children's costs per visit were much higher. This finding suggests that immigrant

TABLE 3—Unadjusted and Adjusted Mean Per Capita Health Care Expenditures for All Ages and Subgroup Analysis for Children: 1998

	Per Capita Expenditures, \$			
	All Ages ^a		Children ^b	
	US Born (SE)	Immigrant (SE)	US Born (SE)	Immigrant (SE)
Total health care				
Unadjusted	2005 (50)	1582 (149)**	704 (32)	249 (43)***
Adjusted	2546 (38)	1139 (62)***	1059 (11)	270 (22)***
Emergency department				
Unadjusted	63 (3)	42(8)*	42 (3)	32 (10)
Adjusted	91 (1)	33 (1)***	18 (1)	45 (3)***
Office visits				
Unadjusted	432 (13)	323 (26)***	189 (13)	65 (18)***
Adjusted	410 (5)	209 (11)***	215 (2)	63 (5)***
Outpatient visits				
Unadjusted	228 (10)	231 (53)	66 (8)	29 (14)*
Adjusted	241 (3)	102 (3)*	84 (1)	25 (2)***
Inpatient visits				
Unadjusted	647 (36)	537 (94)	100 (14)	7 (6)***
Adjusted	932 (22)	634 (44)***	167 (1)	16 (1)***
Prescription drugs				
Unadjusted	310 (9)	195 (14)***	65 (3)	25 (7)***
Adjusted	507 (10)	159 (11)***	86 (1)	24 (2)***

Note. Data are from the 1998 Medical Expenditure Panel Survey and the 1996–1997 National Health Interview Survey.

^aFor all age groups, mean per capita expenditures were predicted by a 2-part model with adjustments for age, ethnicity, poverty level, insurance status, patient-reported health status, and a term for the interaction of immigrant status and ethnicity.

^bFor children, mean per capita expenditures were predicted by a 2-part model with adjustments for age, race/ethnicity, poverty level, insurance status, parent-reported health status (whether a child resisted illness well and whether a child performed age-appropriate social roles), and a term for the interaction of immigrant status and ethnicity.

* $P < .05$; ** $P < .01$; *** $P < .001$ (for comparison with US born).

TABLE 4—Adjusted Per Capita Health Care Expenditures Among US-Born Persons and Immigrants of All Ages, by Race/Ethnicity^a

Race/Ethnicity	Per Capita Expenditures, \$	
	US-Born Persons (SE)	Immigrants (SE)
Non-Hispanic White	3117 (40)	1747 (115)***
Non-Hispanic Black	2524 (80)	1030 (123)***
Hispanic	1870 (60)	962 (53)***
Asian/Pacific Islander	1460 (198)	1324 (82)

Note. Data are from the 1998 Medical Expenditure Panel Survey and the 1996–1997 National Health Interview Survey.

^aMean per capita expenditures were predicted by a 2-part model with adjustments for age, poverty level, insurance status, and patient-reported health status.

*** $P < .001$ (for comparison with US born).

children may be sicker when they arrive at the emergency department. The higher emergency department expenditures we found for immigrant children probably reflect poor access to primary care (as evidenced by such childrens' low outpatient, office-based visit health expenditures).

Some of our findings may be explained by the limits that the 1996 welfare reform legislation^{38,39} imposed on immigrants' eligibility for government health services. The Personal Responsibility and Work Opportunity Reconciliation Act¹² and the Illegal Immigration Reform and Immigrant Responsibility Act⁴⁰ substantially restricted recent immigrants' eligibility for Medicaid and other public benefits.

Before 1996, all legal permanent residents and other legal immigrants had the same access to public benefits, including Medicaid, as

did US citizens. However, welfare reform and other policies established a 5-year ban on Medicaid eligibility for nonrefugee immigrants entering the United States after August 1996. The reform also stated that the income of immigrants' sponsors would be counted in determining eligibility and that sponsors could be held financially liable for public benefits used by immigrants. These policies created confusion about eligibility and appeared to lead even eligible immigrants to believe that they should avoid public programs. Even in states that have attempted to continue public insurance for immigrants, lack of awareness of eligibility for these programs remains a problem.⁴¹

Our findings remained robust even after adjustment for health insurance status, suggesting that immigrants compared with the US born, face additional unmeasured access barriers, including cultural and linguistic barriers.^{42–44} As an example 1 study at an inner-city clinic found that 1 in 9 immigrant parents reported that they had not brought their children in for care because they felt that the medical staff did not understand Latino culture.⁴⁵ Additionally, among the 5–10 million immigrants residing in the United States who are undocumented, fear of deportation is a barrier.⁴⁶

Our finding of lower health care expenditures among immigrants cannot be explained by free care. The MEPS captures free care (and bad debt) in public (but not private) institutions as expenditures; the MEPS captures free care at any site as a charge. Our charge-based analysis yielded results very similar to those of our primary, expenditure-based analysis, indicating that adjustment of expenditure data for free care at private institutions would not change our results. This conclusion is also supported by a recent study that found no relationship between a state's uncompensated care burden and its percentage of noncitizen immigrants.⁴⁷ The deficit of care among immigrants is probably not because of less need; immigrants in our study had slightly worse self-reported health than US-born persons.

Several limitations of this study should be noted. First, because the 1998 MEPS, like the 2000 US census,¹ did not ask about immigration or citizenship status, we could not distinguish between naturalized citizens and

other immigrant groups. Thus, our immigrant category included many European-born persons who resided in the United States for decades, had already become US citizens, and had fully assimilated into US culture and the US economy and health care system. Had we been able to exclude such immigrants, we would probably have found greater disparities. Similarly, we could not specifically identify undocumented persons, whom we suspect have the lowest health care expenditures.

Our study also could not capture health care expenditures outside the United States, where some immigrants may travel to obtain care or prescription drugs. For example, immigrants near the Mexican border may obtain medications from pharmacies in Mexico. However, these omitted out-of-country expenditures could not be viewed as a burden on the US health care system. MEPS also omits expenditures for medical care received by institutionalized persons (including nursing home residents) and for nonprescription drugs. Studies have consistently found that racial/ethnic minority populations reside in nursing homes less often than do non-Hispanic Whites.⁴⁸

Our findings show that widely held assumptions that immigrants are consuming large amounts of scarce health care resources are invalid; these findings support calls to repeal legislation proposed on the basis of such assumptions. The low expenditures of publicly insured immigrants also suggest that policy efforts to terminate immigrants' coverage would result in little savings. In addition, lower health care expenditures by immigrants suggest important disparities in health care use, especially for children. Immigrant children will grow up to become a major segment of the US workforce in the coming years. Ensuring access to health services needed for proper growth and development should be a national priority. Policies that may improve immigrants' access to care include providing interpreter services, ending restrictions on Medicaid and State Children's Health Insurance Program eligibility, improving employer-provided coverage for immigrant workers, and implementing universal national health insurance.⁴⁹ Our study lends support to these and other initiatives aimed at

reducing and ultimately eliminating disparities in access to and use of health services. ■

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Contributors

S.A. Mohanty originated the study, supervised all aspects of it, and completed the analyses. S. Woolhandler, D.U. Himmelstein, S. Pati, and O. Carrasquillo helped with conception of the study, interpretation of the findings, and writing the article. D.H. Bor assisted with interpretation of findings and editing the article. All authors contributed to study conception and design, acquisition of data, analysis and interpretation, and writing the article.

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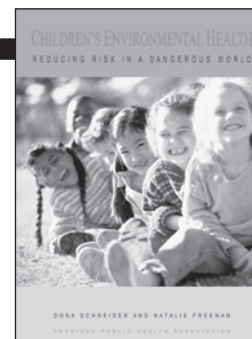
Human Participant Protection

This study received institutional review board exemption from the University of Southern California.

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Public Health Policy Forum

US Emergency Department Costs: No Emergency

ABSTRACT

Background. Many perceive emergency department (ED) overuse as an important cause of high medical care costs in the United States. Managed care plans and politicians have seen constraints on ED use as an important element of cost control.

Methods. We measured ED-associated and other medical care costs, using the recently released 1987 National Medical Expenditure Survey of approximately 35 000 persons in 14 000 households representative of the US civilian, noninstitutionalized population.

Results. In 1987, total ED expenditures were \$8.9 billion, or 1.9% of national health expenditures. People with health insurance represented 86% of the population and accounted for 88% of ED spending. The uninsured paid 47% of ED costs themselves; free care covered only 10%. For the uninsured, the cost of hospitalization initiated by ED visits totaled \$3.3 billion, including \$1.1 billion in free care. Whites accounted for 75% of total ED costs. The ED costs of poor and near-poor individuals accounted for only 0.47% of national health costs.

Conclusions. ED use accounts for a small share of US medical care costs, and cost shifting to the insured to cover free ED care for the uninsured is modest. Constraining ED use cannot generate substantial cost savings but may penalize minorities and the poor, who receive much of their outpatient care in EDs. (*Am J Public Health.* 1996;86:1527-1531)

Patrick H. Tyrance, Jr, David U. Himmelstein, MD, and Steffie Woolhandler, MD, MPH

Introduction

Emergency department (ED) visits have increased,¹ many are for nonurgent complaints,^{2,3} and charges per visit are high. These facts fuel the perception that ED overuse (particularly by the uninsured) is an important cause of high medical care costs^{4,5} and cost shifting.⁶ In his health care reform proposal, the president underscored this view, promising substantial ED savings that would reduce cost shifting from the uninsured.⁷ Managed care plans routinely restrict ED use through several mechanisms: copayments, prior approval requirements, financial incentives for physician gatekeepers, and the threat of retrospective denial of payment after visits are completed.

Our analysis of nationwide data on ED costs challenges these perceptions and policy prescriptions. ED use accounts for a small fraction of medical spending, and cost shifting from uninsured ED patients is minuscule. Moreover, restricting ED use would disproportionately burden minorities and the poor, who are most reliant on EDs for care. Strategies that reduce demand for ED services (e.g., improved primary care; violence, drug abuse, and accident prevention programs) should be pursued to improve health, not because of anticipated cost savings.

Methods

Sample

We analyzed recently released data from the Household and Medical Provider Survey segments of the 1987 National Medical Expenditure Survey (NMES). The survey collected extensive information on medical care use and expenditures by or on behalf of approxi-

mately 35 000 people in 14 000 households. Each household was surveyed quarterly, and data were collected on demographics, health status, and use and sources of payment for health services during 1987. The Medical Provider Survey queried the EDs, physicians, hospitals, and home health care agencies used by these individuals to verify service use and diagnoses. Providers supplied data on payments received from third parties and total charges for care.

The NMES used a stratified multistage area probability design. The survey was designed to provide unbiased estimates for the US civilian, noninstitutionalized population and for subgroups of special policy interest: the elderly, low-income families, Blacks, and Hispanics.

Variables

On the basis of self-report, we classified individuals into mutually exclusive ethnic categories: Black (including Hispanic origin), White (non-Hispanic), Hispanic (excluding Blacks), and other. For the analysis of income, we classified individuals as poor (income below the federal poverty level), near-poor (100%–124% of poverty level), low-income (125%–199% of poverty level), middle-income (200%–399% of poverty level), or

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TABLE 1—US Emergency Department (ED) Spending: Data from the 1987 NMES

	Total ED Expenditure, millions (90% CI)	Per Capita ED Expenditure (90% CI)	ED Spending as % of Group's Personal Health Expenditures	ED Spending as % of National Health Expenditures, by Group
Insurance status				
Uninsured	\$1101 (\$988, \$1213)	\$37 (\$35, \$39)	4.68	0.23
Insured	\$7728 (\$7388, \$8076)	\$38 (\$36, \$40)	2.35	1.62
Race/gender^a				
Black	\$1374 (\$1199, \$1550)	\$47 (\$41, \$53)	3.18	0.29
Male	\$696 (\$544, \$848)	\$51 (\$40, \$62)	3.74	0.15
Female	\$678 (\$596, \$760)	\$44 (\$38, \$49)	2.77	0.14
White	\$6686 (\$6228, \$7145)	\$36 (\$34, \$39)	2.34	1.40
Male	\$3208 (\$2926, \$3490)	\$36 (\$33, \$39)	2.53	0.67
Female	\$3479 (\$3167, \$3792)	\$37 (\$34, \$40)	2.19	0.73
Hispanic	\$556 (\$462, \$649)	\$30 (\$25, \$35)	3.33	0.12
Male	\$264 (\$197, \$330)	\$28 (\$21, \$36)	3.51	0.06
Female	\$292 (\$233, \$351)	\$31 (\$25, \$38)	3.12	0.06
Age, y				
≤ 17	\$2226 (\$2042, \$2400)	\$35 (\$32, \$38)	4.56	0.47
18–45	\$3923 (\$3585, \$4263)	\$37 (\$34, \$41)	3.77	0.82
46–64	\$1499 (\$1244, \$1753)	\$36 (\$30, \$42)	1.72	0.31
≥ 65	\$1207 (\$1069, \$1345)	\$43 (\$38, \$48)	1.07	0.25
Income^b				
Poor	\$1583 (\$1400, \$1767)	\$51 (\$45, \$57)	3.02	0.33
Near-poor	\$686 (\$453, \$865)	\$61 (\$42, \$79)	3.18	0.14
Low-income	\$1372 (\$1223, \$1523)	\$41 (\$37, \$46)	2.90	0.29
Middle-income	\$2792 (\$2543, \$3004)	\$33 (\$30, \$36)	2.40	0.59
High-income	\$2441 (\$2208, \$2674)	\$31 (\$28, \$34)	2.14	0.51
Total	\$8855 (\$8471, \$9118)	\$37 (\$35, \$39)	2.40	1.86

Note. CI = confidence interval.

^aFigures for Asians and Pacific Islanders, Native Americans, and Alaskan Natives are omitted because too few individuals from these groups were included in the National Medical Expenditure Survey (NMES) sample.

^bPoor = below federal poverty level; near-poor = 100%–124% of federal poverty level; low-income = 125%–199% of federal poverty level; middle-income = 200%–399% of federal poverty level; high-income ≥ 400% of federal poverty level.

high-income (400% of poverty level or higher).

The NMES determined the cost of care from the provider survey and the sources of payment from the household survey. The NMES defines free care as charges billed to patients that are neither covered by any third-party payer nor paid by the patient or family. Discounts offered to Medicare, Medicaid, and many HMOs are not classified as free care.

We calculated figures for personal health care expenditures by summing the costs of all medical care received by noninstitutionalized civilians, regardless of the source of payment. We divided outpatient spending into “ED costs” (which included the cost of laboratory and other services provided during an ED visit) and “all other outpatient costs.” The latter category included spending on prescribed medicines, home health, medical equipment, dental visits, office visits, and hospital outpatient (except ED) visits. We used the National Center for Health Statistics’ figure for total national health spending, which includes spending

for public health activities, research, construction, the military, and other items not encompassed in our personal health spending figure.

The NMES gathered information on insurance status at each round of interviews. We assumed a patient’s insurance status at the time of an ED visit (or hospital stay) to be his or her insurance status at the proximate NMES interview, and we excluded from our insurance status analysis the less than 0.05% of persons who failed to report that variable. To analyze inpatient costs associated with ED visits, we identified all visits that respondents reported led to hospitalization and linked the ED visit to a hospital stay commencing within 3 days.

We used SAS-PC statistical software⁸ and the SUDAAN program,⁹ which corrects for the NMES’ complex sample design in calculating confidence intervals.

Results

In 1987 ED expenditures totaled \$8.9 billion (90% confidence interval [CI] =

\$8.5 billion, \$9.1 billion)—\$37 per capita (90% CI = \$35, \$39), 2.4% of personal health expenditures, and 1.9% of national health expenditures (Table 1).

Private insurance paid 42% of ED costs, Medicaid 13%, Medicare 9%, and other third parties (e.g., CHAMPUS [the Civilian Health and Medical Program of the Uniformed Services], the Department of Veterans Affairs, workers’ compensation) 15%. Patients paid 19% of ED costs out of pocket. Free care totaled \$187 million (90% CI = \$146 million, \$230 million), only 2% of ED costs.

The insured accounted for 86% of the population and 88% of ED spending (\$7.7 billion [90% CI = \$7.4 billion, \$8.1 billion], vs \$1.1 billion [90% CI = \$1.0 billion, \$1.2 billion] for the uninsured). Per capita ED expenditures were similar for the uninsured and insured, but accounted for nearly twice as high a proportion of the uninsured’s total personal health expenditures (Table 1). The uninsured paid more of their ED costs out of pocket than did the insured (47% vs 15%). Government programs (e.g.,

**TABLE 2—US Per Capita Personal Health Expenditures among Race and Gender Groups, by Type of Service:
Data from the 1987 NMES**

Race/Gender	Per Capita Total (90% CI)	Hospital Inpatient (% of Per Capita Total) (90% CI)	Outpatient Excluding Emergency Department (% of Per Capita Total) (90% CI)
Black	\$1483 (\$1354, \$1613)	\$942 (63.5) (\$847, \$1038)	\$494 (33.3) (\$428, \$560)
Male	\$1364 (\$1154, \$1573)	\$855 (62.7) (\$699, \$1012)	\$458 (33.6) (\$340, \$577)
Female	\$1587 (\$1424, \$1750)	\$1018 (64.1) (\$869, \$1167)	\$525 (33.1) (\$482, \$569)
White	\$1558 (\$1486, \$1630)	\$825 (53.0) (\$763, \$887)	\$697 (44.7) (\$677, \$717)
Male	\$1422 (\$1310, \$1535)	\$774 (54.4) (\$673, \$875)	\$612 (43.0) (\$583, \$641)
Female	\$1686 (\$1608, \$1765)	\$873 (51.2) (\$805, \$940)	\$777 (46.1) (\$753, \$801)
Hispanic	\$896 (\$798, \$993)	\$483 (54.0) (\$402, \$564)	\$382 (42.6) (\$342, \$423)
Male	\$797 (\$635, \$959)	\$431 (54.1) (\$293, \$568)	\$338 (42.4) (\$276, \$400)
Female	\$994 (\$879, \$1109)	\$536 (53.9) (\$437, \$635)	\$427 (43.0) (\$384, \$470)
Total	\$1474 (\$1410, \$1539)	\$800 (54.3) (\$746, \$854)	\$637 (43.2) (\$618, \$656)

CHAMPUS, state and municipal funds) covered 21% of ED costs for the uninsured, other third parties (e.g., workers' compensation, auto and other insurance) covered 21%, and free care accounted for 10%. For the insured, private insurance covered 47%, Medicare 10%, Medicaid 14%, other government programs 7%, free care 1%, and other sources 6%.

Whites accounted for 75% of total ED expenditures, Blacks for 16%, Hispanics for 6%, and others for 3% (Table 1). Per capita ED expenditures were \$47 (90% CI = \$41, \$53) for Blacks, \$36 (90% CI = \$33, \$39) for Whites, and \$30 (90% CI = \$25, \$35) for Hispanics. These expenditures represented a higher proportion of health spending for Blacks and Hispanics than for Whites. While Black males' average ED expenditures were higher than those of other groups, they represented only 8% of total ED costs and 0.2% of national health spending.

People aged 65 and older had the highest absolute ED expenditures (\$43 per capita [90% CI = \$38, \$48]) but incurred only 1.1% of their medical care costs in EDs. Conversely, for those younger than age 18, ED costs averaged only \$35 (90% CI = \$32, \$38) but represented 4.6% of their total medical care spending.

The poor and near-poor had higher per capita ED expenditures and spent a larger share of their total medical care dollars in EDs than did the more affluent.

Hospitalization followed 15.3% of all ED visits, including 10.2% of visits by the uninsured and 16.0% of visits by the insured. These emergency admissions accounted for 24% of all hospitalizations for both groups.

Inpatient costs for patients admitted through the ED totaled \$49.0 billion (90%

CI = \$45.5 billion, \$52.5 billion), \$3.3 billion (90% CI = \$2.5 billion, \$4.1 billion) of this amount was for the uninsured. The uninsured paid \$725 million (90% CI = \$491 million, \$959 million) of this amount out of pocket, hospitals gave \$1.1 billion (90% CI = \$0.5 billion, \$1.7 billion) worth of free care (0.6% of total hospital costs), and third parties covered the rest.

Total inpatient costs for uninsured patients (including both emergency and nonemergency hospitalizations) amounted to \$12.8 billion (90% CI = \$11.1 billion, \$14.4 billion), 6.7% of inpatient costs; free inpatient care for the uninsured totaled \$2.8 billion (90% CI = \$1.9 billion, \$3.6 billion). The average cost per admission for the uninsured was about one-fifth lower than that for the insured, whether or not the patient was admitted via the ED.

The per capita personal health care expenditure in 1987 for Whites was nearly twice that of Hispanics and 5% more than that of Blacks (Table 2). Per capita outpatient spending (excluding ED costs) for Whites was 42% higher than that for Blacks and 83% higher than that for Hispanics. Outpatient spending (excluding ED costs) as a proportion of personal health spending was markedly lower for Blacks (33%) than for Whites (45%) or Hispanics (43%).

Discussion

EDs account for less than 2% of national health spending, and the uninsured and insured use similar amounts of ED care. The false perception that ED overuse, particularly by the uninsured, is a major contributor to rising medical care

costs^{4,5,7,10} has three questionable corollaries: (1) insuring the uninsured would generate large cost savings by decreasing ED use and emergency hospitalizations; (2) restricting access to EDs by requiring large copayments, prior approval, or both is a useful cost control strategy; and (3) high medical care costs result from patients' misbehavior and excessive demands for care.

The uninsured account for only 12% of ED costs (and 8% of ED admissions), and they pay 47% of ED costs themselves. Workers' compensation, auto insurance, and government funds pay much of the rest. Free ED care for the uninsured totaled only \$114 million in 1987, with inpatient free care costs for ED admissions adding \$1.1 billion. Hence, cost shifting from uninsured ED patients added less than 1% to the average hospital bill.

Our findings contradict the widespread impression that hospitals provide large amounts of uncompensated ED care to the uninsured. This impression may have arisen because many academic emergency physicians work at urban teaching hospitals that provide disproportionate shares of care for the uninsured and free ED care. Thus, previous research on this topic analyzed data from a handful of hospitals that apparently provide more free care than most.^{11,12} The NMES data provide a more reliable national perspective.

We found that emergency admissions accounted for 24% of inpatient stays nationwide for both the insured and the uninsured. In contrast, in a study of five Massachusetts hospitals, 51% of all inpatients and 68% of uninsured inpatients

were admitted through the ED.¹³ Figures from California fell between the Massachusetts estimate and our national figures.¹⁴

The misconception that high ED use causes high medical costs is part of a paradigm that identifies Americans' excessive use of care as the main cost driver. In this view, insurers must discourage patients from overusing care through copayments, deductibles, and so forth, and they should manage physicians' behavior to curtail their ordering and referrals. This strategy rests, in part, on findings from the Rand Health Insurance Experiment, in which 95% copayments decreased total utilization and reduced ED costs by one third, from \$32 to \$22 per capita (1984 dollars).¹⁵ Medicaid managed care experiments have yielded similar results¹⁶: large percentage reductions in ED use, but modest dollar savings.

Moreover, if nonurgent ED use were diverted to more appropriate settings, savings would likely be far smaller than these figures or other projections¹⁷ suggest. The \$200 charge for ED care for a migraine seems impressively wasteful. For the insurer, care elsewhere is far cheaper. But for society as a whole, shifting the patient to a doctor's office or clinic might add primary care costs while subtracting little from ED expense.⁶ EDs have high fixed costs; they must be staffed 24 hours a day to treat real emergencies, and EDs that might otherwise be idle can often accommodate nonemergency visits without additional staff.⁶ Projected ED savings can materialize only if we shut many EDs, not if we run them half full. Interestingly, Canada's per capita ED costs¹⁸ are lower than ours despite Canada's threefold higher ED visit rate.^{18,19} Evidently factors other than volume can drive costs.

One policy variant blames minorities and the poor for the high health costs in the United States.²⁰ Yet Blacks and Hispanics have lower per capita health expenditures than Whites, despite high rates of illness. Nor can substance abuse and violence explain our high costs relative to Canada. Both "external causes" of death (including violence) and the costliest addictions (alcohol and tobacco) are at least as common in Canada.²¹⁻²³ In keeping with other estimates,²⁴ we found that inpatient costs of trauma in the United States (excluding hip fracture and low back pain) were only 5% of hospital costs. HIV-related costs, often perceived as an important factor in medical inflation, will consume only 1% of US health care spending in 1995.²⁵

A recent study found 25% fewer physician visits among patients who identified the ED as their routine source of care.²⁶ Our data confirm that groups with reduced access to primary care—the poor, uninsured people, and Black men—are disproportionately dependent upon EDs^{13,14,26,27}; they spend at least as much on ED care as other groups but have markedly lower outpatient utilization. Of particular concern is the low outpatient use by Black males, whose life expectancy is shorter than that of any other demographic group. Constraints on ED use may worsen care for them and for other groups whose health status and access to care are already compromised.

Health insurance reform is just one step toward improving access to care and decreasing the need for ED visits. Nonfinancial barriers; the scarcity of primary care practitioners in inner cities and rural areas; the inability of low-wage workers to take time off work; real and perceived racial discrimination; psychiatric comorbidity; and language barriers all obstruct access to primary care, increasing reliance upon EDs.²⁸⁻³¹

Assignment of insurance status in the NMES is inexact because insurance coverage may have changed between the interview and the ED visit, an interval that averaged about 30 days. A few hospitals probably included ED charges with inpatient charges for patients admitted through the ED. But these visits should not greatly affect total ED costs, and they would, in any event, appear in our figures for ED-associated inpatient costs. The household survey-derived figures for free care surely include both over- and underestimates. But large errors that would substantially change our key findings are unlikely.

The 1987 NMES is more than 8 years old, but it has only recently been released and it provides the most up-to-date, comprehensive, and detailed data available on medical expenditures. While ED visits have increased, especially for Medicare and Medicaid patients, ED visits by the uninsured have increased more slowly.³²

"Nonurgent" ED visits symbolize our failure to provide accessible primary care to all. ED use for illness caused by drugs and violence identifies an equally serious policy failure. However, the problem is not the cost of ED care, but the lack of better alternatives: readily available personal physicians³³⁻³⁶ for those lacking access, and enhanced career and leisure opportunities and aspirations for persons afflicted by drug use and violence. A

reduction in ED visits is worthwhile only if it is a bellwether of improved health care and social conditions. Restricting patients from using the ED will have little effect on health costs. □

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Talking Point 16

Co-pays and deductibles are not necessary to control costs and reduce unnecessary care.





Cost-sharing: Effects on spending and outcomes

By Sarah Goodell, M.A.¹
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by Swartz

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SUMMARY OF KEY FINDINGS

- > **Cost-sharing may not be an effective tool to reduce the rate of growth of health care costs.** Most people are healthy and reductions in their service use likely would only modestly affect total spending.
- > **Patients do not accurately discriminate between essential and nonessential services when responding to changes in cost-sharing.** Although patients reduced the inappropriate use of emergency department services when cost-sharing was increased, they also reduced the use of preventive care and essential drugs.
- > **Cost-sharing increases are associated with adverse outcomes for vulnerable populations.** Elderly, chronically ill, and welfare patients had increased expenditures for emergency department visits and hospitalizations when cost-sharing for prescription drugs was increased.

Why is this issue important to policy-makers?

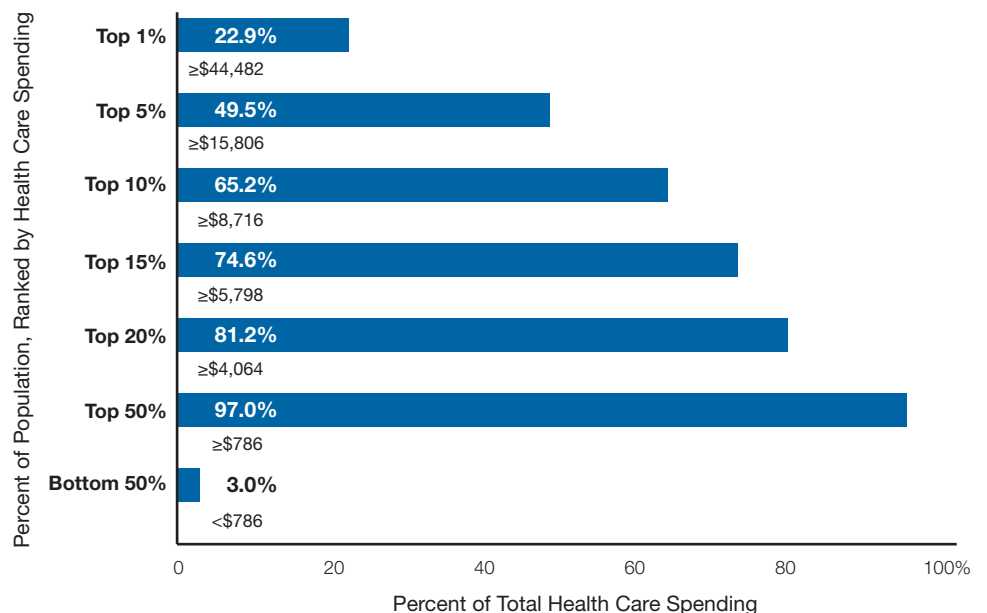
The recent passage of the Patient Protection and Affordable Care Act (PPACA)^a requires for the first time that almost all U.S. citizens have health insurance. Implementing the largest expansion of health insurance since Medicare is a major challenge; policy-makers are also facing the challenge of how to slow the rate of growth in health care costs. Cost-sharing – how medical costs are shared between insurers and patients – is an important part of both challenges.

This brief examines how cost-sharing affects the use of services, whether some patients are more sensitive to cost-sharing than others, and whether reduced use of services as a result of cost-sharing has an effect on health outcomes. All of these issues factor into whether and how cost-sharing could be used to reduce the rate of growth of health care spending.

What is the effect of cost-sharing on the distribution of health care expenditures?

The distribution of health spending in the United States is highly skewed with 5% of the population accounting for almost half of all expenditures (Figure 1). The skewed distribution results from a relatively small percentage of people having serious medical conditions with high expenditures while the majority is relatively healthy with few or no medical expenses in a given year.

Figure 1: Concentration of Health Care Spending in the U.S. Population, 2007



Note: Dollar amounts in parenthesis are the annual expenses per person in each percentile. Population is the civilian noninstitutionalized population, including those without any health care spending. Health care spending is total payments from all sources (including direct payments from individuals, private insurance, Medicare, Medicaid, and miscellaneous other sources) to hospitals, physicians, other providers (including dental care), and pharmacies; health insurance premiums are not included.

Source: Adapted from the Kaiser Family Foundation (Reference 1)

a Public Law 111-148

The low-income and chronically ill are disproportionately effected by cost-sharing and

THE RAND HEALTH INSURANCE EXPERIMENT

The RAND Health Insurance Experiment (HIE) (Reference 2) is the basis for much of our understanding of the effects of cost-sharing. Developed and conducted in the 1970s, the HIE randomly assigned a sample of 5,800 noninstitutionalized, non-elderly people to different levels of cost-sharing ranging from free care to 95% cost-sharing. Important findings include:

- > As coinsurance increased, the number of outpatient visits and total spending decreased.
- > Cost-sharing affected the number of visits, but not the intensity of services provided during the visit – suggesting that cost-sharing has little effect once a person initiates a medical contact.
- > People reduced their use of ineffective care, but also reduced their use of medically appropriate care.
- > Cost-sharing did not adversely affect health outcomes for the average person.

The findings from the HIE are still relevant, but should be viewed in the context of today's health care environment. There are many more medical treatments, diagnostic tests, prescription drugs, and surgical options than there were 40 years ago. Cost-sharing is much more complicated today than at the time of the HIE. Today's population has higher rates of obesity and treatable chronic conditions, and greater income inequality than that of the 1970s.

It is not clear how the distribution of health spending will be affected by changes in cost-sharing. Speculation rests on the responsiveness of two factors: patient-initiated care and care delivered once the patient is in a medical setting.

Reductions in patient-initiated care in response to cost-sharing are likely to come from the half of the population with low medical expenses. If this is the case, increased cost-sharing may result in a more skewed distribution of health care spending.

Once a patient seeks medical attention, the intensity of services provided largely is driven by the provider, not the patient (Reference 2). The HIE (see sidebar) found that once a medical visit was initiated by the patient, utilization did not differ based on the patient's level of cost-sharing. For the sickest population, those with more frequent contacts with medical providers, a change in cost-sharing may shift the financial burden from insurers and public payers to patients.

Could increased cost-sharing slow the rate of growth of health care spending?

Increased cost-sharing has the potential to slow the growth of health spending if: there is a reduction in use of low-value or medically unnecessary care; any utilization reduction is not offset by the use of more expensive services; and reductions in service use do not result in adverse outcomes that may be more expensive to treat.

Patients are not able to discern between appropriate and inappropriate care in response to increased cost-sharing. Evidence from the HIE indicates patients reduced appropriate care as well as medically unnecessary care in response to cost-sharing (Reference 2). More recent studies involving the use of prescription drugs found patients reduced their use of both essential and nonessential drugs in response to increased cost-sharing, although the reduction for nonessential drugs was generally greater (Reference 3).

For vulnerable populations, increased cost-sharing may shift the types of services used rather than reduce overall health expenditures. Two studies of programs for low-income populations found that increased cost-sharing did not result in program savings either because the subsequent mix of services used was more expensive or because there was an increase in adverse events, including hospitalizations (Reference 4).

Increases in cost-sharing for the elderly may result in higher Medicare program costs. Chandra, et al. studied the effects of increased cost-sharing in an employer-sponsored Medicare supplemental plan (Reference 5). They found the reduction in physician visits and prescription drugs was associated with higher Medicare costs due to an increase in hospitalizations for chronically ill beneficiaries.

are at greater risk for adverse health outcomes than healthy or high-income people.

What are the effects of increased cost-sharing on health outcomes?

For the average person, increased cost-sharing may not adversely affect health outcomes (Reference 2). This finding from the HIE may have been one of the most surprising. Importantly, however, the HIE excluded people over age 62, who make up the largest share of the chronically ill and those most likely to have high medical expenses. In addition, all participants had an out-of-pocket maximum based on income which limited financial liability for high medical expenses.

For vulnerable populations, increased cost-sharing is associated with adverse health outcomes. The HIE found that low-income participants in poor health were more likely to experience adverse health outcomes than higher-income or healthy participants (Reference 2). More recent studies of elderly, chronically ill, and welfare beneficiaries found that cost-sharing for prescription drugs is associated with increased expenditures for emergency department services, hospitalizations and admissions to nursing homes (Reference 11).

How do responses to cost-sharing differ by socioeconomic factors and health status?

Low-income populations are likely to be disproportionately affected by increased cost-sharing. The same amount of cost-sharing represents a larger share of income for a poor person than a high-income person, creating the potential for a financial barrier to care. The HIE found poor people reduced outpatient care more than higher-income people and had larger reductions in the use of dental care and immunizations for children (Reference 2). A more recent study examined increases in prescription drug co-payments for privately insured patients and found individuals living in low-income areas were less likely to continue taking their medications than people in high-income areas (Reference 12).

Whether responses to cost-sharing differ by race and ethnicity is unknown. In studies looking at responses to cost-sharing by racial and ethnic minorities in the use of preventive services, it appears low income has a stronger association with the use of such services than race and ethnicity.

People in poor health respond differently to cost-sharing changes than healthy people (Reference 13). One study found retirees in poor health who had cost-sharing increases had larger reductions in spending on physician visits and prescription drugs than those in relatively good health (Reference 14). Those who were healthy reduced expenditures on physician office visits by 3% and by 8% on prescription drugs. In contrast, those who were chronically ill reduced the dollars spent on physician visits and prescription drugs by 15% and 27%, respectively. Significantly, however, the chronically ill used more inpatient hospital care after the cost-sharing increased. The result was a 122 percent increase in Medicare spending on the chronically ill retirees for Part A.

COST-SHARING AND TYPES OF SERVICES

Some types of medical services may be more sensitive to cost-sharing than others. Services for which increased cost-sharing significantly reduces utilization may be viewed by patients as optional or ones for which lower-cost substitutes are available.

Preventive services: Recent studies focusing on Pap tests, mammograms, and colorectal cancer screening found that cost-sharing reduces the use of preventive care (Reference 6).^b

Emergency department (ED) visits: ED utilization was 10% to 15% lower in groups with higher co-payments compared with control groups (Reference 7). Most of the reduction was for visits classified as low or intermediate severity. The studies were of patients in integrated delivery systems who had alternatives to EDs so the results may not be generalizable.

Mental health and substance abuse: Demand for mental health and substance abuse treatment is quite sensitive to patient cost-sharing. Increased cost-sharing reduced the likelihood of follow-up substance abuse treatment and for schizophrenic patients resulted in higher ED use and inpatient care (Reference 8).

Prescription drugs: Increased cost-sharing of about 10% is associated with a decline of 1% to 6% in spending on prescription drugs (Reference 9). There is mixed evidence as to whether people shift to generics or other less expensive substitutes (Reference 10).

^b PPACA eliminates or provides incentives to eliminate cost-sharing for many preventive services.

Policy Implications

Recent studies of patient cost-sharing confirm the primary conclusion of the HIE — demand for most health care services is price sensitive. When people have to pay more, they reduce their use of health care. The HIE's exclusion of the elderly, the increase in the prevalence of chronic conditions, and changes to medical care and insurance design since the 1970s, however, make it important to re-examine the role of cost-sharing. Findings from more recent research highlight important implications for policy-makers, including:

- > **Patient cost-sharing is not necessarily an effective mechanism for significantly slowing health care spending.** Most people are healthy and cost-sharing would only modestly affect their health care spending. People who are very sick or who have serious chronic health conditions are typically deferring to their physicians rather than making choices about medical care based on cost-sharing. Moreover, by itself, cost-sharing is highly unlikely to slow the growth in spending unless the expected increases in the costs of appropriate care for the very sick also slow.
- > **Cost-sharing is not well-targeted on low-value services.** Patient cost-sharing generally has been organized in broad categories (e.g., outpatient care, inpatient care, emergency department care). These broad categorizations do not help people distinguish between essential and nonessential services. Comparative effectiveness research could help insurers and government programs better target cost-sharing to improve value.
- > **Caution should be used when increasing cost-sharing for low-income populations or the chronically ill.** Not only are low-income populations disproportionately affected by increased cost-sharing, but they also are more price sensitive than other income groups. Unless the cost-sharing increases are concentrated on services that are ineffective or unnecessary, low-income groups may avoid necessary medical care as a result. Increased cost-sharing for people with chronic conditions may result in higher expenditures for hospitalizations and other adverse outcomes if necessary care is reduced.

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Talking Point 17

Drug companies spend more on marketing (31 percent) and profits (20 percent) than on R & D (13 percent). Lower drug prices would not jeopardize drug innovation, much of which is, in fact, publicly-funded.



By Steve Breen, Asbury Park (N.J.) Press, for USA TODAY



Discussion

Extraordinary claims require extraordinary evidence

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1. Extraordinary claims require extraordinary evidence

At the beginning of 2003, the *Journal of Health Economics* published a paper of great importance in public policy by DiMasi, Hansen, and Grabowski (referred to hereafter as “DHG 2003”). The paper is based primarily on confidential, proprietary data supplied by pharmaceutical companies to the Tufts Center for the Study of Drug Development, a research center that receives significant unrestricted grants from pharmaceutical companies (TCSDD, 2004a,b). This commentary is intended to invite discussion among health economists and other researchers about the quality of data and sampling used in estimating the costs of pharmaceutical R&D.

DHG 2003 estimates that it costs \$802 million on average (in 2000 dollars) to research and develop a self-originated new chemical entity, including failures and cost of capital. It is worth noting that after adjusting for inflation, the DHG 2003 cost estimates are roughly two to four times as high as other estimates of pre-approval drug R&D costs (Love, 2003; Public Citizen, 2001; OTA, 1993). The 2003 article represents a sophisticated analysis that builds on the authors’ equally important article in 1991, and adds several refinements and extensions of that prior analysis. There are, however, problems with the data and sampling on which these results depend, and this commentary focuses on those problems.

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A careful review of the article identified six serious sources of doubt about the validity and usefulness of the source data and methods used in DHG 2003:

- (1) First, the inherent comparability and reliability of the survey data must be questioned because of variations in internal company cost allocation methods over time and across companies. Because cost data used was proprietary and confidential, readers cannot know how each company collected its data, or what was counted as research costs, and no independent verification of the accuracy of the information is possible. Firms reported R&D expenditures stretching back more than 10 years (to 1980), during which several firms underwent mergers and/or changed accounting systems or practices. The degree of potential variation is large, and these many variations in practice may compound on each other, making any point estimate misleading. (Internal validity)
- (2) Second, considering the clear interest of pharmaceutical companies in higher (rather than lower) estimates of drug development costs, and sampled firms' likely awareness of the intended use of the survey data, it is not unlikely that companies would deliberately and systematically overstate costs in their survey responses (OTA, 1993). The survey design did not permit independent review of the reported costs, so upward bias cannot be ruled out. (Internal validity.)
- (3) Third, the small, non-random firm sample ($n = 10$) and drug sample ($n = 68$) introduce another potentially large source of variation and error into cost estimates. Although the sampling of drugs was reported to be random, this is misleading, because the selection of firms participating in the survey (which preceded the selection of drugs) was not random (DHG 2003, pp. 157–158); randomization cannot be recovered once lost at the first stage of sample selection. A total of 24 firms were invited to respond; 12 firms accepted and were asked to provide data on an unstated number of drugs, randomly selected from those companies' drugs in the proprietary database; 10 firms provided usable data, covering development of 76 drugs; but drug data were usable for only 68, and complete for even fewer (it is noted as an example that only 66 drugs had Phase I trial cost data). No information is provided about how invited firms were selected, nor whether they were selected from the universe of all US research-oriented pharmaceutical firms or some other less representative universe. The 42% of invited firms that responded (10 of 24) self-selected, and given the industry interest in higher cost estimates it cannot be ruled out that firms with higher than average costs were most likely to choose to participate. (Internal validity)
- (4) Fourth, the findings concern U.S. "self-originated new chemical entities" (NCEs; drugs that were researched, discovered, and developed in-house), whose costs are higher than those for more typical "new" drugs. Only 35% of new drugs approved by the FDA (from 1990 to 2000, FDA, 2004; from 1989 to 2000, NIHCREG, 2002) contained a new molecular entity, and only 62.4% of the survey firms' approved NCEs were said to be self-originated (DiMasi et al., 2003b, p. 3, note 1). Thus "self-originated new chemical entities" represented about 22% (62.4 of 35%) of new drug approvals. The number of truly self-originated NCEs may be even smaller, because the authors note that all phases of work may not have been done in-house and because there are well-documented examples of companies making such claims that do not comport with the facts (Mitsuya et al., 1989 Weinhold General Accounting Office, 2003). This might

not matter much, in terms of estimating typical drug development costs, if all drug development costs were similar, but they are not. According to DiMasi et al., 1991 (footnote 48), self-originated NCEs are 3.7 times more costly to develop than acquired or licensed-in NCEs, and many times more costly than new formulations, combinations or administrations of existing drugs. The DHG 2003 estimates therefore pertain to the most costly 22% of new drugs. (External validity.)

- (5) Fifth, estimates of company spending on drug development are presented without deducting (or at least identifying) government subsidies to this work. The industry receives taxpayer funds from the NIH and other agencies, though amounts are not disclosed at the request of drug companies (General Accounting Office, 2003; National Science Foundation, 2003). Given the use of cost data to justify drug prices and patent protection, private (company-paid) cost and not social (total) cost is the policy-relevant figure. (External validity)
- (6) Finally, the cost estimates are not adjusted for tax deductions and credits. Drug R&D expenses are fully tax-deductible each year, and there are special drug R&D tax provisions. The OTA (1993) estimated that tax savings and tax credits reduced R&D spending by nearly 50%. Lower tax rates in the 1990s might reduce that figure somewhat, but pre-tax costs clearly overstate true private (company) costs by a substantial percentage. (External validity)

These significant concerns about internal and external validity call the study results into question. Good science depends on different investigators analyzing the same data. Yet this science-based industry refuses to allow independent parties to check the validity of their cost data and analyze it so that policy can be based on solid, objective, reproducible evidence.

The estimate of R&D cost in this article is widely cited and accepted as an authoritative “fact” in the press and in the highest national and global policy circles. Given the prominent use of these cost estimates by the pharmaceutical industry and its advocates to influence national and international policies, it is critical that they be scientifically valid and relevant to the policy uses made of them. Shortly after DHG 2003 appeared, the Tufts Center for the Study of Drug Development announced that the average cost of developing a self-originated new chemical entity, including post-approval studies, was \$897 million (TCSDD, 2003; Kaitin, 2003; DHG 2003). This figure, like the ones that preceded it, is based on confidential, unsystematic data, and has dubious scientific validity. In addition, adding post-approval studies to the costs of R&D is inherently questionable, because these “seeding trials” are designed primarily to familiarize physicians with the new drug and encourage its use; they are rarely randomized or blinded, but instead feature open-label case series, and are often sponsored by company marketing departments (Kessler et al., 2004).

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Foreign free riders and the high price of US medicines

Donald W Light, Joel Lexchin

The US government, backed by the pharmaceutical industry, wants to convince Americans that they're paying more for drugs because they're contributing more than their fair share of the costs of research and development. Not so, argue two researchers who have looked at the evidence.

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The United States government is engaged in a campaign to characterise other industrialised countries as free riding on high US pharmaceutical prices and innovation in new drugs.¹ This campaign is based on the argument that lower prices imposed by price controls in other affluent countries do not pay for research and development costs, so that Americans have to pay the research costs through higher prices in order to keep supplying the world with new drugs.^{1 2} Supporters of the campaign have characterised the situation as a foreign rip-off.³ We can find no evidence to support these and related claims, and we present evidence to the contrary. Furthermore, we explain why the claims themselves contradict the economic nature of the pharmaceutical industry.

Origins of the campaign

The campaign, strongly backed by the pharmaceutical industry, seems to have started in the late 1990s as a response to a grass roots movement started by senior citizens against the high prices of essential prescription drugs.⁴ This issue was the most prominent one for both parties in the 2000 elections and has since been fuelled by a series of independent reports documenting that US drug prices are much higher than those in other affluent countries.⁵⁻⁷ The idea that other countries are

exploiting the US has led to a hearing of the US Senate Committee on Health, Education, Labor and Pensions and was behind a Department of Commerce report that strongly advocated that other developed countries raise prices on patented medicines.⁸ But are higher prices really necessary?

The free rider myth

We can find no convincing evidence to support the view that the lower prices in affluent countries outside the United States do not pay for research and development costs. The latest report from the UK Pharmaceutical Price Regulation Scheme documents that drug companies in the United Kingdom invest proportionately more of their revenues from domestic sales in research and development than do companies in the US. Prices in the UK are much lower than those in the US yet profits remain robust.^{9 10}

Companies in other countries also fully recover their research and development costs, maintain high profits, and sell drugs at substantially lower prices than in the US. For example, in Canada the 35 companies that are members of the brand name industry association report that income from domestic sales is, on average, about 10 times greater than research and development costs.¹¹ They have profits higher than makers of computer equipment and telecommunications carriers¹² despite prices being about 40% lower than in the US.¹¹

Lower prices do not lead to less research

Mark McClellan, the former commissioner of the Food and Drug Administration, maintained that low prices are "slowing the process of drug development worldwide."¹ A corollary to this claim is that drug companies are shutting down their European operations because prices are too low and moving to the US. This assertion is contradicted by the industry's data. The European Federation of Pharmaceutical Industries and Associations reported that, between 1990 and 2003, its members increased their research and development investments in Europe by 2.6-fold and in the US by fourfold.¹³ The federation concluded that this differential was due to multiple factors, such as the economic and regulatory framework, the science base,



RICHARD DU TOIT/NATUREPL

Are European patients really getting a free ride?

the investment conditions, and societal attitudes towards new technologies.

On several measures, other developed countries spend proportionately as much as the US on research and development. The table presents the spending on research and development as a percentage of gross domestic product for eight developed countries.¹⁴ The US is about at the median. Prices in the countries with better ratios than the US were 31-36% less than those in the US.¹⁵ Pharmaceutical companies commit as large a percentage of sales to research and development in Europe as in the US, about 19% on average over the past seven years.^{9 13} This little reported fact contradicts the widely circulated claims that European countries deliberately ignore research and development costs in calculating prices.¹

Europe no less innovative than the US

Contrary to claims of American dominance, pharmaceutical research and development in the US has not produced more than its proportionate share of new molecular entities. The US accounts for just under 48% of world sales and spent 49% of the global total on research and development to discover 45% of the new molecular entities that were launched on the world market in 2003, less than its proportionate share. European countries account for 28% of world sales, 36% of total research and development spending, and 32% of new molecular entities, more than its proportionate share.¹³

Limited investment in breakthrough research

Pharmaceutical research and development is traditionally divided into three categories:

- Basic—work to discover new mechanisms and molecules for treating a disorder
- Applied—work that develops a discovery into a specific practical application, including research on manufacturing processes and preclinical or clinical studies
- Other—work that includes drug regulation submissions, bioavailability studies, and post-marketing trials.

Although all types of research are valuable, it is basic research that leads to important therapeutic breakthroughs. Only a fraction of overall industry expenditure is on basic research, and it does not require the high prices currently seen in the US to support it.

The Pharmaceutical Research and Manufacturers of America reports that companies invest on average about 18-19% of domestic sales into research.⁹ This figure is considerably higher than that produced by the US National Science Foundation.¹⁶ Its 1999 data show that drug companies invest 12.4% of gross domestic sales on research and development (10.5% in-house and 1.9% contracted out), but only 18% of the amount spent in-house went on basic research. Assuming that 18% of contracted out research is also spent on basic research (the actual figure is not reported) then only 2.2% ($18\% \times 12.4\%$) of revenue goes to basic research. The after tax cost of \$1 of research and development expenditures in the US seems to be \$0.53 to \$0.61, owing to tax incentives to do research.¹⁷ Thus US pharmaceutical companies devote a net of only about 1.3 cents

Ratio of pharmaceutical spending on research and development to gross domestic product and ratio of drug prices to US prices, 2000^{12 15}

	Country						United Kingdom	United States
	Canada	France	Germany	Italy	Sweden	Switzerland		
% of GDP	0.08	0.14	0.11	0.06	0.35	0.55	0.32	0.24
% of US price	63.6	55.2	65.3	52.9	63.6	69.2	68.6	100

GDP=gross domestic product.

($2.4\% \times (0.53 + 0.61) / 2$) of every dollar from sales to innovation.

Only 10-15% of newly approved drugs provide important benefits over existing drugs.^{18 19} From a drug company's point of view, investing principally in research to produce new variations of existing drugs makes sense. Government protections from normal price competition do not distinguish between the lower risk, less costly derivative kind of research and high risk basic research needed to discover new molecules.

Misusing economic theory

The industry's principal claims, as well as being contradicted, are based on false premises. Firstly, counting which country discovers the most new molecular entities is irrelevant in a global market. Companies know that where a good drug is discovered does not matter, and often a discovery comes from research in several countries. Whether domestic revenues recover a given country's research and development costs is also irrelevant. If this were not the case the industry would have shut down operations in Switzerland long ago because of its small market size.

If revenues are inadequate, it would make more sense to conclude they do not cover all marketing costs rather than research costs. Research is central to the industry, and costs associated with it should be deducted first. Pharmaceutical companies report that they invest around three times more in the combination of marketing, advertising, and administration than in research, leaving ample room to cut costs.²⁰

Secondly, every student in introductory economics learns that fixed costs like research do not determine prices.²¹ The market sets prices, implying they are open to free trading like stock prices. Patents, and especially patent clusters, turn the market into a monopoly, and only a monopoly can claim that fixed costs determine prices because it can make that a self fulfilling prophecy. The claim by companies that they have to set prices at 50-100 times production costs to recover research and development costs has never been substantiated, because they have never opened their books to independent public inspection to prove it. What we do know is that all research and development costs are fully recovered each year from domestic sales in the UK and Canada at prices that are far lower than those in the US.

Thirdly, free rider is both a vivid public image of someone jumping on for a free ride and a highly misleading economic term. Technically it refers to a method for allocating fixed costs in proportion to the prices that different groups pay. For example, if Group A (call it Europe) pays \$1 per pill and Group B (call it

Summary points

Prices of patented drugs are substantially higher in the US than in other affluent countries

Published reports indicate that pharmaceutical companies in affluent countries recover research and development costs from domestic sales with substantial profits

Discovery of innovative new drugs in Europe is proportionately equal to that in the US

US pharmaceutical companies invest just 1.3% of net sales in basic research

The idea that the US is subsidising other rich countries contradicts basic economics and the global nature of pharmaceutical markets

the US) pays \$2 a pill and each buys a million pills, then this accounting method would assign half as much of the fixed cost to Group A as to Group B. If, however, the fixed costs are only \$300 000 (a tenth of the total revenue) for the two million pills, the fixed costs could be allocated by volume rather than by price (\$150 000 for each group) and conclude that Group A more than pays the fixed costs and Group B pays much more than it has to. In short, the free riding argument economically is the artefact of an accounting convention and can be eliminated by Group B cutting its prices in half, rather than forcing Group A to double its prices.

Conclusions

The pharmaceutical industry has provided invaluable medicines to cure and relieve millions of patients throughout the world. As an industry, it drives economic growth and employs thousands of skilled people. But it also uses false economics and makes up stories to justify higher prices. Higher prices strain budgets, causing millions of US patients not to take the drugs their doctors think necessary. The pharmaceutical industry and the US government want to blame other developed countries for these higher prices rather than make drugs more affordable.

Contributors and sources: This article is based on all the major documents we could locate, a careful search of the websites of the European Federation of Pharmaceutical Industry Associations and Pharmaceutical Research and Manufacturers of America, and a Medline search. DWL is a professor of comparative health care policy, a contributor to the WHO Observatory volume on European pharmaceutical policy, and a member of the taskforce for the Gates Foundation on how best to make vaccines for global diseases economically viable. JL has been conducting research into pharmaceutical policy for over 20 years and has acted as a consultant to various national governments and the WHO on pharmaceutical matters. DWL had the idea for the article, wrote the first draft, and is the guarantor. JL did the analyses, edited the draft, and made empirical contributions.

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