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**THE ROBERT WOOD JOHNSON FOUNDATION
25TH ANNIVERSARY CONFERENCE**

Piecing Together the Puzzle: The Future of Health and Health Care in America

**Grand Hyatt Hotel - Washington, DC
December 11, 1997**

CONFERENCE AGENDA

8:00 a.m.	Continental Breakfast and Interest Pools	
8:30 a.m.	Welcome and Introduction	Steven Schroeder Ruby Hearn <i>The Robert Wood Johnson Foundation</i>
8:45 a.m.	"A Look Back at a Look Forward": The 1987 Forecast	Linda Wertheimer <i>National Public Radio</i> Wendy Everett Ian Morrison <i>Institute for the Future</i>
9:10 a.m.	"News You Can Use" A Forecast Overview: Health and Health Care in the Year 2010	Robert Mittman and Institute for the Future Staff
10:15 a.m.	Audience Reactions and Summary	Ian Morrison Robert Mittman <i>Institute for the Future</i>
10:30 a.m.	Coffee Break and Interest Pools	
11:00 a.m.	"Health Care Costs: Financial Futures" The Future of Health Care Finance	Matthew Holt <i>Institute for the Future</i> Laurence Baker <i>Stanford University</i> Eli Ginzberg <i>Columbia University</i> Bruce Vladeck <i>Mount Sinai School of Medicine</i>

11:25 a.m.	"Fast, Cheap, and Effective (Pick Two)" Structured Reorganization in Health Care	Marina Pascali Ian Morrison <i>Institute for the Future</i> H. Richard Nesson <i>Partners Health Care System</i> Jason Rosenbluth <i>Volpe Welte</i>
11:50 p.m.	Political Factors Affecting the Future of Health Policy	Bob Blendon <i>Harvard School of Public Health</i>
12:15 p.m.	Summary of Morning Sessions	Ian Morrison <i>Institute for the Future</i>
12:20 p.m.	Luncheon and Interest Pools	
1:20 p.m.	Medical Technologies for the 21st Century	Charles Wilson Wendy Everett Robert Mittman <i>Institute for the Future</i>
1:35 p.m.	"Who Puts the Health in Health Care?" An Integrated View of Health and the Patient Experience	Robert Mittman Charles Wilson <i>Institute for the Future</i> Mary Jane England <i>Washington Business Group on Health</i> Jesse Gruman <i>Center for the Advancement of Health</i> Ellen Stovall <i>National Coalition for Cancer Survivorship</i>
2:35 p.m.	Audience Reactions	Robert Mittman <i>Institute for the Future</i>

3:10 p.m.

Summary of Afternoon Sessions

Wendy Everett
Ian Morrison
Institute for the Future

Bob Blendon
*Harvard School of
Public Health*

David Sibbet
*The Grove Consultants
International*

3:25 p.m.

Closing Remarks

Steve Schroeder
*The Robert Wood Johnson
Foundation*

3:30 - 5:00 p.m.

The Robert Wood Johnson Foundation
25th Anniversary Reception

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Piecing Together the Puzzle: The Future of Health and Health Care in America

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MAKING GRANTS TO
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25
years

PIECING TOGETHER THE PUZZLE:

THE FUTURE OF HEALTH AND HEALTH CARE IN AMERICA

CONFERENCE AGENDA

LIST OF PARTICIPANTS

SPEAKER BIOGRAPHIES

DECEMBER 1997

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Roy Amara has recently rejoined the Institute for the Future (ITF) as a Senior Research Fellow. Since 1990, he has been director of the health care practice at Strategic Decisions Group, an international management consulting firm. Prior to joining Strategic Decisions Group, he was a founding member, President, and CEO of ITF. At the Institute, Roy helped develop the Health Care Outlook Program jointly with Louis Harris and Associates and the Harvard School of Public Health. Throughout his career, he has worked with hundreds of organizations in both public and private sectors. His skills include those of futurist, strategic planner, and decision analyst. During the past decade he has focused his attention almost exclusively on health care – engaging in a variety of strategy development efforts with managed care organizations, physician groups, hospitals, medical centers, health insurers, and large employers. Roy has published widely and has co-authored two books – *Looking Ahead at American Health Care* (1988) and *Business for an Uncertain Future* (1983). He holds a B.S. from M.I.T., an M.A. from Harvard University, and a Ph.D. in electrical engineering from Stanford University.

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Institute for the Future

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Wendy Everett, Sc.D.
Director
Institute for the Future

Wendy Everett directs IFTF's health care programs. She has particular expertise in creating innovative health programs and assessing the scope and value of existing projects. Her past positions include vice president of Brigham and Women's Hospital in Boston and co-founder of a medical software company. In the 1980s, Wendy directed a national demonstration program for The Robert Wood Johnson Foundation. Following that, she was the Program Director for a national program in health promotion and disease prevention for the Kaiser Family Foundation. Wendy has served as a consultant to many state and national philanthropic foundations and was the coordinator of a multi-foundation consortium in AIDS prevention and evaluation. Wendy serves on several boards, including those of The Sierra Health Foundation, Planetree, the Health Commons Institute, and several San Francisco Bay Area hospitals. Wendy holds a B.S. degree in liberal arts and education, another in nursing, and master's and doctoral degrees in health policy and management from Harvard University.

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Director
Institute for the Future

Matthew Holt's research spans a wide variety of issues focused on the finance and organization of health care in the industrialized world. He monitors developments in information technology and creates frameworks and strategies that help constituents deal with the changing market for health care information systems and electronic commerce. Matthew has led the Health Information Infrastructure Outlook (HIO) project, a research program that assesses the impact of the current revolution in communications and information technology on the health care industry. Prior to joining IFTF, Matthew spent three years with the Comparative Health Care Policy Research Project at Stanford University's Asia-Pacific Research Center. Before coming to the United States, Matthew lived in London where he worked as a broker dealing in Japanese and U.S. Treasury Bond futures. He holds masters degrees in both health services research and political science from Stanford University.

Elaina Kyrrouz, Ph.D.
Research Manager
Institute for the Future

Elaina Kyrrouz's research specialty is the future of the 21st century health care consumer and the potential impact of consumers on the health care system. Her interests include the impact of the "new consumer" on patient-provider interactions, the impact of changing provider work environments on the quality of care, the emergence of patient-centered care, the development of new approaches to women's health care, and the use of information technology to educate patients, improve continuity of care and reduce costs. Elaina holds a B.A. in comparative literature from Brown University and M.A. and Ph.D. degrees in Sociology from Stanford University, with specializations in organizations and social psychology. She recently completed a two-year post-doctoral fellowship in Health Services Research at the Veterans Affairs/Stanford University Center for Health Care Evaluations.

Robert Mittman, M.S.
Director
Institute for the Future

Robert Mittman brings a multidisciplinary perspective to health care forecasting and planning. He assesses the impacts of managed care, outcomes research, health policy, and advanced technology on the health care system. His work combines quantitative and qualitative methodologies to look at how the health system will evolve. Recent projects have included a look at the future of cost and utilization controls across different practice settings, development of cancer care quality measurements, and creation of an index of the penetration of managed care in different regions of the United States. In the pharmaceutical area, recent work has included creating strategies for disease management and risk sharing; forecasting the impact on the industry of different drug insurance coverage scenarios; and estimating the induced demand from a Medicare drug benefit. Robert works internationally in research and analysis of collaborative technologies, teleservices, and new media. He specializes in developing innovative approaches to modeling and forecasting under conditions of little or conflicting data. Robert holds a B.S. degree in electrical engineering and masters degrees in both computer science and public policy analysis, all from the University of California, Berkeley.

Ian Morrison, Ph.D.
Senior Research Fellow
Institute for the Future

Ian Morrison has written, lectured and consulted on a wide variety of forecasting, strategy, and health care topics for government, industry, and nonprofit organizations in North America, Europe, and Asia. He is the former President of IFTF, responsible for leading IFTF's growth and success from 1990 to 1996. Before coming to IFTF in 1985, Ian spent seven years in British Columbia, Canada, in a variety of research, teaching and consulting positions. Ian is the author of *The Second Curve - Managing the Velocity of Change* (1996), and has co-authored several books and chapters, including *Future Tense: The Business Realities of the Next Ten Years* (1994); *Reforming the System: Containing Health Care Costs in an Era of Universal Coverage* (1992); *System in Crisis: The Case for Health Care Reform* (1991); *Directing the Clinical Laboratory* (1990); and *Looking Ahead at American Health Care* (1988). Ian is retained by Andersen Consulting as Chairman of their Health Futures Forum. He holds a graduate degree in urban planning from the University of Newcastle-upon-Tyne, England; an M.A. in geography from the University of Edinburgh, Scotland, and an interdisciplinary Ph.D. in urban studies from the University of British Columbia. He is a member of the corporate Advisory Boards of Bristol-Myers Squibb, Interim HealthCare, Benelitics, and Interim Services.

Marina Pascali, Ph.D.
Director
Institute for the Future

Marina Pascali specializes in health economics with a focus on institutional relationships and the organizational structure of health care systems, for both domestic and international programs. Marina has been the director of the Health Care Outlook project and has recently reported on quality issues in health care and the future of the health care labor force, with an emphasis on physicians' changing environments. Her previous research includes an assessment of California's changing hospital and nursing home markets and an evaluation of British Columbia's cost control policies on physicians' billing patterns. Marina holds B.S. and M.S. degrees in microbiology and immunology from McGill University and a Ph.D. in health services and policy analysis from the University of California, Berkeley.

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Director
Institute for the Future

Greg Schmid is Director of Strategic Planning Services at IFTF as well as the leader of the Corporate Associates Program, a 20-year-old multiclient study of trends in the U.S. business environment. Greg spent more than five years with the Federal Reserve Bank of New York, first as an economist and later as chief of its foreign research divisions. Since joining IFTF in 1974, Greg has worked directly with a number of large corporations on planning issues that range from building scenarios to developing tailored strategic plans. Greg is currently working on two large projects: *The Future of Money* and *The Coming Transformation of Mail*. In addition, he has directed studies on *California Libraries Facing the 21st Century* and *The Future of America's Research-Intensive Industries*. He co-authored the book *Future Tense: Preparing for the Business Realities in the Next Ten Years* (1994). Greg received his B.A. degree in history from Yale University and his Ph.D. in economics from Columbia University.

Charles Wilson, M.D., M.S.H.A.
Senior Research Fellow
Institute for the Future

Charlie Wilson joined the health care team as a Senior Research Fellow after a long career as Chairman of the Department of Neurosurgery and Director of the Brain Tumor Research Center at the University of California, San Francisco. More recently he served as Director of Tertiary Care Services at UCSF, and spent a sabbatical year on the future of medical education as Senior Associate to the President of the University of California. His interests include academic health centers, organization/financing of health care delivery, and an extended view of health and emerging medical technologies. He maintains an active neurosurgical practice. Charlie serves on the Board of Directors for UCSF Stanford Health Care and the National Cancer Advisory Board. He holds a medical degree from Tulane University and a master's degree in health administration from the University of Colorado.

Katherine Yu
Research Associate
Institute for the Future

Katherine Yu conducts research for IFTF's health care team, with concentrations on forecasting the future of hospitals, disease management programs, and health insurance coverage by employers. Her past experience includes providing lab and manufacturing support at immunodiagnostic and genetic sequencing companies. She has a B.A. degree in biology and spanish from Smith College. Katherine expects to receive her M.P.H. degree in health policy and administration from the University of California, Berkeley in May 1998.

**INSTITUTE FOR THE FUTURE
PARTNERS AND AFFILIATES**

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Professor
Harvard University School of Public Health
John F. Kennedy School of Government

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Professor
University of California, San Francisco

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Tomi Nagai-Rothe
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Tomi Nagai-Rothe is a consultant, graphic facilitator, and trainer with The Grove Consultants International. She works collaboratively with clients to create both real time and virtual meeting spaces, enhanced with large interactive graphic displays on paper. She is an affiliate of the Institute for the Future and a member of the Outlook Project Team, investigating the changing needs of organizations in the global business environment. She has helped develop several Graphic Guides products including the Strategic Visioning Leader Guides, *Fundamentals of Graphic Language Practice Book*, The Intercultural Learning Model, and the Facilitation Video Kit Series. Tomi also works as a group process designer and trainer for the Fundamentals of Groups Graphics® Workshop and as an instructional materials designer.

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pARTy/SCIENCE

Mark Petrakis brings to media production an extensive professional background in theater, circus, opera, comedy, and puppetry. His work focuses on the presentation of new and collaborative ideas as forms of entertainment. A long-time event producer and early developer of websites, he co-produces ANON SALON <<http://www.anonsalon.com>>, a legendary live San Francisco culture gathering. As a creative consultant, he has worked with a wide range of technology companies such as Apple Computer, Broderbund Software, Kaleida Labs, Living Books, Ameritech, Cunningham Communications, Electric Minds, and PowerTV as well as advertising agencies such as Jamison, Cawdrey, Benjamin and J. Walter Thompson.

**Jane Sarasohn-Kahn, M.A., M.H.S.A.
Consultant**

Jane Sarasohn-Kahn has been a health care economist and management consultant for sixteen years. Jane focuses on the nexus of health care and technology. She advises on a wide range of issues, including market research and segmentation, strategic and business planning, health policy analysis, and technology planning and assessment. Jane has worked with every segment of the health care industry, ranging from academic medical centers and community hospitals to physician group practices, service providers, insurers and managed care organizations; telecommunications, information systems and financial services companies, and public payors including federal, state/regional and local governments in the U.S., Europe and Asia. Jane holds a B.A. in economics and journalism from the University of Michigan, an M.A. in economics, and an M.H.S.A. in public health policy and administration.

**David Sibbet, M.S.
President
The Grove Consultants International**

David Sibbet is president of The Grove Consultants International, an organizational consulting firm he founded in 1977, helping business, government and public sector organizations collaborate in understanding complex organizational and environmental dynamics. David is also affiliated with the Institute for the Future in Menlo Park, co-leading a Groupware Outlook project that is now in its eighth year with more than two dozen Fortune 500 companies and government agencies. David's understanding of organizational process and graphics originally developed over the eight years he was executive director and director of training for the Coro Foundation in San Francisco in the early 1970's. He and a Grove Consultants team facilitated all of the visioning meetings for the conversion of the San Francisco Presidio from an Army base to a national park, and continues to be centrally involved as a process consultant throughout the transition. In 1966 he was a Coro Fellow in public affairs in Los Angeles. David holds a B.S. degree in physics and english from Occidental College in Los Angeles., and an M.S. degree in journalism from Northwestern University's Medill School of Journalism.

**Humphrey Taylor
Chairman and CEO
Louis Harris and Associates, Inc.**

Humphrey Taylor is the Chairman and CEO of Louis Harris and Associates, Inc. Each year Humphrey directs many surveys of health care consumers, taxpayers, clinicians, employers and legislators on a broad range of health care issues, including satisfaction, access, quality, cost and cost-containment policies, managed care, practice patterns and the role of government in the U.S.A. and other countries. Humphrey has had overall responsibility for over 4,000 surveys and has personally directed several hundred surveys in more than 60 countries for government, corporations and foundations. He is Chairman of the National Council on Public Polls, a board member of the Overseas Development Council, a trustee of the Roper Center, the Royal Society of Medicine Foundation, Inc. and the American Academy of Ophthalmology. He is a member of the Steering Committee of the National Academy on Aging and on the Advisory Board of the Cardiovascular Prevention Center at the Harvard School of Public Health.

Preliminary Forecast

MAKING GRANTS TO
IMPROVE THE HEALTH
AND HEALTH CARE OF
ALL AMERICANS

The
Robert Wood
Johnson
Foundation

25
years

PIECING TOGETHER THE PUZZLE:

THE FUTURE OF HEALTH AND HEALTH CARE IN AMERICA

Presented to

THE ROBERT WOOD JOHNSON FOUNDATION

By

INSTITUTE FOR THE FUTURE

DECEMBER 1997

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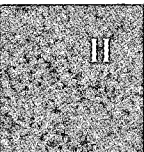
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DECEMBER 1997



HEALTH CARE TEN YEAR FORECAST

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CHAPTER 1: INTRODUCTION

To recognize the 25th anniversary of its founding, the Robert Wood Johnson Foundation asked the Institute for the Future (ITF) to create a forecast of the future of health and health care in America between now and the year 2010. The purpose of this forecast is to provide the foundation grantees, staff and board members with a description of the critical factors that will influence health and health care in the first decade of the 21st century. The preliminary results of the research are presented in this document, and will be summarized at the conference on December 11, 1997 to commemorate the Foundation's anniversary.

In this first report, ITF singled out the trends most likely to influence the course of Americans' health status, and the state of the health care delivery system between now and the year 2005. The drivers of this system are relatively stable and predictable during this time period. Beyond 2005, and through to 2010, the future of health and health care is much more volatile. To cope with the set of uncertainties that exist in these later years, ITF has created three different scenarios that describe emerging visions of health care in this country. They are titled: Stormy Weather, The Long and Winding Road, and The Sunny Side of the Street and are both described and graphically depicted in the last chapter of this report. We hope that the findings of this study will be of value to community organizations, hospitals, providers, and researchers in the long-term planning processes that support their own visions of the future.

ABOUT THE INSTITUTE FOR THE FUTURE

Located at the northern edge of Silicon Valley in Menlo Park, California, the Institute for the Future (ITF) is an independent nonprofit research firm that specializes in long-term forecasting. Founded in 1968, ITF has become a leader in applied research for non-profit organizations, corporations, industries, and governments. The Institute has a cross-disciplinary professional staff that works internationally, analyzing policy, forecasting alternative future scenarios, and identifying markets for new products and next-generation technologies. ITF's Health Care Team is in its eleventh year of providing health care data tracking and forecasting, based on primary research data. Our research projects focus on emerging trends in the organization, financing, and delivery of health care services, technologies, and products, with an emphasis on public policy changes as well as the impact of the private sector markets. The Health Care Team evaluates the forces that both drive and resist innovation, and forecast not only the direction, but the pace of, change in the health care environment.

ITF's cross-disciplinary professional staff works internationally, analyzing policy, forecasting alternative future scenarios, and identifying markets for new products and next-generation technologies.

ITF's Health Care Team is in its 11th year of providing health care data tracking and forecasting, based on

primary research data. Our research projects focus on emerging trends in the organization, financing, and delivery of health care services, technologies, and products, with an emphasis on public policy changes as well as the impact of the private sector markets. The Health Care Team evaluates the forces that both drive and resist innovation, and forecast not only the direction, but the pace of, change in the health care environment.

ACKNOWLEDGMENTS

The idea for this study and the resultant forecast originated with Ruby Hearn, Ph.D., and Steven Schroeder, M.D., of The Robert Wood Johnson Foundation. They believed that there would be value in developing the forecast and sharing it with the Foundation's grantees as a tool for long-range strategic planning. Along with Dr. Hearn and Dr. Schroeder, Frank Karel, Beth Stevens, Ann Searight, and Jeanne Weber provided consistent oversight and cogent direction to the project, helping all of us to focus, refine, and improve the final product. Lois Shevlin and Phyllis Kane were invaluable in guiding us through the planning and development processes. We are indebted to them and are extremely grateful for their support and guidance throughout this project.

The Institute for the Future staff could not have completed the research necessary to formulate this forecast without the help of many colleagues, experts, and friends. Among those who were instrumental in identifying and refining issues and trends with us, we would like to thank particularly the following people: Nancy Adler, Ph.D., Morris Barer, Ph.D., John Berthko, Katherine Binns, Bob Blendon, Sc.D., Toby Cole, M.D., Rena Convissor, John Danaher,

M.D., Karen Davis, Ph.D., Joe DeLuca, Al Dembe, Susan Edgman-Levitan, Bob Evans, Ph.D., Michael Goldberg, Michael Goze, Peter Grant, Jessie Gruman, Ph.D., David Gustafson, Ph.D., David Hansen, Kathy Harty, David Hayes-Bautista, Ph.D., Patrick Jeffries, Don Kemper, Bill Kerr, Julia Lear, Ph.D., Bob Leitman, Jeff Lemieux, Katherine Levit, Arnie Milstein, M.D., Al Mulley, M.D., Al Martin, M.D., Gordon Moore, M.D., H. Richard Nesson, M.D., Mark Petrakis, James Robinson, Ph.D., Richard Rockefeller, M.D., John Rother, Pamela Russell, Bill Scanlon, Carey Sennet, M.D., J.J. Singh, Mark Smith, M.D., Elliott Sternberg, M.D., Felicia Stewart, M.D., Jon Stewart, Humphrey Taylor, Sally Tom, Joan Trauner, Ph.D., Leonard Zegans, M.D. Their thoughtfulness, insightful comments, and generous contributions of time and energy added significantly to our own knowledge and the robustness of the forecast.

With thanks,

Wendy Everett, *Project Director*

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Diana Cypress
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Matthew Holt
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Marina Pascali
Greg Schmid
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Kathy Yu

*Institute for the Future
Menlo Park, California
December 1997*

CHAPTER 2: HEALTH CARE'S DEMAND SIDE: THE FINANCIAL FUTURE

Will Future Growth Be Like the Last Five Years or the Last 30?

The last 30 years in American health care have seen steady cost increases in excess of the growth of the rest of the economy: health care's share of the Gross Domestic Product (GDP) had gone from 5 percent in 1965 to close to 14 percent by 1995, as shown in Figure 2-1. But after growth averaging over 11 percent between 1960 and 1990 (3 percent above the nominal growth of the economy), the growth in health care costs fell to 6.75 percent between 1991 and 1995, and has been falling each year since. For the first time in decades, health care costs appear to be stable as a share of GDP.¹ In the next 12 years, the key question is: will the health sector grow at the rate of the last five years—just a little faster than the economy—or will it resume the trend of the previous 30 years when it grew much faster?

To understand the components of that cost growth, we need to know where the money comes from. The United States has a balanced public-private health care financing system, with spending fairly evenly split between government and the private sector including out-of-pocket costs and insurance premiums paid by individuals since the introduction of Medicare and Medicaid in 1965. Any growth in overall health care costs will be a function of the growth in

private costs (paid by both employers and individuals), and public costs.

So far it's the private sector side that has experienced the greatest reversal in cost growth. From 1960 to 1990, private sector costs grew an average 10.6 percent a year. From 1991 to 1995—in a period viewed by some as the triumph of market-based managed care and by others as the ultimate nadir of cost shifting from employers to consumers and government—private sector health costs fell below the growth rates of the rest of the economy, averaging under 5 percent growth.²

Many employers have seen actual *decreases* in their health care expenditures, some of which happened when they passed more costs onto employees by demanding greater contributions in premiums, forcing higher co-pays and deductibles, and reducing the number of people for whom they provided insurance. But the majority of these cost decreases has resulted from lower payments to health plans. In particular, health maintenance organizations (HMOs) and preferred provider organizations (PPOs) have actively intervened with care providers to lower costs and have become the staple form of insurance plan used by most employers (as

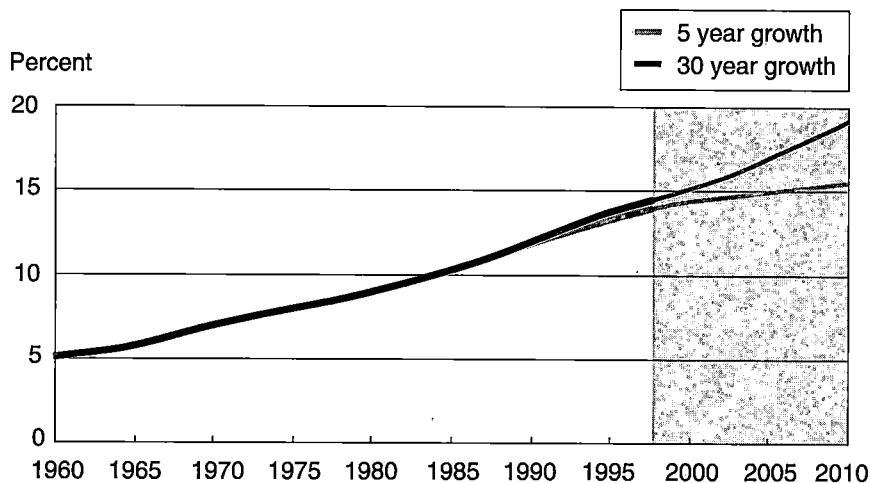
opposed to more traditional indemnity products.

From 1960 to 1990, public spending on health care grew annually at 13.3 percent, about 3 percent more than in the private sector. But most of that difference related to the 1960s and 1970s when Medicare and Medicaid were expanding fast. In fact the 1991 to 1995 experience is in contrast to the early 1980s, when costs in the private sector grew faster than in the public sector. While recently the private sector has seen cost growth slow to below 5 percent, the public sector has had average cost growths of over 9 percent for the last five years. So the difference between has widened to nearly 5 percent, indicating that a greater share of health spending is going to the public sector, and that the public sector cost growth is of greater concern for the future.

While there are several reasons for this fast growth, a casual observer would notice that neither of the major public programs—Medicare and Medicaid—has been as quick to follow the private sector's lead in adopting HMOs or PPOs. Medicare's basic infrastructure supports a fee-for-service cost-reimbursement system for virtually all types of services apart from hospital inpatient care (which was changed to a per-episode prospective payment system in 1983). This may partially explain why public program cost increases have not tailed off as they have in the private sector. Even if these are not the causative factors, they encapsulate two underlying legacies of Medicare and Medicaid—a typical FFS payment system and the peripherality of managed care—each of which will see dramatic changes over the next 12 years.

But the underlying question remains is

Figure 2-1: Spending under the five-year trend or the 30 year trend (health care expenditures as a share of GDP)



Source: IFTF; HCFA

whether the future will look more like the private sector's experience—health care cost growth in line with economic growth—or the public sector's experience of cost growth at 9 per year. The first possibility continues the recent five-year trend. The second takes us back to the high-cost growth of the previous 30 years. Figure 2-2 shows the share of GDP that would end up being consumed by health care under each scenario.

THE ISSUES: WHAT IMPACTS FUTURE COST INCREASES?

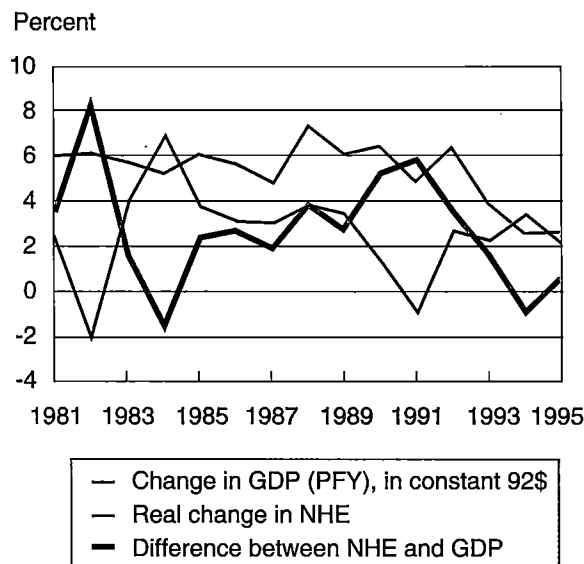
THE ECONOMY IS

THE CRUCIAL DENOMINATOR

Because health expenditures react slowly to cost-cutting measures, the amount government and employers spend on health care goes up much faster than the rest of the economy in times of recession. This rise has a noticeable impact both the share of GDP *and* in the share of public sector revenues and private sector profits. Figure 2-3 shows that the percentage terms, health care costs grew constantly from 1980 to 1995, but the economy was less predictable. The gap in growth of real health care spending and that of the real GDP was greatest in recessions and narrowest in economic booms. Therefore health care costs grow fast as a share of GDP during recessions and stay more or less stable in times of economic expansion. So historically we are used to health care costs being regarded as a problem during and immediately after recessions, while overall they increase a little faster than economic growth.

Other reasons also account for this underlying pattern of slightly faster growth than GDP. In the next 12 years (but in the next 12 years *only*) the oft-mentioned aging population will not increase enough to become a major factor in terms of pure age-based demographic demand. Nevertheless, several observers believe that after the experience of the mid-1990s, the underlying pattern of noticeable cost growth has come about because the

Figure 2-3: Health care cost increases get noticed in recessions (real changes in health expenditure compared to real changes in GDP over time)



Source: HCFA, BOL

experiences and desires of those purchasing health care have changed. Some of these differences include:

- *A more conservative Congress* passed a budget bill aimed in part at cutting back Medicare expenditures, and delegating Medicaid decisions to the states. Managed care options will expand, quickly and involuntarily for those in Medicaid, and rather more slowly for those in Medicare. (It's possible that this will cost rather than save the program money in the short term.) Other entitlements such as Social Security are coming under consideration for future in a political era when a balanced budget mentality appears dominant.
- *Private (and some public sector) employers* have successfully maneuvered a majority of their workforce into HMO and PPO benefit products. They've also either prodded health plans (intermediaries) into more aggressive cost containment efforts with providers, or have increasingly purchased coverage from plans that have taken that stance. Given that employers now know they have influence over costs, they are not likely to loosen that control.
- *Consumers* experienced a steady decrease in their share of overall health spending from 1960 to 1990. But with a combination of fewer employers offering insurance and, of those who do, more demanding premium contributions and increased deductibles and co-pays, consumer are picking up more of the financial

slack. Consumers are likely to be more cost conscious in the future.

- *More "sophisticated" providers.* While higher health care costs eventually mean higher provider incomes, the last five years have clearly communicated the message to all in health care that cost-containment and doing more with less are what payers want. In this equation, specific individuals may be rewarded for reducing costs. So despite the myriad pressures to increase costs, at least some providers have an incentive to reduce costs—a situation that didn't really exist five years ago—and all are absolutely aware of those pressures.

While these factors indicate that a slowing of the underlying growth in health care costs has taken place, several traditional factors ensure that cost-inflation will not die easily. For instance:

- The vast majority of providers are reimbursed on some type of a *FFS basis*. FFS medicine stimulates increased use of services as opposed to capitation, the most extreme form of managed care payment. Although pure FFS is eroding, most forms of provider reimbursement still encourage more utilization of services, rather than less.
- New (and usually more expensive) *medical technologies* are becoming available all the time, and use of these technologies and procedures tends to spread fast whether or not they are cost-effective.

- The number of both high-cost (e.g. physicians) and low-cost employees in the system grew at an annual average rate of 2.65 percent from 1980 to 1995. That's 1.5 percent more than population growth, yet overall wage rates have remained roughly constant. So as more resources go to health care employment, it appears that the

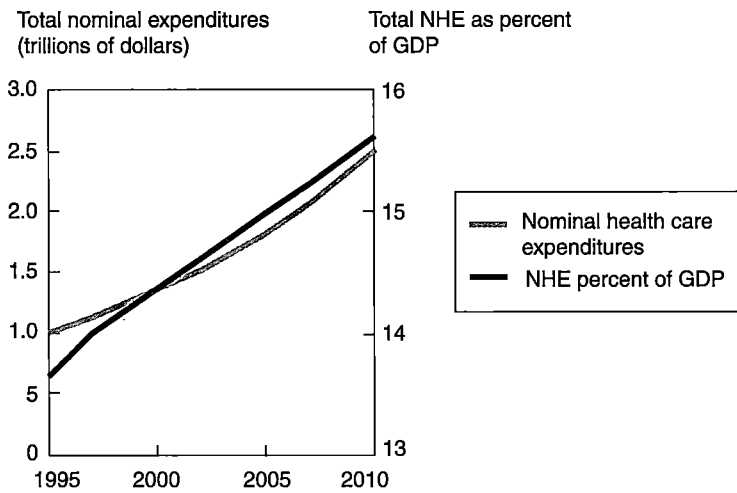
supply-driven demand demonstrated by Fuchs and others in the 1970s is still in evidence.³

THE FORECAST: REAL COST GROWTH AT 1 PERCENT

There are good reasons to believe that the dramatic growth rate of the last 30 years has been broken. But there are still sufficient factors to warrant suspicion that the experience of the private sector—a reduction in costs rates below economic growth—in the past five years is unlikely to be replicated across the system. Overall we forecast that health care expenditures during the next 12 years are likely to grow at 6.4 percent annually—equivalent to just under 1 percent more than monetary GDP growth. If this is correct, Figure 2-4 shows that health care, which currently consumes 14 percent of GDP, will be at 15.25 percent in 10 years and just over 15.6 percent in 2010. Within that steady growth, the differential between private sector and public sector rates of cost growth will narrow.

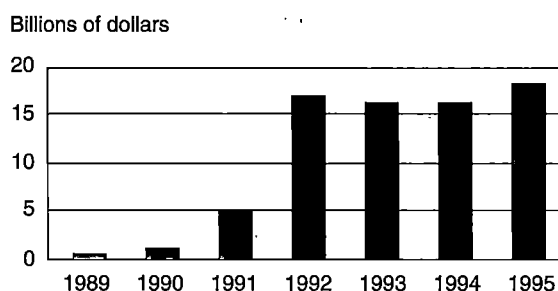
Why will the gap between private- and public-sector growth narrow? So far much of the private sector's gains have come at the expense of consumers, the public sector, and providers. For instance, there are relatively fewer people insured by their own or their family's employers now than these were 10 years ago. The increase in the number of working uninsured and the fact that most employers are demanding greater contributions toward insurance costs means that more pressure is put on safety net providers, such as public

Figure 2-4: Projection of future health care spending (health care expenditures in nominal dollars and as a share of GDP)



Source: IFTF

Figure 2-5: DSH spending explodes in the early 1990s (billions of dollars)



Source: GAO

hospitals and inner-city academic medical centers. Consequently, they've been in worsening financial health, and the amount of compensation the government has paid out in disproportionate share payments (DSH) made to hospitals that deliver a higher-than-average amount of uncompensated care reflects this (Figure 2-5). Similarly the Medicaid expansion of the late 1980s added about 10 million people to the program at a time when fewer people were receiving coverage from employers.

Furthermore, the mainstream Medicare and Medicaid programs have either experienced cost shifting from private insurers, or simply haven't shared as greatly in the productivity improvements providers, especially hospitals, have experienced over the last few years. Figure 2-6 shows that the cost reductions have resulted in disproportionately high benefits to private payers, at the expense of public payers.

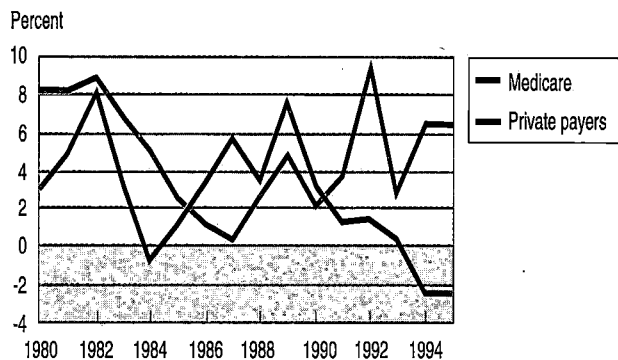
We don't believe that this discrepancy between public and private costs can continue at the 5 percent differential seen to date in the 1990s. It looks like these gains for the private sector at the public sector's expense are mostly a one time gain, and the gap is now starting to narrow.

Evidence of this reversal is accumulating. Already, due mostly to poor margins among health plans and increased utilization in pharmaceuticals and physician services, we see private insurance premiums increasing between 3 percent and 8 percent in 1998. Meanwhile, the increases in excess of 10 percent seen in Medicare and Medicaid costs during the early 1990s have slowed in 1996-1997 to 8 percent and less than 5 percent respectively. The 1997 balanced budget legislation attempts to put an overall cap on growth of Medicare costs at 6 percent for the period from 1998-2002, which should cause a further reduction in overall public sector cost increases. This reduction in Medicare spending should put more pressure on providers, which will in turn try to transfer their costs to the private sector.

We forecast that private sector costs will move closer to the 3 percent to 6 percent range over the next seven to 12 years, and public sector costs will end up in the 6 percent to 9 percent range. Hence our forecast of overall costs averaging 6.4 percent per year.

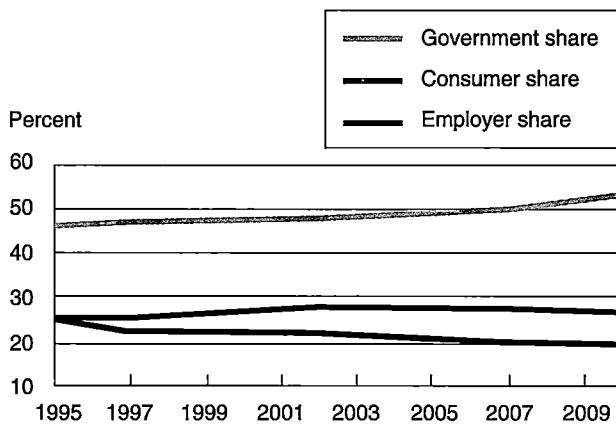
Why will costs stay in that range rather than go much higher, even back to the 30 year trend? On the private side, employers and others now understand

*Figure 2-6: Medicare gets a worse deal in the 1990s
(Average annual per capita growth in Medicare and private health insurance spending in hospitals)*



Source: HCFA

Figure 2-7: Share of costs borne by government, employers and consumers



Source: IFTF; HCFA

that they don't have to simply accept large cost increases year after year. Meanwhile, the Medicare legislation passed recently appears to be the most comprehensive attempt yet to implement cost-containment effort across the entire program, rather than simply squeezing one part of the Medicare cost balloon and letting it bulge out elsewhere.⁴

Nonetheless, given the greater pressures on the Medicare and Medicaid program, and the traditional ability of providers to take advantage of their comparative inflexibility, we think that although cost growth will slow, government's share of all health care expenditures will increase rapidly. Forecasting the rate of public and private sector growth rates, the government's share of spending (*excluding* the government as employer) will increase from around 46.75 percent today to closer to 47.5 percent in 2002 when the current Medicare budget is due to finish, and to as much as 52

percent by 2010.⁵

The consumer is the other source of increased expenditure since across the board the consumer will be paying more for health care. Currently out-of-pocket costs (direct spending on medical services) are \$182 billion a year, or about 18 percent of total health care expenditures. In addition, individuals pay \$62.5 billion in private insurance premiums, either for their primary insurance, as a contribution to what their employer provides or for Medigap coverage.⁶ Combined, these account for 25 percent of total health care spending. Because of the reduction in scope of benefits, increased consumer demand for over-the-counter (OTC) medical products and complementary services (such as chiropractic care), and the slightly higher growth rate of individual health insurance versus group insurance, we forecast that this share of total spending will rise to as much as 28 percent by 2002. After that, growth in the public sector will absorb some of the increase and it will fall back to 26.5 percent by 2010. But for the next five years health care spending will rise as a share of consumer incomes.

Compared to today, in 10 years employers will be paying a smaller share of overall costs, while government and consumers will be paying more (Figure 2-7).

THE SIGNIFICANCE OF OUR COST FORECAST FOR THE REST OF OUR 12-YEAR- OUTLOOK

We broadly agree with forecasts from Ken Thorpe and others who suggest that the health care cost problem is not going to go away. The nominal rate of health care cost growth for the period 1992-2010 will be at about 6.5 percent, or 1 percent over GDP as opposed to 3 percent over GDP for the period 1960 to 1990. But we believe (with some temerity) that because of this relatively slower growth, cost containment, which has been the central issue of health care policy in the public sector for the last 30 years and in the private sector for at least the last five, may not be the dominant issue for the next 12 years. This period up to 2010 is likely to be a hiatus, given the impact of the soon to be retiring baby boomers in the years between 2010 and 2030.

WILDCARDS: POSSIBLE COST DERAILERS

- Risk selection sinks Medicare savings: Choice Plus ends up as cream-skimming medical savings accounts, Physician Sponsored Networks, and HMOs increase on a noticeable scale.
- Cost-reduction strategies in fast-growing parts of Medicare such as Skilled Nursing Facilities, home health and outpatient services don't work or are counterproductive in that they create fast-growing exceptions. Those rapidly growing programs are joined by other new programs like telemedicine, which are equally expensive.
- Cost shifting to providers and public payers causes a collapse of the safety net forcing large influxes of federal funding to several inner-city areas in a mass scale replay of Los Angeles 1995.
- The next recession is deeper than usual, requiring more services, and hence a greater share of government revenue and GDP to be spent on health care, while taxes and other revenues go down.
- "The weapons are taken out of managed care's hands." A combination of legal and regulatory restrictions on health plans, such as "any willing provider" laws, bans on capitation, and utilization review, tilt negotiating power back towards providers.
- The provider surplus, plus aggressive HMOs, plus Medicare actually sticking to 6 percent cost increases and Medicaid getting tougher, keep costs below our forecast and below 4.5 percent. As a consequence, health care shrinks as a share of GDP.
- The technology revolution increases the rate of economic growth. Health care shrinks as a share of GDP because GDP grows so quickly.
- No one can profitably deliver home care services in the next three years, leading to a crisis of underfunding in the home care industry.

ENDNOTES

¹ Since the mid-1980s the underlying trend has been for the economy to grow at an annual clip of 5.5 percent in nominal terms (2.5 percent real growth and 3 percent inflation). Thus for health costs to maintain their share of GDP they would have to grow at an average annual rate of 5.5 percent in nominal terms.

² i.e. less than 5.5 percent, the average growth of the economy in nominal terms (not adjusted for inflation).

³ V.R. Fuchs & M.J. Kramer *Determinants of Expenditure for Physicians Services* in V.R. Fuchs *The Health Economy*, Harvard University Press 1986

⁴ Medicaid, too, appears to be growing more slowly. However, as Medicaid costs grow fastest during recessions and the recent falls in Medicaid cost-growth (e.g. to below 4 percent in 1996) have come during an economic expansion, we forecast Medicaid growth to remain at about 8 percent.

⁵ This does not include the government's spending as an employer. We count that spending as private health insurance (as does HCFA in some versions of the NHE) and believe that it will increase at the rate of private spending. In 1995 government spending on insurance for federal, state and local government employees amounted to roughly \$58 billion of the \$242 billion spent by employers on private health insurance in 1995. If this *were* to be counted as part of government health expenditures it would mean that the government accounted for 52 percent of health expenditures in 1995.

⁶ This does not include \$16 billion paid as premiums by individuals for Part B of Medicare, which are included in our Medicare numbers.

CHAPTER 3: THE FUTURE OF HEALTH INSURANCE

A History of Mixed Models

The American health insurance system developed out of a need for hospitals and physicians to make their product affordable to ordinary people. Health insurance first became a reality for Americans in the 1930s with the creation of specialized health insurance companies, the Blue Cross and Blue Shield plans. The system was given a boost when health insurance became an employment benefit during and after WWII, and when Medicare (for the elderly) and Medicaid (for the poor) were created in 1965. It was this indemnity-based system of mixed public and private insurance sources that constituted the mainstream of American health care until the early 1980s. Only in some regions, notably in the West, were any substantial number of people enrolled in the prepaid health plans that were later called Health Maintenance organizations (HMOs).

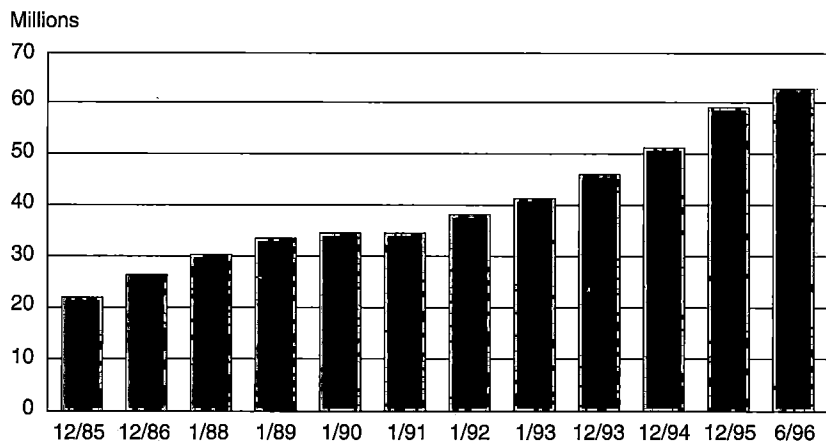
During the 1970s and 1980s, a series of legislative and court decisions enabled the growth of selective contracting. Selective contracting allowed insurance plans, which came to be known as Preferred Provider Organizations (PPOs) and HMOs, to contract with networks of providers. The plans could arrange the contracts at a predetermined price and reimburse providers for their services in

a number of different ways, still including (but not limited to) a traditional fee-for-service model. Generally, the Medicare and Medicaid programs were not included in these arrangements during the 1970s and 1980s.

By the early 1990s the cost advantages that HMOs and PPOs afforded employers were so great that most large employers, such as public employers like California Public Employees Retirement System (CalPers), moved their employees to this type of insurance arrangement. This caused a rapid growth in the numbers of people enrolled in HMOs and PPOs, and later in hybrid models like Point of Service (POS) programs. By 1995, most companies had moved their workers away from indemnity plans, and by 1997 more than 65 million people were enrolled in HMO plans (Figures 3-1 and 3-2).

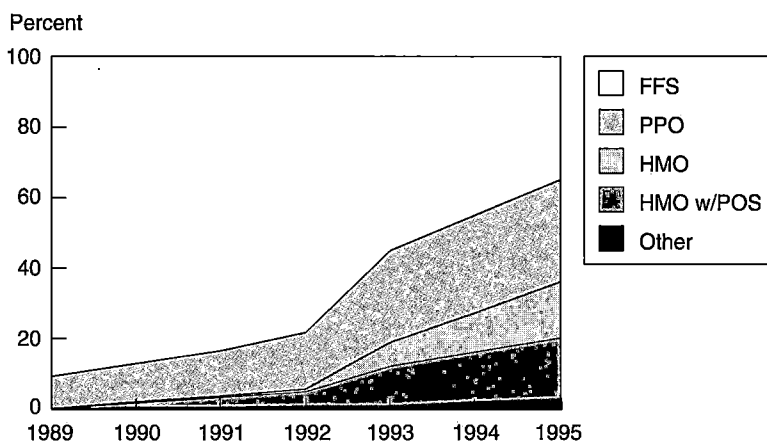
Meanwhile, moving employees into managed care plans was not employers' only response to rising health care costs. They also offered fewer employees insurance, particularly those with lower education levels. The proportion of nonelderly who had employment-based insurance fell from 69.2 percent in 1987 to 63.5 percent in 1993 (Figure 3-3).¹ Insurance coverage stayed at this level to

Figure 3-1. HMO membership takes off in the 1990s
(Number of HMO enrollees in millions)



Source: Interstudy, AAHP

Figure 3-2. Type of plan that covered most employees of companies with 100+ workers



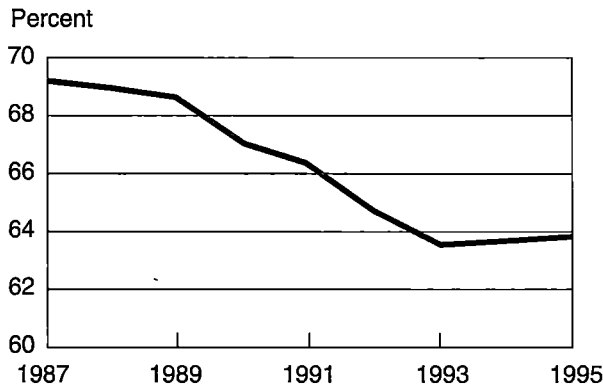
Source: IFTF Employer surveys, 1989, 1992, 1993, 1995

the present despite the large number of new jobs created during the 1992-1997 economic expansion. This erosion of health insurance as an employee benefit has been particularly severe for those with no more than a high school education (Figure 3-4).

What has changed over the last few years is the number of people who are uninsured—a number which typically increases during recessions and decreases during economic expansions—now appears to be increasing during expansions. This increase suggests that, in this current expansion, any income effect (people buying insurance as a result of higher incomes or employers offering health insurance benefits as a result of a tighter labor market) or price effect (people buying more health insurance when it becomes relatively cheaper) is being outweighed by:

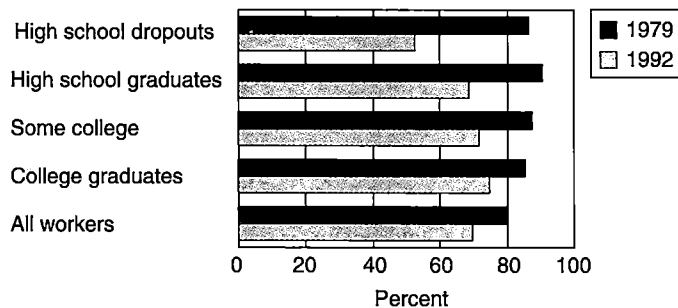
- structural shifts away from employers offering insurance, such as more part-time workers and more workers in smaller firms (Figure 3-5)
- the sharp decline in health insurance provided by small businesses (Figure 3-6), which already offered less health insurance compared to larger firms (Figure 3-7). Part of this change has been that many small business jobs are now in the service sector where employers offer fewer benefits than in the manufacturing sector.
- the underlying price effect, that is, employers and individuals dropping insurance coverage because of increas-

Figure 3-3. Employment based insurance is falling.....
(Percent of nonelderly adults with employer-sponsored health insurance)



Source: EBRI analysis of CPS data

Figure 3-4. . . .and it's the least educated who've borne the brunt of the decline
(Percent of full time male workers with health benefits by educational attainment)



Source: J. Sneddon Little, New England Economic Review, 1995

ing costs in comparison to real wages, which are still below the 1989 level.

So the plight of the uninsured, which has been a focus of health policy throughout the century and led to the creation of Medicare and Medicaid, will remain unresolved if current trends persist. The numbers of uninsured people have been growing fairly steadily and are at 42 million people. This correlates to approximately 15 percent of the population being uninsured at any one time, and 7 to 9 percent being uninsured for a year or more. Although there is some dispute over the calculation², it appears that the rate of the uninsured has recently been rising by about 750,000 per year, a growth rate of 2 percent as compared to overall population growth of 1 percent. However, the absolute number of uninsured increased about 2 million a year during the 1990-1992 recession.

THE ISSUES: HOW WILL PEOPLE RECEIVE HEALTH INSURANCE?

Some of the factors determining how people receive health insurance over the next 12 years are predictable. Most people will have their insurance paid for by the same source it comes from now. An assessment of the sources of health insurance for Americans (Figure 3-8) shows that in 1995 about 155 million individuals, or just under 60 percent of Americans, received private health insurance from their employer or purchased it themselves (20 million or 7 percent). Of the remainder, 30 million (11 percent) are in the Medicaid program, some 38 million (14 percent) are

Figure 3-5. The flexible workforce is growing quickly

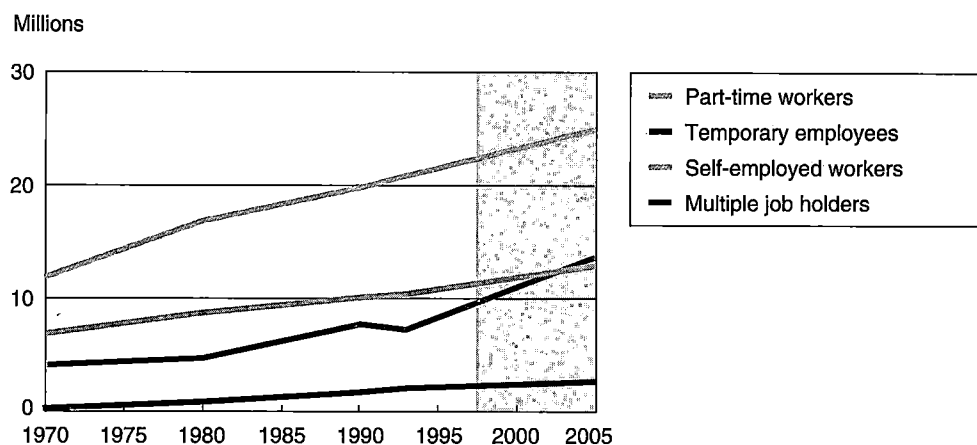


Figure 3-6. Small business drops health benefits
(Percent of employees at firms of >100 receiving health benefits from their employer over time)

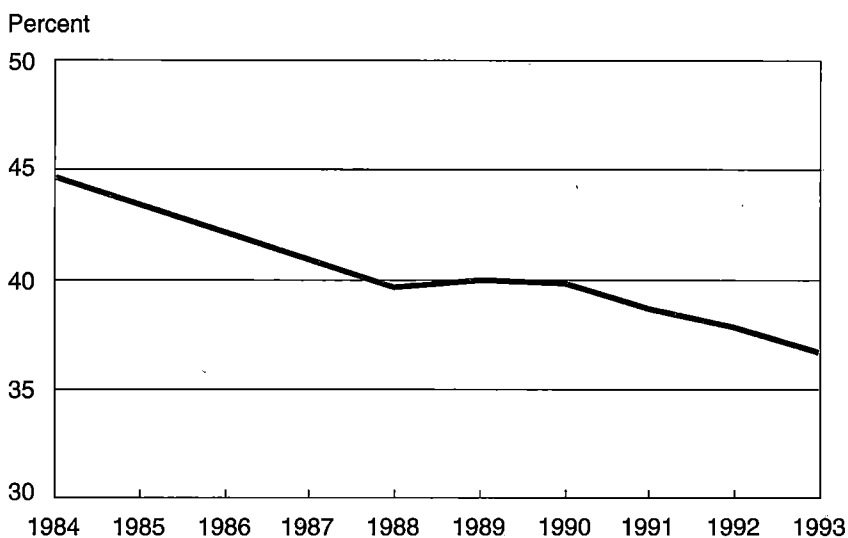
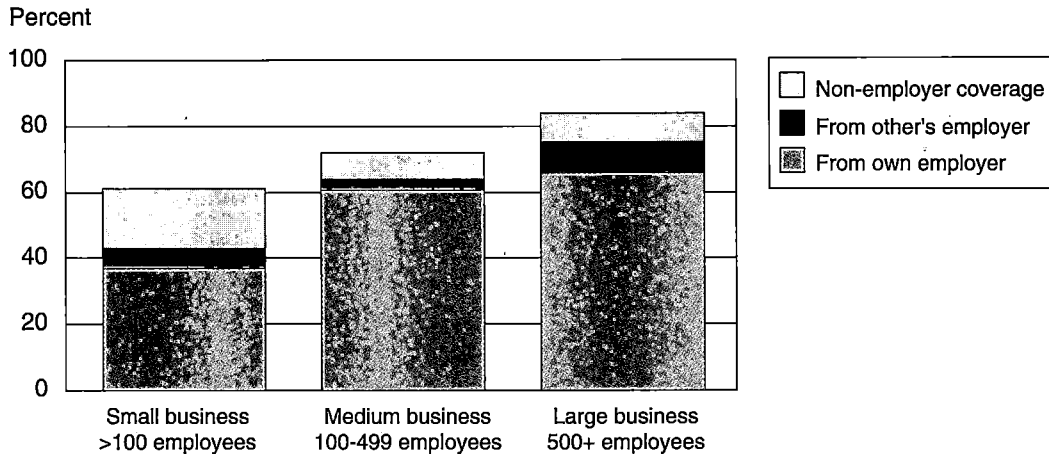
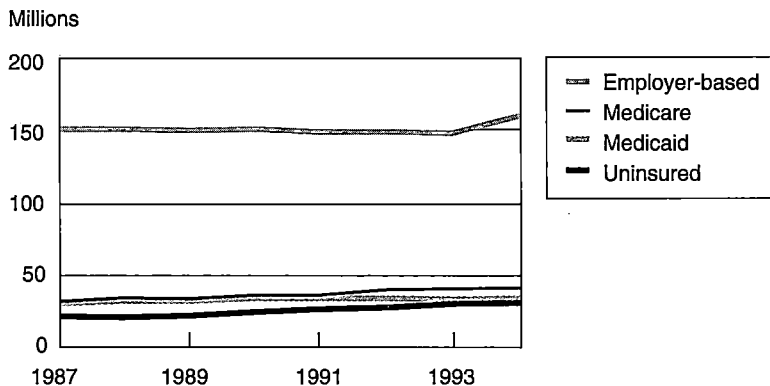


Figure 6-7. Few small business employees find insurance at work. . . . or anywhere else
(Source of insurance coverage by size of employer 1993)



Source: Small Business Administration

Figure 3-8: Sources of health insurance for Americans over time



Source: IFTF, using data from HCFA, EBRI and CPS

in Medicare, and some 42 million (15 percent) have no health insurance and rely on self-pay, county and local programs, or charity.

For the next five years we know who the Medicare population will be; any future policy changes related to eligibility will not kick in until late in the next decade. In the near future, employment-based insurance will remain the predominant form of insurance for most people under 65. There will be a continuing group of Medicaid recipients and uninsured, but their numbers can not be known for certain. The major categories of Medicare, Medicaid, uninsured and private health insurance will remain the core sources of coverage, or lack thereof.

However, the question is not only, From which source do people receive health insurance? We must also ask, What form does that insurance take? During

WHAT'S BEHIND MEDICAID'S GROWTH?

The Medicaid program has grown in both size and complexity since its inception in 1965.³ The program now accounts for some 15 percent of all health care spending (\$150 billion in 1995) and covers some 36 million people, primarily with four major types of coverage: 1. acute medical insurance coverage; 2. coverage for the disabled, including residential care for the long-term mentally disabled; 3. long-term care for the poor elderly (those who have "spent down" to poverty level and need nursing home care); and 4. state Medicaid programs paying the Medicare Part B insurance premiums for poor elderly and disabled (known as dual eligibles).

Sixty-five percent of those enrolled in Medicaid are in the first category, and 65 percent of the money is spent on the 35 percent in the last three categories. As that spending tends to fall outside of the traditional acute care model, it is difficult to include in managed care programs.

A series of legislated eligibility expansions in the late 1980s, followed by the 1990-1992 recession, increased the numbers of people covered by Medicaid from 23 million in 1987 to 36 million in 1996. Currently, about 30 million people use Medicaid as their primary source of health insurance (our model counts the dual eligibles in the Medicare numbers). Federal legislation in 1996 gave states far more freedom to alter Medicaid plans, both in terms of implementing new benefit arrangements, and in changing eligibility levels. Meanwhile several states, notably Tennessee, had already moved their Medicaid population into managed care programs.⁴ Most other states have announced an intention to do the same, and we forecast that about 60 percent of Medicaid recipients will be in managed care plans by 2005, although they will account for only 35 percent of spending.

The 1997 Balanced Budget Act also gave the states funding to increase the number of children covered by health insurance. States may use these funds to increase Medicaid eligibility levels for children or they may create separate child health programs.

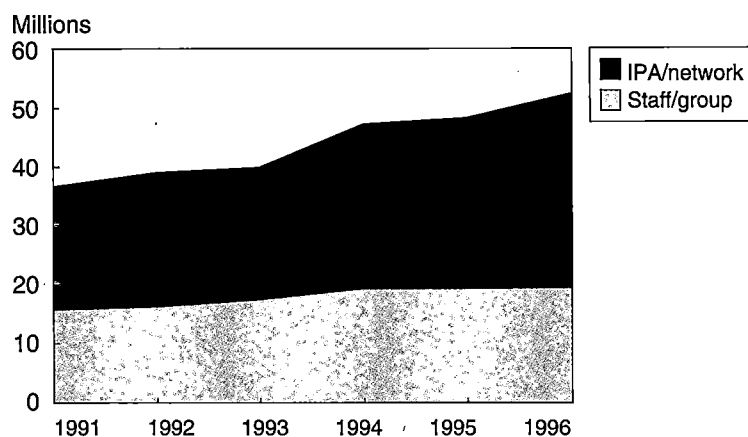
the last few years, most people with employer-based insurance have moved from indemnity plans into a variety of more complex models, including several types of open-panel HMOs and PPOs. The shift from indemnity to PPO and HMO models will continue, with the shift accelerating in the public programs.

Contrary to popular opinion, the growth in PPOs and HMOs was not primarily a result of an increase in the number of members of traditional staff and group model health plans, such as Kaiser Permanente or Harvard Community Health Plan. Instead, the growth came from IPA-based HMOs that developed new contracting arrangements with community providers and intermediary organizations, such as medical societies (Figure 6-9). In other words, the delivery system used by the new intermediaries was the same one that the Blue Cross, Blue Shield and traditional indemnity systems had been using all along.

In the mid 1990s, the Medicare and Medicaid programs began seeing HMO enrollee increases, as some state governments forced Medicaid recipients to join HMOs and it became more attractive for private-sector health plans to recruit senior citizens into specialized HMOs. This "Medicare risk contracting" was increasingly profitable for commercial health plans, particularly in areas where Medicare's average costs were high. For each member enrolled, HMOs were reimbursed 95 percent of the average costs in a particular county—a reimbursement policy that encouraged the

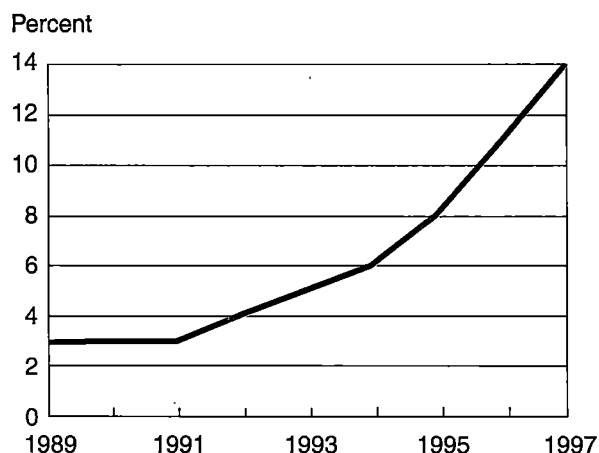
recruitment of seniors in high-cost markets such as Los Angeles, Miami and New York City. Membership of seniors in risk-contracting HMOs grew from 4 percent at the end of 1989 to 6 percent at the end of 1994, to over 11 percent in December 1996, and we anticipate that it will be at 15 percent by the beginning

Figure 3-9. It's been the IPAs that have grown fastest (HMO enrollment growth split by IPA & network models versus group and staff models)



Source: IFTF, using data from Interstudy

Figure 3-10. Enrollment growth in Medicare risk (TEFRA) HMOs



Source: HCFA

of 1998 (Figure 6-10). After 1998, Medicare recipients will be allowed to join other types of insurance programs such as PPOs, under the new Choices + program.

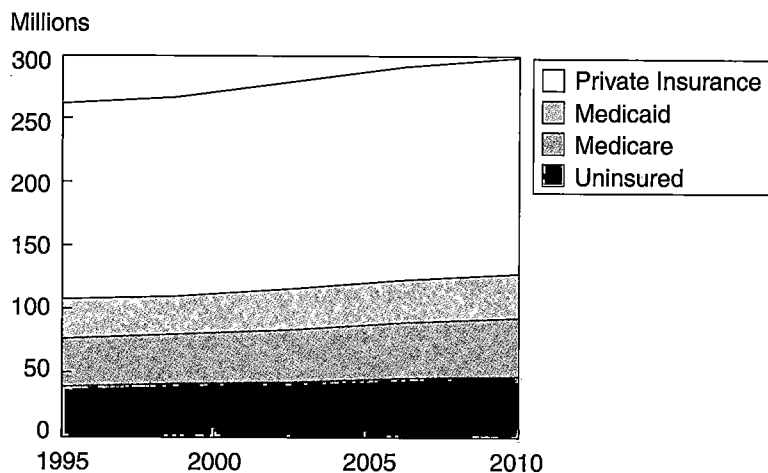
Two major issues then, have influenced our forecast for health insurance. One is the *source* of insurance. Those payers will remain fairly constant. The other is the *type* of insurance. Although we estimate that the numbers enrolled in the classically defined products—indemnity, PPO and HMO—the distinction between different types of HMOs, PPOs, POSs and all the rest of the players in the alphabet soup is becoming irrelevant. Continued innovation in the benefit plans' contractual arrangements will rapidly erode the distinction between the classic gatekeeper HMOs, PPOs, POSs, and other models of managed care.

THE FORECAST: THE SOURCE OF INSURANCE—WHERE ARE THE PEOPLE?

PRIVATE INSURANCE

The economic trends downward in the numbers of people with employment-based insurance and upward in the numbers with Medicaid (and the uninsured), will remain consistent over the next 10 years. The numbers receiving health insurance from employers will decrease, as a proportion of overall population, at 1 percent every five years from about 59 percent in 1997 to about 55.5 percent in 2010 (Figure 3-11).

Figure 3-11. Future sources of health insurance for Americans



Source: IFTF, based on data and projections from HCFA, Urban Institute, Lewin Inc. & CBO

MEDICARE

Meanwhile, the population insured through Medicare will increase at a rate a little greater than the rate of overall population growth, from just under 38 million (14.2 percent) to 45 million in 2007 (15.5 percent) and 49 million in 2010 (16.8 percent). While there will be growth in the numbers of elderly, the fastest growing segment of the Medicare population is now the disabled, which is growing at 6 percent annually. Considering that no changes to eligibility were made in 1997, a policy that is unlikely to change during the next several years, we think that Medicare will continue to cover people over 65 years of age, at least until 2010. There are now 34 million Americans over 65 and there will be 40 million in 2010. The significant growth in the population over 65 years old, owing to the baby boom after World War II will begin in 2010, and continue until 2040.

MEDICAID

There are now about 30 million Americans (11.5 percent) who use Medicaid as their primary insurance. That number does not include the nearly 6 million people who are eligible both for private insurance and for the Medicare program. It also ignores an estimated 6 million additional people who are eligible for the Medicaid program but are not enrolled in it—we classify these people among the uninsured. The rate of growth of the Medicaid population depends on both federal and state government policy and the economy, and is notoriously difficult to forecast. However, we do not forecast a substantial expansion in Medicaid eligibility other than for some children covered under Kiddeicare.

Projections based on demographic patterns over the next 10 years, particularly the aging of the population, means that there will be a fall in the growth rate of the core populations Medicaid serves (such as mothers with children). We estimate that Medicaid will grow from 30 million to 34 million by 2010,⁵ remaining consistent at around 11.5 percent of the population. Several factors could inflate this forecast, including a faster uptake of children into Medicaid under Kiddeicare, or a severe recession that would cause an expansion in the ranks of the poor. However, states now freed from federal mandates could tighten eligibility requirements, which would reduce the number of people served.

THE UNINSURED

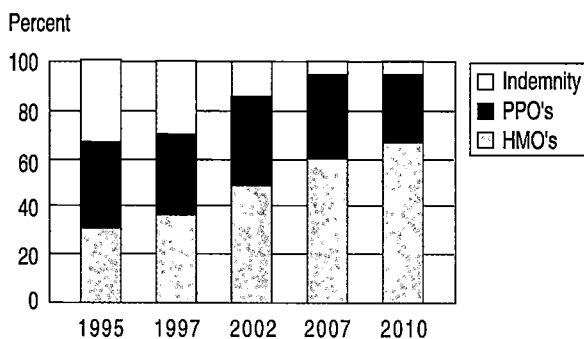
The uninsured will still constitute a sizable proportion of Americans, but our core forecast is that they will continue to be about 15 percent of the population. Although ascertaining the number of uninsured is problematic, their number appears to be increasing at about 750,000 people per year. Because health insurance costs have dropped in the past three years, we project that, assuming a generally tight labor market, the underlying trend will fall over the next five years (although a likely recession may keep the average growth at 750,000).

There will also be a modest impact on Medicaid as between 1.5 million and 2 million children receive coverage over the next five years through the Kiddiecare provision of the 1997 Balanced Budget Act; (10 million of the uninsured are under 18 years of age). In total we forecast that by 2002 the uninsured will increase from its current

42 million to around 44 million. After 2002 the average rate of increase will decline partly because of the shifting age structure in the population. Lack of insurance is most common among people aged 18 to 34 years, and most of the baby boomers will be aged 40 to 60 years by then. Overall, we estimate that the underlying rate of uninsurance will fall to closer to additional 500,000 per year through to 2010. We estimate that, in 2007, 16 percent of Americans (46.4 million) will be uninsured, a percentage that will rise to 16.1 percent or 47.9 million in 2010.

The important factor in these projections is the *proportion* of the population that is uninsured at any one time. About half the number uninsured at any one time (i.e. the often quoted 42 million) will be uninsured for a year or more, and twice that number will be uninsured at some time over a two-year period. Furthermore the period of time it takes for the population to progress through the cycle of going from insured to uninsured and back to uninsured again shortens during recessions and hence has greater political impact then.

Figure 3-12. The future is much more of the present
(Type of insurance coverage for the insured)



Source: IFTF

WHAT TYPE OF INSURANCE WILL PEOPLE HAVE?

While the distinction between indemnity, PPO, and HMO is breaking down, the numbers making the move toward managed care have been counted by the increase in HMO membership, and that's how it will be forecast throughout the near future. Figure 3-11 shows the change in type of insurance coverage enjoyed by the insured over the next 12

years.

Among those with private insurance, HMO membership has been growing at about 7 percent each year during the 1990s and we expect that rate to remain constant out to 2002, and then drop to 5 percent from 2002-2007, and to 4 percent after 2007. Indemnity programs will increasingly turn into PPOs, and PPO membership will increase to about 60 million by 2002, but then it will decline to below 50 million as PPO members increasingly move into HMOs. However, the distinctions between these products will be hard to discern by then.

Meanwhile, Medicare and Medicaid HMO enrollment is likely to grow considerably faster (Figure 3-13). Our estimate is that Medicare Risk enrollment will continue to grow at a consistent rate of about 90,000 insured lives a month, a trend that will result in about 25 percent of seniors being in Medicare Risk HMOs by 2002—nearly doubling the present amount—and about 33

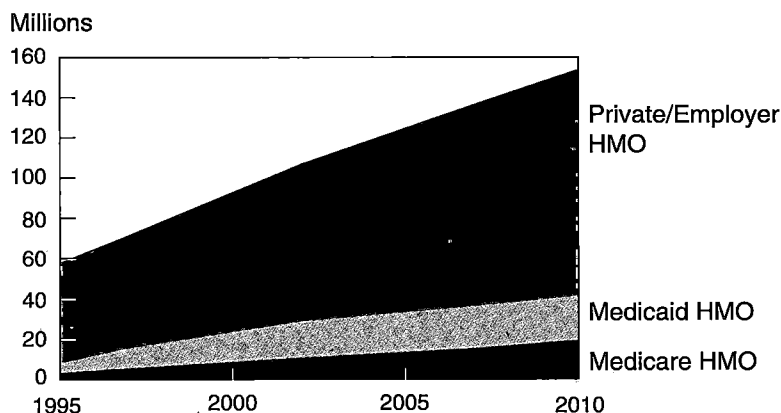
percent by 2007.⁶ The variety of managed care plans offered by the private sector to these seniors will increase to include POS and even PPOs. Most of the rest of the Medicare population will remain in the FFS program, but a small minority may choose alternatives, such as Medicare Savings Accounts (MSA) or buying private indemnity plans. Medicaid HMO enrollment will happen much faster, as the recipients will be given no choice and will not need to be sold membership one-by-one. We project that virtually all the nondisabled adults and children in the program will be moved into HMOs by 2002. This process has already started, and despite some false starts, within five years it should be nearly complete with as many as 63 percent of the recipients in HMOs.⁷

The overall forecast is that HMOs will cement their position as the dominant form of health insurance product over the next decade. PPOs will have some durability as an indemnity-like insurance product, particularly within the upper echelons of the employee population. Pure indemnity will decline rapidly in importance remaining viable only in the Medicare program and for a tiny percentage of the employed.

But the real importance behind these distinctions in health insurance models will fade by the early years of next century. For those insurers that remain, the two key issues will evolve into:

- The components of the benefit packages, in terms of the insured's obligations like coinsurance,

*Figure 3-13. HMOs move from mainstream to majority
(Percent of Americans in HMOs by source of insurance)*



Source: IFTF

deductibles, and copayments.

- The way in which insurance plans reimburse the providers

We look at the second question, provider reimbursement in Chapter 4, *Delivery of Care*. The first issue, benefits packages and insureds' obligations, is somewhat clearer, and will reflect the underlying tiering that is developing among consumers in the population as a whole (see Chapter 8, *Consumer Influences*). Three types of insurance models are likely to develop, based on the employment status and wealth of the participants:

- *High-echelon indemnity or PPO, including traditional Medicare.* These will remain traditional programs with high deductibles and coinsurance, copayments, and free choice of providers.
- *HMO derivative benefits:* Most Americans will have excellent benefits in terms of low or no deductibles, and low copayments (the current HMO standard), if they stay within the provider network and work through their plans' referral processes (be it from gatekeeper physician, or nurse to a specialist). The option to self-refer to other providers will be covered in general, but at a lower percentage of reimbursement with higher copayments and most likely higher coinsurance.
- *The low tier,* which will include most Medicaid enrollees, will face a more restrictive set of provider choices, but

with better access to them than they've experienced in the traditional program. The providers for this group will also be dealing with most of the uninsured. There will also be continued but limited efforts to help uninsured individuals and small groups buy into these lower-tier plans. The outcome of the Kiddlecare legislation in many states will be a similar plan or buy-in to Medicaid.

Again, to see how these factors will translate into reimbursement and affect the provider system, see Chapter 4, Part B.

WILDCARDS:

- A severe recession increases the uninsured and Medicaid populations by 75 percent each.
- Universal health insurance legislation is enacted reducing the number of uninsured to nearly zero.
- Health insurance premiums become a taxable benefit; employers stop providing coverage and abandon the market as purchasers.
- MSAs, vouchers for Medicare, and other individual-based buying becomes a significant force, changing the group nature of the insurance market.
- HMO enrollment growth in either Medicare or the commercial market may slow substantially or even decline due to legislative, market, or other pressures.

- A national health insurance system is adopted; private sector insurance is eliminated.

ENDNOTES

¹ EBRI analysis of 1987-96 CPS

² For example, the two main surveys used to calculate this number, the CPS and the NHIS, count uninsured children in different ways. They also count veterans who potentially could use VA hospitals differently. In another example of the mystique around this number, the questionnaire was changed in the 1995 CPS which led to an apparently large rise in the number of people receiving coverage at work while the underlying trend and many other surveys were revealing the opposite

³ In fact the expansion in eligibility of the Medicaid program in the late 1980s, which saw the population covered by that program grow from about 19 million to closer to 30 million, had some impact on keeping the number of uninsured lower than it would otherwise have been. Few of these new Medicaid recipients had been previously uninsured, in fact most of them had previously been insured by an employer, but it did make a one-time impact on the underlying trend of uninsurance.

⁴ Until the 1996 legislation it was necessary to receive a waiver from the Federal government to make substantial changes. Several waivers were granted including that which allowed Tennessee to introduce the TennCare managed care program for Medicaid recipients and the uninsured.

⁵ There's some controversy over forecasting Medicaid enrollment. CBO estimates annual Medicaid growth of 2.7 percent. The Urban Institute reworked the Congressional Budget Office (CBO) number in 1997 and established to our

satisfaction that CBO had overestimated the growth in the core Medicaid populations of AFDC moms and kids and the disabled. They projected a 1.6 percent annual growth rate, which we've used here.

⁶ This is much lower than several other estimates including CBOs. But it is revised up from our 1995 projection which had HMO growth stalling in Medicare at around 25 percent. The upward revision takes into account future leveling of the AAPC rates, the abolition of the 50/50 rule, the upward boost to rural AAPCC rates and the PSN legislation which will make it easier to set up the infrastructure to enroll seniors in smaller markets. The one major brake on Medicare risk is the likely institution of risk adjustment for government paid premiums after 2000, which could make enrolling healthy seniors a good deal less profitable than it is now. In any event, HMO penetration will not approach that seen in the employer market. See IFTF's 1995 report, *Medicare & Medicaid Managed Care* for a full discussion of our projection.

⁷ This includes pre-paid health plans and HMOs, but not primary care case-management which we regard as an addendum to the regular fee-for service program

CHAPTER 4: DELIVERY OF CARE

Main Themes of the Future Delivery System

The mixture of physicians, hospitals, and other providers that makes up the American health care delivery system has never been a well-organized entity. We are a few years into what we perceive will be 15 to 20 years of profound change in the way health care providers are organized. This period of change will occupy all of our forecast period up to 2010, and the outcome of those changes will be of profound importance for the future well beyond 2010. That outcome is uncertain, in that no one can state precisely what kinds of organizational models will deliver most of the care in the future, or who will control how that care is provided. Although, patients will be involved in all stages, both as active agents and as passive recipients of change, most of the action will be driven externally by employers, governments, and health insurers, with various players in the system trying to create organizations that will survive and even profit in the future. Several key backdrops underlie this system:

- *Continued organizational change.* A combination of the demands of employers, the rise of managed care, the recommendations of consultants, and the infusion of Wall Street capital into the health care system has led to a desire for new models of

health care delivery, and current providers are trying to make sure that they will be in the game for the long term. Consequently, there has been a rash of mergers, acquisitions, and new initiatives in and among all sectors of the market. This activity has been as prevalent among nonprofit organizations as it has been among their Wall Street-funded brethren. It presages a slow transition from a world of independent entities to one of more corporate systems. Between here and there have been—and will be—many false starts, poor investment decisions, and organizational disasters.

- *The role of intermediaries.* Health care plans, disease management companies, case managers, and other management organizations will become much more important in directing patients to providers and in intervening and directing the activities of both care providers and patients. There is a possibility that providers will attempt to get around the intermediaries and go directly to such end-payers as employers or Medicare. There is also a possibility that, as patients become more engaged in their care, they will influence the behavior of these intermediaries as well as that of their providers.

- *An overcapacity of hospitals and a surplus of physicians.* America has far more hospital beds than it uses, and many physicians are working at much lower efficiency levels than they could. Whether or not this situation is a surplus to some normative “need,” the overall market effect is that providers increasingly will be working in a buyer’s market rather than the seller’s market that has existed for the past six decades.
- *Control over medical management* will be the main arena of inter-organizational conflict in the medium-term future. Physicians and providers have lost substantial organizational, financial, and clinical control to health plans and payers, but they have also been working to build systems to win back some of that control. The control over medical management will be the central arena in which this power struggle plays out. The shift in locus of decision-making away from individual clinicians to other entities will continue. The question is how far and how fast that shift will go, and what combination of “others”—including those “others” internal to the providers’ organization—will direct.

Assuming these four major medical management decision-making themes—overcapacity in the system, continued change among all organizations, the evolving role of the intermediary, and the control of medical management—this chapter forecasts the future roles of intermediaries, the new models of reimbursement to providers and care organizations, and the structure of service-delivery organizations.

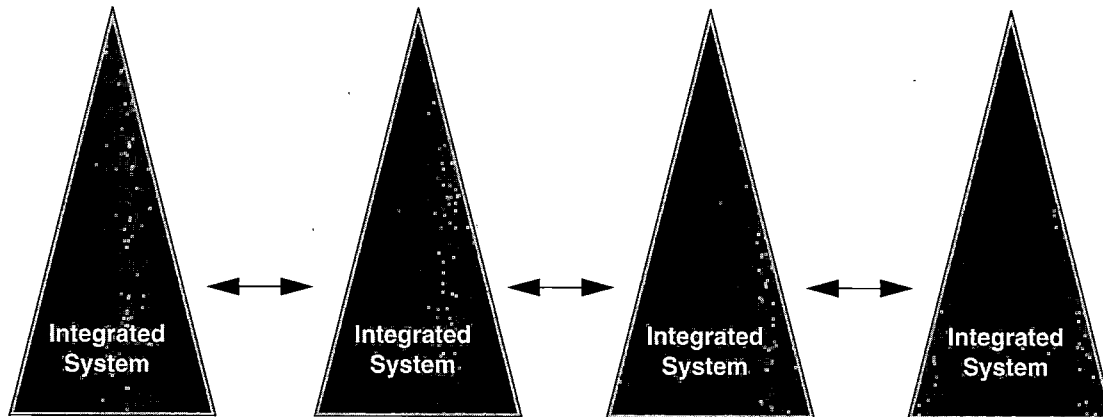
A. INTERMEDIARIES

BACKGROUND: THE CONVERGENCE OF OPEN NETWORKS AND THE DEATH OF VERTICAL INTEGRATION

The last 15 years has produced a dramatic change in the commercial insurance market and the beginning of a similar change in the Medicare and Medicaid systems. Health maintenance organizations (HMOs), preferred provider organizations (PPOs), and point of service (POS) plans, which restrict patient access to physicians and services through financial incentives and gatekeepers, have become the dominant form of health insurance for employees and their families. Similarly restrictive plans have been able to increase enrollment in Medicaid and even in Medicare. However, most enrollment growth has not been in the classic prepaid health plans—the staff and group model HMOs—but rather in IPA-based HMOs that use mainstream community physicians and hospitals.

This pattern surprised many observers who thought that, when the shift to HMOs came, the cohesiveness and internal controls of group and staff plans would give them a competitive advantage over the IPA models. However, the ability of IPA models to control provider costs has meant that there has been no competitive advantage for the staff model HMOs. Access to the same providers that patients were already seeing has been the IPA models’ biggest weapon in selling their products, and this shift has significantly changed what most pundits thought the managed care landscape was going to look like (Figure 4-1).

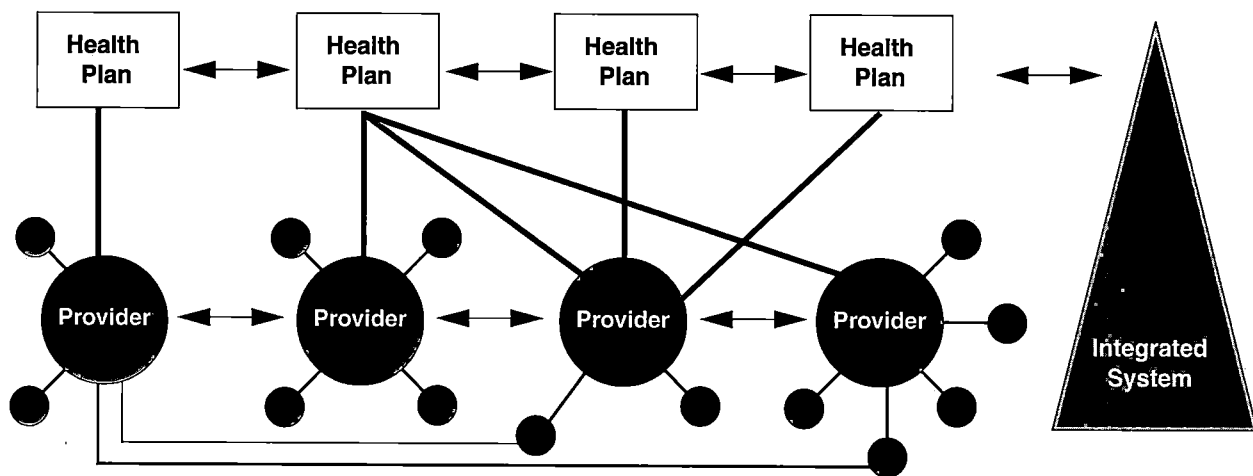
Figure 4-1. Managed Competition: How It Was Supposed to Be:



World of:

- competition between vertically integrated systems
- exclusive relationships
- empowered consumers

How It Really Is:



World of:

- horizontally integrated delivery systems
- nonexclusive relationships
- competition among plans and providers
- confused consumers

Source: IFTF

Virtually all HMOs—with the notable exception of Kaiser Permanente and the few other group- and staff-model HMOs—use the same provider networks and pay providers a mix of discounted fee-for-service and partial forms of capitation. Moreover, as health plans have widened their networks and developed point-of-service plans and direct patient referrals to specialists, their HMO products are becoming increasingly similar to the products of PPOs.

ISSUES: NOW THAT WE ARE ALL IN MANAGED CARE, WHAT ARE WE GOING TO DO?

Most intermediaries offer a mix of insurance products that provide more or less the same physician networks and similar medical management techniques. They compete on the basis of price to employers, customer service, and benefits to individual enrollees, particularly in the Medicare market. Most of the savings they have gained were achieved by cutting reimbursement rates to providers, and those cuts have gone about as far as they can for the short term. These plans are coming under three new types of pressure:

- While intermediaries have been successful in cutting costs, the savings have been achieved by onetime reductions in reimbursement rates. Meanwhile, utilization rates are rising across the board, particularly as these plans have added new providers to their rosters, included different types of populations in their membership (such as Medicare recipients),

and added new products such as POS. In the latter part of 1996 and through 1997, the “medical loss ratios” (i.e., how much money was passed on to providers) of many publicly traded HMOs began to increase. Yet cutting back on product offerings is not an option, as their employer customers are demanding *more*, not less, variety and choice among provider networks.

- Employers, the government, and accreditation agencies such as NCQA are demanding proof of quality performance. Given their lack of provider differentiation, it is very hard for health plans to demonstrate quality, particularly quality as compared to that provided by a competitor.
- It is also increasingly difficult for health plans to avoid a commitment to treat high-risk populations, both because of such legislation as Kennedy/Kassebaum and because often they are getting a large enough share in any one market that they cannot avoid treating the sicker segments of the community. If insurers cannot avoid expensive cases, their only option is to manage their care in a more cost-effective manner without cutting quality. How to do this is a new adventure for virtually every plan in America.

As patients from every venue enter managed care, the question becomes which intermediary model is best suited to resolve the issues of cost, quality, and care management. The attempt to find

such models is a key driver for the future of health plans and for health care generally.

FORECAST: INTERMEDIARIES MULTIPLY IN TYPE

What types of intermediaries will patients use? For the insured segment of the population, the mix of indemnity to HMO plans will reverse over this next 12-year period. For those on Medicaid, indemnity Medicaid will become managed care Medicaid, perhaps with slightly better access to providers. The uninsured will rely on the same network of safety net providers who survive with a mixture of state and local funding.

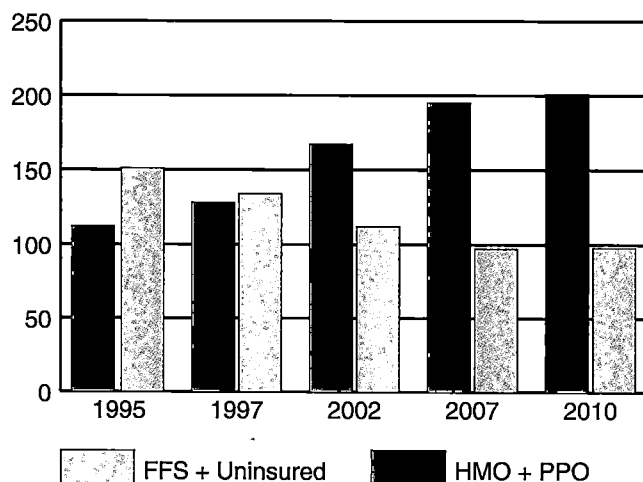
The net result of this forecast is that enrollment in HMOs will increase from 27 percent to 47 percent by 2007 (Figure 4-2). Combined enrollment in

HMOs and PPOs will cover just over two-thirds of the entire American population. Only the uninsured, a little over half of Medicare recipients, and a few upper-echelon employees, (those in our "high-end fee-for-service broker" category), will be outside their number.

While this growth progresses, the intermediary marketplace will evolve into a mixture of different health-plan models, most of which will spend the next 5 to 8 years in a constant flurry of consolidation, experimentation and restructuring. Several dominant strategies will emerge by 2005. Most intermediaries will adopt one or more of these strategies, depending on the geography, philosophy, and availability of organized providers:

- *The case manager intermediary.* The case manager intermediary divides a population into the well and the sick, and permits the well to have free access to virtually all of its loosely organized provider network. Its primary focus is the aggressive medical management of the sick, often parsed out by disease state. It uses a mixture of provider organizations and relies on the development of information systems to track the activities of its loosely organized provider network. The intermediary spends much of its energy in directing the activities of providers and sick patients. Providers are reimbursed in a multitude of ways, usually on a fee-per-episode, but must meet or exceed several stipulated specifications regarding costs, quality, and patients' satisfaction in order to keep their contracts.

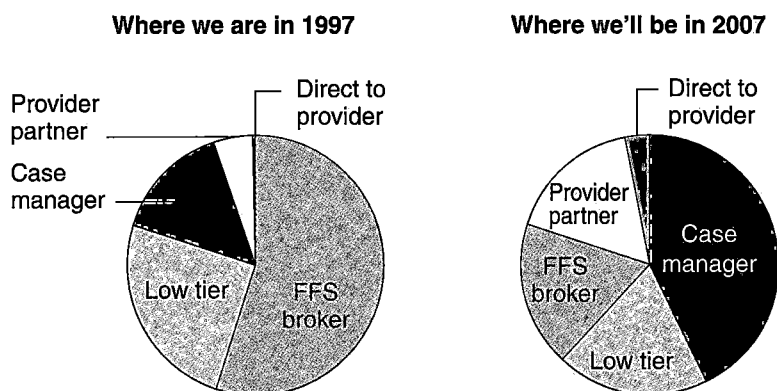
Figure 4-2. Managed Care Takes Over From "Unmanaged Care"
(Number of Americans, in millions, in HMOs and PPOs versus FFS and uninsured over time)



Source: IFTF

- *The provider partner intermediary.* The provider partner allows providers to be responsible for the medical management of the enrollees, and takes on for itself responsibilities for customer service to members, for marketing its providers' services, and for redistributing risk among its providers. The health plan relies on the use of various risk-sharing vehicles to pay providers, including full and partial capitation, satisfaction incentives, and customer-retention patterns. The intermediary rigorously audits providers to ensure that they manage patients to an agreed upon standard, but relies on the clinicians to develop protocols and demand-management techniques. This model operates successfully only with large provider organizations, and most intermediaries run this type of model in one region and the case manager model in others.
- *The high end fee-for-service broker.* For upper-echelon Americans, the remnants of the old fee-for-service system will offer indemnity insurance products or PPOs with very rich benefits and less rigorous utilization controls. Although these plans are unable to compete directly with the more aggressive "case-managers" or "provider partners" on price, they are able to select better risks in their enrollee population and charge relatively high premiums for good customer service and access to high-tech and complementary care. Meanwhile, a slight majority of Medicare recipients remains in the fee-for-service system, which provides access to a provider network that looks just like this one.
- *Direct to provider plan.* In a minority of cases, large employers in rural markets and a couple of big employer coalitions are able to bypass the major plans and set up their own administrative systems that allow them to contract directly with providers. The providers are asked to take most of the downside risk from these arrangements and to provide medical management and population care to enrollees. Essentially, the intermediary functions here are shared by employer and provider alike. After 1999, Medicare will permit provider service networks (PSNs) to accept risk directly, bypassing health plans. The financial solvency of this sector will not be strong for the first few years, but by 2005 a small, but important, portion of the market will be contracting directly with employers.

Figure 4-3. The "Fee-For-Service Brokers" Will Lose Their Dominance (Percent of population in each insurance model)



Source: IFTF

- *The low-tier safety-net funding recipients.* Most of the Medicaid population and some of the indigent will end up in a provider-partner or a case-management HMO; but some of them— and the majority of the uninsured —will end up with in a “No intermediary, No luck” scenario with limited access to care despite the best efforts of safety-net providers.

B. REIMBURSEMENT MODELS: BETWEEN FINANCE AND DELIVERY

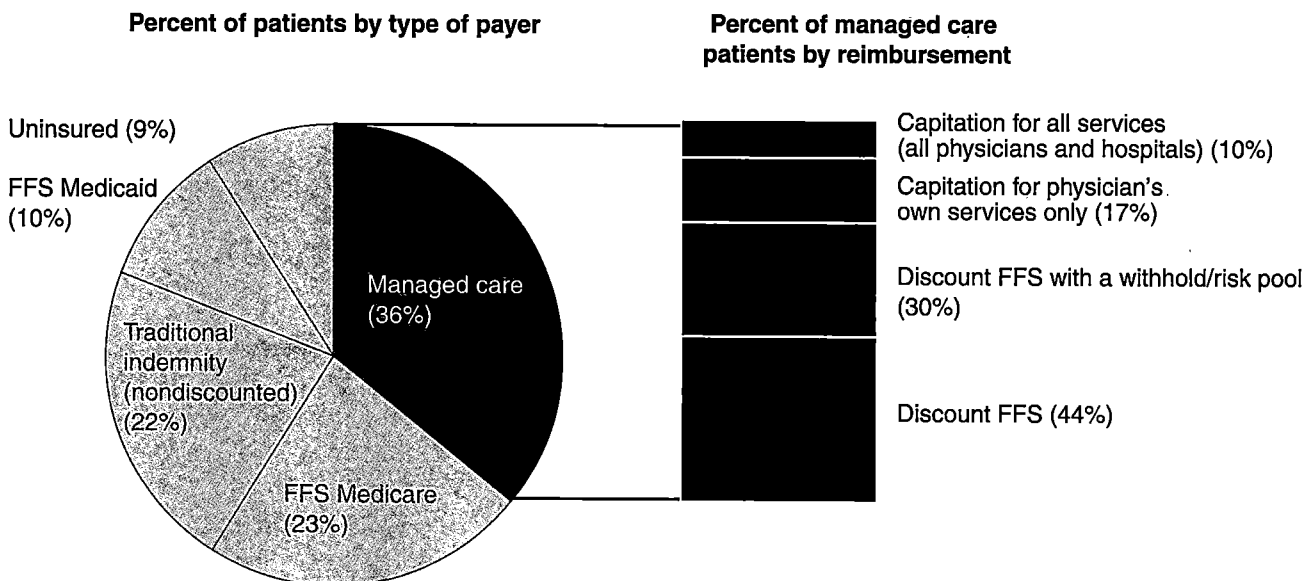
BACKGROUND

For patients with either Medicare or private insurance coverage, reimbursement for physicians and hospitals was fee-for-service until the 1980s, when

Medicare introduced a prospective payment system (Disease Related Group or DGR) for hospital inpatient services. As a consequence, the introduction of DRGs led to the early movement of Medicare inpatients from inpatient status to outpatient facilities owned by the hospital and for which additional fees for service could be charged.

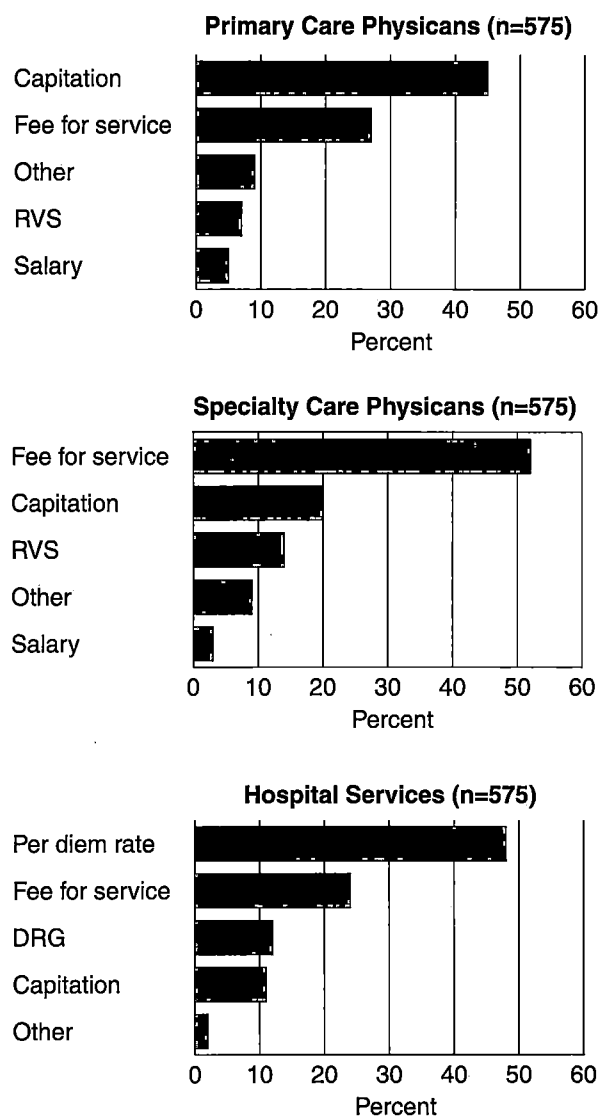
In an effort to control the cost of health benefits for employees, many employers and employer coalitions moved to HMOs or other managed-care insurance products. Insurers, except in staff-group model HMOs, began to “push risk” to the providers, either capitating physicians only (partial capitation) while paying hospitals a discounted per diem, or capitating physicians (or physician-hospital organizations) for all required

Figure 4-4. How Physicians Get Paid in 1997
(Percent of patients coming with various payment techniques)



Source: HCO Physicians Survey 1997

Figure 4-5. How HMOs Pay Their Doctors and Hospitals
(Proportion of HMO reimbursement for different services paid by various methods)



Source: Interstudy, using 1995 data

Note: Interstudy changed its survey question in 1996 and so did not report exactly the same data that year, but noted that the proportion of capitation did not increase from 1995 levels

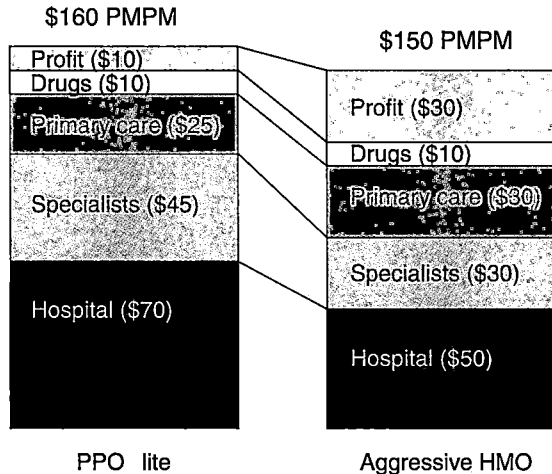
services (global capitation).

When we naively asked a Boston colleague why the HMO membership rate in Massachusetts was the same as in California, yet the utilization rates in California for all services were so much lower, he replied: "We have lots of managed care in Boston; it's just fee-for-service managed care." The numbers in Figures 4-4 and 4-5 confirm that theory; the spread of managed care has not meant a significant spread of capitation.

In fact, only about 1 in 10 dollars paid out by HMOs is in the form of global capitation—the classic Southern Californian model that was developed in the late 1980s. Although capitation is spreading outside of Southern California, it is usually only used for primary care services. Aggressive HMOs have reduced fee-for-service payments to specialists and hospitals and placed money in risk pools that primary care doctors may share if their overall utilization and referral rates are below a specified level. The net result has been a transfer of resources from hospitals and specialists to primary care physicians and health plans without much global capitation occurring (Figure 4-6).

The culmination of this arrangement has been that many of the organizational models that hospitals and physicians have designed over the past few years have not been successful because they were designed to treat capitated lives. Even the Southern Californian providers found that some health plans did not want to pass the risk (and possibly the

Figure 4-6. How Premium Payments Get Divided Up: The FFS world versus the HMO world



Source: IFTF

profits) on to the providers, and those providers who did accept global capitation found that the rates they were paid were restricted by the plans. When providers tried to resist those rate decreases, their market power was less than they had hoped.

ISSUES

While mixed reimbursement methods for physicians, such as discounted fee-for-service, withholds, and partial capitation on the physicians' side, and DRGs and per diems on the hospital side remain the norm, they all provide incentives for more utilization. The health plans counteract this by attempting to control utilization externally. Although increases in utilization are still a significant problem for payers, the payers have not responded by passing that risk off in the form of capitation.

There appear to be three reasons for this:

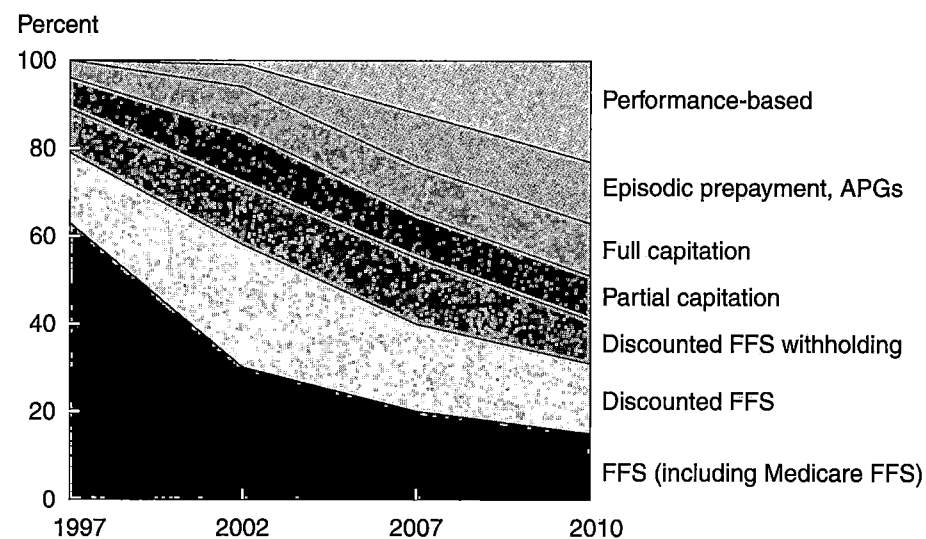
- Health plans that were successful in managing risk could be more profitable than those that pass it on in the form of capitation.
- Providers generally are not organized well enough to be able to take on the risk-bearing function of capitation and have little incentive to so organize in a world where fee-for-service predominates.
- Patients and consumer groups fear that capitated providers may withhold necessary care, although they fear that fee-for-service encourages providers to overtreat in equal numbers. Several highly visible court cases have fueled this "backlash."

The question for the future is whether this situation will change, and what the current flood of people into HMOs will mean for reimbursement to providers. The type of payment will have a great impact not only on providers' behavior but also on how providers organize.

FORECAST

It is likely that neither global capitation nor discounted fee-for-service is sustainable in the long run. Fee-for-service is inherently inflationary; and capitation raises fears of under-treatment among patients and consumers. We believe that eventually a new way of paying providers will emerge, but for the next 10 years we will see develop a version of the current system that will shift toward more capitation because of the flood of

Figure 4–7. Fee-for-service will fade, but capitation is not its only successor
(Share of physicians' revenue coming from different reimbursement schemes)



Source: IFTF; based on IFTF, Louis Harris & Associates, Interstudy and AMA data

people into HMOs. Global capitation will most likely double in prominence as the number of HMO recipients increases, but it will never cover much more than 10 percent of patients. Meanwhile, Medicare will start to introduce episodic prepayment for many of its components, including outpatient care, and will increasingly replace the current fee-for-service system. Figure 4–7 presents a forecast of how reimbursement dollars will flow to physicians for their care.

Out of this mixture a separate type of reimbursement will develop. Plans and intermediaries will devise reimbursement systems that give providers incentives to deliver care in a manner that improves quality, customer satisfaction, patient tenure in the plan, and outcomes, as well as productivity and cost effectiveness. We dub this system “performance-based”

reimbursement, as payments will depend on the provider's performance on a string of relevant algorithms. By the latter part of the next decade, this system will be the single most important way of paying provider organizations, although the old methods will still be a prominent part of the system.

C. CARE DELIVERY ORGANIZATIONS FOR THE NEXT DECADE

BACKGROUND

The chaotic upheaval of the American health care system that started in the early-1990s is driven by several forces. The most important of them is the search for stability: individual physicians and smaller organizations have looked to the large hospitals and health plans to buffer them

through tough times. Larger groups and hospitals have allied and merged with each other in an attempt to develop bargaining power against the health plans, which have also been merging to amass bargaining power over providers. There have also been attempts to change organizational structures and processes in order to make patient-care management more effective, but so far that goal has been elusive.

Several types of provider groups have looked to for-profit companies to access capital, although the investor-owned sector is a small, barely growing minority of hospitals (about 14 percent) and an even smaller minority of physicians. It does not appear yet that there is anything fundamentally different about the way for-profit groups are behaving, except that the largest for-profit hospital chain, Columbia/HCA, is backpedaling from its national "strategy" in the light of the ongoing government investigation into its Medicare billing practices. However, there is investment money available for people trying to create new types of provider service organizations, many of them focused on disease management or specialty care.

ISSUES

Through all the activity of the past several years, most physicians who were independent have stayed independent and most hospitals have joined systems more in name than in terms of substantially changing their organization and governance. But the driving pressures of reimbursement reductions and the certainty that the challenges of tomor-

row will be different from those of yesterday is driving continued reinvention in every provider organization. What changes this reinvention might produce are less certain than ever, and at present, several models exist in stages that range from planning to decomposition. They include:

- *Vertical integration.* A combination of provider plan and health plan, usually developing in an altered form of staff HMO (e.g., Lovelace Health System in New Mexico).
- *Horizontal integration.* A combination of several similar organizations, such as independent hospitals, in one system (e.g., Catholic Healthcare West, Promina in Atlanta).
- *Integrated delivery systems or networks.* A combination of physicians with hospital services and other types of delivery systems in one organization, typically by hospitals purchasing physician practices, but sometimes by physicians acquiring hospitals (e.g., Advocate EHS in Chicago, Mullikin Medical Centers in Southern California).
- *Virtual integration.* A combination of various care-delivery services provided by separate organizations that offer services under contract to each other and are organized seamlessly (no good examples yet!).
- *Niche players.* Single specialty organizations that provide a defined service, either as a subcontractor directly to a plan (e.g., MedCath in cardiology, MD Anderson Cancer Center).

The dominant issue for delivery organizations is which model will prove flexible, resilient, and profitable enough to survive the turbulent decade ahead. Intermediaries and end-payers will demand not only cost-effective and efficient processes, but also the ability to manage patients and coordinate among a range of institutions over the care continuum.

FORECAST

We do not believe that any one organizational form will emerge by 2005 to replace the individual practitioner and large teaching/community hospital model that dominated medical care from the 1930s to the early 1990s. In order to satisfy the demands of intermediaries and patients, there will be several different types of organizations using various models, each of which will provide a substantial percentage of care in at least some regions of the country. During the late 1990s, versions of all of these models are being built with more or less aggressive intentions by entrepreneurial physicians and business people. They include:

- *The hospital-centered system.* The series of large hospital mergers in the mid 1990s were intended to create a model that provides all services in a metropolitan area across a range of facilities. The range includes inpatient, outpatient, diagnostic, and ancillary facilities, as well as physician multispecialty clinics, usually owned by or closely aligned with the system. These systems will employ many clinicians, either directly or

under a contractual umbrella. Many of the systems will be based around academic medical centers, which will have problems making the transition to this more comprehensive approach, particularly in their relations with their faculty and with the physician practices they will acquire. Fundamentally, their primary problem is their organizational origin as inpatient care centers. The cultural inertia of the principle underlying the former system, which demanded to "fill those beds," will cause many to falter. Nonetheless, in many areas of the country the large capital reserves of these systems and their significant presence in the market will ensure their survival. This is particularly true where their brand name (e.g., Johns Hopkins) is sufficient to ensure their presence in intermediaries' networks.

- *The virtual physician group cooperative* is one evolved form of the independent practitioner association (IPA)—the most common current organizational form for physicians. Although they originally were thought of as a transitional model on the path to "real" medical groups, IPAs will continue to be an important factor until 2005 and beyond. Their ability to use information technology and their contractual flexibility to coordinate services will enable virtual groups to enter into contracts with several health plans. In many cases, the "real" medical groups at the core of these networks will be neither large nor cohesive. The organization will be created from independent

physicians with a natural set of referrals, on-call coverage, and clinical respect for each. A management services organization (MSO) will help them make contracts with plans for business, with hospitals and other providers for services, and often will help them assume risk. The MSO management will also help to identify and negotiate with providers whose utilization or quality is inadequate. IPAs will remain as an umbrella organization for these physicians, and within them there is a range of activity, including attempts to build groups. Nonetheless, almost all small-group and individual physicians will find that, as a contracting vehicle, the virtual group will provide them with a substantial proportion of their patient revenue stream.

- *The corporate PPM (physician practice management corporation).* The trail of for-profit physician practice management companies to Wall Street that started in the early 1990s will continue into the next decade. The main growth in this area has and will come from the PPMs that accumulate existing smaller practices, purchasing physician groups abandoned by former staff- and group-model HMOs. While pressures from Wall Street will cause many of those corporations to fail, several will develop a common platform across their groups that is similar to the mix of corporate and franchise-owned operations seen in other industries. Considering the administrative inefficiency of most physicians' practices, there is no reason

that these economies of scale should not show some savings. Achieving greater returns than that may prove troublesome over the longer term.

- *The single specialty carve out.* In some specific disease areas, single specialty groups and networks of specialists will market their services either directly to payers or to other providers such as hospital-based systems or multispecialty groups that need particular expertise. A proliferation of networks will provide specialty disease management services for cancer, cardiovascular disease, nephrology, and AIDS, among others. Some multispecialty groups that do not have sufficient volume will refer their patients in some disease categories because they cannot support nearly as large a specialty panel as can a single-specialty network. Patients needing specialty care will appreciate being able to go to these networks, which usually will allow them a wide choice of physicians. Some of these organizations will provide all comprehensive specialty services in a particular specialty area, such as cancer treatment, whereas others will provide niche support services, such as patient monitoring and education, that are used in combination with services provided by other organizations.
- *The remnants.* Changing an 80-year-old health care system that has spent the last 30 years supported by government subsidies is not going to be accomplished quickly. Some of the independent hospitals, such as profitable community hospitals in

some suburbs and cash-strapped public hospitals in inner cities or rural areas, will not find partners or be incorporated into a bigger system. Many of the remaining individual and small-group practice doctors will still be doing what they have always done until their retirement. In that regard, much of the present system will remain in the health care system of the future.

D. MEDICAL MANAGEMENT: THE NEW ARENA OF ACTIVITY

BACKGROUND: FROM MANAGED CARE TO *MANAGING* CARE

While all of these arrangements on the intermediary side, the reimbursement scene, and in provider realignment are continuing, the numbers of people employed in the health care industry, the volume of procedures, and the utilization of pharmaceuticals continue to increase as new technologies are introduced. At the same time, consumers and physicians in tandem frustrate the attempts of case managers to reduce utilization severely. Meanwhile, the health care industry has been rocked by the realization that it is the care of the sick that is expensive. Serious attempts are now being made to manage (and establish routines for) the care of the chronically ill in the expectation that this effort will save money overall, particularly in substituting preventative maintenance for adverse acute events. This is called disease management.

As a consequence of the inability of health plans to control providers and the

projected potential of disease management, control over the management of medical care will continue to develop as the key arena of activity—and conflict—in health care into the middle of the next decade.

ISSUES: A NEW IDEA MAKES SENSE AND TROUBLE

Medical management—active management over the full care of patients and populations—is currently applied sporadically if at all. The main issue is to what extent medical management will spread and become more comprehensively applied. In some respects this movement is taking the health care system from a state of managed care to one of “managing care.” That active management component involves not only changing how physicians and clinicians manage patients, but also how health systems monitor and look after patients during the rest of their lives, including how much they encourage and support self-care.

The issue of medical management involves to some extent at least five parties; health plans, providers, employers, patients (and their representative associations), and the government. All of these groups are wrestling over are decisions surrounding the creation of clinical pathways and protocols, specifically, what should be done and what should be measured. The intermediaries and providers are most concerned with control over adherence to those pathways and protocols; that is, who ensures that they are adhered to and how. The main arena of conflict will concern who

enforces the behavior of patients and clinicians: will it be the intermediaries or provider organizations?

Still, the main question for the health care *system* is how much of the care delivered is actively managed. That question will be broken down in two steps that will categorize the population by their health status. How important will the management of disease states be for the acutely sick and chronically ill, and how much impact will demand management have on the generally well?

Beyond the impact this question will have on the system for health care and health, the most important question behind the all the protocols, the process management changes, and the disease-specific approaches is whether they will make any difference to cost, care quality, and outcomes in the long term.

FORECAST: MEDICAL MANAGEMENT FOR THE CHRONICALLY SICK

Conflicts about deciding which treatment parameters will apply to whom will stay increasingly visible as a political issue during the next decade. States and the federal government will continue to be involved in legislating lengths of stay for particular procedures, and occasionally will demand minimum staffing levels and mixes in different types of medical facilities as well. In the meanwhile, intermediaries and provider organizations will slowly but steadily defer to the greater legal and moral authority of specialty societies, government agencies and patient associations to create guidelines. Instead of design-

ing proprietary guidelines, they will concentrate on developing the power to impose general guidelines.

Neither plans nor provider organizations clearly dominate or appropriate the role of controlling utilization. For instance the "provider partner" strategy mentioned earlier essentially assumes that providers will take on that role, whereas in the "centralized case manager" strategy the intermediary keeps that role. In either event, the prerogative of medical management shifts away from the independent physicians, and both internal managers, working as part of a clinical team within provider organizations, and external managers, working for intermediaries, assume increasing authority over physicians and patients in three areas:

- Managing physicians and physicians' organizations adherence to protocols, guidelines, and pathways to ensure consistent application of best practices.
- Creating systems that extend care pathways across the continuum of care to all facilities where patients receive care; the evolution of current case management.
- Managing patients' compliance with their treatment regimens, particularly in the case of pharmaceutical use, and educating and motivating them to better self-care.

Whereas there remains great variation in medical practice patterns in the 1990s, the spread of guidelines will have a

significant impact on medical practice and patient management for the chronically ill by 2005, and a sporadic but discernible effect on practice variation by 2010. Most chronically ill patients will be under some type of disease management program within the next 10 years, and there will be hints of possibility of measurable improvements in outcomes. The use of demand management by advice nurses in contact with patients using the telephone and the Internet will be commonplace by 2005. However, the continual struggle over who controls patients' and physicians' behavior between the intermediaries and providers, and among and within the different provider organizations, will not be resolved by 2010.

There will be ample evidence by 2005 that individual programs of patient management for the more severely chronically ill patients improve their health outcomes in the short term, deliver more consistent and higher quality care, and save a small amount of money over a population. However, there will be no clear evidence that overall cost savings are realized system-wide by the development of these programs, and their impact on the overall costs of American health care will be hard to ascertain.

ENDNOTES

¹ M. Burdi & L. Baker, unpublished 1996 survey of California physicians compared with age matched cohorts of California physicians extracted from the 1991 RWJ survey of Young Physicians.

² AMA news, Vol. 40, No. 3, Jan 20, 1997.

PHYSICIANS IN GROUP PRACTICE

During the past 30 years, there has been an explosion in the total number of physicians in group practices, with an increase from 28,000 in 1965 to 210,000 in 1995—more than three times faster than growth in the overall physician population. What still surprises many people, however, is that more than 40 percent of all office-based physicians still deliver care in individual practices. Furthermore, only 40 percent of office-based physicians are in group practices of three or more and, of these, about 70 percent are actually in small, three- to six-doctor practices. To be effective in contracting and managing a contracting environment, a practice of that size is probably too small.

Despite all the press coverage and expectations, only 50,000 office-based physicians are in multispecialty groups of more than 100 members—

the type of group best suited to accept global capitation. That is fewer than 13 percent of all office-based physicians and less than 10 percent of the market of physicians delivering patient care. Most physicians have not reorganized into large multispecialty group practices to counterbalance the forces of consolidating health plans.

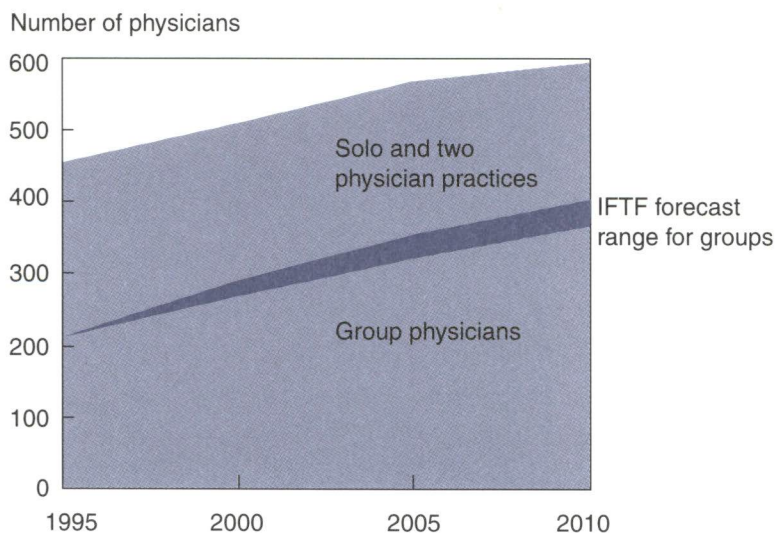
Younger physicians, however, are more interested in group practices and other employment opportunities than they are in setting up their own individual practice. In a comparison of age-matched California physicians with less than 9 years in practice, the rate of practice ownership declined from 53.3 percent in 1991 to 42.4 percent in 1996.¹ Overall, between 1983 and 1995, employed physicians increased from 25 percent to 45.4 percent of all practicing physicians.²

Of this new influx of physicians into employee positions, most are joining existing group practices—they are not starting their own groups. These young physicians are looking for security. They will continue to swell the ranks of group physicians, but it will take time before they alter the overall physician demographics.

The growth of group practice will not be driven purely by the influx of new physicians, but they will certainly be the greatest influential force. Our core forecast projects that the percentage of patient care physicians in group practice after their residency training will increase from 46 percent in 1996 to between 57 percent and 62 percent in 2005 and reach between 63 percent and 67 percent by 2010 (Figure 4-8). This forecast assumes that there is no change in the current number of residents, and that all physicians retire at the same rate, regardless of whether they are in an individual, a two-doctor, or a group practice. The lower estimate assumes that all new patient care physicians will enter group practice and that the number of hospital staff does not increase substantially but rather is consistently replaced. The upper estimate further assumes that 10 percent of physicians in individual and two-doctor practices join group practices over the next seven years.

A historic shift will therefore occur in the next 3 to 8 years that will place the majority of patient care physicians in groups. However, a substantial minority of physicians (150,000 to 200,000) will continue operating in solo and two-physician practices through to 2005 and are likely to continue practicing that way in the more rural areas.

Figure 4-8. More physicians and many more group physicians
(Number of physicians in group practice)



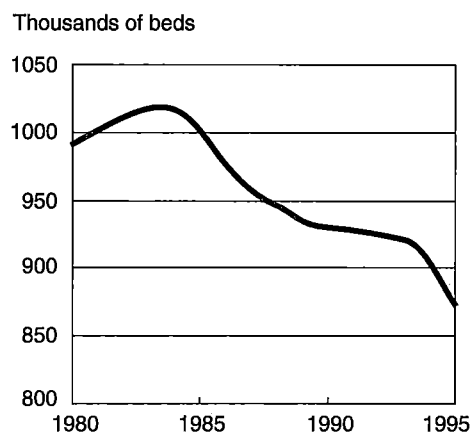
Source: IFTF, based on AMA data

WHAT HAPPENS TO HOSPITALS?

The death of the hospital?

To borrow from Mark Twain, reports of the demise of American hospitals have been much exaggerated. But the growth in numbers of beds stopped in the early 1980s slightly before the move of Medicare Part A to the DRG-based prospective payment system. Since then, reimbursement and medical technology have been pushing care out of inpatient settings. Beds have closed, from a high of slightly over 1 million in 1983 to below 900,000 in 1995 (Figure 4-9).

*Figure 4-9. Hospital beds are slowly disappearing
(Total beds in community hospitals)¹*

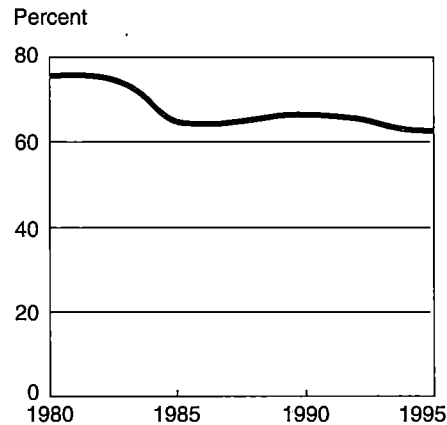


Source: AHA Hospital Statistics

But the rate at which inpatient bed-use has declined, has been much faster than their rate of closure and hospitals *themselves* have closed at a very slow rate, somewhere between 30 and 80 a year, from a high of 5,800 in 1980. Despite all the rhetoric about the surplus of hospitals not much has changed, and in 1995 there were still 5,200.

The survival of so many hospitals during what has been regarded as an unfriendly era for them is partly because facilities and beds have been converted to day-surgery and 23-hour stays, and staff time has been converted from inpatient to outpatient care. But it's also because closing beds and, particularly, hospitals themselves is very difficult for a variety of business, political and social reasons. So since the early 1980s hospital occupancy has fallen quite rapidly across the country, to an average of 62 percent in 1995 (Figure 4-10).

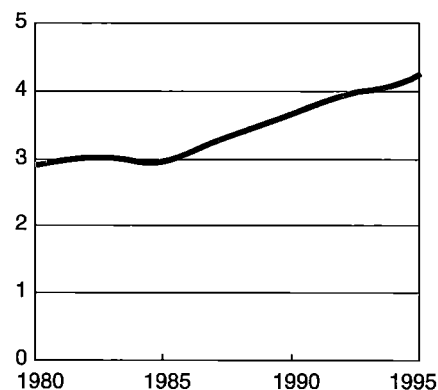
Figure 4-10. Occupancy has also been falling consistently
(Average hospital occupancy rates in community hospitals)



Source: AHA Hospital Statistics

In the mid-1990s, even those areas that have previously been exceptions to that pattern have started to experience it. For instance, occupancy in New York City fell from the high 90 percents to the 80 percents in 1996 to 1997. Whereas some parts of California had seen occupancy below 50 percent by the mid-1990s. Meanwhile, the level of activity on the outpatient side and the increased needs of the comparatively sicker patients left in inpatient beds have meant a significant increase in staff per bed over the last 15 years (Figure 4-11).

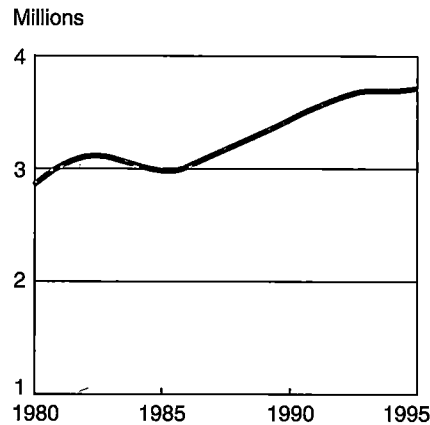
Figure 4-11. Sicker patients and fewer beds means more staff
per bed
(FTEs per hospital bed in community hospitals)



Source: AHA

But rather than there being merely a *relative* increase in the ratio of employees to beds because beds were closing and those remaining in them needed more intensive treatment, there has been an *actual* increase in total hospital employees (Figure 4-12).

Figure 4-12. But there are also more staff in total (FTEs in community hospitals)



Source: AHA Hospital Statistics

So overall the future of hospitals is murky. A combination of technological advances, managed care and Medicare reimbursement policy² means that the underlying demand for inpatient services will continue to fall. However, the community hospitals appear to be weathering the storms of the early 1990s by venturing into other services and re-engineering their inpatient delivery side in a way that's allowed them to become more profitable in the mid-1990s. Average operating margins for nonteaching hospitals rose from 2.7 percent in 1990 to 4 percent in 1994.

Their larger brothers, the academic medical centers, are applying the same tactics—operating margins for integrated academic medical centers went up from 0.43 percent in 1990 to 2.50 percent in 1994.³ They've also been getting subsidies from the government, including DSH (disproportionate share payments), that have maintained their profitability over recent years. Furthermore all hospitals are getting a greater share of their revenues from outpatient care and other services, and many plan to become more heavily involved in those services by making the leap from hospital to "health system."

Issues for the Future of Hospitals

Despite the last 15 years of downsizing, pressures from Medicare, the growth of HMOs and other aggressive health plans that have cut hospital days for their members, more than 35 percent of the health care dollar is spent on hospital services. That's a little more than the 34 percent they represented in 1960, but down from the high of 41.5 percent in 1980. Moreover, hospitals also remain a big chunk of the health care landscape, in that they are the biggest employers in health care and usually major employers in their communities.

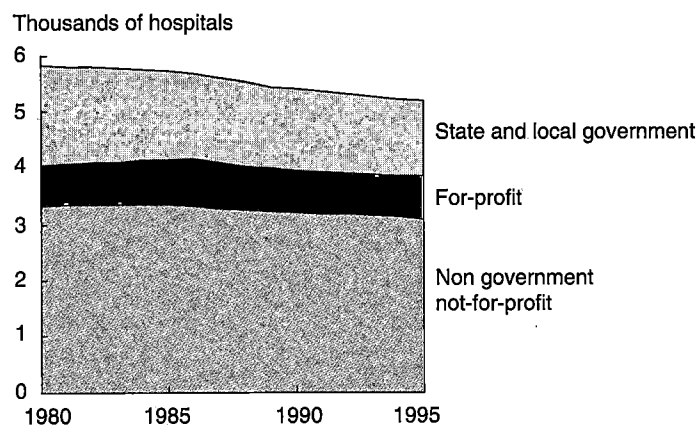
Among health care institutions, hospitals enjoy the greatest ease in raising and retaining capital. The increased number of for-profit hospitals, even though they still only account for 14 percent of all hospitals, has made for even greater access to capital. Hospitals and hospital-centered systems have been deploying this capital by buying physician practices, all types of ancillary providers, and each other, over the last five years. But in the next 10 years some fundamental questions about hospitals will be answered. Most of them concern organization and ownership:

- *The for-profit, nonprofit divide.* Of U.S. hospitals 3,100 remain nonprofit with another 1,350 being publicly owned, usually by counties (Figure 4-13).⁴ But the rise of the big for-profit chains, notably Columbia/HCA, which consolidated several smaller for-profit chains between 1993 and 1996, showed some market advantages for investor-owned hospitals. Consequently, several nonprofits began to convert to for-profit status—usually by selling out to Columbia. Only nine converted in the decade from 1983-1993, but 93 converted in 1994-1995. A combination of more aggressive regulatory scrutiny by attorneys general in several states, and some bad publicity about Columbia, slowed the trend in 1996. Currently Columbia has reversed its aggressive strategy of acquiring and converting nonprofits, and the trend toward for-profit status appears to be slowing. But the valuation Wall Street has put on investor-owned hospitals is so much greater than the amount nonprofits can raise to buy them⁵, that the incentives to become for-profit will remain strong. So this issue is not going away.
- *The tax status of hospitals.* Though only a small minority of hospitals are for-profit, several studies have shown that most nonprofits act like for-profits in several ways, with only marginal differences in their costs, the amount of charity care they deliver, and the way they deliver services. Furthermore, the fact that nonprofit hospitals (many of which own for-profit subsidiaries) advertise on TV, compete aggressively with each other, and otherwise look much like any other corporation is increasingly attracting politicians' attention. Given the tax advantages state governments bestow upon nonprofits, might this

status be withdrawn or amended in the future?

- *The prevalence of hospital systems.* Many hospitals have announced or activated plans to become part of a larger system, even in the nonprofit sector. Usually this means a hospital entering some form of alliance with others; these arrangements vary from a nominal affiliation to full blown mergers of assets—although most are starting with the former. Some 445 nonprofit hospitals were involved in some form of merger and acquisition in 1995 alone⁶, yet most hospitals behave independently. Even in “merged” systems there are often different boards and competing interests that don’t look like a typical corporate organization. Some hospitals are taking an alternate track and staying independent. How prevalent will these systems be in the future, and what will they look like?
- *Which services will be under the hospital umbrella?* The early 1990s saw hospitals trying to get into the business of offering physician services. But now most faculty practices have been “integrated”—with success akin to Stalinist collectivization—and many hospitals are suffering financial trouble with the private physicians’ practices they’ve bought. Will we see a return to these “health systems” offering only traditional hospital services (possibly including employing hospitalists but not primary care physicians)? Or will they be a base for truly integrated care delivery? And if they manage to create the latter, will they take the opportunity of Medicare PSN legislation to bypass health plans and sell insurance directly to individuals and employers?

Figure 4–13. *There Are More For-Profits, But Not That Many More*
(For-profit hospitals as a share of all community hospitals)



Source: AHA Hospital Statistics

• *The future of the academic medical center.* Over the course of the last 30 years, academic medical centers have increasingly delivered major amounts of routine care, in addition to serving in their roles as centers of specialized tertiary care, teaching and research. In fact they have used their care services as revenue-generators that subsidize their medical schools. They've also expanded their residency programs, both in their home-base hospitals and at other teaching hospitals in their regions. But this expansion is under attack on multiple fronts. Medicare, which subsidizes graduate medical education (GME) to the tune of about \$80,000 per residency place per year is planning to reduce those subsidies by 25 percent over the next five years. Further, while Medicare has been willing to pay the premium that academic centers charge to cover their generally sicker patient mix, private health plans have become increasingly reticent to do so—and have played AMC's off against each other as suppliers of "big-ticket" procedures. As a result academic centers are redesigning themselves. Many have merged with cross-town rivals to cut competition in specialty services. Others have developed regional health networks. Still others have struggled with a worse paying patient mix and reduced state and local funding; and several are being spun off by their owners (usually universities) to other nonprofit or for-profit organizations. What will these battleships of the medical care system look like in the future? Will they be flexible enough to still play a role in health care service provision?

Besides the issues of ownership and organization, there are a couple of broader issues about the future of hospitals.

- *How many hospitals, how many beds?* We've seen a steady decline in the number of hospitals and beds. But declining faster is the number of occupied beds as more and more procedures move outside the inpatient ward. So how many hospitals and beds will there be to serve the presumably sicker patients occupying them?
- *How much money and will it matter?* Since 1985 a smaller share of overall health care spending has gone to pay for hospital services each year (apart from one blip upward in 1990). The money instead has flowed into home health care, skilled nursing facilities, ambulatory surgery centers, and all the other facilities that have accepted the exodus of patients. Part of that flow is inevitable as technology allows

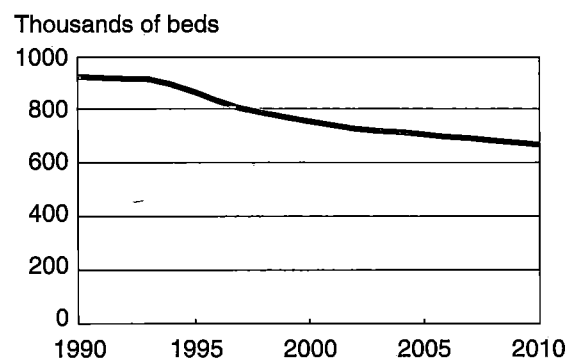
less invasive procedures. But part has to do with the intricacies of Medicare financing, which has rewarded early discharges from hospitals to SNFs and home health visits. Now that Medicare is getting serious about the cost explosion in these areas, and private health insurers are increasingly putting providers at risk for a continuum of services, it may make sense for hospitals to keep patients in hospitals a little longer if it prevents other expenses later. But the bigger question behind this is, If we're moving to a system of more integrated patient care, does hospital spending per se matter as a separate category?

Forecast

Given the complexity of the issues around hospitals, as well as their increasingly intertwined relationships with the rest of the health care delivery world (see Chapter 7), not all of these issues will resolve themselves in the next 10 years. Generally we do not expect radical change in terms of either mass hospital closures or significantly less money spent on inpatient services; this will be more a period of gradual attrition. But eventually the number and organization of hospitals will look quite different.

Hospitals and beds will continue to close, but at not much faster than the slow pace we're currently seeing. Beds will close a little faster than hospitals, with occupancy rates falling faster still. Most activity will come in the rest of this century and then early in the next decade. For example, hospitals will close beds at a faster rate in the next five years (our forecast is about 2 percent of all beds closing each year from a 1997 level of 810,000) than they will thereafter. By 2002 there'll be roughly 735,000 beds and there'll still be more than 670,000 in 2010 (Figure 4-14). Hospitals themselves will

*Figure 4-14. Hospital beds are slowly disappearing
(Total beds in community hospitals)*



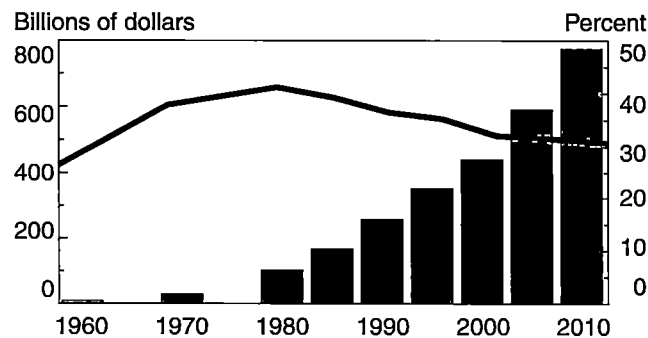
Source: IFTF

close much more slowly. Even if they close at twice the rate at which they've been closing for the last 15 years, there will still be 4,300 hospitals in the year 2010; the actual number will probably be closer to 4,500. Part of this reflects the difficulty of closing facilities, and part of it reflects a transformation of many to smaller, more patient-centered facilities. Hospitals will still perform most of their activities without using their inpatient beds. However, in the very long run, many hospital systems will hang on to their bed licenses waiting for the baby boomers to supply the demand for inpatient care out beyond 2015.

In terms of ownership, about 1,000 hospitals will remain city-, county- or state-owned (down from 1,300 now) and around 2,400 will be traditional independent nonprofits (mostly community- or religion-based). The tax status of nonprofits will come into debate, but it is unlikely to be changed significantly. A minority (about 300 over 10 years) will convert to for-profit status in order to gain better access to capital, leaving about 25 percent of hospitals (1,100) for-profit by the year 2010. But most hospitals will stay nonprofit because of their religious mission, increased scrutiny from regulators about those conversions, and (eventually) waning interest from Wall Street in investing capital in an industry that cannot easily create fast earnings growth.

Tracking hospitals' membership in systems is very complex, and several different definitions of "hospital system" will make the rounds over the next few years. But AHA will likely count individual hospitals, and their owners will at least try to make them look independent and community-based. So the official figures will look something like the

Figure 7-15. Hospital Spending—still a big deal, but proportionately falling slowly (Spending on hospital services 1980-2010 in dollars and as percent of all health spending)



Department of Labor's counting of "firms" and "establishments"—where one firm can encompass many establishments. It's likely that around 35 percent of hospitals are currently in a multi-hospital system that shares a common overseeing board, if not a common ownership. This will likely increase quickly to 60 percent by 2002. As this happens there'll be continual increases in the sizes of various systems, particularly on a regional basis. However, by the time the merger and consolidation wave plays out, it's likely that several will have fallen apart, and the number of hospitals in systems will be back down to 50 percent or lower by 2007. But the majority of the systems that exist after 2005 will be more real and more corporate. In those systems a single management structure will have final authority over the activities of all its hospital facilities—including the authority to close them down.

A similar pattern will play out as hospitals move into other services. Most will continue to be in the business of ancillary services such as providing home health care. Most hospitals retain arms' length relationships with other services, especially those provided by physicians. A minority of the systems will become successful long-term employers of virtually all their doctors. Most will get into looser relationships with virtual medical groups, single specialty groups and work with individual physicians. The pattern will vary greatly depending on the region, with more successful hospital-based integration with physicians in the Midwest and South than in the West or Northeast, but with intense variations within regions. It'll be those successful integrated systems in regions outside of the large metropolitan areas in the West and Northeast that'll have the best chance of successfully starting PSNs, and then going direct to provide insurance coverage to employers—becoming the truly vertically integrated system. But the hospital-based system of going direct to employers will remain a minority, even in regions where hospitals remain dominant compared to medical groups and health plans.

Academic medical centers will continue to face financial pressure from all angles. In response, they will continue to merge, or at least find ways to reduce local and regional competition in tertiary and quaternary care and extreme sub-specialty procedures like transplants. They will face slow but steady reductions in their Medicare GME subsidies and will increasingly be forced to withdraw residents from other teaching hospitals. The problem of uncompensated care will increase, and the margins earned on Medicare (especially for outpatient services) will decrease. But the political strength of the major AMCs means that they will continue to receive reimbursement from Medicare that reflects their sicker patient mix. It's unlikely that many will take any option other than merging clinical services with their similar neighbors, but some may look to enter for-profit chains, and the possibility of severe downsizing or even bankruptcy will exist for

a few. Those that are in the public sector and have the worst payer mix (high HMO penetration in their region while being situated in a poor inner-city area) are the most likely not to survive.

In terms of overall spending—their share of the health economy—hospital services will stabilize at approximately 32 percent of health spending after 2002. A fairly sharp spending drop in the late 1990s, will come as a combination of more aggressive health plans and the new Medicare reimbursements squeeze the rate of spending increase. But since the early 1980s, hospital costs have increased at just under 1% less than growth in total national health spending and we expect that pattern to resume by the early part of next decade. Total spending will increase from around \$380 billion in 1997 to closer to \$490 billion in 2002 and \$650 billion in 2007. By 2010 hospital spending will be about 31 percent of NHE, but the distinction between hospital services and other classifications becomes increasingly irrelevant, and some care is reintegrated into hospital facilities from homes and other facilities.

But the underlying change in technology—especially interventions and pharmaceuticals that reduce LOS and admissions—means that inpatient days drop continually. That's the main story for hospital services over the next 13 years—as it has been for the last 13.

Wildcards

- PSNs and direct-to-employer strategies work and take up considerable market share.
- New epidemics and new diseases require more hospital beds.
- Hospitals become supplier parts of truly integrated systems. Their management close facilities and beds quickly. The supply of inpatient beds reaches market equilibrium by 2005.

Endnotes

¹ AHA Hospital definitions defines a community hospitals as "all nonfederal short-term general and other special hospitals". This includes academic medical centers, for-profit hospitals, and state and local government hospitals that match the category. It excludes Federal hospitals, long-term hospitals, hospital units of institutions, psychiatric hospitals, and several other specialized long stay hospitals.

² U. Rienhardt, *Spending more through cost control: Our obsessive quest to gut the hospital* Health Affairs (Summer 1996) vol 15 no 2

³ AAMC Databook, 1997. This number comes from AAMC analysis of AHA data Independent AMCs margins went from 1.6% to 2 % over the same period. For all hospitals total margins (which include DSH payments and investment income were on average about 1.5% higher.

⁴ 1995 data from AHA *Hospital Statistics 1996*

⁵ Richard Johnson *Nonprofit hospitals: Bargain Prices?* letter to Health Affairs July/Aug. 1997 vol. 16. no 4 describes why conversions make sense from Wall Street's perspective

⁶ S. Hollis *Strategic and Economic Factors in the Hospital Conversion Process* Health Affairs March/April 1997 vol. 16, no 2

⁷ CBO clearly doesn't think so and has declined to make projections on hospital spending in its 1997 forecast

CHAPTER 5: THE HEALTH CARE WORK FORCE

Future Supply and Opportunities

Despite unending speculation about the evolving structure of health care services, there has been little fundamental change in the way health professionals are organized and the way they interact with each other. For physicians, the number and variety of contractual arrangements has increased significantly, as has the oversight from intermediaries in terms of utilization review. But there has been little change in the way most physicians practice medicine. Furthermore, physicians remain the central figures in American health care with nonphysician providers poised to play a more critical part in the delivery of health care services, *but* as yet unable to significantly penetrate the system. Although nurses, physician assistants and other health care providers may possess skills that appear to be well-suited to the demands of an environment with a greater focus on cost containment and managing health behaviors, their roles have been limited by their small numbers and the still-significant clout of the medical profession. However, changes in the relative supply and emerging roles of new providers may alter the landscape more drastically over the next 10-15 years than has occurred in the last 30 years. These changes will, in many ways, determine how quickly and in what way

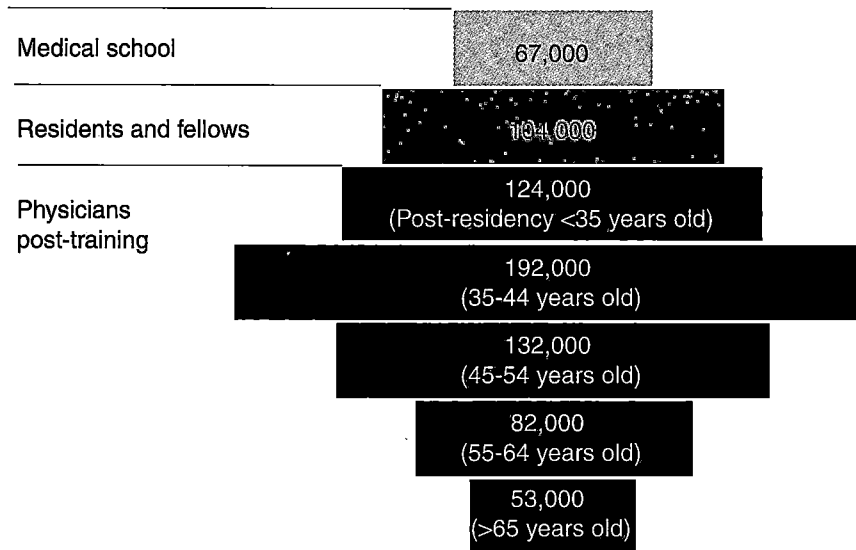
new service delivery forms develop in the future.

PHYSICIANS

Roughly 170,000 physicians are currently in medical training, with 16,000 new students graduating from medical school every year (Figure 5-1). Adding international medical graduates (IMGs) to this equation, the physician pipeline is spewing out close to 23,000 physicians from residency and fellowship programs every year. Given that approximately 75 percent of IMGs remain to practice in the U.S. and that 7 percent of physicians choose administrative and research careers, an estimated 19,500 new physicians enter patient care each year. Over the next decade, the number of retirees is expected to increase from an estimated 8,000 to 13,000 annually, leaving a net annual increase of between 11,000 and 6,000 in the number of practicing physicians.

Assuming there is no change in the current production of physicians, and barring significant immigration or other policy changes, this influx will increase the supply of nonfederal patient care physicians from 450,000 to 600,000 by 2010 or 219 physicians (excluding residents and interns) per 100,000

Figure 5-1. Physicians in the Pipeline



Source: IFTF; Association of American Medical Colleges, 1997; American Medical Association, 1996

population (Figure 5-2). Assuming historical patterns of specialty choice, in which 70 percent of trainees enter specialties, the specialist-to-population ratio is expected to reach 152 per 100,000 population in 2010, while the generalist physician-to-population will remain stable at 67 per 100,000.

WHY SO MANY DOCS?

Over the last 25 years, the patient care physician-to-population ratio has increased 65 percent from 115 to 190 physicians per 100,000 population, with specialists increasing from 56 to 123 per 100,000 population. Several factors have contributed to growth in physician supply. In 1970, amid dire predictions of a physician shortage, the federal govern-

ment provided financial incentives to medical schools to expand their capacity and foster the immigration of physicians trained in foreign medical schools. Between 1970 and 1994, the number of medical students educated in the U.S. grew by 65 percent and the number of residents increased by approximately 100 percent. However, when the shortage threat dissipated, not all policies were adjusted accordingly. From 1988 to 1994, although the annual number of U.S. medical school graduates remained flat, the number of residency positions increased by more than 80 percent. As a result, there are now 1.45 first-year residency positions for every U.S. medical graduate. The excess positions have been filled by IMGs, 75 percent of whom remain to practice in the U.S.

DO WE NEED ALL THESE PHYSICIANS?

Even the American Medical Association (AMA), that stalwart defender of physician autonomy, has recognized that the U.S. faces an excess supply of physicians (particularly of specialists, and especially in urban areas), and agreed that the unfettered production of more physicians is not the solution.

How does the supply of physicians compare to the projected needs of the population? Pooling results of four different requirement models, the Council on Graduate Medical Education

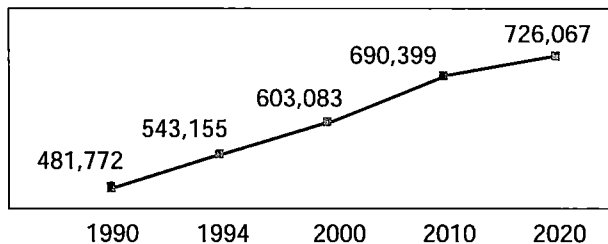
(COGME) estimates that in the year 2000, the U.S. will need 145-185 physicians providing patient care per 100,000 population: 60-80 generalists and 85-105 specialists (Table 5-1). Looking out further, requirements for all physicians will increase moderately, reaching between 150-190 per 100,000 population in 2010. Each of these models assumes varying levels of managed care penetration (between 20 percent and 66 percent), various generalist-to-specialist staffing ratios (based on staff and group model HMOs, which vary from 88:50 to 56:81) and current patterns of utilization.

The main differences in the projected requirements are for specialists, as each model assumes a slightly different competitive environment in the future. However, even the highest estimates of specialist demand lie well below the projected supply of 152 per 100,000. The situation for primary care physicians is a little less clear. The number of generalist patient care physicians is expected to remain stable at 67 per 100,000, a number sufficient in some scenarios but inadequate in others. With some specialists providing more primary care (see below) and the slowdown in primary care as a gatekeeper in managed care, we forecast an adequate supply of primary care providers through to 2010.

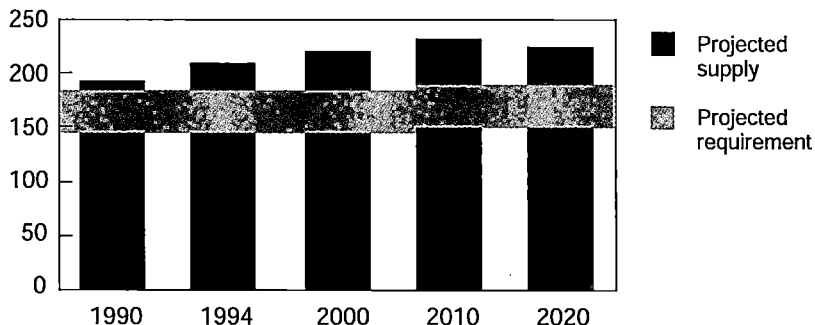
The apparent oversupply of physicians prompts questions regarding the appropriateness of current medical education policy, particularly at the graduate level. Many advocate that the number of residents trained in the U.S. should be reduced to give preference to

Figure 5-2. *In Excess: Physician Supply and Estimated Requirement (Including residents and interns)*

Total supply of nonfederal patient care physicians



Nonfederal patient care physicians per 100,000 civilian population



Source: IFTF; Bureau of Health Professions; American Medical Association; Council on Graduate Medical Education

Table 5-1. Projected Physician Supply and Requirements for Specialists and Generalists, 2000-2010

	Year 2000		Year 2010	
	Supply	Requirement	Supply	Requirement
All Physicians	203	145-185	219	150-190
Generalists	63	60-80	67	60-80
Specialists	140	85-105	152	90-110

Source: IFTF and Council on Graduate Medical Education

U.S. medical graduates. The Pew Health Professions Commission has gone even further, recommending the closure of 20 percent to 25 percent of the nation's medical schools. But even if drastic changes are made today to reduce the number of new entrants, and new regulations make it more difficult for foreign medical graduates to practice in the U.S., many of the physicians who will supply the future U.S. market are already in the pipeline. Medical training takes so long that any changes in either medical education or policy will not be felt in the market for at least another decade.

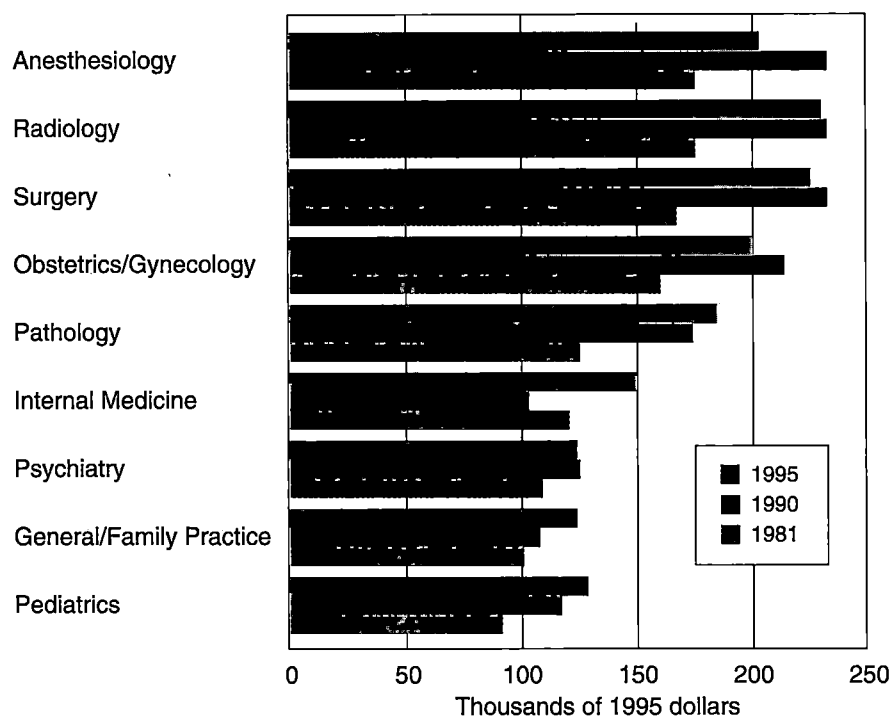
TOO MANY SPECIALISTS

In addition to being in excess supply, there is an uneven distribution of U.S. physicians by specialty. Despite the shift to more outpatient care and the emphasis HMOs have placed on the role of the primary care physician as gatekeeper, primary care doctors still represent roughly the same percentage of all physicians as they did back in 1970—44 percent. In fact, if we remove the primary care subspecialties and consider

just general primary care, the percent of primary care physicians has actually declined from 43.2 percent in 1970 to 37.5 percent in 1994. Why? Because, as Figure 5-3 shows, the money still goes to specialists.

But the excess supply of specialists is now being felt by young physicians who are finding it more difficult to find full-time jobs in their chosen specialties. As news of these market pressures filters through to graduating students, there is some evidence of an emerging trend toward generalist training. For the first time since 1987, just over half of all senior medical students entered residencies in family practice, internal medicine, or pediatrics in 1995, increasing to 54 percent in 1996. Even if this proves to be the beginning of a trend and not just a small blip, it will still take decades for this new ratio to be reflected in the population of actively practicing physicians. First, it will take 3 to 5 years for these physicians to complete their training and begin practicing. Second, they will be entering a relatively large workforce where only 37.5 percent of practicing physicians are currently in

Figure 5-3. Median Net Income



Source: Association of American Medical Colleges, 1997; American Medical Association, Center for Health Policy Research

general primary care.

Although the proportion of physicians *trained* as general practitioners is unlikely to affect the proportion of primary care providers in the near future, more physicians (that is more specialists) are likely to be providing primary care. In a 1997 survey of physicians conducted by Louis Harris & Associates, nearly half of specialists reported spending at least 25 percent of their time providing primary care and 22 percent of specialists said they will be providing more primary care in the future. Even though specialists are not flocking to formal retraining programs, they are following the

market's prompting. The share of all physicians *self-reporting* as primary care providers was a full 16 percent higher in the 1997 survey than in the 1994 survey (46 percent versus 30 percent)—and we know this is not due to a large increase in the number of primary care physicians being trained.

The excess supply of physicians in 2010 will be primarily among specialists and predominantly in the medical and surgical specialties. The tragedy here will be twofold: Not only will there be a national underuse of highly-skilled individuals, but the money expended for a large portion of their training will

have come out of the public purse. Basically, this is a waste of valuable resources whichever perspective one assumes.

There is however, the glimmer of a silver lining here. The excess supply of specialists may nudge some physicians to practice as clinical investigators, filling the ranks of a depleted cadre of physicians engaged in clinical research and the conduct of clinical trials. Others may assume new roles within chronic disease management organizations. As the number of Americans suffering from chronic disease increases, these organizations will assume total care for defined populations of patients with diabetes, congestive heart failure, and cancer and they will seek highly-trained specialists to develop and manage their programs.

POOR GEOGRAPHIC DISTRIBUTION

Apart from the uneven distribution of physicians across specialties, there is also a geographic maldistribution of physicians across the country, with the greatest concentrations in large metropolitan areas. Per capita physician density parallels the size of regional and urban populations. As with any other professional, the cultural and social advantages of metropolitan areas make them highly desirable living locations. And those with the best climates tend to have the highest physician densities. The more specialized the physician, the more pronounced is the maldistribution. For specialists, the opportunity to work in a large medical center and interact with colleagues is a critical advantage.

The issue for individuals living in areas with low physician-density is access. Not only may the closest physician be located several hours away, but her practice may be so busy that she cannot take on additional patients. For many people, these are effective barriers to obtaining necessary medical care in a reasonable amount of time. In the absence of timely medical attention, their health suffers accordingly.

Financial incentives have had a very limited affect in attracting physicians to rural areas where the professional isolation, long working hours (especially for on-call duties) and cultural isolation have acted as strong deterrents. In fact, the number of areas in the U.S. with physician shortages is greater now than it was 30 years ago. The most successful efforts to retain physicians have actually relocated graduate medical education training to these underserved communities. Once trained in these areas, physicians are more likely to stay and practice, regardless of where they went to medical school. Medicare's decision to reimburse physicians for rural telemedicine consults will lead to greater use of this technology and will, to a certain extent, combat the professional isolation of a rural practice. However, the social and cultural isolation will continue to deter physicians from locating in rural areas and the medical access problems faced by these communities will remain unresolved in 2010.

NOT A LOT OF DIVERSITY

In addition to the uneven distribution of physicians across specialties and geo-

graphic areas, ethnic minorities are poorly represented in the medical profession. Nationally, African Americans represent 12.6 percent of the general population but only 3 percent of physicians; Hispanics represent 10 percent of the general population and only 4.6 percent of physicians. The racial and ethnic maldistribution is even more stunning in regions with diverse populations. For example, in California, Hispanics constitute 26 percent of the general population but only 4 percent of practicing physicians.

Because of cultural and language differences, underrepresented minorities prefer to, and when possible do, obtain care from physicians with similar backgrounds. These physicians in turn play a major role in providing care to minorities, especially to those residing in low-income, underserved communities. If the physician workforce does not mirror the ethnic and racial diversity of the population to be served, it is more likely that minority populations will not have access to essential health care services. In the absence of significant policy change directed at recruiting minority physicians, their underrepresentation in the medical profession will continue and will be further exacerbated in regions where minorities are becoming a greater proportion of the general population.

NEW ROLES FOR DOCTORS

THE NEW INPATIENT SPECIALIST

There are two new and emerging roles for physicians in the health care arena. The

first is the "hospitalist" or "intensivist." These physicians work full time in the hospital, providing all of the care to the inpatients of office-based physicians. They are distinct from the radiologist, anesthesiologist and pathologist who also work full time in the hospital. Most hospitalists are general internists, 10 percent to 15 percent are critical care doctors (hence the term "intensivists") and between 5 percent to 10 percent are family practitioners and emergency room physicians.

Hospitalists are perceived to be more efficient than office-based physicians, not only because of their greater familiarity with the inner workings of the institution but also because they are more capable of effectively managing inpatient care. Because they are constantly in the hospital, they are able to monitor patients more closely, which leads not only to the ordering of fewer tests, but also to better patient outcomes. Furthermore, because hospitalists have the authority to discharge, patients do not have to wait for their physicians to conduct their morning or evening rounds—they can be discharged at any time, which leads to higher patient satisfaction and shorter lengths-of-stay.

There is some question regarding the continuity of care that is provided when the oversight for patients' health is transferred among providers. In one sense, transferring the care of a patient to a hospitalist is akin to referring a patient to a specialist—and all of the questions regarding continuity of care that are raised with specialists also apply to the hospitalist. What is new, however,

is the movement of this phenomenon into the arena of general hospital care and the transfer of authority for the patient from the primary physician to the hospitalist.

There are an estimated 1,500-2,000 hospitalists currently providing inpatient hospital care. Assuming that the average hospitalist can care for 15-20 patients at any one time, and considering the need for on-call duties and time-off, it is estimated that the smallest functioning unit will be four hospitalists caring for approximately 50 inpatients. Over the next 15 years, the greater efficiencies of the hospitalist will lead to increases in their employment in hospitals with at least 80 medical beds and expansion into skilled nursing facilities. It is estimated that close to 100 percent of nonsurgical inpatients will be cared for by the hospitalist by 2005.

THE MEDICAL MANAGER

The second new training path for physicians is the one that leads to the business-savvy MD. Frustrated with their diminished autonomy in a managed care environment, and intent on keeping an upper hand, many physicians are retraining, either in business schools or in health care administration, and seeking employment managing other physicians. It is difficult to quantify the exact number of physicians seeking this form of retraining since many opt to pursue this avenue through correspondence courses. However, as HMOs and pharmaceutical companies enter the medical management arena, they will be

seeking physicians administrators who not only understand the health issues, but who also have the business acumen to manage their colleagues and their patients. The demand for these dual-trained doctors will increase as those who try to alter physician behavior realize that the best way to do that is to employ someone who is respected by physicians—and nothing beats a colleague.

NURSES

In many ways the nursing profession is the most qualified to respond to current changes in the health system. Nurses' training focuses more on the behavioral and preventive aspects of health than does that of physicians. Their skills are increasingly in demand in an environment that is moving toward more outpatient care and requires its health care providers to function as teams and assume managerial responsibilities.

REGISTERED NURSES

Registered nurses (RNs) are the largest single group of health care providers in the U.S., numbering over 2.2 million, with hospitals being their primary place of employment. As the role of the acute-care hospital takes a back seat to other venues of care, one might predict that RNs' primary place of employment will disappear. However, despite the substantial rise in outpatient activity, two-thirds of RNs continue to work in the hospital setting. This ratio has remained steady over the last 15 years with only a slight decline since 1992. In fact, Linda Aiken has shown that although total

Table 5-2. Projected RN Requirements by Employment Setting, 1995-2010

	Total	Hospitals	Nursing Homes	Ambulatory Care	Public/Community Health	Nursing Education	Other
1995	1,800,000	1,171,500	117,900	126,500	285,300	39,200	60,100
2000	1,969,000	1,231,800	128,200	134,200	364,300	37,800	72,500
2005	2,095,000	1,305,200	138,000	142,600	387,200	41,500	80,200
2010	2,232,000	1,386,100	152,600	150,700	411,000	45,500	87,400

Projections by Division of Nursing, BHP, MRSA, USDMMS, March 1996

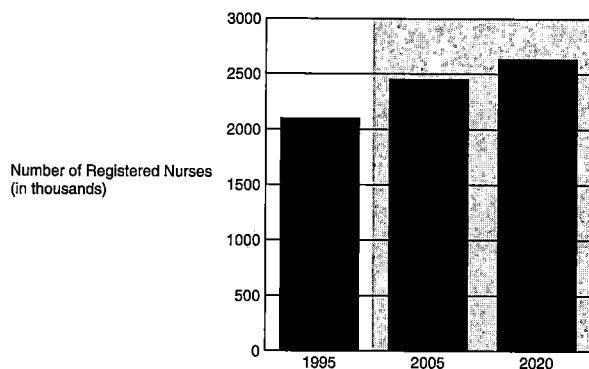
hospital employment of all nursing personnel has declined, the number of full-time equivalent (FTE) hospital RNs actually increased between 1984 and 1994 by 27.6 percent, increasing the RN-to-patient ratio by 29.4 percent. When adjusted for case-mix severity, the ratio increased by only 0.3 percent, indicating that the increases in RN hospital employment barely kept pace with the increased case-mix severity. Other hospital nursing staff, such as licensed practical nurses (LPNs) and nursing aides, have been reduced in absolute terms, suggesting that the staff-to-patient ratios for these nurses have not kept pace with the increased case-mix severity. RNs are providing more of the care for a sicker population of patients.

Although the average age of the nursing workforce is increasing and is likely to lead to greater numbers of retirees in the future, over the next 15 years it is highly unlikely that the current annual graduating cohorts of 95,000 RNs will continue to be absorbed in the hospital setting. The Bureau of Health Profes-

sions' division of nursing projects that the staffing requirements for FTE RNs will increase by 18 percent in both hospitals and ambulatory care settings by 2010 (Table 5-2). But new employment opportunities will increasingly be found in nursing homes, clinics and community health settings. Requirements for full-time equivalent RNs are projected to increase by 30 percent in nursing homes and 44 percent in community health settings between now and 2010.

The future supply of RNs is expected to be sufficient to respond to these increased demands although, as with the physician workforce, it will require a shift in training away from hospital skill sets toward more appropriate primary care settings, nursing homes and skilled nursing facilities (Figure 5-4). There will be some downsizing in the hospital sector. We are forecasting a 17 percent drop in the number of hospital beds between now and 2010 and the closure of 13 percent of hospitals. This will certainly affect work force employment to some extent. But we are not forecast-

Figure 5-4. Projected Supply of RNs, 1995-2020



ITF Projections

ing a wholesale closure of large numbers of hospitals and an open hospital must be staffed whether it has half of a wing or a whole wing open.

NURSE PRACTITIONERS

The nurse practitioner (NP) is a registered nurse who works as a primary health care provider, focusing on health promotion and disease prevention, as well as the diagnosis and management of acute and chronic diseases. Unlike RNs, 90 percent of NPs work in outpatient settings, one-third of which are private practices or HMOs. Although only nine states permit NPs to practice independently of physicians, over two-thirds of NPs have primary responsibility for a specific group of patients within either a team or panel situation. More than 85 percent have the authority to prescribe pharmacologic agents. One in 10 has hospital admitting privileges and one in three has hospital discharge privileges. In some circumstances, NPs function as physician substitutes, while in others they serve as complements, providing

health prevention, education and counseling.

There are approximately 50,000 nurses with NP training, of whom 25,000 are actually practicing as NPs. In the late 1980s and early 1990s, the expectation that there would be insufficient numbers of primary care providers fueled an increase in both the number and capacity of NP training programs. Approximately 40 percent of currently practicing NPs deliver primary care and 80 percent of graduates are specializing in this area.

The future supply of NPs will undoubtedly increase as the demand for their services grows and the number of training programs increases. Based on current training capacity, there will be at least 2,000 graduates every year. Conservatively, 55,000 NPs will be practicing by the year 2010. If there is sufficient demand, a portion of the 25,000 nurses who are trained but not practicing as NPs may reenter the profession. In conjunction with an increase in the number of training positions, this could swell the ranks of practicing NPs to over 80,000 in 2010.

PHYSICIAN ASSISTANTS

Physician assistants (PA) are health care professionals licensed to practice medicine under a physician's supervision. This new category of health care professional emerged in the 1960s, partly in response to the supply of experienced hospital corpsmen and combat medics returning from Vietnam and looking for work. In 1970, there were only 237 practicing

PA's. Between 1990 and 1995, the number of new graduates increased 80 percent from 1,195 to 2,139. There are now approximately 30,000 PA's in clinical practice. Approximately 5,000 students are enrolled in PA programs, with 2,500 graduates annually, a class size which has more than doubled since 1990.

PA's' precise scope of practice varies across the country according to each state's medical practice act. They all require physician supervision but in some states this supervision must be on-site and in others it can be provided from a distance. PA's provide basic health care services that, 20-30 years ago, were provided by the physicians themselves—and in many cases still are. These tasks may include taking medical histories and performing physical examinations; ordering and interpreting lab tests; diagnosing and treating illnesses; assisting in surgery; prescribing or dispensing medication; and counseling patients. PA's can legally prescribe drugs in 39 states.

Approximately 43 percent of PA's' work is in primary care settings, but there is a steady increase in surgical subspecialization in which only 22 percent of all PA's currently work. Roughly one-third of PA's are employed in hospital settings, 40 percent in physician offices, 10 percent in clinics, 7 percent in HMO's and the rest in nursing homes, correctional institutions and federal agencies.

In 1995, eight out of every 10 PA graduates were employed as PA's in less

than a year. The growth in PA jobs is projected to increase by 23 percent between 1994 and 2005—9 percent faster than the overall U.S. job-growth rate. Based on current training capacity, it is projected that at least 68,000 PA's will be in practice by the year 2010.

FUTURE EMPLOYMENT

In this cost-cutting era, health plans, hospital systems, and medical groups are looking at diverse combinations of providers as part of their cost control strategies. The roles of many health professionals overlap to a certain extent but the scopes of practice for nurses and PA's most closely resemble that of physicians. To what extent will nonphysician personnel be employed in the future and in what capacity?

Staff and group model HMO's, which have the greatest incentive to employ the most efficient mix of personnel, exhibit great variation in their employment of nonphysicians, ranging from a low of zero to a high of 67 per 100,000 enrollees. It's therefore difficult to forecast future requirements with any certainty based on expected growth in managed care. There is evidence that some staff model HMO's are using nonphysician providers as substitutes for primary care physicians, but this practice is not widespread.

Large multispecialty group practices and physician groups that are heavily capitated are another source of employment for NPs and PA's. The correlation with size suggests that smaller practices are unable to take advantage of the cost-

savings offered by nonphysician providers. Furthermore, even though studies indicate that nonphysician providers increase physician productivity and incomes, professional resistance certainly affects physicians' decisions. As an example, physicians are more likely to employ PAs (who cannot function independent of physician oversight) than NPs.

In the short term, the greatest impediment to wholesale use and integration of nonphysician personnel into provider networks is lack of supply. If all large multispecialty group practices restructured with a ratio of one NP or PA for every two physicians (which some capitated primary care groups are aiming to do), there would not be sufficient personnel to staff them. If training programs were expanded sufficiently now, it is possible that by 2010 the supply of nonphysician providers could increase to fulfill the demand.

However, beyond the supply issues there are several barriers to the widespread involvement of nonphysicians as direct-care providers. First, state laws somewhat arbitrarily limit the care that nonphysician providers may give by restricting pharmaceutical prescribing, requiring on-site supervision, and requiring case-by-case physician approval of services that are ordered. Organized medicine has a strong incentive to lobby and maintain such restrictions. Second, the perception of lower-quality care, regardless of its merit, not only limits consumer demand for access to nonphysician providers but

may also make health plans skittish about using them more aggressively in cost-cutting efforts. Finally, the salaries of nonphysician providers are approaching those of newly trained physicians. Although these income gains are the results of hard-won battles, in an era of physician glut and quality consciousness, medical groups and hospitals may prefer to hire a newly trained physician over an NP or PA.

Overall, we expect to see greater but sporadic use of nonphysician providers in the next 10 years. NPs with extensive primary care experience will compete with general practitioners in select markets. Many physicians will still not be working with nonphysician providers in 2010.

CHAPTER 6: THE FUTURE OF HEALTH CARE

Forecast of Medical Technologies

New medical technologies are one of the key driving forces in health care. From its unscientific roots in the 19th century, medical technology has made great strides in verifying the germ theory, creating aseptic surgical technique, discovering antibiotics, developing anesthesia, and imaging the inside of the body. The impacts have been huge, improving public health, extending lifespans, saving lives, and heightening quality of life. Cost impacts have been equally huge, especially in the United States, where new medical technologies are enthusiastically embraced as they become available.

Here we examine eight medical technologies that will affect patient care over the next decade. We describe the technology, then discuss the magnitude and areas of impact, as well as the barriers to change (where applicable). We've excluded some of the leading-edge developments that, because of the long lead time to bring them to market will result in new technologies beyond our 10-year time frame. The technologies we focus on here are:

- Rational drug design
- Imaging
- Minimally invasive surgery
- Genetic mapping and testing

- Gene therapy
- Vaccines
- Blood substitutes
- Xenotransplantation

Even after a medical technology or technique has been discovered, developed, approved, and commercialized, it may take years for it to be disseminated widely. In many clinical areas, state-of-the-art knowledge takes years to be widely adopted in community practice. We conclude with a discussion and forecast of the process of procedural technology transfer in health care.

1. RATIONAL DRUG DESIGN

Most drugs on the market today have been discovered in random screens of naturally occurring products or from analog development programs. Once a time-consuming manual process, today's robotic systems can screen up to half a million compounds in a year's time. This method of random trial and error is inefficient: of 10,000 agents tested, 1,000 typically show bioactivity, 100 are worth investigating, 10 go to clinical trials, and only one reaches patients on the market. Most current pharmaceuticals were chanced upon after years of this research by trial and error. Occasionally, researchers came across something that

ADDITIONAL TECHNOLOGIES

We conducted a number of expert interviews to identify technologies that would have the largest impact over the next decade. In addition to the eight described in this report, the experts identified others. We excluded these technologies from deeper consideration because although they will have a significant impact on the health industry, it will be smaller and emerge at a later time. These include:

- ablative techniques
 - artificial livers
 - cloning
 - DNA sequencing/diagnostics
 - functional neural stimulation
 - joint replacement
 - pain control
 - regional perfusion
 - tissue sealants
 - treatments for drug-resistant disease strains
 - virtual reality systems
-

was not only safe for human use, but also beneficial. The chemicals identified from these experiments were discovered as they existed in nature. Happily, we are no longer just searching randomly in nature to find therapeutic chemicals. Now scientists are *designing* thousands every day.

Rational drug design is the development of new chemical or molecular entities by looking at the physical structure and chemical composition of a target—a molecular receptor or enzyme—and designing drugs that bind to these sites, turning the targets on or off. Drug designers use physical chemistry to identify qualities of a specific agent that creates a pathology; once identified, designers attempt to intervene in a known chain of events at a particular

point with a specific method. Designers use several strategies and methods:

- *Structure-based design.* The central assumption of structure-based design is that good inhibitors must be complementary to their target receptor. The two-step process begins by determining the structure of receptors and then solving the 3D jigsaw puzzle of matching molecular structures using specially developed computer programs.
- *Molecular modeling.* This technique looks at the physical structure of a receptor and creates the model of a compatible chemical entity using computer imaging. This can be done with incredible precision, down to the level of DNA coding. With the help of computed chemical algorithms, designers can build (first virtually on the computer, then “wet” in the lab) the molecule of perfect chemical fit.
- *Virtual reality modeling.* This is a form of computer-enhanced molecular modeling. It includes features such as a force feedback handle that allows tactile manipulation of a three-dimensional image, of the candidate molecule model’s orientation.
- *Combinatorial chemistry.* This technique allows drug researchers to produce quickly as many as several million structurally related compounds, which are then screened to find those that are bioactive and possibly have therapeutic value. The chemical attributes of these molecules

are known and the chemists working with them expect certain biological activity. With the development of more reliable and rapid screening tests, thousands of related chemicals can be tested in parallel processes for reactivity with a complement of human antibodies on a mass scale.

Rational drug design will shorten the discovery process. New chemical and molecular entities will get to clinical trials faster as the random and unpredictable time for discovering a compound by chance is replaced by these more predictable design processes, ones based on the structure and complexity of the pathogen.

Because there may be fewer complete reject entities, rational drug design will result in a problem of excess: too many new chemical entities and not enough resources to test them all. Prioritization and stratification of candidate products will be an important area of concern.

MAGNITUDE AND AREAS OF IMPACT

Rational drug design will have impacts in a number of therapeutic areas. Chief candidates are:

- *Neurologic and mental disease.* Drugs are being created that fit the receptors for various neurotransmitters, potentially modifying nerve activity and influencing the function of the nervous system. This happens in different areas of the nervous system where neurological and mental pathology are manifested.
- *Antiviral therapies.* Protease inhibitors designed to combat viral disease will be an important area of development. Every virus uses proteases to chop proteins into amino acids, which the virus then uses as building blocks. Targeting and inhibiting these enzymes could lead to the creation of the first truly effective antiviral. In the next 10 years, rational drug design will create antiviral therapies to combat diseases like HIV, encephalitis, measles, and influenza.

KEY BARRIERS

One of the key driving forces behind rational drug design has been the increasing power and ease of computer use. These techniques and processes are highly information-intensive. The pace of their adoption is regulated, in part, by the availability of research teams that combine knowledge of biochemistry with that of computer technology.

As researchers seek to combat more complex pathogens, they will need to

THE PACE OF CHANGE IN DRUG DESIGN

The pharmaceutical and biotechnology industries have enthusiastically adopted the techniques of rational drug design. Five years ago, few pharmaceutical companies were heavily invested in rational drug design. Today, entire biotechnology companies have been formed primarily to carry out structure-based design, and most major pharmaceutical companies have structure and computational groups as part of their drug discovery effort. In five years, rational drug design will yield a rich crop of new candidate molecules for clinical trials.

UNNATURAL NATURAL PRODUCTS

Antibiotics that are in current clinical use are compounds made by antibiotic-producing bacteria and fungi—researchers have accepted the natural products that nature provided. Now, using recombinant DNA technology, “unnatural” natural products can be produced by combinatorial biosynthesis using genetically altered strains of a bacterium such as *Streptomyces*. Instead of isolating and testing a single natural product, thousands of novel biosynthetic molecules, a new class of antibiotics, can be obtained and screened. One such product may prove to be a powerful neuroregenerative agent that could be used in conditions such as Parkinson’s disease, multiple sclerosis, Alzheimer’s disease and stroke.

DRUG-PRODUCING ANIMALS

Transgenic animals can be engineered to produce proteins that act as drugs. These living drug factories can be grown from animal embryos injected with human DNA.

Transgenic animals can be cloned, and an entire herd can be created in a single generation. A transgenic ewe can produce milk containing an anti-enzyme, and its use in treating asthmatics is now in clinical trials. A transgenic drug industry has been born as yet another product of biotechnology.

develop drugs that interact with their targets in more specific ways. With increased specificity and complexity will come increased costs in developing the proper new chemical entity.

Drug design can indeed create an embarrassment of riches in terms of screened candidate compounds. Much progress will need to be made in evaluating and prioritizing the candidates. Because rationally designed drugs can be mass-produced and do not depend on outdated technologies for discovery and production, the utility of any new drug

will be determined by its cost-effectiveness in clinical trials.

2. IMAGING

Imaging technologies present an enhanced visual display of tissues, organ systems and their functions. They reveal the structural and functional aspects of organs, allowing clinicians to localize specific functions or conditions in a noninvasive way.

Imaging has four elements: capturing the energy aimed at the area of interest; detecting or receiving that reflected or refracted energy; analyzing the data with computers; and displaying that data with technology that allows the clinician to view and interpret the information. Advances are taking place in each of these areas that will open up new functions for imaging technologies.

- *Energy sources* currently used for imaging include X-rays, ultrasound, electron beams, magnets, and radio frequencies. There is a constant trade-off in the energy sources used: On one hand, the more powerful the energy source, the more deeply it can penetrate and the more detail it can reveal in the image. On the other hand, powerful beams can injure tissues and organ systems. The same ultrasound energy that reveals “baby’s first picture” to expectant parents also can, at a higher energy level, smash kidney stones in an electrolithotripter. Energy source technology is advancing as scientists find ways to more narrowly focus an energy beam to avoid damage to

adjacent tissue. Research also is being conducted on alternate energy sources, such as thermal differences, in order to minimize residual damage.

- *Detector technology* is advancing along two dimensions. First, digital detectors benefit from the trends in micro-electronics toward smaller and smaller features on devices. The resolution of those detectors is improving constantly. The first commercially available "megapixel" (able to detect an image that comprises a grid of 1,000 by 1,000 pixels, discrete elements of the image) detector became available more than a decade ago. By 2005, detectors that can resolve 6,000 by 6,000 pixels will become available. Second, there are advances in radio contrast media. These are chemicals that, when introduced in the body, enhance the contrast of an image in specific ways, for example by highlighting areas of malignant tissues or tissue abnormalities with more blood flow. Work is

proceeding on contrast media that have organ, tissue and cellular specificities.

- *Analysis of the images* is the next function experiencing rapid advances. Computer analysis of the masses of data from high-resolution detectors gets faster and better with increases in raw computing power. Break-throughs in algorithms and techniques, such as neural networks, will speed the conversion from two-dimensional to three-dimensional images, improve pattern recognition through better detection of edges and other features of images, and ease the manipulation and enhancement of digital images.
- *Display technologies* are getting bigger, faster, and cheaper. There is spillover from a range of applications that require high-quality images for medical imaging. Improvements include larger displays, higher resolution, richer, more meaningful contrasts, and "deeper" color.

MINI-MRIs AND MRNs

An important trend in MRI technology is the design of increasingly smaller scanners with much lower capital and operating costs. The key: smaller and less costly magnets. Mini-MRI units will be available for dedicated uses in orthopedics, neurology and mammography.

MRN (magnetic resonance neurography) can identify the site of damage to a peripheral nerve by detecting increased signals at sites of nerve entrapment and trauma. It can also visualize the process of peripheral nerve degeneration and regeneration, the first imaging modality to do so.

MAGNITUDE AND AREAS OF IMPACT

These advances are combining in several areas. *Electron-beam computed tomography* (CT) scanning (in contrast to conventional CT scanning that uses X-ray beams) offers substantial improvements over old technologies. It will allow for rapid acquisition of an image, reducing the discomfort patients experience from remaining immobile for the duration of a conventional CT scan. While this technology can detect calcium in the wall of the coronary artery showing

POSITRON EMISSION TOMOGRAPHY

Positron emission tomography (PET) was developed and applied clinically to the central nervous system for the diagnosis of epilepsy and brain tumors. It became the gold standard for determining myocardial viability and myocardial blood flow, but it found only limited application to other organ systems. Within the last five years the introduction of multislice imaging, 3 mm. resolution and 3D resolution has revolutionized the field and made whole-body imaging one of the most exciting developments in imaging for the diagnosis of metastatic and recurrent cancer. For recurrent cancer of the head and neck, a notoriously difficult area to image using current technology, PET has shown an accuracy of greater than 95 percent in detecting recurrent disease. Although it is being used to stage many cancers, because the current technique uses glucose uptake as the marker, this highly sensitive detector lacks specificity. Within the next decade tumor-specific marker molecules will be labeled with positron emitters to provide more specificity, at which point whole-body PET scanning will be faster, less expensive, more widely available, and the most accurate and rapid means of detecting cancer that has spread beyond the primary site or has recurred.

atherosclerosis, it does not show whether there is narrowing of the blood vessel. With the development of new contrast agents, electron-beam CT will be able to show visuals of the arteries themselves, making this technology competitive with magnetic resonance imaging (MRI), although MRI has the additional value of showing blood flow.

Harmonic imaging will overcome a number of barriers in ultrasonography. About one-third of all patients are "difficult to image," which means that a patient's body wall anatomy, for a variety of reasons, is difficult to "see" through. Specifically, someone who is obese, or extremely muscular, or some-

one with narrow rib spacing is often difficult to image. Smokers and those who have had radiation therapy can also fall into this category for cardiac imaging, and for OB/GYN a variety of impediments of the abdomen can cause difficulty. Harmonic imaging improves the quality of images in these patients. Ultrasound generally works as follows: sound waves are transmitted into the body at a relatively low frequency and are detected by a receiver that is tuned to the same frequency. In harmonic imaging, the receiver is tuned to a higher frequency than the transmitter, so that the clinician detects the harmonics, or the frequency-multiples of the echoes, that are produced inside the body itself. Higher frequency waves produce images with better resolution. Applications of harmonic imaging include better prediction of heart attacks by allowing the clinician to visualize blood flow through the myocardium.

Functional imaging, which provides information about how a tissue- or organ-system is operating, will go far beyond the capabilities of conventional magnetic resonance imaging (MRI), computed tomography (CT), and ultrasonography, which now provide only *structural* information about tissues and organ systems. Positron emission tomography (PET) has long been capable of metabolic imaging—detecting patterns of energy use in the body. High resolution PET will allow pinpoint accuracy in these images, which will render many invasive diagnostic procedures, such as surgical biopsy, obsolete. Functional MRI is used to determine location of neurological

functions, such as memory and reasoning, in the brain, giving us the first look at how the brain works. Future applications of functional MRI will be in the study of disease and the body's response to treatment, for example, changes in the pattern of neural activity in the brains of schizophrenic patients under treatment with new drugs.

Because developments in computing power have increased image display speed and improved the quality and content of digital data, *image-guided surgery* is becoming a mainstream procedure. Image-guided surgery is a new kind of minimally invasive surgical intervention. It improves on endoscopic and endovascular surgical methods by allowing the clinician to see a computed functional image superimposed with the surgical instrument location and other relevant information. The current combination of near-real-time imaging with functional mapping will improve to real-time, high-contrast, and high-spatial-resolution images.

Overall, imaging technologies will improve the diagnostic process immensely. Clinicians will use these technologies to look at the form and function of organs that were once examined only by surgery, decreasing the need for invasive diagnostic procedures.

KEY BARRIERS

There are few barriers to the development of new imaging technologies, which benefit from the continual progress of computing power. Econom-

ics, however, will limit some of the application of them. Historically, imaging technologies have been additive—new technologies do not replace old ones, but rather supplement their use. In a cost-constrained health system however, more restraint will be exercised on the use of new imaging systems. Comprehensive analyses of cost-effectiveness, including the full life-cycle cost of the equipment, will become commonplace.

3. MINIMALLY INVASIVE SURGERY

Also called minimal or limited-access surgery, this technological advance was made possible by the introduction of fiber optic technology, miniaturization of improved instruments and devices, image digitization, navigational systems for vascular catheters and, a sudden awareness that image-guided surgery was the wave of the future. Early examples of minimally invasive surgery were arthroscopic meniscectomy, endovascular obliteration of intracranial aneurysms, and laparoscopic cholecystectomy. More recent innovations are image-guided brain surgery, minimal access major cardiac operations, and the endovascular placement of grafts for abdominal aneurysms. Over the same period of time, open surgery biopsy has been replaced by fine-needle aspiration of many tumors, gaining general acceptance for tumors of the breast and thyroid gland.

The movement toward minimally invasive surgery has promoted the proliferation of ambulatory surgicenters.

The consequent major reduction in the volume of surgical procedures performed in hospital facilities achieved a remarkable reduction in the length of stay as patients having procedures previously requiring hospitalization enjoyed more rapid recovery and return to full activity because of the lowered morbidity of less invasive operations. Overall dramatic cost savings have been achieved. In areas where minimally invasive procedures have replaced their more disruptive antecedents, short-term as well as long-term outcomes have been the same or, in most examples, better with a high level of patient acceptance and satisfaction. In the case of invasive procedures, *less is better*.

MAGNITUDE AND AREAS OF IMPACT

To begin at the top, brain surgery has been a major beneficiary of image-guided technology. Operations requiring access to areas of the brain beneath the surface are conducted using navigational systems and image guidance via limited openings in the skull. Even more dramatic has been the impact of endovascular surgery, the creation of a group of innovative interventional radiologists. Using current technology—digitized image guidance, catheter navigational systems, and an array of implantable materials—endovascular surgeons can treat almost all intracranial aneurysms and many arteriovenous fistulas. Further, subsequent open surgical procedures can be facilitated by preoperative reduction of blood flow to tumors and congenital arteriovenous malformations.

Endovascular surgery has advanced and matured rapidly in the past decade. The practitioners of the art fall into three broad categories with limited overlap. The first, interventional neuroradiologists, deal with vascular pathology of the brain and spinal cord. In addition to the procedures described earlier, these neurointerventionalists can lyse blood clots in cerebral arteries and veins, dilute intracranial arteries narrowed by pathologic vasospasm, and open partially or completely occluded arteriosclerotic arteries that restrict blood flow to the brain.

The second and largest group of endovascular interventionalists are cardiologists whose major procedure is coronary angioplasty. With advances in intravascular stent technology and the introduction of pharmaceuticals that inhibit the principal cause of restenosis—post-angioplasty proliferation of subendothelial smooth muscle in the arterial wall—percutaneous angioplasty will further reduce the indications for open operations for coronary artery bypass grafting. Cardiac interventionalists can also correct cardiac arrhythmias, treat selected cardiac valve disorders, and using improved technology close congenital septal defects.

Laparoscopy has truly revolutionized the practice of abdominal surgery for procedures on the gastrointestinal tract and female organs. The most recent addition to the laparoscopic surgeon's growing list of operations is bilateral adrenalectomy. Further advances will incorporate telepresence technology (which allows a surgeon to remotely

operate), robotics, and 3D imaging. Technological advances are proceeding with unprecedented speed, placing pressures on practicing general and gynecologic surgeons to seek either additional training or drift into obsolescence with out-of-date skills.

Future refinements in minimally invasive surgery will expand the present scope and range of procedures. New arthroscopic procedures, wider use of image guidance in operations on the head and neck, and innovations in limited access procedures for spinal and thoracic diseases are evolving; within the next five years they will be accepted practice. These advances will be aided by interventional MRI, currently used for liver and kidney biopsy, with its shorter acquisition time and 3D capability.

For patients with acute stroke, interventional MRI will be a major addition to the surgical process: pharmacologic brain protection will extend the viability of an ischemic brain, prompt transfer to a dedicated MRI facility will allow immediate assessment of brain viability and blood flow, and when appropriate, occluded vessels can be opened by endovascular intervention under MRI guidance. By the year 2010, large population centers will have "vascular institutes" that are serviced by emergency transportation networks. Vascular institutes will facilitate rapid movement of heart attack, stroke and other acute vascular-accident victims to an institute staffed around-the-clock by endovascular surgeons who can prevent the death and disability that current technologies cannot. Current gaps in ancillary pharmaceuticals will be closed by products emerging from the biotech industry. The development of stent graphs that can be used in cervical vessels and at branchings will extend their application at sites currently beyond the reach of endovascular technology.

4. GENETIC MAPPING AND TESTING

Until recently, most genetic tests have been used to detect rare and singular conditions. Many of these single-gene disorders become clinically apparent in infancy and childhood, whereas others, such as Huntington's disease and polycystic kidney disease, are of adult onset. Genetic tests were used to detect carrier states and for prenatal counseling.

THE ETHICS OF GENETIC TESTING

When the importance and future ramifications of genetic testing became clear, a number of panels were convened to look at the technical, social, and ethical issues. The Task Force on Genetic Testing was created by the National Institutes of Health-Department of Energy Working Group on Ethical, Legal and Social Implications of Human Genome Research to make recommendations to "ensure the development of safe and effective genetic tests, their delivery in laboratories of assured quality, and their appropriate use by health care providers and consumers." The task force called on the Secretary of Health and Human Services to establish the Advisory Committee on Genetic Testing and to apply "stringent scrutiny" when a test can predict future inherited disease in healthy or apparently healthy people, is likely to be used for that purpose, and when no confirming test is available. The National Center for Human Genome Research has set aside funds for consideration of ethical, legal and social implications of human genome research in which genetic testing has the central role.

The special field of clinical genetics evolved from observation of familial occurrence of inherited disorders to use of the tools of human molecular genetics. Genetic tests have become available for more common and more complex diseases, many with onset in later life. With the identification of cancer-susceptibility genes and of genes leading to several neurogenetic disorders, including Alzheimer's disease, the Human Genome Project provided the engine that propelled the rapid identification of a wide range of genes that can cause complex diseases such as diabetes, cancer and heart disease. These gene discoveries provided the basis for genetic susceptibility testing, i.e., recognition of a predisposition to disease, and with it unprecedented opportunities to intervene with strategies for prevention, avoidance, or modification of the predisposed condition. Abruptly, clinical genetics assumed a role whose importance was only imagined a decade ago.

No scientific discipline is as fast-paced today as medical genetics. It seems that each week one or more disease-associated genes are identified and added to the genomic database to fuel a parallel growth of diagnostic and screening tests. To date clinical tests have been developed for use in almost 500 human genetic disorders, a number that will continue to grow in the flurry of activity to complete the mapping of the human genome.

The National Cancer Institute has established three primary goals with regard to genetic testing: identification of every major human gene that predis-

poses individuals to cancer; clinical application of these discoveries to persons at risk; and identification and remedial attention to psychosocial, ethical and legal issues associated with inherited susceptibility. A secondary goal is developing an informatics system to collect, store, analyze, and integrate cancer-related molecular data with epidemiologic and clinical data.

MAGNITUDE AND AREAS OF IMPACT

Genetic-susceptibility testing for breast, colon and prostate cancer is moving into clinical reality, and in each instance the hereditary pattern of disease provided the initial search for the identification of the critical gene or genes.

More complex genetic disorders, such as childhood asthma and late-onset Alzheimer's disease, suggest either a polygenic inheritance, in which more than one gene is responsible for the disease in a given individual, or genetic heterogeneity, in which different combinations of genes produce the same condition in different individuals. Of even greater complexity are the conditions currently being studied in the emerging field of neurogenetics, where genes that increase susceptibility to schizophrenia, manic-depressive illness, and depression are studied to find out how they interact with non-genetic factors, e.g., environmental, to trigger the onset of the recognized disease state. In these psychiatric disorders, identification of the identified genes may give clues for designing pharmacologic interventions, and the discovery of genetic susceptibility provides the basis

for initiating preventive measures whether through pharmacologic means or counseling. The new term "genometrics" has been applied to the discovery of a gene or genes responsible for a trait and defining precisely the trait controlled by each gene involved in complex multifactorial illnesses.

Within a few years, our present methods of genetic analysis, sophisticated though they are, will be viewed as time-consuming, labor-intensive, expensive and limited in scope and application. New technology will use microchips designed to interrogate DNA or RNA samples for sequence or expression information. The chemicals for these microchips can be synthesized cheaply, rapidly and efficiently using the synthetic methods borrowed from the semiconductor industry. Using fluorescent methods for detection of DNA and RNA targets, hybridization will occur in a special chamber, and the resulting signals will be detected by scanning microscopy in a matter of minutes. Current applications of this microchip technology will revolutionize the fields of diagnostics and genomics. Within five years cancer tissue can be analyzed for differences in gene expression, and in another five years specific therapies can be assigned to individuals with identified cancer genotypes. Tumors of a particular type will be classified by genotypic profile, and once classified, perhaps even individualized, treatment will be quite specifically administered. Applied to genetic testing, microchip technology will have predictive power for disease and disease predisposition that is almost unimaginable.

KEY BARRIERS

Practicing clinicians, generalists and specialists alike, lack the education and knowledge base to practice genomic medicine. Genetic testing, particularly predisposition genetic testing for late-onset disorders in adults, requires a multidisciplinary approach. Persons seeking such testing need appropriate pre-test education and genetic counseling and post-test follow up care. Before testing is done, individuals must be informed that other factors, genetic and nongenetic, may influence onset and severity of the condition, and that in many situations testing is probabilistic rather than deterministic. Potential consequences must be understood as must the inability to guarantee confidentiality despite all safeguards and legislative protections.

Genetic testing has a predictable future based on technological potential. This potential could be constrained, delayed or lost entirely by several possible developments: the desire in prenatal testing to enhance specific attributes of offspring; technology advancing too rapidly for rational assimilation and application because of understaffed clinical genetics workforce; premature availability of self-administered testing kits as a consequence of unregulated commercial interests; and ethical roadblocks imposed because of misuse of genetic information contrary to public policy, e.g., sterilization of individuals afflicted by a serious heritable disease to prevent genetic transmission to offspring.

With proper safeguards, genetic testing will revolutionize prevention and treatment of many conditions and diseases, but without these safeguards, the possibilities for mass confusion, misapplication, discrimination, and lawful or unlawful commercial exploitation are sobering.

5. GENE THERAPY

Two years ago a blue ribbon panel of experts sharply criticized the rush to initiate clinical trials of gene therapy before having an adequate scientific base. The consequence was a slowdown in clinical applications and a return to basic research in several critical areas: better vectors or delivery vehicles to ferry corrective genes into target cells; more precise targeting of genes to specific sites and tissues; and enhancement of gene expression following entry into the target cell.

Nevertheless, revolutionary advances in gene therapy are preparing medicine for an epochal shift to an era in which genes will be delivered routinely to cure or alleviate an array of inherited and acquired diseases. Gene therapy can be defined as "a therapeutic technique in which a functioning gene is inserted into targeted cells of a patient to correct an inborn error or to provide the cell with a new function." The successful delivery and insertion of a functioning gene leads to the expression of a therapeutic protein of some kind that will supplement or replace a defective gene or treat the effects of acquired diseases like cancer. Somatic gene therapy, discussed here,

only affects somatic cells, the kinds that are neither sperm nor egg.¹

Current methods for gene therapy use directly harvested cells, cultured cell lines, genetically modified cell lines and viral vectors, such as modified retroviruses or adenoviruses. In the *ex vivo* approach, cells from specific tissues are removed, cultured and exposed to viral or non-viral vectors or DNA containing the gene of interest. Following insertion of the genes into these cells, they are re-administered to the patient. In the *in vivo* approach, viral or non-viral vectors or simply "naked DNA" are directly administered to patients by various routes. A third approach involves the encapsulation of gene-modified cells and the reversible introduction of an encapsulated cell structure into the human body.²

A challenge for genetic researchers is to develop methods that discriminately deliver enough genetic material to the right cells. Most gene vectors in current use are disabled mouse retroviruses. Retroviral vectors offer the most promising prospect for the transfer of useful gene sequences into defective tumor cells since they target only dividing cells and have the potential of long-term expression. They are considered safe and effective gene delivery vehicles and are attractive because they are designed to specifically enter cells and express their genes there. Retroviruses splice copies of their genes into the chromosomes of the cells they invade, and the integrated gene is then passed on to future generations of cells. Since cell entry by a

retrovirus occurs only when cells are actively dividing, this feature is exploited in rapidly dividing cells such as bone marrow, but is not suitable for other tissues such as muscle and lung. Unfortunately, retroviruses are somewhat indiscriminate and have been known to deposit their genes into the chromosomes of a variety of cell types, prompting research into viral envelope alteration in hope of increasing target specificity. The specificity of the envelope—how the vector is “packaged”—ensures the appropriate receptors are triggered.

Other viral vectors are also being explored. These include adeno and adeno-associated viruses, herpes viruses, alpha viruses, vaccinia virus, and poxviruses. Each virus has a potential therapeutic niche established by its attributes and behavior. The next most commonly used vector after retrovirus is the adenovirus, a DNA virus, which, though capable of entering dividing as well as nondividing cells, has produced disappointing results. Adeno-associated viruses appeal because they cause no known diseases in humans and they integrate their genes into human chromosomes. But because they are small, they may not be able to accommodate large genes. Herpes viruses do not integrate their genes into the host's DNA but they are attracted to neurons and may be useful in neurological therapies.

Liposomes are yet another potential vector under examination. These synthetic lipid bubbles can be designed to harbor plasmids—stable loops of

DNA that multiply naturally within bacteria—in which original genes have been replaced by those intended to be therapeutic. A synthetic liposome-like vector, the lipoplex, can bind firmly to cell surfaces and insert its DNA package into cells at a significant rate. Mixing lipoplexes with DNA has since become a standard technique for inserting genes into cultured cells.

Although currently undeveloped for clinical use, two new viral-based vector systems hold out the possibility of advancing toward the ideal delivery system for directly supplying cells with healthy copies of missing or defective genes. Both systems have the capacity to alter quiescent cells such as the mature stem cells that generate the immune system. These viral vectors, HIV and simian virus 40 (SV40), share the preceding characteristics. Although HIV is a human pathogen whose use will be restricted at least initially to advanced cancers, origin from a human source may confer an advantage. SV40, an adenovirus, can be rendered harmless, is capable of infecting several resting and dividing cell types, is easy to manipulate, stable and non-immunogenic. In short, one wonders why SV40 has been ignored. Clearly this vector is not ready yet for clinical trials and some safety concerns are unresolved. Still, SV40 appears to be as benign as any available viral vector and has the added attribute of being directly injectable into target tissues. Some investigators foresee the development of hybrid vectors that build on the best features of viral and nonviral vectors.

MAGNITUDE AND AREAS OF IMPACT

Scientists are currently debating whether gene therapy has definitively improved the health of the more than 2,000 patients in clinical trials worldwide. Current clinical trials are investigating the genetic treatment of several cancers and genetic diseases such as cystic fibrosis. Gene therapy has succeeded in treating the symptoms of patients with hypercholesterolemia, and several children with severe combined immunodeficiency diseases are surviving as a direct result of treatment.

One of the most significant developments in this field is the application of this methodology to gene marking in the study of the biology of cancer. Close to 1.4 million Americans will be newly diagnosed with cancer this year alone and the treatments currently available—surgery, radiation therapy and chemotherapy—cannot cure 50 percent of them. Although gene therapy was originally targeted toward single-gene deficiency diseases that are recessive and relatively rare, about 75 percent to 80 percent of the current clinical trials now focus on cancer.

For treating cancer, a variety of approaches are being attempted. Some involve imparting cancer cells with genes that give rise to toxic molecules. When these genes are expressed, the resulting proteins then kill the cancer cells. Genetic marking of marrow cells used in similar *ex vivo* therapies allows physicians to monitor the effects of different cancer purging methods. Another research focus is on the correc-

tion or compensation for acquired genetic mutations, particularly of the oft-mutated tumor suppressor gene p53. Yet another field of cancer research is in immunotherapy. Immunotherapeutic research designs target how tumors evade detection and attack by the immune system, how they spread away from their sites of origin, how they gain a new blood supply and how they accomplish other feats that allow them to endure and spread.

A different form of genetic marking is used in immunotherapy, also called vaccine therapy. Immunotherapeutic vaccinations tag cancer cells with certain genes that make them more visible to the immune system. One method being widely tested involves modifying a patient's cancer cells with genes encoding cytokines—the communication proteins of the immune system's *B* and *T* cells—to draw an attack from the immune system. Unfortunately, this method will only benefit patients with robust immune systems and not those with advanced cancer.

KEY BARRIERS

Despite encouraging results, the field awaits answers to many unresolved questions. An area where enormous progress has been made, but where much more is needed, is developing gene delivery vectors. Virus-based vectors have been the most efficient for inserting genes into cells in the laboratory, but in clinical applications the results have in some cases been short-lived, and there have been unwanted side-effects.

In addition, the field needs to develop animal models to test the biological and clinical efficacy of the new vectors and procedures. As a result, gene therapy may take longer to reach patients than originally predicted. Furthermore, the progress of gene therapy depends on adequate technical, financial and training resources, and demands close interaction between academics, clinicians and private-sector companies.

Private companies are playing a critical role in promoting the development of technology. They have millions of dollars at risk: they have to choose technologies, knowing that the ultimately successful approaches are likely to require complex assemblies of new chemical tools and procedures. For industry, a necessary incentive is the award of exclusive protection of innovative breakthroughs. However, gene therapy can be viewed as the product of an assembly line, and limited access to enabling technologies—such as vectors—because of time-consuming and expensive licensing processes, could lead to prohibitive commercial burdens which would delay progress in the field.

In June 1997, there were 180 clinical studies involving gene therapy, of which 134 protocols involved new drug applications, with the majority intended for patients with cancer. The same advisory group that in 1995 accused the scientific community of overselling the present benefits of gene therapy, stressed its extraordinary potential for the long-term treatment of human disease. The lack of more efficient gene vectors was singled out as the major barrier to

attaining better clinical results.³

With the intense ongoing activity in vector development, within 10 years a number of efficient gene delivery systems will be in clinical use. Vectors that have both site- and cell-type specificities will deliver genes to treat a wide range of conditions in most, if not, all organs. The potential of using genes and gene products in novel strategies is an incredibly powerful incentive to pursue gene therapy as the equal of the future's most effective therapeutic modalities.

6. VACCINES

“The advances in technology have allowed the beginning of an understanding of the regulation of the physiology of bacteria which parasitize and sicken mammalian hosts. They also have given insights into the marvelously diverse molecular strategies used by these organisms to circumvent the host's nonspecific defenses and immune recognition, and have highlighted the difficulties associated with the development of vaccines to prevent bacterial infection. Opportunities to change the course of diseases by immunological means are becoming increasingly evident. The intellectual excitement of the study of bacterial disease in concert with immunology and cell biology has never been greater and holds vast promise in ameliorating the human suffering due to infectious diseases.” —Dr. Gotschlich, JAMA, 1997

Since Jenner conferred smallpox immunity with inoculations of cowpox in the early 19th century, vaccines have been administered globally as preventive measures for acute diseases (such as

diphtheria, smallpox, and whooping cough) and have been used to avoid acute infection by creating a low-level immune response that will remain as acquired immunity. In the history of public health, vaccines have proven to be among the most effective disease prevention tools. Some diseases, such as smallpox, polio, measles, have been eradicated or brought under control through mass vaccination programs.

Current use of vaccines includes any preparation intended for active immunization of the recipient. Until recently, vaccines were prophylactic—their sole objective was preventing a specific infectious disease. They were, therefore, directed against the causative infectious agent. Lately, vaccines have been used against noninfectious diseases. Patients with certain cancers have been vaccinated either prophylactically to prevent the emergence of micrometastatic tumors or therapeutically to boost their immunologic cytotoxic response to the tumor.

Vaccines can have preventive and therapeutic uses. Preventive vaccines allow a vaccinated individual to develop immunologic responses that prevent or modulate subsequent infection or disease. Recently developed therapeutic vaccines use new recombinant DNA technology to provide genetic therapy to patients who already have a disease. The key to using this technology is specificity for tumor cells.

The application of molecular biology to the identification of virulent genes has led to a fundamental understanding of

the pathogenesis of virulent microbes. With the molecular tools of the new genetics, the genes responsible for the organism's virulence can be identified and isolated. The molecular genetic definition of virulence has exciting and highly promising implications for vaccines. Given the side-effects of antibiotics, including the emergence of resistant bacteria, novel strategies for controlling infectious diseases are evolving. One of the most promising strategies, that of using molecular microbiology and whole gene sequencing to develop candidate vaccines, will be the wider use of gene-specific vaccines.⁴

Recent therapeutic vaccines are designed to attack certain chronic infections. Early cancer vaccines had few successes, but with the new knowledge and technology ushered in by molecular biology and medicine, and recombinant DNA technology, anti-cancer vaccines are gaining increasing attention. This resurgence of interest in therapeutic vaccines reflects a new and broadened understanding of the immune system and its elements.

Vaccines have been effective in treating melanomas and renal cell carcinomas, two cancers that are unique in their responsiveness to the immune system. Vaccine therapies for cancer that stimulate the immune system and don't involve surgery, radiation, or cytotoxicity could become the least traumatic mode of treatment for selected cancer patients. A vaccine can activate the immune system by delivering a tumor antigen or by eliciting a nonspecific

immune system response. A nonspecific response would simply boost the activity of the immune system, resulting in greater overall immune activity.

MAGNITUDE AND AREA OF IMPACT

Prophylactic vaccination to prevent cancers caused by viruses would prevent an estimated 850,000 cases of cancer each year, roughly 11 percent of the global cancer burden: examples of these viruses and their secondary cancers are Epstein-Barr virus and nasopharyngeal cancer, human papilloma virus (HPV) and cancer of the cervix, and hepatitis B virus and primary liver cancer. Because cervical cancer is diagnosed in 16,000 women in the U.S. each year, the impact of a vaccine for HPV will be substantial. In addition, a live attenuated HIV vaccine may be a realistic projection by 2005 (or even sooner).

A novel new vaccine against rotavirus, a major cause of childhood diarrheal disease mortality in developing countries, causing an estimated 600,000 deaths worldwide each year, is a live oral rotavirus vaccine. Incorporation of this vaccine into routine immunization could reduce severe rotavirus gastroenteritis by 90 percent.

Could some diseases currently believed to have a noninfectious cause be the direct consequence of an infection by an unidentified or unrecognized agent? If the recent connection of *H. pylori* infection to gastric carcinoma and lymphoma and the putative role of infectious prions with Alzheimer's disease are the prelude to the future, the

answer is a resounding "yes." Among immediate candidates for such an etiologic connection are other cancers and rheumatoid arthritis. By the year 2010, prophylactic and therapeutic vaccines will compete with rational drug design for airtime.

KEY BARRIERS

Advances in vaccine development are contingent upon the same obstacles that must also be overcome in gene therapy: delivering enough of the immune system trigger and to the right cells. Vector development to increase the efficacy of delivery is what vaccine departments at most major pharmaceutical companies are working on now.

Human-subject clinical trials for HIV vaccines will undoubtedly be controversial and politically charged. Traditional approaches to vaccine development, such as "whole killed" or attenuated virus methods, raise special safety concerns with HIV, since a faulty vaccine that actually infects a recipient would have lethal consequences. HIV vaccine research goals may focus on a product that can inhibit progression to disease, or lower viral load in infected persons instead of preventing actual infection.

7. ARTIFICIAL BLOOD

Blood transfusions are given for two reasons: to increase oxygen-carrying capacity and to restore intravascular volume. Intravascular volume can be restored by other fluids, such as crystalloids and colloids, which are free from the risks of transmitting an infectious

agent. Thus, increasing oxygen-carrying capacity is rapidly becoming the *sole* indication for blood transfusions, which in most cases is done by administering packed red blood cells. The only major risk of blood transfusion, assuming the absence of human error in the pre-transfusion process, is transmission of an infectious agent that has eluded detection by the battery of screening tests currently performed before a unit of blood is cleared for use. The principal concerns are the HIV and hepatitis viruses capable of producing fatal or crippling diseases for which no effective treatment currently exists. Availability of donated blood in the U.S. does not pose a problem, infrequent temporary shortages being geographically restricted and short-lived.

Historically, the armed services have tried to develop artificial blood for military use under wartime conditions and in natural disasters. The features of an ideal blood substitute would be ready availability, safety, long shelf life, efficacy, and compatibility across all blood types. Interest in artificial blood peaked in the 1980s because of the seriousness of transfusion transmission of HIV and hepatitis infections.

MAGNITUDE AND AREAS OF IMPACT

Hemoglobin-free fluids carrying dissolved oxygen have been approved for clinical use, but because of their inability to achieve desired oxygenation of tissues, these products have found limited use in practice.

Hemoglobin-containing products have been produced using outdated human

blood or bovine blood. A serious drawback of these hemoglobin products was kidney damage caused by the splitting of hemoglobin into agents which were shown to damage the kidneys. Human hemoglobin can be chemically stabilized to avoid this splitting, and refined blood substitutes based on human hemoglobin are now in advanced clinical trials. The obvious problems are the supply of outdated blood and the risk, although reduced, of disease transmission.

A new company, Somatogen, has produced a recombinant hemoglobin using *E. coli*. The recombinant hemoglobin acts like human hemoglobin, and the synthetic process can be programmed to produce a product with an ideal oxygen-release curve. The recombinant hemoglobin, like stabilized human hemoglobin, has a half-life of 24 hours. FDA approval of stabilized human and synthetic hemoglobin products should have a satisfactory blood substitute widely available by the year 2000. Further refinements of synthetic hemoglobin molecules will lead to a near-ideal substitute for blood by 2010. This fluid will have a shelf-life of one year or greater, obviate the need for cross-match, that is, be a "universal" source of blood, and carry no risk of infection. Such a product will be used routinely for cardiac bypass procedures and renal dialysis, as well as for transfusion.

8. XENOTRANSPLANTATION

Xenotransplantation—the transplantation of cells, tissues and whole organs from one species to another—had its modern beginning in the early 1960s with the transplantation of kidneys from

chimpanzees to six human patients. But these xenotransplants, and later other grafts of solid organs across species, succumbed to immune rejection after brief periods of normal function in the new host. In contrast, allotransplantation—transplantation within species—of bone marrow and solid organs from related and unrelated human donors has become highly successful because of satisfactory, although less-than-ideal, means of avoiding immune rejection, principally by using immunosuppressive drugs and avoiding major histoincompatibilities to the extent possible.

MAGNITUDE AND AREAS OF IMPACT

The number of patients meeting strict criteria for receiving transplants of kidneys, lungs, livers and hearts currently exceeds the supply of suitable donor organs. In the last 10 years, the number of solid organ allotransplants has increased slightly more than 50 percent with the greatest increase being in lung transplants. Over the same span of time, the number of names on the wait list for all organs reached 50,000 at the end of 1996, and 3,500 potential recipients died while awaiting a suitable donor organ. Median waiting times in 1997 approach one year for livers, more than one year for lungs and more than two years for kidneys. In 1997 nearly 20,000 organ transplants are projected: 11,500 kidneys, 4,000 livers, 1,000 pancreases, 2,000 hearts and 750 lungs. Availability of a suitable donor organ poses a particular problem for infants and children because of organ size, and for ethnic minorities because of a lack of suitably matched donors.

As indications for organ transplantation have broadened, wait lists grown, and waiting times for suitable human organs lengthened, research on xenotransplantation has accelerated using the new knowledge and methods of molecular genetics, transplantation biology, genetic engineering and transgenic technology. Current xenotransplantation research is focused on the pig because of its size and favorable biologic factors. The basic strategies fall in two areas: combined transplantation of bone marrow and the solid organ; and modification of the animal serving as the source of the organ. Both strategies are designed to avoid acute rejection. Combined transplantation, considered a high risk but an equally high reward strategy, depends on first successfully grafting the foreign bone marrow into the patient, thus permitting later successful transplantation of the solid organ. The strategy more likely to be successful is genetic modification of the pig using transgenic technology. Introduction of a new gene requires 14 months, but this time will be shortened in the future. The short-term goal will be to use organs from modified pig donors to bridge a human recipient for a matter of months while awaiting a suitable human organ, and this may be possible within the next two years. The use of pig organs as bridges will teach critical lessons essential to the creation of transgenic pigs whose organs can be transplanted for permanent replacement, an ideal that should be attained within 10 years. Humans are presently living with xenotransplants of nervous tissue mechanically transplanted to the brain for the treatment of Parkinson's disease, so the feasibility of

organ xenotransplantation is not far-fetched.

Transplantation of organs has been one of the great medical advances of the century and the one modality that treats a chronic disease successfully by replacing the diseased organ. The present limitation of solid organ transplantation is the availability of donor organs, and for both social and economic reasons, current wait lists do not reflect the true need for organ transplants in our population. The applications of xenotransplantation go beyond eliminating the wait lists for solid organs as they are now used. Chronic conditions, such as diabetes and Parkinson's disease, can be successfully treated with xenotransplants, and xenotransplants of cells and tissues can be used to transfer genes and their gene products for the treatment of genetic diseases, such as hemophilia, and acquired conditions, such as cancer. Pediatric organ transplants could be used in the treatment of congenital heart disease and as a prophylactic measure in the patient with Wilm's disease. The potential is incredible.

KEY BARRIERS AND INDICATORS

The principal scientific concern relates to animal-to-human disease transmission. The pig is known to harbor a retrovirus, but there is no known transmission of any infection or disease from pig to human. In theory, any infectious agent could be bred out of the donor animal, but the threat of disease cannot be dismissed entirely nor can the successful treatment of a transmitted

infection be assured. Preliminary vaccination of the organ recipient is a feasible option that could confer additional protection. Another concern is excessive inbreeding, and one goal of creating herds of pig donors is to use as little inbreeding as possible.

Two issues will need to be addressed: the economic consequences of applying a new technology on a scale that today would seem to be vast but which is not precisely predictable; and the ethical and public policy implications of resource allocation and equity.

TRANSFER OF PROCEDURAL TECHNOLOGIES

Procedural technology refers to the acquisition of a skill, which implies a proficiency that comes from training. Procedure in this sense is the act, method or manner of carrying out some process, such as laparoscopic surgery or coronary angioplasty. Skill, therefore, is to be distinguished from knowledge, which is a state of understanding or knowing. The means by which one acquires knowledge and skill are very different. The acquisition of knowledge has a theoretical base, for instance, adult learning, that is very different from the theory and practice of acquiring a particular skill. Procedural technology further involves a manual component that is missing in the acquisition of knowledge. The point here is that learning about a procedure (knowledge-based) is very different from acquiring the competence to perform the procedure (skill-based).

Technology transfer refers to transferring (teaching) a skill-based procedure *from* the originator or teacher *to* a practitioner, who is otherwise qualified, but lacking the skill required to perform the procedure at some defined level of competence. In the field of medicine, a person who has mastered the skill, but is unlicensed to apply it in the practice of medicine (e.g., an employee of a surgical device manufacturer), may serve as the teacher.

THE PAST

Technological procedural innovations were, for the most part, few, modest, usually incremental and introduced slowly until the very recent past. In fact, three technologies either initiated or facilitated most subsequent procedural advances: the operating microscope, fiberoptic endoscopes, and image-guided intravascular catheters. Judged by the technical complexities of many current procedures, earlier technologies are relatively simple in concept, design and application, and, consequently, they were more easily learned with a short but steep learning curve. Beginning competence often required little more than observing the procedure, learning the fundamentals, *perhaps* practicing on a suitable laboratory animal cadaver and then incorporating the procedure into clinical practice. The fundamentals underlying the procedure, indications for its use, and complications were learned through print, didactic lecture, or both, and in certain courses of instruction this material was presented and learned at a distance, for instance via teleconference, audiotape, or videotape.

THE PRESENT

Newly introduced procedural technology is learned, but not necessarily mastered, during the course of graduate medical education, the level of competence attained by the trainee being related to the volume of cases, the educational environment, and the quality of instruction. Added, or higher level, competencies are often learned in structured postgraduate fellowships and only rarely as an apprenticeship in a nonacademic setting.

The much larger problem is the difficulty of transferring procedural technology to the two-plus generations of practicing physicians who are otherwise qualified, but lacking this particular skill and who want to add the procedure to their practice repertoire. Opportunities for learning to perform the procedure can be structured, such as a course, or unstructured, such as visiting a center as an observer, or watching or assisting a colleague in performing the procedure.

The great majority of courses are sponsored by professional societies, either as part of national professional meetings or as free-standing courses; the former one-half to one-day long and the latter one day or more (typically a weekend). Commercial courses are offered by device manufacturers for the sole purpose of promoting products, like surgical drills, or instrumentation for percutaneous spinal disk removal. Rarely and usually only in courses offered in academic medical centers is proficiency either measured or required for certifications that state that the course was

completed. The new learners attain competence on their own, but learning in this way may take too many cases, with poor outcomes often eluding quality assurance surveillance. Sadly, when the volume of cases is low, the learner may never achieve an acceptable level of competence.

The present situation regarding procedural technology transfer is worsening for two principal reasons: first, an explosion of image-guidance technologies, device miniaturization, computer-based systems and new devices, such as intravascular stents; and second, an oversupply of specialists eager to gain competitive advantage over colleagues by having the "latest and best," usually less invasive, technology.

THE FUTURE

Academic medical centers, in which almost all procedural technologies are conceived, developed and refined (laparoscopic cholecystectomy being a stunning exception), have been caught off guard in two respects. First, the rapid changes in procedural technology were unanticipated, and second, the culture in academic medical centers has placed a much higher value on traditional bench science than on procedural aspects of medical care, and engagement in postgraduate and continuing medical education has been valued even less.

As we enter the next century, increasingly residents will learn to develop complex procedural skills in laboratories equipped with virtual reality technology. Surgical procedures will be planned

and simulated in a work space environment, incorporating robotic-assisted techniques when needed. In effect, learning will take place in a virtual system, and experience in this environment will precede real-life experience that places patients at risk from poorly planned and executed procedures. The outcome will be a graduating resident who has incorporated a new learning paradigm and who at the same time enters practice with a higher level of skill and a template for future learning of newly introduced technologies. These same learning laboratories will have developed and validated methodologies for measuring and testing critical technical skills before awarding a certificate of competence, as opposed to the certificate of course completion of yesteryear. If airlines can train and certify pilots in a virtual reality setting, surely surgeons can, too.

The greater challenge is in procedural technology transfer to practicing physicians. Introductory courses will be offered by professional societies and by manufacturers, but increasingly a public desiring access to the latest procedural advances will demand not only access but also proof of the operator's competence by some voluntary or mandatory certification: the new consumer wants both access and assured quality. By 2010, academic medical centers and many large teaching hospitals will have suites of laboratories for training, testing and certifying physicians in training as well as physicians in practice. Stations equipped with virtual reality simulations will be available, and these same laboratories will use distance learning

technologies to augment and complement laboratory-based learning of particular skills. Funding for these futuristic laboratories will be provided in part by manufacturers, by managed care organizations that have decided to limit performance of a procedure to properly certified physicians, by the learners themselves, and in many instances by grants from federal and private agencies.

Over the next decade, as centers for tertiary and quaternary medicine and surgery become more clearly defined as serving a defined population of patients who require high-end care, national decisions will be made regarding which of the new technologies should be transferred to practicing specialists in the community and which should remain in a major center because of the complexity of the procedure, the infrastructure required to support it, or the relative infrequency of the conditions for which the procedure is indicated. An increasing demand for quality care will reduce, and by 2010, largely eliminate from community practice, most of the high-risk and low-volume procedures, because their consequence is not only care that too often leads to costly complications, but care that also fails the test of acceptable outcomes required by a newly empowered and demanding consumer.

ENDNOTES

¹ Ronchi, E, STI Review, 19:19-44, 1996

² Ibid.

³ Jenks, SJ, National Cancer Institute, 1182-84, 1997

⁴ Moxon, Lancet, 350:1240-1244, 1997

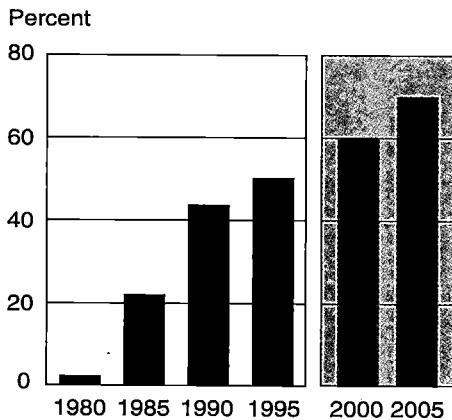
CHAPTER 7: INFORMATION TECHNOLOGY

Will Health Care Join the Information Age?

Over the next decade, health care in the United States will at last be dramatically affected by the revolution in communications and information technology that has been in process for the last 15 years. Most information technologies, which have become a familiar part of the business landscape, are outgrowths of the increased power and reduced costs of

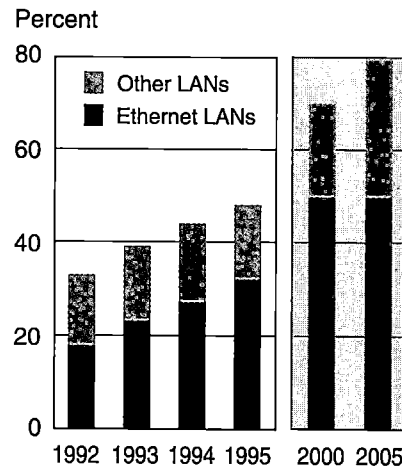
microprocessors and lasers, and the consistent cost reduction in both data processing and computer memory. Indeed, most businesses in the U.S. are now filled with networked computer technologies (Figures 7-1 and 7-2), which have migrated into households in the past five years (Figure 7-3).

Figure 7-1. More and More PCs in the Workforce
(Percent of workforce using Personal Computers)



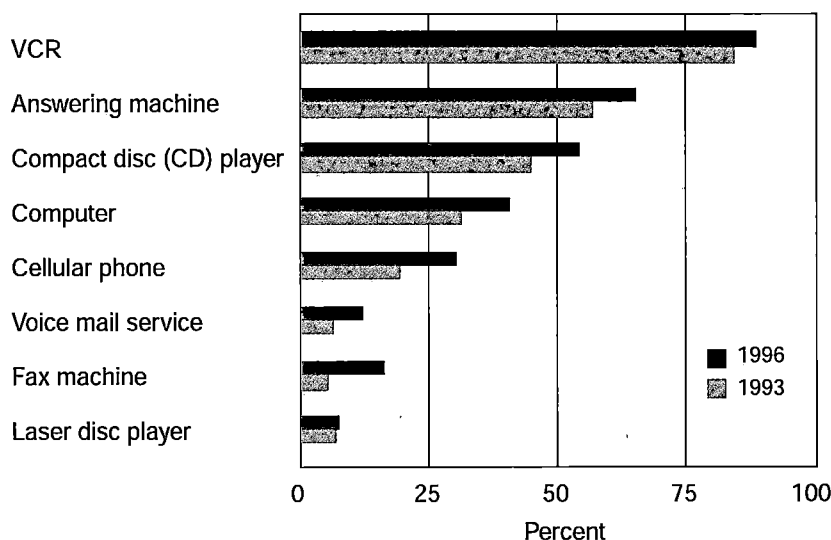
Source: IFTF; U.S. Bureau of Labor Statistics

Figure 7-2. Percent of PCs connected to local area networks (LANs)



Source: IFTF; International Data Corporation

Figure 7-3. Technologies in the Home Take Off
(Percentage of U.S. households with . . .)



Source: IFTF; Louis Harris & Associates

Although spending on information technology will grow to as much as \$18 billion by 1998,¹ the health care industry has lagged behind others in adopting technology-enabled processes, and has not experienced the dramatic changes in practices seen in finance, retail, distribution and other industries. No health care company has used technology to change the way of doing business as dramatically as WalMart has changed retailing, for instance, or Charles Schwab transformed securities brokering. But it's clear that changes in information technology will continue to be one, if not *the*, prime catalyst of health care change over the next 10 years. Can we then expect a shift toward the prevalence of automated customer service, electronic information exchange and real-time data analysis that's commonplace in those other industries? Meanwhile, as

health care tries to assimilate currently—available technologies, new types of information technology, and uses for it, are emerging at a rapid and increasing pace. How will health care adapt to incorporating a host of new technologies over the next decade?

There are two key parts to the answers: the technology and how health care will use the technology. First, it's useful to understand the underlying technologies that will emerge from the cutting edge in other industries and enjoy mass diffusion by 2010. The second is to understand which aspects of health care will be most affected by the technologies.

BASE TECHNOLOGIES

All of the applications and new processes that will change health care's use of information depend on developments in base technologies. The most important underlying technologies are listed below, with brief explanations of what they do and what developments are likely.

- *Microprocessors.* The "brain" within computers that executes their functions. Moore's Law suggests that, as has been true for 30 years, microprocessors will continue to double in power every 18 to 24 months. This means that by the end of the next decade, personal computers will have a processing capacity some 30 times faster than they do today, and powerful processors will be found in virtually every manufactured product including clothes, furniture and buildings, as well as cars and con-

sumer electronics. Medical devices and information systems will also benefit from increased processing power.

- *Data storage.* Enabled by the development in the late 1980s of the communications laser—the key to both compact disks and large-capacity optical storage systems—data storage capacity has fallen in price to the point where technology planners believe that it will soon be nearly free. Consequently very large data sets, such as entire film outputs from years of MRI use, can be captured and stored. Those files are then accessible for searching, processing and analysis.
- *Software tools.* Software is the instruction that enables processors to perform their tasks. Programming software has been a specialized operation, but increasingly the tools to create software are simpler and more fault-resistant. The ease with which World Wide Web pages can now be created by amateurs, where, just five years ago it took training in computer programming just to use the Internet, is a taste of this shift. In the future, object-oriented software will potentially eliminate the need to write code, allowing computer operators to change applications.
- *Networking and data compression.* Networks that enable information transfer between computers have exploded in prevalence and utility. With a combination of higher bandwidth networks, and new techniques in compressing data so that more information can be saved in the same amount of computer storage, larger amounts of data will be transferred at higher speeds among more users. Health care providers, especially radiologists and others working together on large-image files, will benefit from this trend.
- *Information appliances.* The most common information appliance is the computer, but increasingly the components and functions of computers will appear in telephones, televisions, and other hand-held devices. The class and number of information appliances will accelerate dramatically.
- *Intelligent agents* are software programs that find and retrieve information over a network that is likely to be helpful to an end user, even though the user doesn't know where it's coming from. Current intelligent agents are somewhat crude, but over the next few years their filtering and retrieval ability will increase dramatically.
- *Security and encryption.* The transmission of medical and financial information will depend on the full distribution of encryption technologies that enable secure transmission of data. The underlying technology for encryption is fast developing, but the procedures ensuring that all transmissions are secure will be difficult to implement.
- *Internet and the World Wide Web.* Although the Internet as we know it

will scarcely be recognizable in a decade's time, its current incarnation provides a common format for viewing, exchanging and transacting information of all kinds that is transferable between different computer systems. In particular, the volume of transactions (as opposed to the simple one-way sharing of information) conducted over the Internet will increase dramatically.

- *3D Computing.* Data visualization is the use of computing to represent huge volumes of data in three dimensions on one computer screen. The ability to move, shape and analyze the data in ways that support decision-making will enable managers to view activities, classes of transactions, and entire organizations in whole and in detail at the same time.
- *Databases.* A new class of both relational and object-oriented databases will increase their capacity to store, present, sort and analyze data over the next decade. Even though these new database systems will be incompatible with older "legacy" databases, a considerable amount of older information will be extracted from those databases using techniques called "data warehousing" and "data mining."
- *Sensors* are devices, such as digital video cameras or blood pressure monitors, that can be used to connect the real world with computers. The key change of the next decade will be the fall in cost of sensors enabling them to become an integral part of

many computing devices and information appliances. Their great diffusion will allow the monitoring of events that previously went unreported or were very costly to track.

- *Expert systems* are computer applications programmed with a set of rules that codify experts' assessments of particular situations. The combination of that knowledge with informational inputs allows them to suggest options and outcome probabilities. They can support humans making all kinds of decisions, including medical interventions.

Given the progress made so far, and the massive international commercial investment in information technology R&D, we can expect continued rapid advances in and diffusion of these basic technologies over the next decade. For health care, which has been behind the curve, both the application of currently available IT and the development of new technologies will combine to cause dramatic change.

THE ISSUES: THE DIRECTION IS CLEAR, THE PACE UNCERTAIN

While it's possible to imagine some incredible impacts of information technology on health care, the implementation of new information systems is a task barely begun. There are all kinds of organizational, financial and educational barriers preventing adoption of different technologies, and all kinds of difficulties with their use when they are adopted. Several major proposed information-system ventures in health care

have failed, particularly on the clinical information systems side; the planned exchange of information over dedicated local networks (like the Community Health Information Networks [CHIN] of the early 1990s) also went nowhere despite much effort. The next decade will see much greater change than in the last. But we need to be clear what we're defining.

Information systems in health care are used for administrative, clinical, and financial purposes. Most systems have elements of all three activities, but administrative and financial transactions are already much more automated than most clinical ones. For example, about half of all claims are sent electronically, whereas well under 5 percent of physicians use computers to record clinical

information for an average patient. A similar difference exists among hospitals using computer systems to automate their admission and registration, but paper charts to record nursing activities. The adoption of electronic transactions varies dramatically by sector for the same type of transactions, with physicians' offices typically being the least automated (Figure 7-4).

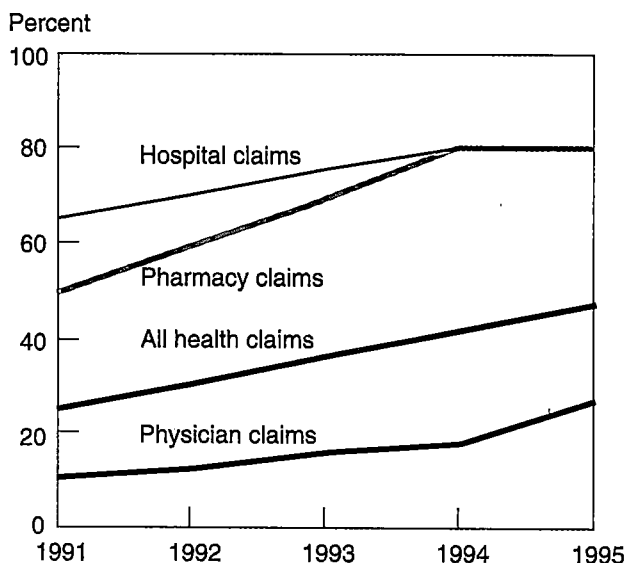
Given that information systems will be used to convert health care from recording on paper to recording with electrons—but at a different rate depending on the activity and organizations—there are some key questions: How fast will the diffusion of different types of technologies be? What kind of organizations will use what type of technologies and for what purposes? Who'll pay for them and who'll benefit? While there will be no part of the health care system that doesn't see change caused or enabled by information technology, we believe that four major areas will see the most impact.

THE FORECAST: FOUR BIG IT DEALS IN HEALTH CARE

Although health care will use information technology in a variety of ways, we think the most important impacts will be in four main areas:

- process management systems
- clinical information interfaces
- data analysis, and
- telehealth and remote monitoring

Figure 7-4. Electronic health care claims pick up the pace
(Percentage of electronic claims by source)



Source: Faulkner and Gray

AREA ONE: PROVIDER AND PLAN MANAGEMENT SYSTEMS GO ELECTRONIC

The first major area where information technology will affect health care is in the automation of basic business processes between providers and intermediaries and their customers. These processes include provider network contract administration, communications between different organizations over administrative issues (such as patient eligibility and claims submission), and the business and medical protocols used in customer service centers. These developments are occupy the broad category of "electronic commerce."

Electronic commerce is being encouraged by cheaper and more flexible technologies, such as transactions conducted over the Internet and other open and cheaply accessible computer networks. But the major driving force in its adoption in health care is the combination of mandated standards for electronic data exchange and the regulatory incentives to use them legislated in the 1996 Kennedy-Kassebaum Act (officially known as the Health Insurance Portability and Accountability Act [HIPAA]). In the next three years these new standards will be implemented, and the economic and regulatory incentives to adopt them and use the electronic transactions they allow will be overwhelming.

We can expect several prominent functions to be mostly performed electronically by the early years of next decade. These include claims submis-

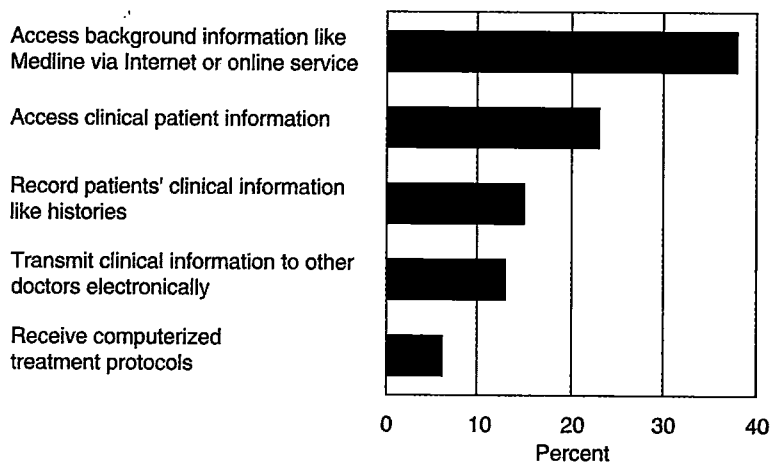
sion, eligibility verification, coordination of insurance benefits between providers, utilization review and pre-certification, materials management, pharmacy claims and utilization review and receipt of lab tests. So the technology-enabled processes that manage the everyday interactions of health plans, providers and patients will change dramatically, and quite soon.

These administrative links between providers and plans will be complemented by better use of computing and telephony links between plans or providers and their members and payers (including employers). Telephone-based customer service centers (with human staffs) are likely to remain the largest single example of this interaction, but other links will be symptomatic of this convergence of technology and process; these include automated enrollment using interactive voice response (IVR) or the Internet, administrative information and health information delivered by a combination of phone, mail and computer, and even the development of online insurance markets. These secondary electronic commerce developments will become mainstream during the years after 2005.

AREA TWO: CLINICAL INFORMATION INTERFACES FOR CLINICIANS

The electronic medical record (EMR) has been an elusive promise of technology for at least a decade.² The concept is that all medical information about a patient should be stored electronically, be accessed whenever, wherever and by whomever needs it, and that data need

Figure 7-5. Which clinical functions do physicians perform with computers?



Source: Health Care Outlook Physicians Survey 1997, Louis Harris and Associates; IFTF

be input only once. That information system would close the loop back from the patient to the physician, pharmacist and case manager, allowing medical management in real time (rather than retrospectively). This ideal would require ubiquitous use of information technology. But as Figure 10-5 shows, by 1997—more than 10 years into the PC revolution—few physicians use computers in their everyday clinical practice, and even those few do so irregularly.

Nonetheless, many of the components that would support an EMR, such as databases, networks, and computers, are being put into place. Meanwhile the past few years have seen the development of sophisticated software tools that support clinical practice. What has been missing to jumpstart the EMR is an easily useable interface that helps clinicians get information into and out

of computer systems as fast as they can into paper, or that at least gives them a payoff for investing in the system's use.

Over the next decade, ubiquitous information appliances, sophisticated decision support systems and voice recognition will create interfaces with computing systems that are much more clinician-friendly. Consequently, we're likely to see more input of clinical observations into electronic databases, and more information being fed back from these systems to clinicians at the point of care. The clinicians' interface will link to most areas of health information systems, but will follow a close codevelopment with aspects of clinical databases and analytical tools. So we will be moving incrementally closer to an EMR.

The rate of change toward prevalent use of the EMR will depend on the economics driving the adoption of these systems, which currently can cost up to \$50,000 per clinician. While the price of the systems will fall, the majority of the actual cost of their introduction is in the implementation and education required. Currently the initial training alone is estimated to be at least 48 hours per physician.³ Of course there are advantages of using electronic medical records that are also measurable in cost terms, including faster access to data, lower rates of re-testing (in the case of when original results couldn't be found) and often more accurate care (as in the case of fewer adverse drug reactions).⁴

Both the increased importance of nonphysician clinicians and the fact that

younger physicians have greater experience with computers will drive this increased use of clinical information technology. Many health care organizations are also developing into an economic size and type that gives them the financial and management resources to automate clinical activities, and many organizations have announced plans to implement clinical information systems for clinician use. Their reasons are partly because of pressure from intermediaries and end-payers for better reporting, and because of a belief that improving the clinical process will give them a competitive advantage in the future. The economic value of automating the clinical process will drive its adoption particularly in reimbursement environments that reward lower costs, such as capitation.

In order to encourage physicians to use this technology, more effort will focus on finding ways to educate and encourage physicians to change their behavior. The pursuit of that goal will lead to greater study of the clinical decision-making process as a whole and how best to use information technology to influence decisions at the time they are made.

However the dissemination of clinical information systems into the daily practice of clinicians will be a slow process. Clinicians will start to use computers more as part of their regular work, including accessing and recording patient information, usually in a hybrid paper/computer approach. But the ideal of the EMR will not come about so easily. A number of other information

systems challenges (such as the year 2000 problem) distracting organizations, a lack of capital, and continued resistance from clinicians will mean that only a low percentage of physicians and clinicians will be conducting their practice using fully computerized medical records until later in the next decade.

Within the move toward information systems that clinicians can integrate into their daily work, two models are developing for the future EMR. One will focus on giving clinicians access to clinical information, such as lab results, transcripts, and demographic data, that's currently already available over information networks. These systems will accept physicians input in any way they can, including voice, handwriting scans, and free text. These systems will concentrate on presenting as much relevant data to the clinician as possible, and getting this implementation widespread quickly.

The other approach will also try to provide this data but will go the extra mile to have physicians input their notes in a structured format, either using check boxes or menus, or allowing them to type and use natural language processing technology to codify and assign values to their words. The idea is to capture and analyze their clinical assessment of patients, as that's where much of the most valuable information resides. The codifying of that clinical assessment will allow better analysis for outcomes studies, provider profiling, and eventually, assessing the value of interventions in close to real time—potentially changing the model of how

information about clinical practice is disseminated. This model demands far more involvement from clinicians and more resources from their organizations, and will probably diffuse more slowly. After next decade, these EMRs may include expert-systems that support clinicians' decision-making, and incorporate many of the analytical tools now being developed on the database side discussed in Area 3 below.

AREA 3: DATA ANALYSIS AND OUTCOMES ASSESSMENT

The analysis of all types of health care data is a growth industry. In the next few years, more data will be collected from diverse input sources, including clinicians, patients, other clinical data sources, and administrative and claims data systems. We are already seeing improvements in the ability of databases and data-warehouses to store and link disparate data streams; likewise, the ability of analysts to visualize and deconstruct complex data sets is improving. Both data-mining and database design will improve dramatically in the coming decade, but the most important aspect of this technology will be sophisticated data manipulation. Two related trends in data manipulation are likely to emerge from this core technology, both involving attempts to better understand the impact of clinical interventions and in particular how clinical interventions affect outcomes.

Shorter term, a great deal of effort will be aimed at pulling clinical information from what are largely administrative data sets. A new group of sophisticated

"data jockeys" will give plans and providers the tools to learn much more about patients' clinical outcomes from particular interventions. This trend will lead to:

- Better decision support for internal and competitive analysis, which will be aided by improved computing that allows 3D visualization of complex data sets.
- Better understanding of patients' likelihood of future illness.
- The ability to adjust payments to plans depending on the relative risk of illness of an enrolled population. This "risk adjustment" will be based in part on a much wider use of patients' self-assessment to understand their own health status.

Medicare will start to use risk adjustment algorithms to change the amount it reimburses health plans after 2000, at which point the importance of data analysis will increase. Those attempting to understand the costs of care for their patients with different acuity levels won't merely be seeing theoretical savings down the road, but will instead have to manage the care they deliver in order to receive those savings. So we expect dramatic growth in this type of analysis—data mining is now being used by retail companies, computer marketers and professional basketball teams—in medical care by the year 2002.

Longer term, more codified and analyzable clinical data will be available

directly recorded from the clinician and patient interface. The data will probably include patients' genetic information and will enable not only greater understanding about patients' experiences and outcomes, but provide a better tracking of who—both clinicians and patients—is performing well or badly. The emergence of online analytical processing (OLAP) will enable analysis in close to real-time of the key questions, such as what was the result of a particular intervention. This is in contrast to the retrospective analysis that's (partially) done today, and will be an addition to (as well as an advance on) the analysis based on data mining of administrative data sets described in the previous paragraph. However, analytical processing of clinical data will not be more than a fringe activity until a majority of clinicians are using electronic medical records. That'll take several years and not be prevalent until well after 2005

Some of this data analysis will be made publicly available through regulatory agencies, and bodies like the National Committee on Quality Assurance (NCQA) which accredits health plans; consequently the ability of more organizations and individuals to access information about the type and quality of care provided will increase later in the next decade.

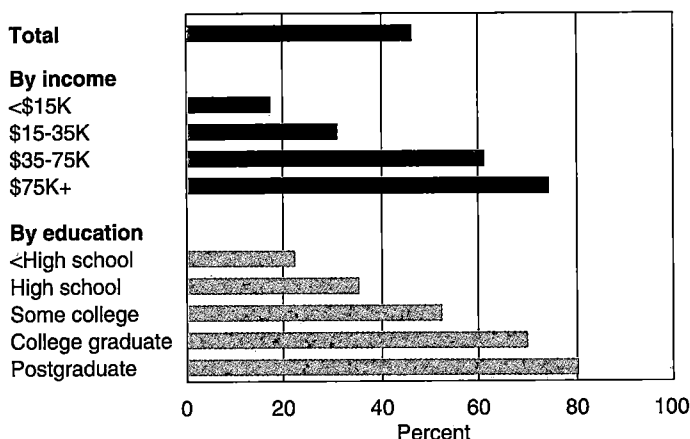
AREA 4: TELEHEALTH: REMOTE CARE, COMBINING CASE MANAGEMENT, PATIENT INFORMATION SYSTEMS, AND REMOTE MONITORING

In the longer term, the impact of all these technologies will be greatest on patient care. There are three main trends that will converge in their use of interconnecting technologies to provide remote care. The trends are case management, patient information systems and remote telemetry.

CASE MANAGEMENT GETS AUTOMATED

Plans and providers will use automated techniques to case manage patients. Most use of case management will concentrate on the process of disease-state or chronic-care management. Disease management organizations, whether providers or intermediaries, will use protocols, clinical information, software and infrastructure that have been developed to support that process. The protocols will make use of mathematical models that assess appropriate treatment for specific conditions and data collected on individual patients.

Figure 7-6. Technology in households is mostly for the wealthy and educated
(Percentage of U.S. households with PCs by education and income)



Source: IFTF; Louis Harris & Associates

The data will be manipulated both to improve the treatment options of the individual patients and to add to larger databases. Case managers will use medical records and protocols to track and assess treatment patterns, and the growth of call centers will help deliver that information to patients.

EMPOWERED PATIENTS GET "INFOMATED"

Some of the same technologies that providers will use for medical management will also impact patients independently. Patients will use them for a variety of health information activities that will include shared decision-making, psycho-social support groups, disease-specific information research, physician and provider assessment, information about alternative medicine, and patient self-care support tools, such as software that tracks diet and treatment regimens. Patient empowerment via information-gathering will center around the use of Internet and other use of online services, interactive voice response, CD-ROMs, and video and television, including video-on-demand over cable and satellite networks.

Most of the activity already happening in this area has been patient-inspired and somewhat anarchic in nature. That won't change anytime soon; but there will be significant entry of plans, providers and other actors into this arena who will try to impose a more structured use of information sources so that they can guide and track the treatment of their patients.

One problem we foresee is that the chronically ill and elderly tend not to have the necessary technology in their homes. Figure 7-6 shows that while 46 percent of American households had computers in 1997, they were much more likely to be in households with higher incomes and better educations, (and therefore lower ages and better health status). Our forecast is that by the year 2000, 50 percent to 55 percent of American households will have appliances with processing power equivalent to a PC, and that by 2005, 65 percent to 70 percent will have them. So there's also a significant possibility that America's information have-nots will not get access to the services associated with these technologies. 1996 surveys of Internet use³ show that fewer than 5 percent of Internet users were 55 or older (27 percent of Americans are in that age category). Further, in 1996 16 percent of Americans over 65 had home computers, but only 6 percent of those over 65 had accessed online services, and that share was even lower for the 55- to 64-year-olds.

This will be an area of public policy contention in the next few years, and possibly of some market activity, as manufacturers get the capacity to use Internet-like services into lower cost devices such as network computers, game machines and televisions, and these become affordable for everyone. If these appliances can be used for accessing online information, there's no reason to believe that they won't be nearly as common as color TV, with more than 95 percent of households having the processing and communications power

of a current top-end PC by sometime not long after 2005.

SENSORS BOOST REMOTE TELEMETRY

The final piece of the puzzle needed for remote care to really take off is the monitoring function that connects the case managers to the patients. While education and self-care is a necessary component that will be facilitated by information technology, clinical assessment of patients has to this point required that they be at a medical facility or attended to in their own homes by expensive labor. But a new type of technology is becoming available that will enable a revolution in remote care because it will provide the capacity for remote telemetry. The technology is the sensor, which converts analog (real-life) signals into digital format, which computer systems can understand and therefore report on and react to.

The sensors that are being created for automobiles, video cameras, and all manner of other electronics, will become cheap enough to drive their adoption in medical devices. Examples of how sensors may be used in remote telemetry include: monitoring vital signs with wireless heart monitors; the integration of digital signal creation by wireless (or intermittently wired) respiratory meters, blood pressure cuffs, blood glucose monitors, and the like, with patient, plan or provider information systems; and alerts from pharmaceutical dispensers that a needed pill hasn't been taken. At the back end of all these devices will be a link into the software for disease management or provider information

organizations that will analyze, report and react to abnormal results, or the absence of them. This in turn should ensure appropriate follow up (for instance a visit from a nurse) in more cases, and better use of resources.

Inventing new ways of getting these technologies and the networks to support them into homes and smaller medical facilities will be an area of focus over the next ten years. But it'll be one in which health care can ride on the back of other industries, notably entertainment. As well as the pursuit of monitoring the chronically ill, who tend to be high resource users, similar technologies will be used for patient self-monitoring, including reporting results back using phone or computer—typically for those with less severe chronic conditions. For instance, lab testing will become increasingly decentralized. Advances in self-diagnosis using small, portable testing devices and immune assays will also be increasingly important. An example might be the “smart toilet,” a very simple-to-use device that tests for problems in the digestive-system. Results from these devices will be captured in computer systems and monitored in a similar way to the more active telemetry.

CONCLUSION

The four areas we've described are not the only aspects of information technology that will impact health care.⁶ But the four areas we've defined—process management systems, clinical information interfaces, data analysis, and remote monitoring—are dominant themes that

will encapsulate a great deal of the change that information technology will bring health care. But it will not be an equal progression. The advent of electronic commerce will transform administrative processes in the next few years, and the new ways of administration will be ubiquitous by 2007. While great strides will have been made in other areas, the use of information systems by clinicians as an integral part of their work—the key vision of the electronic medical record—will only develop in the latter part of the next decade, and will not be complete by 2010. However, the use of information systems will change the patient role and the case manager intermediary role in the next 10 years. Patients will become more informed and involved in their own care plans, and those responsible for medical management will use IT extensively to assess cases in real time. Physicians will adapt their practice to adjust to this, but at a slow pace.

The adoption of technology will depend on the ability of health care organizations to set aside capital for investment, and therefore depends on the ability of those organization to become more like other types of corporations. While health care is moving in this direction (e.g. growth of physician groups), it will remain a fragmented industry that, as it consolidates, will struggle with the adoption and deployment of information technology. So the use of IT as an enabling driver to change health care will not really be felt until those consolidated organizations are more stable, after 2005. By that time, the cost of the more complex clinical information

systems will have fallen to the point that its widespread adoption need not be put off for economic reasons. After that the vision of an information-intensive industry using information technology for consumer friendly, high quality and low cost patient care can become a real possibility.

WILDCARDS

- With a new generation of software and hardware, diffusion of clinical information technology happens fully in the next three to five years. The EMR becomes commonplace, patients records are standardized and the clinical care process dramatically improves.
- Federal legislation on privacy of patient information stops the ability of health care organizations to electronic share health information. The development of EMRs and even much exchange of administrative information with clinical components starts to fade.
- Early large-scale implementation of information systems to support and case manage the chronically ill show no cost benefit advantages compared to traditional low technology care. Given the cost of system installation, the development of home monitoring and case management remains in its current embryonic state.
- The year 2000 problem creates a major systems crisis, with much more serious consequences than had been anticipated spreading to almost all

equipment in health care. Through the years 1999-2001 almost all staffing resources have to be re-deployed to sort out current systems, delaying all other advances in information technology to much later in the decade.

- The spread of information technology to consumers is very rapid. By 2005 all patients have access to as much information as medical professionals. Substantial numbers of these infomated patients reject physicians and plans and become their own care managers. Alternate care providers, physicians, pharmaceuticals and facilities all lose their professional status and/or become commoditized as consumers use them as undifferentiated suppliers.

ENDNOTES

¹ This is Sheldon Dorenfest & Co's estimate. Ann Gallo of Alex Brown and Co estimates that it is closer to \$22 billion (personal communication). RL Johnson and Associates believe it to be much smaller (\$5 billion) although that only includes providers' spending on IT.

² In its 1991 report the *Computer-based Patient Record*, the Institute of Medicine listed areas of technology that, when all integrated, would comprise a Computer-based Patient Record (CPR). The technologies included databases and database management systems, workstations, data acquisition and retrieval, image processing and storage, data exchange and vocabulary standards, and system communications and network infrastructure.

³ See Krall MA *Proceedings of Annual Symposium of Computer Applications in Medical Care* 1995;:708-711 for a generally positive description of the implementation of the Epic EMR at Kaiser NW

⁴ see Bates DW, Cullen DJ, Laird N, Petersen LA, Small SD, Servi D, Laffel G, Sweitzer BJ, Shea BF, Hallisey R, et al: Incidence of adverse drug events and potential adverse drug events. Implications for prevention. ADE Prevention Study Group *JAMA* 1995 *Jul* 5;274(1):29-34. This describes the problems with drug interactions and other mistakes that Brigham and Womens Hospital more or less eliminated by switching to a computerized ordering system. See also Anderson JG,

Jay SJ, Anderson M, Hunt TJ: Evaluating the potential effectiveness of using computerized information systems to prevent adverse drug events. *Proceedings of AMIA Annual Fall Symposium* 1997;9:228-232

⁵ The O'Reilly-Trish Internet Survey and the CommerceNet/Nielsen online survey

⁶ For instance, telemedicine today is a fringe activity in which physician consults occur over dedicated videoconferencing facilities. This will stay a fringe activity but some telemedicine will transmute into the use of groupware (computer communications) to share information between care teams, and the use of online environments for collaboration between clinicians. In another example, the production of digital signals from imaging equipment will dramatically increase radiologists ability to use computers to analyze and abstract information from x-rays, MRIs and other imaging devices.

CHAPTER 8: HEALTH CARE CONSUMERS

Tiers of Access, Security and Empowerment

We define “health care consumers” as anyone who receives or has the potential to receive health care services, regardless of whether or not they pay for those services directly. Although employers and government, not health care consumers, are the most frequent purchasers of health insurance and thus pay for a great deal of the care provided, we will discuss them in this chapter only in the context of their effects on the impact of individual consumers on the health care system.

Consumers are more actively engaged in their own health care than in the past. Up until the mid-1980s, health care consumers in the United States generally had been passive recipients of care: most patients submitted to whatever procedures a physician recommended, and most were happy to let the system take responsibility for decisions about their care. By and large, mainstream Americans revered doctors and trusted them—a culture sustained by the large information gap between highly educated doctors and the average patient. It was a gap further reinforced by doctors’ political and economic power.

Patient impact was also reduced by the fact that employers and government, not patients, were (and still are) the purchas-

ers of health care for a majority of working adults. Employers typically offered little choice among health insurance plans to their employees, making it difficult for patients to “vote with their feet” if they were dissatisfied with their coverage. Yet because traditional indemnity plans allowed free choice of provider, and employers and government generally provided health care coverage as a defined benefit with low out-of-pocket costs, consumers’ lack of plan choice did not seem to affect their care or their pocketbooks much, keeping dissatisfaction low among insured consumers (Figure 8-1). The uninsured have made do with limited coverage from safety net funding streams and providers (a mix of public institutions and private charity) and have not had many advocates to speak for them. Although insured consumers and their advocates have had some impact on insurance legislation over the years, they have had little impact on the delivery of care. Their legislative voice has been muted, in part because they haven’t had many big issues to complain about.

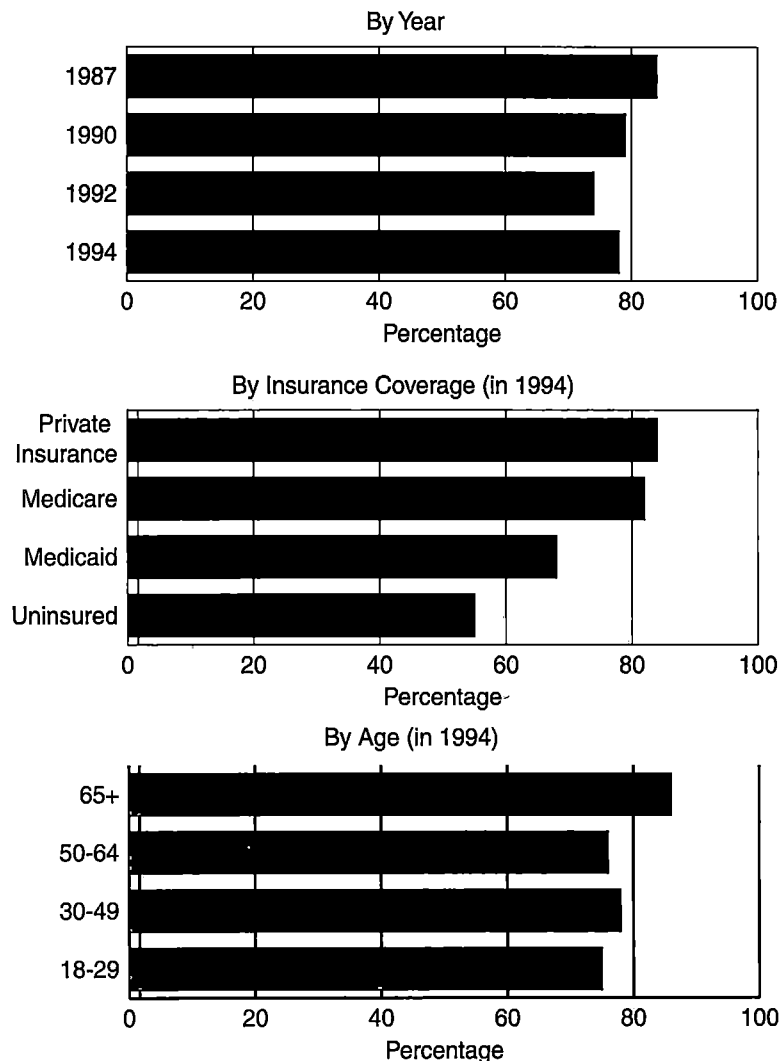
As a consequence of these three factors—a culture of physician respect and power sustained by an information gap; employer- and government-mediated purchasing; and defined benefits with

free choice of providers—consumers have had relatively little effect on the organization of American health care. Up through the 1980s, providers (mostly hospitals and solo practice or small group physicians), health care plans, and purchasers (mostly employers and government) controlled how and

where care was provided, who got it, and how much it cost the individual out-of-pocket (in premiums, deductibles, and most recently, copayments). Individual consumers adapted to the system.

That picture is changing. As a new, more educated and informed generation

Figure 8-1. Consumer Satisfaction: In the Past, No Major Complaints—for the Upper Tiers, at Least
(Percent “very satisfied” or “somewhat satisfied” by: year, coverage, age, OOP costs, education, and income)



continued

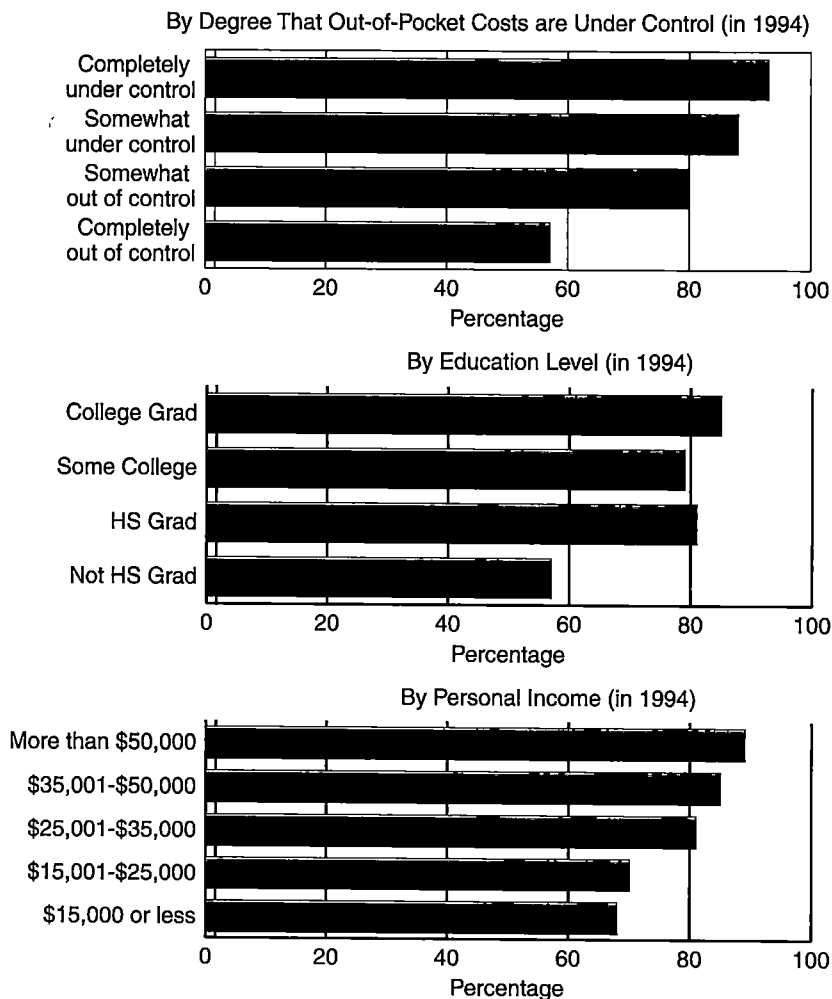
of baby-boomer consumers moves through the system and reaches the age where they use more health care services, a new culture of assertive skepticism is replacing the old culture of passivity and respect. A rapidly growing subgroup of "new" consumers is trusting plans and providers less, demanding more infor-

mation and choice from providers and plans, engaging in more self-care and self-management of disease, and showing more interest in sharing their health care decisions with providers. These are the key modes of consumer empowerment in the health care arena.

As baby boomers reach the age of more-frequent doctor visits, employers are beginning to pass more health care costs to employees, often by replacing defined benefits programs with defined contribution programs—thus potentially weakening employer mediation of consumption. The managed care revolution, triggered by escalating national health care costs, has limited consumer choice of providers and forced them to negotiate a thicket of primary care gatekeepers, access charges for specialists, and triage nurses on telephones to get the care they need. Combined with rising out-of-pocket costs, these limits have given the new, more informed and vocal consumers something to complain about. Change in the consumer role is definitely in the wind.

Will the historically supply-driven health care market soon be forced to grapple with consumer demands? Will such changes be large and noticeable by 2010, or only incremental? To answer these questions, we need to know which consumers are likely to drive change the most, what changes they are likely to push most quickly, what forces will resist them, and what impact the changes are likely to have on providers, purchasers, and plans. Will the overall impact on the system within the coming decade be striking, or a yawn?

Figure 8-1, continued



Source: Louis Harris & Associates Survey, 1994

THE THREE MODES OF EMPOWERMENT

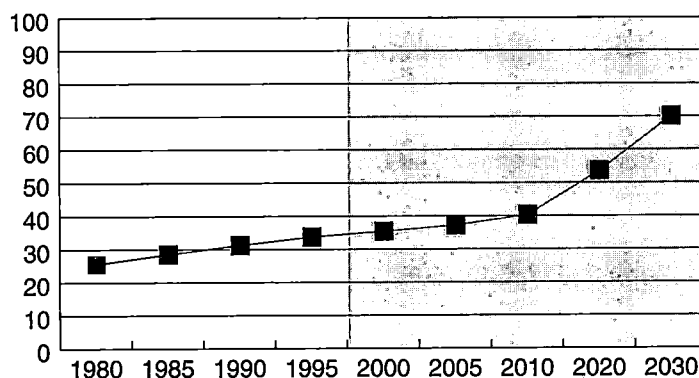
Informed Choice of Plans and Providers: The combination of employers' shifting to defined contribution programs and the increasing openness of provider networks available through plans will lead to a greater range of choices of providers and plans. Consumers will demand more sophisticated and comparative information about plans and providers to help them make these increasingly complex choices.

Self-Care and Self-Management: Increasing consumer access to medical information formerly known only to providers, combined with improved remote sensing technologies, will facilitate greater patient involvement in their own health care, including preventative care (e.g. improving diet and lifestyle), treating acute episodes at home, and helping manage the course of their chronic diseases.

Shared Medical Decision-Making: Improved medical record systems and increasingly sophisticated decision-support tools will facilitate patients' ability to understand complex medical decision-making processes and become more active in choosing treatments that match their preferences and values.

THE AGING BABY BOOMERS

Figure 8-2. Population that is Over Age 65, 1980-2030 (Millions)



Source: U.S. Bureau of the Census Statistical Abstract, 1996

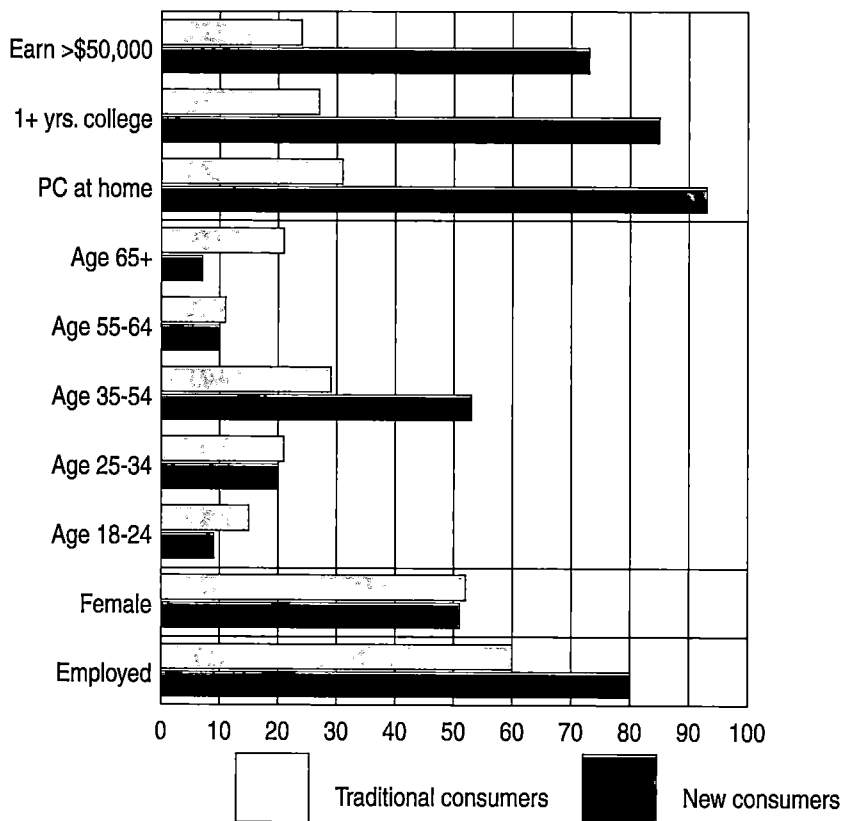
Baby boomers make up the generation born between 1945 and 1964. The first baby boomers to turn 65 will do so in 2010. The percent of the population that is over age 65 has been steadily increasing in this century, but the baby boomers will drive that percentage sharply higher. Over the next 13 years, the baby boom cohort will move into its 50s and begin to experience more chronic and severe illnesses. Those who are "new consumers" will be a particularly strong voice for change.

THE NEW CONSUMERS: WHO ARE THEY?

We define new consumers as people who have at least two of the following three characteristics:

1. Discretionary household income of \$50,000 or more (in constant 1995 dollars)
2. At least one year of college education
3. Experience with information technology (e.g., owns a PC)

Figure 8-3. Characteristics of Traditional and New Consumers



Source: Louis Harris & Associates Survey, 1997

To get at the answer, we first identify the three tiers of coverage into which consumers currently fall and the key issues facing each tier. We then forecast the changes most likely to occur in each tier and their implications for the system. We also take a look at some wildcards and identify a few emerging consumer needs that health care services may be able to fill in the future.

THREE TIERS OF HEALTH CARE CONSUMERS

Although legislators frequently hold up the ideal of a one-tier health care system, plans requiring major redistribution of resources have not been well-received in Congress or by the public. In reality, three tiers exist. The first is the rapidly growing group of Americans who lack access to the main system and are served largely by an increasingly tattered safety net because they are either uninsured or on Medicaid. (Currently the number of uninsured is about 42 million when measured at a single point in time; about one-quarter of these are children). Second are those working Americans whose benefits are insecure because of threats to their jobs (due to restructuring or ailing industries), low re-employability, employer benefits cuts, restrictions on providers and treatments, or potential inability to pay the insurance premiums passed onto them by their employers. The third tier is made up of the very wealthy and the more securely employed, who have fewer restrictions on their care. The current system thus consists of a disenfranchised bottom tier (the excluded consumer), an insecurely enfranchised middle tier (the worried

consumer), and a securely enfranchised top tier (the empowered consumer).

An alternative way to define the three tiers would be by the continuity of their insurance — to look at who is continuously insured, insured on and off, and continuously uninsured during a given period. If we examine the two years between 1992 and 1994, we find about 73 percent of Americans were continuously insured, 30 percent lacked coverage between one and 27 months, and 5 percent were continuously uninsured. These three groups were further divided along ethnic lines: in the bottom two groups combined, 49 percent of Hispanics lacked coverage for a month or more, compared to 36 percent of blacks and 23 percent of whites.

The problem with using continuity of coverage as a means of defining the tiers is that many who are continuously insured are nonetheless worried about either the stability or the flexibility of their benefits—they experience job insecurity, or their employers threaten to cut benefits or pass benefits costs on to them, or they worry that managed care may limit their ability to obtain the kind of care they need. Furthermore, some of them have only very limited coverage, including those on Medicaid.

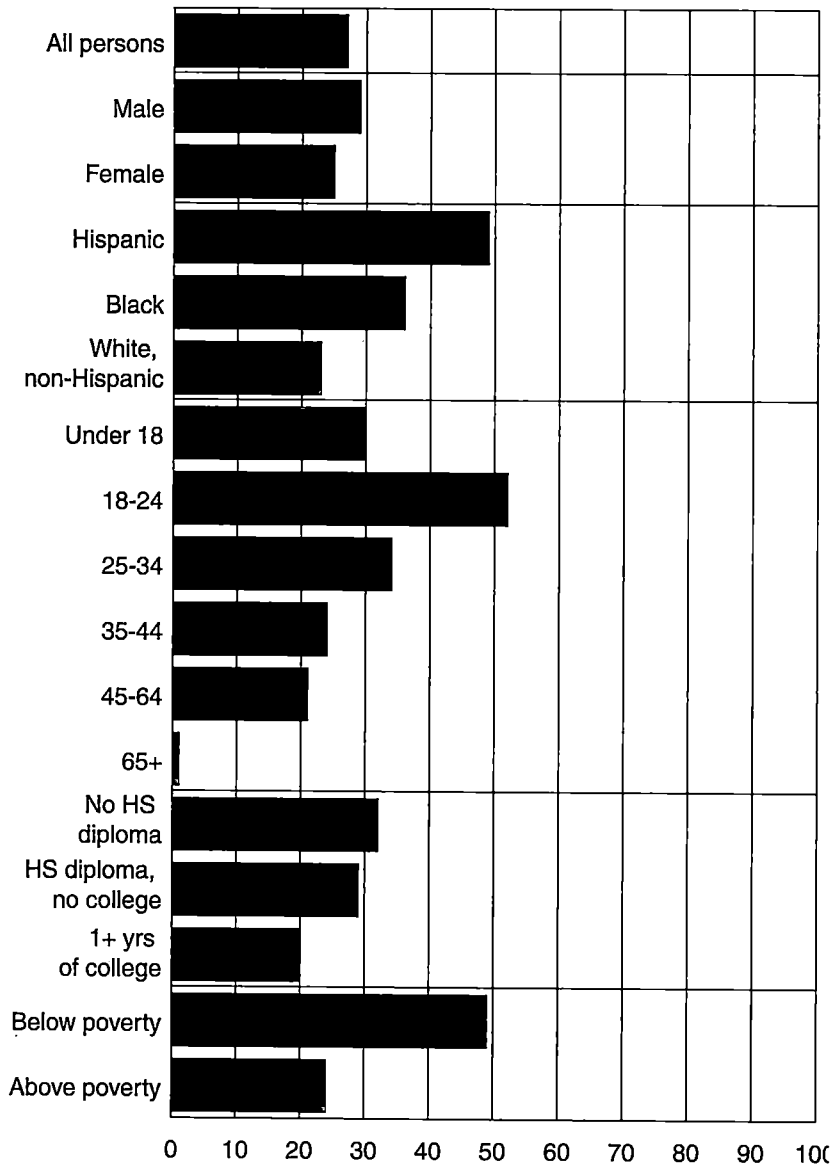
Hence we have chosen to define the three tiers by the degree to which their benefits are adequate and perceived to be secure. Although we recognize that a fair amount of movement goes on between the bottom tier and the middle tier, and between the middle tier and the top tier, the three tiers themselves persist.

The consumers most likely to become empowered in the coming decade are the new consumers. The new consumer group is mostly composed of people with at least one year of college education. Because education, income and experience with information technology are closely linked, most of the disenfranchised bottom tier consists of traditional consumers. Significant segments of the middle and upper tiers, however, are new consumers, including a large proportion of the baby boom generation.

In other sectors of the economy such as retail and banking, the new consumers have already initiated a revolution in the way goods are purchased and customers are served. These consumers are also narrowing the patient-provider information gap; they are no longer in awe of physicians, and they will be the first to demand change from health care plans and providers as they interact with the system between now and 2010. In discussing the key issues facing each tier, we will highlight the points at which the new consumers may have the most impact.

THE BOTTOM TIER: THE DISENFRANCHISED AND NEVER- ENFRANCHISED

The main issue for the disenfranchised, of course, is access to health care.¹ This tier consists of people under 65 who are uninsured (including a significant number of children) or have very limited insurance (mostly through Medicaid, and a very small number on both Medicare and Medicaid). In 1996, about 6 percent of the U.S. population were

Figure 8-4. Benefits Insecurity*(Percent of group without health insurance for at least 1 month (out of 28 months), 1992-1994)*

Source: Bureau of the Census

In 1993, 79 percent of Americans had continuous insurance coverage, 21 percent lacked coverage for at least one month, and 8 percent were continuously uninsured. The chart at left shows the percent of various subgroups who were without health insurance for one month or more out of 28 between 1992 and 1994.

adults covered by Medicaid, about 12 percent were uninsured adults, about 6% were children on Medicaid, and about 4 percent were uninsured children, for a total of about 28 percent of the U.S. population falling into the bottom tier.

Care for this tier is severely rationed because the safety net has become frayed. People in this tier depend utterly on the limited resources and strained generosity of safety net funding streams and providers. Even those on Medicaid have limited choices. A significant proportion of people on Medicaid are mothers and children receiving AFDC and whose benefits depend on state budgets, where they compete for resources with prisons and schools; their hold is precarious.

Recent welfare reform bills have limited eligibility for Medicaid, particularly where immigrants are concerned. A 1995 survey of state officials found that about 65 percent thought that in the next three years their state was likely to

place tighter constraints on care for Medicaid patients than it permitted for privately insured patients.

Mostly poor and generally lacking a college education, most people in the bottom tier will have serious trouble overcoming the information gap between providers and patients, even those few in an economic and political position to demand better care. Most college-educated new consumers (1.2 percent of the population were uninsured people with bachelor's degrees in 1996) in this tier are not-yet-insured recent college graduates who have not yet found stable jobs—and most move quickly out of the tier once stabilized, to the middle and top tiers.

THE MIDDLE TIER: THE INSECURELY ENFRANCHISED

The primary issue for the middle tier is benefits security. When unemployment is high, this tier is insecure about maintaining coverage at all; when unemployment is low, they are insecure about maintaining flexibility and quality of coverage under managed care. Although at any one time most of this tier is insured, their benefits are insecure for a variety of reasons. Adults in the middle tier consist of a combination of: (1) working people of all ages with low job security (including employees and owners of small or declining businesses, contract employees, and employees of companies undergoing restructuring) and (2) early retirees (aged 55-64) waiting for Medicare to kick in. We estimate that roughly 34 percent of the U.S. population falls into the middle tier.

CHILDREN: PATIENTS AND BENEFICIARIES, BUT NOT ACTIVE CONSUMERS

In 1994, children (under age 18) made up roughly 27 percent of the U.S. population. Roughly one-third of this group (representing 9 percent of the total population) lacked coverage for at least one month in a 28-month period between 1992 and 1994.

Although we include children in our estimates of the percentage of the population falling into each tier—and the problem of uninsured children is a serious one—we do not discuss them further in this section because they are generally not active purchasers of or participants in their health care and will therefore exert little influence over it.

The working group is worried because many of their employers are reducing or eliminating health care benefits or passing their costs on to employees, who may be unable to pay for them. Low job security and relatively low re-employability also put middle-tier members at risk for significant periods of time without coverage. The coverage this group does have tends increasingly to be HMO and PPO coverage, which to some extent limit both covered procedures and choice of providers.

Some early retirees are insecurely enfranchised because employers are increasingly cutting or tightening restrictions on pension health benefits. Those benefits may be either managed-care plans or fee-for-service coverage. In 1995, roughly 12 percent of employers reported that they anticipated dropping some or all health coverage for current retirees. Roughly 38 percent anticipated capping how much they paid for retiree health benefits.

Closely related to benefits security are the issues of choice and value. As employers cut the premium amounts they cover and reduce the scope of the benefits they offer, costs are increasingly passed on to this tier of consumers and value—the amount of coverage per dollar spent—becomes more of an issue.

As choice of plans and, in an increasingly managed care environment, choice of providers, becomes more restricted for this group, choice also becomes a bigger issue—complaints about choice and value may further increase among the middle tier unless plans address these issues.

The new consumer segment of this tier—growing rapidly—will be the most informed about their choices and the most likely to demand good information to help them make those choices, taking a step in the direction of empowerment. As independent agencies and, increasingly, health plans have begun to generate “report cards” for employers on plans and providers, the information-savvy new consumer segment may take advantage of them. As middle-tier members increasingly gain access to personal computers at home and at work, the Internet will be a rapidly growing and easily accessible source of this information.

In contrast, most of the traditional consumers in this tier have high school educations or less, and thus tend to have lower incomes and less exposure to information technology. The patient-provider information gap will be hard for this segment of the tier to overcome.

THE TOP TIER: THE SECURELY ENFRANCHISED

The primary issue for the securely enfranchised tier will be empowerment. Although the changes that this tier drives in the system will be slow and incremental at first, this is the tier with the most ability to effect change. This tier consists mainly of those who are (1) securely employed or highly employable, (2) very wealthy and thus self-insured, or (3) elderly and thus on Medicare, either with or without supplemental private insurance.

Many members of this tier are employed

by large companies, many of which offer plans with generous benefits designs and pay the lion's share, if not all, of premiums; and the top few companies offer the choice of several different health insurance plans.

Medicare currently offers a rich benefits package, mostly fee-for-service, although that is changing as Medicare HMOs become increasingly competitive.

Like the middle tier, the top tier consists of a mix of traditional and "new" consumers, with significant numbers in each category. Most of the over-65 in the top tier are traditional consumers and will therefore not effect much change. However, a large proportion of the group is made up of baby boomers who will turn 50 during the next decade—these are new consumers, they will be interacting more and more with the system, and they will become a powerful force for change.

People in the top tier are generally continuously insured in any given two-year period; when they *do* lose their jobs, they are quickly re-employed thanks to their high levels of education. In recent years about 61 percent of the total U.S. population has been continuously insured by a plan other than Medicaid during any given two-year period. Some are securely insured, some insecurely. About 13 percent of the population is covered by Medicare, usually supplemented by private insurance. (Medicare enrollees are securely insured.) We estimate that about 38 percent of the population are securely enfranchised empowered consumers and thus fall into the top tier

of coverage.

SUMMARY OF THE THREE TIERS

As Table 8-1 shows, about one-third of the U.S. population currently falls into the middle tier of coverage, with a bit less than one-third occupying the bottom tier and a bit more than one-third the top. New consumers, who represent the largest potential for driving system change in the next decade, are concentrated in the middle and upper tiers.

FORECAST & ASSUMPTIONS

THE BOTTOM TIER: THE DISENFRANCHISED

FORECAST

Because they largely lack college education and have less access to information, and because their energy is focused on issues of access to care, this tier is unlikely to drive a consumer revolution or to be greatly affected by one. Although this group has many reasons to protest, it lacks voice and clout. Their advocates may push for legislation, particularly to cover children, but as a bloc they have relatively little power over government or employers—their voter participation rates are lower than average, some are unemployed, their incomes are low, and a sizable group are minorities who face discrimination in many arenas. If the problem of access is to be solved for this tier, the solution will likely be driven by advocacy groups and members of the other two tiers. A motivating factor that

Table 8-1. The Tiers of Coverage

	TRADITIONAL CONSUMERS	NEW CONSUMERS
THE EMPOWERED CONSUMER (Roughly 38% of total U.S. population) <i>Total U.S. pop.</i> 1996=266,793,000	• age 18-64, no college education, high-income workers (& spouses) with no PCs but high job security, with private managed care plans or fee-for-service insurance (paid by employers or self) • age 65+, no college education, moderate to high savings/resources, no PCs, Medicare only or Medicare and private insurance • children securely insured	• age 18-64 college-educated, high-income workers (& spouses) with high job security, with private managed care plans or fee-for-service insurance (paid by employers or by self) • age 55-64 early retirees, college-educated, high savings/resources, private managed care plans or fee-for-service insurance (paid by generous former employers, or by self) • age 65+ college-educated, moderate-to-high savings/resources, with PCs, Medicare + private insurance • children securely insured
THE WORRIED CONSUMER (Roughly 34% of total U.S. population)	• age 18-64, no college education, low to moderate income workers (& spouses) with low job security, in managed care plans (paid by employers or military) • age 55-64 early retirees, no college education, low-to-moderate incomes, in managed care plans (paid by former employers who are not reassuring about keeping retiree benefits, or have already tried to reduce them) • children insecurely insured	• age 18-64 college-educated middle-income workers (& spouses) with PCs and low job security, in managed care plans (paid by employers, by military or by self) • age 55-64 early retirees, college education, high incomes, in managed care plans (paid by former employers who are not reassuring about keeping retiree benefits, or have already tried to reduce them) • age 18-54, no college education, high-income but low job security workers (& spouses), with PCs, in managed care plans (paid by employers) • children insecurely insured
THE EXCLUDED CONSUMER (Roughly 28% of total U.S. population)	• age 18-64, no college education, poor, unemployed or in a job with no benefits, uninsured • age 18-64, no college education, unemployed and/or very poor, on Medicaid • children uninsured • children on Medicaid or other government assistance	• age 18-34 temporarily uninsured, some college, with PCs, no full-time job yet or between early low-income jobs

might bring about a such solution is the potential spread of drug-resistant infectious diseases, exacerbated by lack of proper care, from this tier into the other two tiers.

ASSUMPTIONS

- Lack of access to information and resources is a significant barrier to empowerment.
- Advocates for the bottom tier will be largely ineffective at changing legislation and the structure of care.
- Struggling for access prevents people from putting energy into other aspects of empowerment.
- The plight of the disenfranchised will not become so horrible and visible that it triggers the level of mass dissatisfaction with the health care system that would lead to comprehensive reform.

THE MIDDLE TIER: THE INSECURELY ENFRANCHISED

FORECAST

The portion of new consumers in the middle tier (and advocacy organizations representing them) is the first segment that will want the system to provide high-quality consumer-oriented information about performance—report cards. These middle-tier new consumers are a rapidly growing group—demographic factors are driving a steady transfer, about 2 percent a year, of people from the lower middle class into the new

consumer group, and many of these are in the insecurely enfranchised middle tier.

Because benefits insecurity and the resulting worries about out-of-pocket costs and coverage are currently this group's major issues (and will be even more so in the predicted recession of 1999-2000), the first report cards this segment will be interested in will show the relative merits of health plans. Because many people in this tier work for small employers, however, many do not yet have a choice of plan. Thus employers will be the first market for this type of report card. Eventually report cards on plans may stimulate demand for similar report cards on providers, to help both employers and their employees in this tier choose providers that offer the best value.

Because report cards are consistent with the cost-efficiency goals of plans, plans will actively pursue the development of provider report cards (both for hospitals and for medical groups and eventually perhaps individual physicians). Providers, already facing sharp drops in income because of managed care, will object to such report cards, but they will be given little choice in the matter.

The older people in this tier, particularly the early retirees, are half new and half traditional consumers. Although the traditional consumers may complain more than they did in the past as the whole culture shifts from passivity to active skepticism, they will not have enough access to information to narrow the patient-provider information gap

much, and thus will not be the best position to demand change in the organization of their care. They will, however, be very experienced with the system and motivated to improve their care.

Those who have not yet retired may be able to put some pressure on their employers to keep their pension health benefits intact, but their numbers are too small for their complaints to stimulate major change. Employers are more concerned with pleasing young, educated employees. These retired consumers will be heard primarily through their high voting rates and through advocacy groups like the American Association of Retired Persons (AARP).

When the elderly traditional consumer voices in the middle tier are combined with those of the aging new consumers who share this tier and the upper tier, they may be a major force for changes in the organization of care at both provider and plan levels. As they get sicker, they will push for greater security of benefits and greater flexibility, service and coverage in managed care plans.

ASSUMPTIONS

- Increased choice leads to increased need for information.
- Empowerment and access to information will be tightly linked.
- Empowerment will not “trickle down” from the top tier to the middle tier.

THE TOP TIER:

THE SECURELY ENFRANCHISED *FORECAST*

The aging upper-tier new consumers, though relatively small in numbers now, are growing rapidly as most of the baby boom generation turns 50 over the next decade. As these informed consumers encounter the chronic and severe illnesses that accompany advancing age, they will interact more and more frequently with providers and plans in demanding change. Indeed, they have already begun to drive a shift in the culture away from passive respect of providers, toward more active engagement in their care.

This segment will use all three major modes of empowerment : (1) choice of plans and providers; (2) ability to provide self-care and self-management of their chronic diseases; and (3) ability and desire to share medical decisions with their providers. By 2010, as the first of the baby boom cohort reaches 65, this group will have paved the way for a revolution in the organization of care—a revolution simultaneously fomenting in other sectors of the system, as noted in the other chapters of this report.

Because the new consumers in the top tier are information-rich and health-related information sources like the Internet are rapidly growing, they are increasingly marshaling enough information to narrow the patient-provider information gap. They are not as preoccupied with benefit security as the

new consumers in the middle tier are, so empowerment becomes their most pressing issue.

The youngest new consumers in this tier are not very sick—and thus many of them do not interact with providers with the frequency required to demand big changes. Some do, however, particularly women of childbearing age, who interact with providers both for OB/GYN care and on behalf of their children. Both young men and young women will also demand better customer service from plans and access to more open networks of providers.

Although continued employer mediation of health plan choices will limit new consumers' direct impact on plans to some extent, today's employers do tend to listen to the needs of their young employees. New consumers will encounter health plan customer service issues simply in the process of signing up for plans and choosing or switching primary care providers. They will encounter provider interaction issues when undergoing routine exams. They will affect plans by complaining to their employers and pressuring employers to complain to the plans or switch to more customer-friendly plans. Those that have a choice will simply switch. Because they are not sick enough to see very many providers very often, their effect on changing provider interactions and increasing shared decisions will be relatively small before 2010. Beyond 2010, these young new consumers will join the older group in driving a change toward patient-centered care.

In contrast to the young new consumers in this tier, the elderly are the most sick segment of the population, and thus do interact frequently with providers. They also purchase their care directly from providers, and can take their Medicare money elsewhere if they don't like a particular provider; this gives them power in the health care market. Because the elderly are also a large voting bloc and have powerful lobbying organizations like AARP, they are a potent force for both legislative and market change. Although we estimate that two-thirds of the elderly in the upper tier are traditional consumers whose impact on provider behavior will be greatly muted by their inability to bridge the information gap, even they will be influential in supporting legislation that protects their rights to privacy and dignity, especially in end-of-life medical decisions.

Both traditional and new elderly consumers in this tier will also be outlets for the voices of their adult children, many of whom are baby boomer new consumers. This "sandwich generation" (especially women) interacts with the health care system both through their children and through their elderly parents. These more assertive and informed children will attempt to intervene as advocates for their parents with providers, adding to their impact. If large numbers of the top-tier elderly begin to switch providers or plans on their children's advice, they will act as amplifiers of the voice of the new consumers. This amplified impact would be mostly in the direction of more patient-centered care and better service, but since some of the elderly have

children in the middle tier, to some degree it might also push plans to address middle-tier issues by offering more coverage and better value.

ASSUMPTIONS

- Although the 65+ elderly will not become empowered in large numbers until beyond 2010, the aging 50-64-year-old new consumers will begin to have an impact.
- The people able to drive change in health care plans and provider behavior in the next decade will be not only those people who purchase health care directly (e.g. Medicare recipients) and use it frequently (e.g., the sick, largely the elderly) but also a rapidly increasing segment of aging baby boomer new consumers who interact with the system for "well" care and on behalf of children and parents.
- Health care legislation empowering patients will not be the primary force behind change in provider behavior and plans, although it may begin to have a larger effect as the baby boom generation ages and increases its voter participation.
- Most providers will not be motivated to bridge the patient-provider information gap, since that would reduce their power and status.
- Information technologies that would aid shared decision-making (for instance, the electronic medical record, smart databases) will be fairly

slow to develop, limiting the development of the shared decision-making form of empowerment.

THREE LEVELS OF EMPOWERMENT WILL ARRIVE AT DIFFERENT TIMES

Of the three elements of consumer empowerment in health care, informed choice of providers and plans will develop first as middle- and upper-tier new consumers join forces with plans to create report cards. We estimate that today roughly 10 percent to 15 percent of all people have access to any information on plan quality. In some areas such information is published in newspapers or on the Internet, but in most it is not yet available. We forecast that by 2010, 50 percent of all consumers will have access to comparative, understandable information on plan quality, and possibly provider performance. Employers, and possibly government, will join with consumers to push in the direction of comparability and competition between plans. Provider report cards are already being developed by some plans.

The other two elements of empowerment—self-care and shared decision-making—depend more on the cooperation of providers, who right now are busy organizing themselves to resist the strictures being imposed on them by managed care. Of these two, the element of self-care and self-management will be the next to emerge, in part because it will be assisted by pressures from plans to reduce costs. As the new consumers rapidly gain access to information (online and through traditional media), they will narrow the patient-provider

information gap and make effective self-care possible and desirable.

We forecast that by 2010, 30 percent of health plan members will be able to identify the three most important threats to their health status, and a high proportion of these folks will be actively engaged in executing elements of their treatment plans. Right now we estimate that only 5 percent to 10 percent of members engage in self-care or self-management. Medical technologies involving remote sensing of patients' vital signs will hasten this development.

Shared decision-making will be the last element of consumer empowerment to take hold. This lateness is partly due to provider resistance to change, and partly to the fact that many medical decisions are so complex that they require a sophisticated informational infrastructure to assist both patients and providers. This infrastructure will be slow to emerge. The issue of confidentiality of medical records may further slow the emergence of this infrastructure. The quality of medical information available on the Internet will also be a factor. We forecast that by 2010, only 10 percent of all consumers will be aware of the primary treatment choices implicit in the health risks they face and will share with their providers decisions about treatment paths, with providers helping them to pick paths in line with their personal preferences and values. Right now we estimate only 1 percent of consumers share decision-making with their providers. This element also has the most potential to transform the system in the longer term and improve

health status.

On the down side, shared decision-making, if widely implemented, may exacerbate the widening gap in access and health status between the information-rich new consumers and the information-poor traditional consumers: information access is key to effective shared decision-making. Ultimately (beyond 2010) this could push us towards a two-tier system, in which the information "haves" have secure access to high-value, patient-centered care while the information "have nots" struggle for access, choice and value.

All this adds up to a forecast for incremental consumer-driven change by 2010, not a full-blown consumer revolution. Nonetheless, consumer forces will build rapidly in the growing top tier by 2010, and this will shift the passive consumer culture significantly in the direction of active skepticism. The combination of this shift, the push towards self-care by cost-conscious plans, patient-rights legislation supported by the elderly, and slow but steady improvements in the information infrastructure, will prepare the way for a major consumer revolution when the baby boomers begin to hit age 65 in 2010 and beyond.

WILDCARDS

Wildcards are low-probability but high-impact events. The key wildcards to watch out for in the health care consumer arena in the coming decade are listed below. The sidebar shows new consumer needs that may represent

opportunities for the development of new health care services.

- Consumer empowerment trickles down faster than expected from the securely enfranchised new consumers to other groups—in particular, the “information poor” get “wired,” gaining increased access to information through technologies like WebTV, and thus become part of the force for change.
- Employers switch *en masse* to a defined contribution system, making defined benefits obsolete and putting health care purchasing back in the hands of patients, thus converting health care to a demand-driven system well before 2010.
- Biosensors and other new medical technologies reduce costs dramatically rather than increasing them, and lead to do-it-yourself home care, improving access in the process.
- Spillover of infectious diseases from a rapidly growing uninsured population into the middle and top tiers leads to national legislation to fix the safety net, shrinking the bottom tier.
- Congress and the President join forces to push through legislation to reduce benefits insecurity, shrinking the middle tier.
- Congress and the President join forces to push Medicare entirely to HMOs or cut benefits drastically, shrinking the top tier (or igniting a revolution among the elderly).

NEW HOUSEHOLD NEEDS THAT HEALTH CARE SERVICES MAY BE ABLE TO FILL

(based upon IFTF report *Anticipating Consumer Desire for New Media at Home*)

All types of organizations in the future will be asked to speak to the household needs listed below. Beneath each need are some ways health-care-related services might be able to fill it.

1. The need to create meaning, connection and community
 - electronic health support groups
 - sharing of health stories on bulletin boards and web sites
 - Internet access in hospital rooms to keep patients connected
 - primary care providers that facilitate continuity of care
 - hospice services that help add meaning to the process of dying
2. The need for control and flexibility through asynchronous communication
 - direct email communication between patients and providers
 - telehealth systems that allow remote and asynchronous contact with providers
 - information and triage hotlines available 24 hours a day
3. The need to create documentation and memory
 - electronic medical records (EMRs) that help record family medical histories
 - medical information from the internet that can be printed out at home
4. The need to create identity and culture through rituals
 - electronic reminder systems and programs like diet and exercise planners
 - parents providing more direct medical care at home for their children
 - families sharing their medical stories with others on the internet
5. The need to engage in meaningful dialogue with organizations about products
 - provider and plan report cards distributed on the internet or through employers
 - interactive question & answer email or phone services from plans
 - direct marketing of health care products to the customer; direct purchasing
6. The need to establish bonds while having boundaries respected
 - ways to ensure privacy and confidentiality of medical records
 - medical advice that respects the values of the patient
 - patient-centered care

ENDNOTES

¹ By "access to care" here we mean not convenience, but rather ability to get even minimally adequate care when it is needed. This basic access is limited in this tier by inability to pay (either out-of-pocket, or for insurance) and by the poor quality and limited resources of the facilities available to those with limited ability to pay.

CHAPTER 9: EXPANDED PERSPECTIVE ON HEALTH AND DISEASE

Beyond the Curative Model

As we move into the new millennium, we're broadening our perspective on health. Until recently, biomedical understanding of disease and the definition of health as "the absence of disease" provided the fundamental framework in which modern medicine evolved, and the curative model of medical care predominated. The curative model narrowly focuses on the goal of cure, i.e., the eradication of the cause of an illness or disease. Although cure is unquestionably appropriate as a goal, other goals are important as well: restoring functional capacity, relieving suffering, preventing illness, injury and preventable death, promoting health, and caring for those who cannot be cured.

Cure-oriented medicine reveres the "hard" medical sciences, and it ignores behavioral phenomena that are not entirely explained by biological science. Effective cure is presumed to be contingent on diagnosis derived from knowledge of disordered function; treatment is supposed to be derived from empirical research on clinical outcomes. In fact, on careful analysis a significant component of medical practice is neither knowledge-based nor supported by evidence.

The cure-oriented approach to medicine

and health is highly invested in a biomedical perspective that values scientifically based data over other information and accepts evidence-based approaches to treatment over those less rigorously derived. The curative model has created a hierarchical structure of relationships among health professionals: those who command the most biomedical knowledge — physicians — also command the most authority. Our society has granted this authority to physicians and has entrusted them with the role of granting or denying the legitimacy of matters relating to health and disease. Thus, indirectly, the medical profession has defined health in the narrow meaning of disease according to a curative, biomedical model.

In the past quarter-century, the record of biomedical discovery and progress has been spectacular, and yet on critical analysis our ability to diagnose and treat disease has had no more than modest impact on the public's health. Despite improved diagnostic and therapeutic capabilities and an unprecedented expenditure of resources, we are not the most healthy among the developed nations. Perhaps an obsession with disease has unintentionally relegated health to a position of secondary importance. The health care delivery system is

Palliative care is the active total care of patients whose disease is not responsive to curative treatment.²

still organized, staffed and financed on the assumptions that its central task is to use biomedical interventions to provide care for people facing acute episodes of illness.

From many quarters comes evidence that our view of health should be expanded to encompass mental, social, and spiritual well-being. An expanded view of health integrates the concepts of curative medicine (absence of disease) with public health (absence of excess mortality, morbidity and risk factors for disease) and adds productive functioning and well-being. This expanded view of health recognizes the importance of mental factors, social support, income and behavior in avoiding disease and disability. The expanded view of health moves beyond attention only on disease to incorporate the concept of *salutogenesis*, the generation and maintenance of health.¹

The American public expects accurate and timely diagnosis and treatment of illness and disease, but this same public has new expectations for avoiding illness and disease and wants more attention directed to chronic diseases, aging, and terminal care at the end of life. The public's understanding of health and its interest in healthy lifestyles has advanced remarkably in this past decade. As individuals, each of us wants to be healthy and fully functional, which means adopting an expanded view of health that adds to physical health essential mental, social and spiritual components. This expanded definition of health has three implications:

1. For individuals to function at their best, health as defined here is a necessary precondition;
2. Impairment of any component of health can predispose to or cause disease and create an unhealthy state; and
3. Mental, social, and spiritual factors, singly and collectively, influence behavior and therefore health.

An expanded view of health assumes a particular meaning for the elderly, those aged 65 years or older, who currently constitute 13 percent of our population. Less concerned about life span than about life quality during the remaining life span, this cohort embraces all elements of health with the same tenacity of younger generations. Evidence shows that maximum human life span is fixed and that improvements in health can affect only mean life span and not maximum attainable life span. Nonetheless, all adult generations want to postpone the effects of aging and to avoid or mitigate age-related disabilities. Concern about aging thus becomes a largely unarticulated part of the equation for health, and it requires special consideration as we develop a much broader concept of what health and being healthy mean to all segments of our population.

Because socioeconomic status is a powerful determinant of health and disease, recognizing and understanding of the relevance of an expanded definition of health to the lower socioeconomic segments of our population will

Health is a composite of interdependent components that, even if less-than-perfect, are optimal for the individual.

be critical to improving the collective health of our nation. Improving the health of the middle and upper income segments of the population is important, but it is clearly insufficient if achieving substantial improvement in our national health status is the goal.

Finally, who can, and will, integrate an expanded view of health into the planning and delivery of health care, and what should be the roles of government, providers, employers and consumers in advocating changes that recognize and respect this new definition of health? This multifaceted question will be addressed in a later section of this chapter, but posing the question at this point may heighten sensitivity to the issue.

DEFINITION OF HEALTH

A definition of health must have equal applicability to all of us: to the fully well; to those who are unwell because of disease or illness that is treatable or even curable and for whom the goal is a return to health; and to that growing segment of our population with genetic or acquired impairment, such as those with chronic disease, disability or obesity. Furthermore, the definition of health must at the same time represent an objective to be attained and a yardstick by which to judge the state of health. Health can be applied to an individual, a community or a nation, and in each instance the goal is to be as healthy as possible within constraints that cannot be changed.

Perfect or ideal health is a state of

complete physical, mental, social and spiritual well-being. For the vast majority of our population, being healthy means functioning as fully as possible under present circumstances. Health is a composite of interdependent components that even if less-than-perfect are optimal for the individual. As it is used in an expanded definition of health, each of the four components of health is a necessary contributor. Neglect of any component of health predisposes one to, or creates, an unhealthy state, and although this may seem to be stating the obvious, the concept is critical to understanding the significance of an expanded view of health and the factors that determine it.

CONTRIBUTORS AND DETERMINANTS OF HEALTH

1. **Physical.** In the traditional meaning of health and disease, disease represented disordered form and function while health was the absence of disease. Physical health or well-being is essential to good health, but taken alone is insufficient. Physical health incorporates functional as well as structural integrity. Impairment of function in the biomedical view of disease is assumed to have an organic basis. "Functional" is used in another way that may be confusing because in clinical practice "functional" describes a set of symptoms that have no organic basis. Thus, in medical practice, a "functional" illness is one that has no known physical (organic) causes and is assumed to reflect mental factors.

2. **Mental.** Mental factors include more than the absence of mental illness; they extend to emotional states (e.g. depressed feelings short of clinical depression), dispositions (e.g. hostility, optimism), and beliefs and expectations (e.g., self-esteem, self-control, self-efficacy). Mental factors, such as stress, depression, and inability to change lifelong habits, contribute to the onset of some disorders, the progression of many, and the management of all. Understanding the role of mental factors in health and disease may be the most important contribution of an expanded view of health.

3. **Social.** The term has two different meanings in relation to health. Social position or status refers to the tiered structure of society and the activity of its members. This meaning of social cannot be dissected neatly from the more descriptive use of socioeconomic status. The position of an individual, a family or a community in the social order is an ordering of employment, income, wealth, education, voice and health status. In this context, the multiple social and economic factors that influence health are central not only to the development of disease but also to its treatment and outcome. The other meaning of "social," and the one implied in using "social well-being" in the expanded view of health, relates to relationships rather than to social order. This is social as in sociable, and refers to companionship, enjoying the company and support of family and friends, and very often intimate and supportive

relationships with one or more individuals or groups. The social interaction often takes place in a community of people in the same or similar socioeconomic stratum.

A recent body of research has focused on the role of social networks in maintaining individual health. Social networks build communities and contribute to social capital. Social engagement and social support, regardless of an individual's socioeconomic status, are basic human needs without which a person cannot be fully healthy. Evidence clearly shows the powerful influence of social support on recovery from myocardial infarction and breast cancer.

4. **Spiritual.** Spirit is the thinking, motivating, and feeling part of humankind, and involves a code of ethics and philosophy. Spirituality usually, but not necessarily involves belief in a higher power. A spiritual person has a set of beliefs that give meaning to life, and for many this belief provides a basis for faith and trust in an otherwise disorderly and unfeeling world. A growing body of evidence supports religious involvement as an epidemiologically significant protective factor that promotes healthy behavior and lifestyles. When shared in a community it also provides social support, which buffers stress and enhances coping mechanisms. The consistency and robustness of studies involving the role of spirituality in health have led to the emergence of a growing area of research called the "epidemiology of

religion." That spiritual factors promote good health, aid in recovery from illness, and contribute to the state of well-being that characterizes health has growing support: The questions are how and why? The mental, social and spiritual components of health may have distinctive but similar salutary effects mediated through psychoneuroendocrine pathways.³

STRESS

Stress is unavoidable, and although the socioeconomically disadvantaged may have fewer means and mechanisms for coping with stress, and are thus more vulnerable to it, all of us are exposed to stress on an almost daily basis. Some amount of stress is part of life and is both natural and normal, but when stress is sustained and unrelieved it has deleterious effects on the function of endocrine and immune systems, lowering resistance and increasing vulnerability to illness, disease, and accelerated aging. This mechanistic explanation has garnered scientific support although any claim for thoroughly understanding this complex series of interactions is premature.

Research is underway to examine how the biological consequences of adaptations to stress interact with other factors and what impact this has on health. Nancy Adler and Bruce McEwin, among others, have promoted the concept of an allostatic (adaptive) system that includes stress-induced activation of the hypothalamic-pituitary-adrenal axis, the autonomic nervous system, the cardiovascu-

lar system, the metabolic systems and the immune system.⁴ Allostatic response systems are coupled closely with an individual's psychological makeup, prior experience and available resources for coping with stress. Stress turns on an allostatic response, and as long as the response is time-limited, protection via adaptation predominates over adverse consequences. However, weeks or years of repeated exposure to elevated levels of stress can result in allostatic load with resultant damaging physiological consequences. Allostatic load can result from frequent stress, from inability to shut off responses when stress is terminated (a feature of aging), or from inadequate allostatic responses. Inability to control their lives and the daily stresses on those in lower socioeconomic groups lead to allostatic load, sustained allostatic responses, and a downward spiral toward poor health, illness, and untimely death.

SOCIOECONOMIC STATUS AS A DETERMINANT OF HEALTH

Whether social class is measured by income, education, employment grade, or prestige, it determines the resources that are available to meet life's challenges and thereby influences the control that one has in shaping life. The 1980 publication of the *Black Report* showed the statistical association between illness and social class in England and Wales. Physical and mental health, the statistics showed, ran parallel to social rank. With the introduction of universal health care through the National Health Service, these differences in health status among different socioeconomic groups were not

reduced but actually became greater¹ This observation provided early evidence that the availability of universal health care does not eliminate the root cause of lower health status among the socioeconomically disadvantaged. In England, commoners die sooner than aristocrats, sergeants have more heart attacks than generals, office clerks are more depressed and anxious than office managers; in America, the lower-middle-class is more mortal, morbid, symptomatic, and disabled than the upper-middle-class. With each step down the educational, occupational and income ladders comes an increased risk of health-related symptoms, illness, chronic disease and early death.

Socioeconomic status (SES) exhibits a linear relationship to the incidence of illness and avoidable death. Universal health insurance would have an imperceptible effect on reducing the socially

driven inequalities in health: SES differences in health are evident in countries with universal coverage; differences can be shown between levels at the upper range of the SES hierarchy; and SES differences appear in a wide range of diseases, some of which are treatable and others that are not.⁵

Cross-national studies have shown the importance of the size of the gap between the wealthy and the less well-off. In any given society, the greater the gap in income between the rich and the poor, the lower the average life expectancy. This consistent observation explains why a country as wealthy as the U.S., which spends more money per capita on health care than any nation in the world but has an ever-widening gap between rich and poor, endures an average life expectancy that is conspicuously low among the developed nations.⁶

Research into health and illness has now recognized the contribution of social, economic and environmental factors to health, and a critical body of evidence is beginning to document the influence of these factors on morbidity and mortality.⁷ However, the fact that a group of factors — social isolation, social class and depression — predict health outcomes across *all* diseases has been largely ignored in mainstream medical research on disease. Recognizing shared determinants of health rather than only those unique to specific diseases will enrich and modify our understanding of how internal and external factors interact to produce health or lead to illness and disease. Recognition and acceptance of the seminal role of upstream determi-

TALKING TO THE DOCTOR

The relationship between patient income, health risk behaviors, the prevalence of physician discussion of these behaviors and patients' receptiveness to advice was examined in a random sample of 6,549 Massachusetts state employees.

- Depression was reported by 31 percent of those with incomes less than \$20,000 and 8 percent of those with incomes more than \$80,000
- Low-income patients were much more likely to attempt to change behavior on physician advice than those with higher incomes
- Physicians were more likely to discuss diet and exercise with high-income patients and more likely to discuss smoking with low-income smokers⁴

nants of disease by the medical establishment, policy makers, and funding sources can create a virtual transformation in our approach to creating healthier individuals, communities and nations.

WHAT'S NEW?

The answer to "What's new?" is straightforward: dependence on a biomedical model to define disease and health has been rendered insufficient by a growing body of evidence that health involves much more than freedom from active disease or illness, and that upstream environmental and psychosocial determinants of disease deserve parity with conventional biological theories. The answer to "Why now?" is more complex, but the reasons revolve around three factors. First, an increasingly empowered public expects more than our existing system of health care provides and when individuals become ill or impaired by chronic disease or aging and seek medical care, they want a healing relationship with physicians. Second, unless corrective measures are implemented very soon, an enlarging segment of our population, spanning all socioeconomic classes but most severely affecting those at the bottom, will be exposed to avoidable illness and disease and excessive mortality. Third, the nation's bill for health care and health-related disability will continue to rise until an expanded view of health promotes maintenance of full health, greater attention to the management of chronic diseases, and elimination of upstream determinants of diseases that directly result from socioeconomic status.

"ALTERNATIVE," "HOLISTIC," "EXPANDED": WHAT'S IN A NAME?

The search for a label that adequately captures the essential concepts embedded in an expanded view of health has been a colossal failure. No single word or phrase seems to capture what it means to view health and disease through a wider lens, to define health as a state that moves outside of a biomedical model, and to realize that upstream determinants of disease go beyond genetic endowment and access to care to even more critical socioeconomic, behavioral, social and environmental factors. Labels in the contemporary lexicon, such as "mind-body" and "holistic," have connotations of their own and further fail the test of descriptive accuracy.

"Alternative medicine," "integrative medicine" and "complementary medicine" merit similar objections as labels, although these descriptors contain elements that pass the test of compatibility with an expanded view of health. The public's acceptance and use of alternative or complementary medical practices must be interpreted as an indication that these alternative providers fulfill some unmet need. Interestingly, much of "alternative" medicine is practiced in a way similar to biomedicine but using different forms of intervention and treatment, for instance using herbs instead of prescription drugs.

Concluding that no single term or phrase could satisfy the goal, we decided to follow the lead of the Center for the Advancement of Health and use the descriptive label of "an expanded view of health," leaving an open field for creative lexicographers. An expanded view of health maintains and extends beyond the biomedical model; an expanded view of health applies not only to individuals but to communities and even nations; and each component in an expanded view of health has been validated by evidence submitted to scientific scrutiny. It is the evidence-based foundation of expanded view of health that makes it such a powerful summons to rethink and then redirect our approach to health, illness and healing.

A coincidental factor is the new dominance of managed care organizations. Managed care is organized to function according to the fundamental precepts of public health, health promotion, epidemiology, and population-based medicine. Assuming responsibility for the health of a defined population, as capitated managed care organizations do, creates a compelling incentive to improve and maintain the population's

health. An expanded view of health is the formulation of the desired goal — good health—for a population as well as each of its members. An expanded view of health also requires an understanding of upstream determinants of health and illness, which in turn provides insight into the roles of socioeconomic factors, behavior and social capital. An expanded view of health was no less relevant to the practice of medicine in the era preceding managed care than it is today, but the public's changed expectations of physicians and managed care's new focus on health maintenance and disease prevention have made it appear so.

EVIDENCE-BASED STUDIES: WHAT THE RESEARCH SHOWS

P psychological and social factors—how we think, feel and behave—profoundly influence the onset of some diseases, the progression of many, and the management of nearly all.

- In a large study covering 13 years, depressed and socially isolated persons were four times more likely to have a heart attack than those who were not depressed or isolated.⁸
- A seven-year follow-up of women diagnosed with breast cancer found that those who confided in at least one person in the three months after surgery had a seven-year survival rate of 72.4 percent compared with 56.3 percent in those who didn't have a confidant.¹¹
- In another study, women with advanced breast cancer who attended weekly therapy groups survived an average of 18 months longer than women who did not get such support. Four years later, a third of the support group attendees were still alive, all of the nonattendees had died.¹²
- In a study examining the correlation of social ties to susceptibility to common cold viruses, increased diversity in types of ties to friends, family, work, and community was significantly associated with increased host resistance to infection.¹⁶
- In a study examining 232 elderly patients who had elective open heart surgery, those who did not participate in any group and did not receive strength and comfort from religion had three times the risk of dying than those who lacked one or the other.¹⁸

WHY NOW?

CONSUMER EXPECTATIONS

Led by health-conscious seniors and a generation of baby boomers who seem to view aging as an option subject to free choice, the medical establishment is confronting a mandate to move beyond the curative model to become engaged in preserving health and preventing illness and disease. The public believes that medicine has overpromised cure as the be-all and end-all. Preventive maintenance, after all, is standard procedure for other industries. Although the enlightened consumer wants to be healthier and understands the importance of maintaining good health, a quick-fix mentality still encounters difficulty in understanding the hard work of health. Today's physicians were taught nothing about changing their patients' behavior, and with only on-the-job experience as a source of knowledge, most physicians falter when confronted

with the consequences of their patients' unhealthy behavior such as obesity, tobacco use, and sexually transmitted disease. A medical curriculum reconfigured by an expanded view of health would require a course in behavioral psychology.

Their needs unmet in biomedicine, millions of Americans flock to practitioners of alternative medicine in growing numbers. Medical practitioners should not become providers of alternative medicine, and vice versa. As at no time in the past, the medical establishment will be more open to adopting an expanded view of health and enlarging the scope of medical practice — not with the intention of introducing alternative methodologies but rather with the goal of providing more comprehensive medical care to patients. Does this mean that for the first time your own physician may ask you about your own social support, spiritual practices, and allostatic load? Quite possibly.

DETERIORATING HEALTH CONDITIONS

The issue most urgently in need of resolution is the deteriorating health status of an enlarging segment of our population. To argue that this is a socioeconomic problem caused by macroeconomic forces and erosion of social capital, and not at its core a matter of health, indicates a failure to recognize their connectedness and interdependence. In fact, separation of socioeconomic status and health is artificial, and this basic tenet is embed-

ded in an expanded view of health. The emerging reality is that a growing segment of the population in the world's richest nation is unhealthy despite a per capita expenditure on health care that is the largest among developed countries. Health status declines with socioeconomic status, amidst a dizzying array of alarming observations: use of illicit drugs, alcohol, and tobacco by a generation of young people growing up in an environment without social order and support and in which risky behavior is *de rigueur*; a growing population of underinsured and uninsured, many of whom lack financial resources for access to basic health care as the health care safety net unravels; a rapidly expanding population of the elderly with significant health needs, such as preventive services, social support and the treatment of depression; and at all levels of society, avoidable illness and disease attributable to ignorance, unhealthy behavior, lack of education and dismemberment of family structure and social support.

Certain mental, social, and spiritual matters fall directly into an expanded scope of health care and can be dealt with by a physician or other health professional without outside intervention. Other socioeconomically driven health concerns cannot be resolved by the health professions, and by their nature these issues will require major shifts in political and social policy and cooperation from other professions for significant change to occur. When the medical profession adopts an expanded view of health, as it almost certainly will, it acknowledges the direct rel-

As we enter the next century, cardiovascular disease, depression and injury-related death and disability will be major health-related concerns.¹⁴

evance of upstream determinants of health and disease that have received little or no attention because of the profession's historical focus on a biomedical model of disease.

Quite apart from concern about distributive equity, why should the higher income classes become concerned about poor health conditions among the less advantaged? The reasons are principally two. First, the cost of preventable illness and disease is enormous and increasing due to premature births, teenage pregnancies, AIDS, avoidable hospitalizations, communicable diseases and the consequences of substance abuse and other risky behaviors. To the direct cost of providing health care must be added the indirect costs of lost productivity and chronic disability as a consequence of poor health. Second, communicable diseases are a major public health concern that is amplified by the worldwide emergence of drug-resistant

infectious agents, involving not only common infections like *E. coli* and *Staphylococci*, but less common infections, such as tuberculosis, HIV, and even plague. Any reservoir of disease constitutes a direct threat to all of us because we share the same air, water, food, space, and transportation — and even needles and medical devices. We ignore the problem at our own peril.

GLOBAL HEALTH PERSPECTIVE

As we enter the next century, cardiovascular disease, depression and injury-related death and disability will be major health-related concerns.

An individual's behavior and allostatic response to life's stresses create a profile of risk factors for developing and dying as a result of cardiovascular disease. Risk-promoting behaviors—smoking, alcohol abuse, sedentary life style, unhealthy eating habits—have a dominant role in the evolution of cardiovascular disease, and stress-related factors promote disease progression and affect recovery from acute events such as myocardial infarction. Social and mental factors often contribute to the course of cardiovascular disease either in promoting its progression or in favoring full recovery from an acute episode of clinical illness.

Depressive illness and risk-taking behaviors are subjects that have been largely excluded from consideration in a traditional biomedical model of disease. Depressive illness—clinically significant but falling short of disabling major depression—affects a surprisingly large proportion of the elderly population,

Table 9-1. Paradigmatic Shifts

Biomedical		Expanded View
<i>Rigid adherence to the biomedical model</i>	→	<i>Expansion to incorporate a multifactorial view of health</i>
<i>Attention solely on acute episodic illness</i>	→	<i>Chronic illness management</i>
<i>Focus on individuals</i>	→	<i>Focus on communities and other defined populations</i>
<i>Cure as uncompromised goal</i>	→	<i>Adjustment and adaptation to disease for which there is no cure</i>
<i>Focus on disease</i>	→	<i>Focus on diseased person AND disease</i>

and among the nonelderly, including adolescents, depression directly or indirectly causes poor health. An expanded view of health recognizes depressive illness as a cause of disability to be as legitimate as diabetes, asthma and peptic ulcer. Because depressive illness looms so large as a major health concern, the rapid adoption of an expanded view of health that addresses its cause and treatment becomes a matter of high priority.

Injury-related death and disability involves the innocent as well as the guilty, the cautious as well as the careless, the abuser as well as the abused. The emergency room log in any major

hospital records the consequences of traffic accidents, industrial injury, personal assaults, alcohol- and drug-related accidents and criminal behavior, in-home injuries and spousal abuse. The myriad factors in this melange of misery have social, cultural, mental, behavioral, racial, environmental, occupational, economic and circumstantial elements that with few exceptions have been considered outside the scope of medical education and practice. A study of intentional and accidental injuries inevitably exposes the major role that socioeconomic status plays in causing injury, either directly or indirectly. Social, mental and spiritual health is incompatible with the risky, antisocial and violent behavior that often leads to serious injuries and their consequences. The prevention of injuries and injury-related morbidity and mortality, formerly considered the responsibility of public health officials, must become a legitimate concern of medicine and other health professions.

THE WILDCARD

In predicting global health concerns in the next century, great uncertainty surrounds the threat posed by drug-resistant infections. Particularly at risk of contracting drug-resistant infections are those in the lowest socioeconomic groups, the homeless, those with chronic diseases or in poor general health, stressed adults in all socioeconomic strata, prisoners, and depressed and malnourished elderly. Rapid and remarkable advances in biotechnology, molecular genomics and structure-based drug design are expected to prevent regional outbreaks and global epidemics of these potentially fatal and contagious drug-resistant diseases, but what if . . . ? Furthermore, there is deep concern for the possibility of biologic weapons in the hands of terrorists, which is based on the difficulty of defending against biologic weapons' attacks and the lack of a rapid and effective response system. One can imagine global spread of an infectious agent overwhelming the health system's capacity and taking countless lives worldwide. This threat is being taken seriously because the risk of a biologic global disaster is a frightening possibility.

THE FUTURE: SHIFTING PARADIGMS

Thomas Kuhn pointed out that scientific advances come in the form of paradigmatic shifts only when existing conceptual models break down, and are no longer able to explain observable facts. New paradigms will emerge in the next century by expanding the definition of health. An expanded view of health is the engine that will drive the paradigmatic shifts shown in Table 9-1.

The first shift is from rigid adherence to the biomedical model to an expanded,

CHANGE MAKERS: BY WHOM AND HOW

Physicians

Physicians can bring about change by assuming two differing roles. In the first and customary role—that of a practicing physician—the patient-doctor relationship can be changed by the adoption of an expanded view of health. The patient-doctor interaction will move beyond a medicentric focus to a consideration of the other components of an expanded view of health, leading to inquiry and concern about mental, social and spiritual factors that affect the state of well-being that determines health. This is the healer or good physician role in a healing relationship.

Sadly, the current environment of practice creates two paradoxical circumstances: First, the public wants a healing relationship with physicians at the same time that the forces of managed care have abbreviated physician's time per patient; and second, although ultimately an expanded view of health will reduce the national cost of health care and health-related disability, the payment system for reimbursing physicians does not favor the provision of services outside of a defined biomedical perspective. The dilemma: How do the health care professionals practice the principles of an expanded view of health in the context of the current atmosphere with its economic imperatives?

In a second role, the physician uses the full authority of professional standing to effect systematic change. As the legitimate judge of health-related matters, the physician alone can sanction the connectedness of health and the determinants of disease: Basically this affirms the principles underlying an expanded view of health. The excess morbidity and mortality experienced because of social, mental and behavioral factors parallels socioeconomic circumstances, and this is at the core of the issue. Secondary factors are the cost of preventable illness and the epidemiologic threat of communicable disease. In this second role as an advocate for systematic change, the medical community can assume leadership in a campaign that above all is the right thing to do.

Although the need for systematic change is health-related, health professionals alone cannot bring about the change; the issue is simple but the solution is not. Physicians must frame the issues, articulate a plan of action,

multifactorial view of health. While the scientific model looks only at biological indicators of health, the expanded model goes beyond this to include social, mental, and spiritual, as well as physical health. This shift in focus will lead to the regular provision of psychosocial and other services that are not currently in the health care mainstream. How the medical community acts to encourage the shift will greatly impact the speed and degree to which it happens.

A second shift will be from attention solely on acute episodic illness to the management of chronic illness. This shift is already beginning in the treatment of certain populations, such as patients with end stage renal disease, diabetes and asthma. Chronic disease management programs have evolved rapidly because they provide better care at lower cost across the health care continuum. Protocols, case managers, prevention strategies, and the coordination of ancillary services have proven the value of chronic disease management by reducing the frequency and severity of acute illness episodes. In increasing numbers, health plans and large medical groups are forming their own teams to manage populations of chronically ill patients or "carving out" their care to multispecialty networks that assume full responsibility for all patient care needs on a per capita basis.

The shift in focus from individuals to groups reflects several factors. In the traditional model, a physician-patient relationship implied a contract in which physicians vowed to do everything for their patients that might be of possible

benefit even if the benefit had marginal value. The terms of this contract recognized no financial restraints, and in a fee-for-service system of care the cost was not a major consideration. As managed care has evolved over the last decade the principles of population-based health care, already being practiced in the public health system, have become a popular model of care: the rising cost of health care under the old system was unsustainable, and the movement toward capitated payment models called for a system of health care that was more population-focused.

Community-centered health care is population-based medicine as it applies to defined groups of people. As in public health, the central theme is using finite resources to achieve the best health outcome for the entire population. The importance that an expanded view of health assigns to the maintenance of health and prevention of disease fits perfectly into a public health/population-based model of health and health care.

Cure-oriented medicine recognized "cure" as the objective and measure of success, and it used diagnosis and treatment as the means of obtaining it. Palliation—lessening the severity of disease without curing it—was viewed as a compromise and deserving of less interest and attention. Many chronic diseases (asthma, diabetes, cardiovascular disease, and multiple sclerosis) and conditions that accompany the aging process are by their nature incurable. An expanded view of health care promotes individual adjustment and adaptation to live with these conditions comfortably.

and by dint of their professional mantle become leaders in bringing about change. Unquestionably, all health-related professionals must become involved and work together as a team because physicians alone will be less effective than a broad consortium of committed health professionals. However, if physicians do not lend validity to the cause and stand in the forefront of change, then who will?

Researchers

Researchers can bring about change by recognizing the importance of these legitimate research questions. As they seek funding for exploring the link between health and its psychosocial components, they validate the expansion of biomedical disciplines to include cross-cutting social issues. Funders for health care research in government and the private sector must encourage research on these all-embracing issues as well, not just on disease-specific research. Researchers can extend scientific inquiry into nontraditional medical practices asking questions such as Do they work and if so, Why do they work? The NIH's creation of the Office of Alternative Medicine was a step in this direction. At the moment, the federal system for funding health research is not structured to widen its research perspective, and current research training perpetuates the status quo. This will change as the cross-cutting nature of psychosocial and socioeconomic research questions is examined. Social epidemiology, the study of the impact of social structures and conditions on the incidence and prevalence of disease, is not a field that has garnered appropriate attention or financial support.

It is the responsibility of researchers to report their findings back to the public, and success in this endeavor requires that the message is framed in terms that can be understood by the media and communicated to the public. The funding for most scientific research is public funding, and researchers are obligated to share and promote their findings, especially when they bear information on improving the public's health.

Community Leaders

Communities could be big winners in an expanded view of health. As clinicians and the health system focus more widely on population health, wellness programs and other examples of community involvement in

matters of health will add to social capital. In communities where citizens are active participants, they are able to effect change, and as a result the community's health status will be markedly higher. Strong churches remain powerful forces in many communities and in all communities similar structures, institutions, groups and organizations, either alone or in coalitions can focus the community's human resources to obtain better health for all.

Consumers

When consumers understand the expanded view of health, who among them wouldn't want it? In reality, consumers have always wanted it but didn't know what to ask for and from whom to ask for it. Until the health professions understand and adopt an expanded view of health, consumers must lobby to have their full health needs met by the conventional health system whom they hold responsible for providing it.

Employers

Employers have two reasons for selecting health plans and managed care organizations that believe promote an expanded view of health. First, this is what informed employees want for themselves and their families. Second, when employers are presented with evidence that truly healthy employees will be more productive, have fewer days absent from work, and lower the company's risk-adjusted cost of health care premiums, health plans and managed care organizations will be selected based on their ability to provide the full spectrum of services, including mental health services, mandated by an expanded view of health.

Health Plans

Every health plan hopes that its insured population remains healthy, which means lower cost of providing care, improved margin of revenues over expenses, and a strong market position because of competitive premiums. Adherence of the plan and its providers to an expanded view of health will be a strong selling point to employers as well as to individuals, improving the health of a company's employees and proving it can be an effective marketing tool.

However, the functionality and quality of life for those afflicted can be immeasurably improved by using available palliative measures. The aging of our population and the longer survival of patients with chronic diseases will shift greater attention to the health benefits of palliative interventions.

The final shifting paradigm moves from an exclusive focus on the disease to a broader focus on the importance of the person bearing the disease. The diseased person not only has an illness with its organic manifestations but is also an individual with unique and relevant social, mental and spiritual characteristics. Also, many chronically ill patients suffer from multiple co-morbid conditions, and the focus on one disease could subordinate the impact of something equally debilitating. Restoration of the patient's health requires elimination of the disease if that is possible, but in addition it requires that attention be directed to the patient's mental, social and spiritual well being in keeping with an expanding view of health.

THE PARADIGM SHIFT: EVOLUTION OR REVOLUTION

Amid signs that the shift is getting underway, it is sobering to be reminded that institutionalized values and processes change slowly, and that change may not follow a direct linear progression from "what was" to "what will be." To be sure, consumers who want a more personalized relationship with health professionals have spoken, and this message will result in a less formal and more symmetrical physician-patient interchange. However,

this manifestation of change may be more cosmetic than fundamental.

With little doubt, by the year 2005 the impact of an expanded view of health will be recognizable although neither dramatic nor widespread. Physicians will be reluctant change-makers because the generations of physicians in the current workforce learned, believe in, and practice according to the biomedical, bipolar view of disease and health. Interviews with practicing physicians provide ample evidence that medicine's disdain for soft science—and in their view the psychosocial sciences are soft—is alive and well. In time many will be converted to proponents of an expanded view of health, but inroads by 2005 will be modest. Economic rewards for attention directed toward social, mental and spiritual well-being do not exist in current reimbursement guidelines. However, by 2005 the principles underlying an expanded view of health will become general knowledge. This knowledge, reinforced by evidence that health and recovery from disease are profoundly affected by social, mental and spiritual factors, may create a momentum that could accelerate the paradigmatic shift in the years following. Unless political forecasts are mistaken, by 2005 no significant legislation will be enacted that will remedy socioeconomic inequities. Health plans may expand mental health benefits in response to consumer pressure, but the impact of this change will be limited.

By 2010 the new physicians entering practice will have been educated in a

Media

The media, with their far-reaching capacity play a crucial role in expanding the view of health. As NPR news correspondent Daniel Schorr said, "If you don't exist in the media, for all practical purposes, you don't exist." The media reaches everyone. Real change takes place only in the presence of persistent and inescapable cues that things are different. The media can provide those cues on a regular basis by devoting daily attention to health stories and reinforcing the concept that health is an everyday investment and a complex concept. The complexity of health deserves appropriate airtime. Responsible health reporting is not just "eat oat bran to prevent heart disease" but a better description of the long-term "hard work of health" i.e., the day-to-day health-promoting behaviors.

Larry Wallack proposes media advocacy as a way for communities to promote health:

"Historically, the mass media have tended to present health issues in medical terms with a focus on personal health habits, medical miracles, physician heroics or technological breakthroughs. High-tech curative treatment and low-tech preventive behavior-change have been the primary focus. Social, economic, and political determinants of health have been largely ignored by the most pervasive media. Media advocacy tries to change this by emphasizing the social and economic, rather than individual and behavioral, roots of the problem."¹⁹

Legislators

Acting in the interest of the public's good, legislators can design and enact programs that have a profound effect on the nation's health in its expanded meaning. The range of critical program spans formal educational opportunities, job creation, social welfare, public health systems, youth programs and public health education. The health of every one of its members reflects this or any nation's priorities, and this includes those members without political voice. Legislators individually and collectively must be educated regarding the essential role that enabling legislation can play in assuring that all Americans are healthy and the importance of a healthy nation to a healthy economy. A necessary part of this education is the relevance of socioeconomic status to health and why socioeconomic status is such a profound determinant and predictor of behavior and health.

Government

Any government—city, county, parish, state or federal—with taxation authority collects revenue to provide services required by the public and in its interest. At each level governments are concerned about the health of their constituents and to varying degrees are responsible for it. Government officials should be educated along the same lines as legislators to develop an understanding of an expanded view of health, essential health services and the relationship between socioeconomic status and health.

different school of thought, and this new generation will understand an expanded view of health. They will need no convincing to practice accordingly, if the practice environment permits. They will augment a growing number of older colleagues in advocating for major restructuring of programs to correct socioeconomic ills. The year 2010 will see the beginning of major government initiatives by legislators who will understand the interconnectedness of socioeconomic status, the public's health and the nation's productivity. At the most fundamental level, legislators will have the political will to invest in community-level programs because, for the first time in our history, they can

justify the expenditure of public funds for programs that fully benefit the nation's health, productivity and economic welfare.

This forecast may seem overly optimistic. For certain, change will be incremental and geographically uneven. Although 2010 will look different than 2005, we do not expect major change to occur until the middle of the following decade. It will be an evolution rather than a revolution, the progress of which will be painfully slow unless and until the medical establishment openly adopts an expanded view of health. It will need to bring the full force of its professional position to bear in declaring that mental, social and spiritual factors are legitimate components of health. Physician-led advocacy is a necessary prerequisite for meaningful change in the way that consumers, providers, employers, health plans, governments and legislators think about health and its immediate determinants. We bet on physicians to get the ball rolling, but predicting when is a matter of pure speculation.

ENDNOTES

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CHAPTER 10: THE FUTURE BEYOND 2005—THREE SCENARIOS

And Now, for the 12-Year Forecast...

A scenario is a plausible, internally consistent description of a possible future. Our goal in creating scenarios is to imagine very different consequences from a similar set of starting conditions.

The first seven years in our forecast of health and health care proceed consistently, with significant growth of “new consumers”; more tiering in the care delivery system; and a range of cost-containment strategies that reduce overall levels of health insurance coverage, increase the share of costs paid by individuals, and place more restrictions on beneficiaries. Health plans and providers experiment with a range of organizational forms and relationships, but they aren’t able to settle on any dominant models. Conflict continues over who will control decisions about patient care. Biomedical advances improve our ability to prevent and treat diseases. Wider dissemination and steady improvements in information systems contribute to positive changes

in care management and efficiency of administration.

After 2005, our forecast branches into three scenarios—Scenario One: a pessimistic scenario in which pressure builds from inequality in access to care and inability to contain costs (Stormy Weather); Scenario Two: an intermediate scenario in which costs grow moderately through constant turmoil, restructuring, and pressure of providers and consumers (The Long and Winding Road); Scenario Three: an optimistic scenario in which payers and providers build an infrastructure that will sustain moderate costs and good quality health care for the long term (The Sunny Side of the Street). This scenario is depicted graphically at the end of this section in a fold-out map.

WHAT LEVEL OF HEALTH SPENDING GROWTH IS SUSTAINABLE IN THE LONG RUN?

A sea change in health care spending took place in the early 1990s. The annual growth rate dropped from 11 percent—a rate that had been sustained since the 1960s—to 6.75 percent. A combination of forces converged to lower spending growth: strong price pressure from employer coalitions and other large purchasers, a low point in the health insurance underwriting cycle, and providers and suppliers keeping their prices in check during the health reform debate and its aftermath. A key question for the next 10 years is this: do we sustain the recent, five-year pattern of low growth rates in spending or do we return to the historical, 30-year pattern of higher growth? Scenario One reflects the 30-year pattern of spending growth. Scenarios two and three reflect the more recent five-year pattern of spending growth.

SCENARIO ONE: STORMY WEATHER

In the Stormy Weather scenario, pressures accumulate through the year 2005—rising costs, dissatisfied providers and patients, marked inequality of access to care, greedy profit-takers, and repeated health care scandals. None of the fundamental problems of cost, quality, or access are addressed in a meaningful way. Between 2005 and 2010, the barometer drops, winds converge, and stormy weather erupts. The primary driving forces in this scenario include:

- Managed care programs fail to deliver on their promises to contain costs or to improve quality. Instead, they degenerate into more hassling of providers and gaming of utilization

management systems.

- Consumers and providers react to the adversarial climate with a strong, unified backlash to managed care. They succeed in getting legislation passed that further erodes the effectiveness of managed care organizations by intervening in a variety of clinical and structural decisions, such as regulation of lengths-of-stay for various procedures, staffing ratios, and any-willing-provider laws.
- As Medicare moves toward managed care and a wider range of choices for its beneficiaries, health plans engage in substantial adverse selection and cream-skimming of beneficiaries. Medicare risk plans manage to get the bulk of low-cost, healthy beneficiaries, leaving the sick, costly people to the conventional indemnity plan. Each attempt at risk adjustment is met with strategies that boost overall Medicare spending.
- Provider oligopolies, including large group practices, physician practice management firms, national single-specialty groups, and large hospital chains prove able to sustain high prices in an environment that demands open provider networks. They threaten to leave the networks of plans that don't pay well and the plans blink first.
- In the face of a tight labor market, large employers continue to offer insurance as a benefit of employment and are not able to demand substantial price breaks from health plans.

SCENARIO ONE INDICATORS

Health Care Spending Growth:	2.5 percent per year above nominal GDP growth
Health Care Spending:	19 percent of GDP, \$10,200 per capita
Uninsurance Rate:	65 million uninsured, 22 percent of population

Many small employers, meanwhile, drop insurance benefits altogether, increasing the number of uninsured substantially.

- The march of new medical technology continues unabated. Consumers, prompted both by direct-to-consumer advertising by pharmaceutical companies and by "gee-whiz" articles in the popular press, demand access to the latest, greatest, and most expensive medical technologies. Beleaguered health plans concede the point and lose control over both cost and quality.
- No social consensus develops about limiting spending on health care near the end of life. Costly medical technologies for extending life, while not universally used, are not restricted.
- Information technologies, once thought to be the way to efficiency, consistency, and higher quality, prove to be costly and ineffective. Plans and providers find that their investments in the late 1990s and early 2000s

don't pay off. Seeing no better way, however, they continue to invest after 2005.

Scenario One plays out with a range of difficult consequences. Health care spending comprises, by 2010, almost one-fifth of gross domestic spending. Even with expenditures at that level, more than one in five Americans remain uninsured. A majority worry about losing their health benefits. The feeling (and reality) of insecurity of benefits is widespread as many people are just one job change away from being without health insurance. Even those who retain insurance are a lot less happy as their out-of-pocket costs rise.

The health system exhibits radical tiering, with much poorer access to care for the uninsured and people on Medicaid. Medicaid itself puts enormous strain on states, as the state programs are faced with medical costs that overwhelm recession-depleted state budgets. A number of major public hospitals are forced to close their doors. Although their closing helps bring the supply of hospital beds into closer relation to the demand, it also strands many people who have nowhere else to go. The Medicare program finds itself unprepared, either structurally or financially, to absorb the baby boomers, who begin to become eligible in 2010. By the end of the forecast period, health reform is again on the public policy agenda.

SCENARIO TWO INDICATORS

Health Care Spending Growth:	1 percent per year above nominal GDP growth
Health Care Spending:	16 percent of GDP, \$8,600 per capita
Uninsurance Rate:	47 million uninsured, 16 percent of population

SCENARIO TWO: THE LONG AND WINDING ROAD

In Scenario Two, The Long and Winding Road, incrementalism reigns. The successive attempts at revising a portion of the health care system work sufficiently well that tinkering continues well past 2005. As costs get pushed down in one place, they pop up in another, but the system is able to respond rapidly and keep costs in balance. The primary driving forces for this scenario include:

- Employers continue to pay strong attention to health care costs and their benefit structures. They keep substantial price pressure on health plans, limiting increases on the commercial side to one-plus percent per year. They also shift cost and risk to employees by moving increasingly from a defined benefit plan to a defined contribution program. As beneficiaries' out-of-pocket costs increase, utilization of health care services drops off in response.
- Health plans, in turn, increase

pressure on providers. They convince employers that they only can control utilization in a more closed network, so the expansive networks of the late 1990s disappear. In their place are more tightly controlled networks that exert both clinical control and strong price pressure on providers.

- Providers, stung by the high cost and organizational difficulty of forming large units and integrating care, adopt few of the innovations of the leading edge provider groups. Instead, they engage in sustained (and largely unsuccessful) resistance to being "hassled" by insurers.
- The cost containment provisions of the 1998 federal budget, which rein in both Medicare and Medicaid spending, stick. That bill sets the standard for budget bills for the first ten years of the next century.
- The period of 2005 through 2010 is one of turbulent, disorganized change. The health care landscape changes as much in that five years as it did in the period from 1993 to 1998.

In Scenario Two, costs grow only a little faster than nominal GDP growth, reaching 16 percent of GDP by 2010. Federal and commercial cost containment work well enough to make insurance coverage affordable for most employers. Uninsurance affects 47 million, or about one in six, Americans.

Much as at present, the health care system remains tiered, with about 20

percent of Americans in the bottom tier of public coverage and uninsurance, 80 percent in managed care plans that substantially restrict their choice of providers and limit providers' autonomy, and 20 percent in a high-end, indemnity-type program.

The bottom tier Safety Net providers face tighter conditions, with cuts in disproportionate share hospital (DSH) funding, an end to cost-based reimbursement for outpatient clinics, and tight state and local budgets. But they manage to muddle through as usual by patching together a range of disparate funding sources.

Care delivery remains fragmented, as national players remain relatively rare and small. The majority of physicians now practice in groups of three or more, but the bulk of those are in 3-doctor to 6-doctor groups. These are not a size group that can safely accept global capitation, align with a hospital, or influence their physicians' practice patterns radically.

Comprehensive health reform does not enter in the public policy debate, as incremental changes each year reassure elected officials that they are "doing something about health care."

SCENARIO THREE: THE SUNNY SIDE OF THE STREET

In The Sunny Side of the Street Scenario, all the hard work and investment of 1997 through 2005 pays off after 2005 in the form of a sustainable, efficient health care system. Competition helps

drive excess capacity out of the system. We learn what works and what does not in medicine and, especially, how to get providers and patients to work effectively together. Health plans and providers put in place information and management systems that can take the health care system through the next two decades. The driving forces for this scenario include:

- Competition at all levels of the health care system, but especially among providers, helps drive costs down. Young physicians enter the market, with lower income expectations and more of an employee mentality than their predecessors.
- The wave of consolidation of the late 1990s continues through the early 2000s. Efficient health care organizations, which can assimilate the best practices from their constituent parts, emerge. Consolidation also serves to drive some excess capacity, especially of hospital beds (not necessarily hospitals themselves), out of the system.
- The provider service networks (PSNs) that form to contract with Medicare find that they have efficient administrative structures. They begin to contract directly with employers in certain parts of the country. Medicare encourages further growth in its risk contracting as it develops effective risk adjustment methods that make risk contracting cost-neutral for the program.
- Innovative payment approaches are

SCENARIO THREE INDICATORS

Health Care Spending Growth:	1 percent per year above nominal GDP growth
Health Care Spending:	15 percent of GDP, \$8,100 per capita
Uninsurance Rate:	30 million uninsured, 10 percent of population

developed throughout the health care system. Prospective payment for outpatient services is put in place first by Medicare, then by commercial health plans.

- Health care information systems make significant progress beyond their current administrative functions. Clinical information systems are put in place that successfully improve care process and outcomes. The electronic medical record sees the light of day.
- Developments in medical technology focus on both improving outcomes and on reducing costs. Regulators favor technologies that can demonstrate their cost-effectiveness (as well as their safety and efficacy) with more rapid approvals. Health plans and providers, through their improved information systems, develop the capacity to make trade-offs among therapies according to their cost-effectiveness.

In Scenario Three, cost growth is also just 1 percent above the nominal growth of GDP. By 2010 it reaches 15 percent of GDP. These moderate cost increases make health insurance more affordable. People experience more security of benefits, leaving an uninsurance rate of 10 percent.

The best news is that the basics are in place—health systems are equipped to minimize unnecessary variation in practices, they operate efficiently, they can track what they're doing. The time spent cultivating a well-organized health system pays off in the long run.

Medicare and private plans begin thinking about the long term. They put in place incentives to reward population management in addition to individual patient care. They also provide incentives for a longer-term focus on health care decisions today. The best news is that the system appears well-equipped to take on the wave of baby boomers who will begin to be eligible for Medicare starting in 2010.

HEALTH AND HEALTH CARE

EXPANDED VIEW OF HEALTH

- PATIENTS, NEW CONSUMERS, AND POPULATIONS
- PAYERS AND HEALTH CARE COSTS
- HEALTH PLANS AND INSURERS
- HOSPITALS, PHYSICIANS AND OTHER PROVIDERS
- CARE PROCESSES AND MEDICAL MANAGEMENT
- INFORMATION AND MEDICAL TECHNOLOGIES
- ECONOMIC AND LEGISLATIVE CONTEXT



TIER OF COVERAGE

MODERATE, CONSISTENT COST GROWTH THROUGH 2005

PRIVATE SECTOR 3-6%/yr.
PUBLIC SECTOR 7-9%/yr.

- ▲ OPEN NETWORKS
- ▲ FOR-PROFIT CONVERSIONS
- ▲ SHIFTING RISK

▲ HOSPITAL OVERCAPACITY—occupancy < 60%; demand for inpatient days falls faster than beds can close.

▲ PHYSICIAN FRAGMENTATION—83% of office-based, patient care physicians in practices of 6 or fewer

▲ CONFLICT OVER MEDICAL MANAGEMENT health plans, providers, patients, government

▲ BLOOD SUBSTITUTES

▲ IMAGING

▲ RATIONAL DRUG DESIGN

▲ GENETIC MAPPING/TESTING

▲ ANTI-MANAGED CARE LAWS incremental clinical trials

▲ GENETIC PRIVACY LAWS

▲ GRADUAL TO MANA MEDICARE

▲ CONTINUED SQUEEZE ON MEDICARE

Conflict who creates and enforces clinical protocols

Scenario 1: Stormy Weather

- ★ Hospital oligopolies sustain high prices
- ★ Large employers pay up; small ones drop insurance benefits
- ★ New medical technologies are costly and in high demand
- ★ IT systems costly and ineffective
- ★ No social consensus on limiting end-of-life spending
- ★ Baby boomers hit Medicare unprepared—Meltdown

- 18% of GDP, \$10,200 per capita
- Radical tiering of access & care
- 65 million uninsured, 22% of Americans
- Spending on Medicaid overwhelms state budget
- 60% of Americans worried about security of benefits

Scenario 2: The Long and Winding Road

- ★ Limited adoption of organizational innovation
- ★ Government limits Medicare and Medicaid expenditures
- ★ Turbulent, unorganized change
- ★ Benefit cuts drive out-of-pocket costs ↑ utilization
- ★ Employees keep pressure on plans
- ★ Continued "hassling" and rate pressure by plans

- 16% of GDP, \$8,600 per capita
- Fragmented delivery of individual care
- 47 million uninsured; 16% of Americans
- Continued 3 tiers of health care
- No major policy reform in health care
- Safety net muddles through as usual

Scenario 3: Side of the Street

- ★ Effective risk adjustment for Medicare risk
- ★ Prospective payment works for ambulatory care
- ★ Willing and able PSNs
- ★ Clinical information technology improves care processes and outcomes
- ★ Cost effective medical technologies adopted
- ★ Best practices minimize practice variation
- ★ Tiers of care by amenities, access, quality
- ★ Medicare and private plans reward population management
- ★ Medicine population and preventive services prevail

- 15% of GDP, \$8,100 per capita
- Best practices minimize practice variation
- 30 million uninsured; 10% of Americans
- System well-equipped to absorb baby boomers after 2010
- Medicare and private plans reward population management
- Medicine population and preventive services prevail

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APPENDIX: HOW TO USE THIS STUDY

Scenario-based Planning Is Lens to the Future

Scenario-based planning is a unique way to handle a basic human dichotomy: We can never really know what the future will look like, yet we must make decisions today on the basis of assumptions about that future. Scenario-based planning is a means of exploring opposing viewpoints about the future with large groups of knowledgeable participants. We can use the insights gained to identify and set priorities for our current activities.

Outlined here is a process that uses four distinct steps. Each step presents you with expert viewpoints that we hope will stimulate a reassessment of your own assumptions in light of that group judgment. Our goal, then, is not to convince you of a point of view but to help you identify your assumptions and to help identify points of disagreement between yourself and a particular group of experts. We hope this process of "assumption checking" will be a valuable contribution to the decision-making process that will shape the U.S. health care system of the 21st century.

Here are the four distinct steps that will engage you in the process of redefining your assumptions:

Key driving forces. Our experts have

identified the forces most likely to stimulate change in the health care system over the next 10 to 15 years. Forces include those embedded in our scenarios; some forces are the aging of the baby boomers, attitudes toward government spending priorities, and the profitability of business. Our list of driving forces is not meant to be comprehensive, but rather to provide a forum in which field experts can define the forces.

Combinations of drivers. Key driving forces can be combined in any number of ways, with differing weights or relative importance attached to each. We generated several scenarios on the basis of a key outcome: the total amount of spending on health care. Each scenario illustrates a plausible outcome. The driving forces selected for each scenario are chosen to highlight the key differences between the scenarios. Thus, the factors that are common to all scenarios are not given as much weight as those that separate the scenarios. The scenarios are useful, then, not as forecasts of what will be, but as consistent pictures of what might result from the interplay of a particular set of driving forces. You may modify any of the scenarios as

you see fit.

Impacts on the health care system. Each scenario illustrates a different impact on the health care system as measured in terms of costs of, of organization of delivery systems, of hospital admissions, etc. Again, the value of the scenarios is to present consistent models linking driving forces and impacts on the system. You may modify any of the impact linkages and derive an independent set of linking assumptions to stimulate thought.

Key issues. Once they had gone through the scenario exercise, our experts then identified the most important issues or choices the health care system faces. These issues are independent of a particular scenario, but reflect the insights of those who have gone through the process of building and discussing these scenarios. Again, you can test your own issues against those that result from this particular process.

Each of these four steps offers an opportunity for you to test your assumptions against those of a panel of experts.

HOW YOU CAN USE THE SCENARIOS

Our goal is not to describe what the future looks like, but to engage you in a process for examining your assumptions about the future so that you can prioritize the choices you must make today. Three examples of scenario-use for health care organizations are provided

below. Each illustrates different purposes at three different organizational levels.

TRUSTEES, BOARDS, TOP MANAGEMENT

The scenarios, in original or abbreviated form, can be effectively used by boards and senior management to identify goals and missions. Good venues might be annual retreats or "planning workshops," both through presentations and small group meetings in which active participation of attendees is encouraged. Both information and process are relevant here.

The information contained in the scenarios can be used as points of departure for creating a "best guess" trajectory or for extending the scenarios to develop forecasts of direct relevance to the organization. Also, the workshop processes can be replicated in small group sessions.

One of the most useful end products from these exercises is the development of a shared vision to guide the organization's future development. Say a hospital board wants to develop a more coherent view of health care system change in the next 10 to 20 years. In trying to set long-term directions for the hospital, it has become clear that the different board members bring quite different "world views" of both the external environment shaping the health care system and of the health care system itself. Some believe, for instance, that the drop-in hospital admissions or lengths of stay is only a temporary phenomenon, while others feel it signals

a major structural change; some feel the hospital must look outside traditional health care boundaries for income, while others feel it should stick closer to its knitting; some feel that the resolve of business and government to contain costs will soon wane, while others do not.

What they all want is an opportunity to construct an overall framework within which a common vision of the broad health care system outlines may evolve. Say the chair suggests a one-day "mind-stretching" retreat for the 20-member board. The following would be a good way to organize the meeting:

First, each member is provided *prior to the meeting* a 10–20 page summary of the basic scenarios focusing exclusively on the environmental drivers. These include demography, costs analyses, role of government, and technology. Omitted in this summary is any information on how these contrasting external environments may change the health care system itself.

In the first two hours of the retreat day, the environmental scenarios are described in detail to the full group. Ample opportunity is provided for questioning assumptions, the number of scenarios, the positioning of the scenarios, and possible "wild cards." Participants may reposition the scenarios, change basic assumptions, and fill in important gaps. The only restriction is that they aggregate their perceptions into a specific number of scenarios. This is the "buy-in" stage of the process.

After the morning break, the group is challenged to construct its "best guess" single trajectory from the elemental scenarios. If the scenarios resemble the original ones presented, a great deal will turn on the degree of resolve of business and government in "enforcing" cost containment. In one such session, the consensus is that the current cost containment policies will eventually make themselves felt in the early 2000s, but that the inexorable forces of aging and new technologies would eventually break the hold by the late 2010s. The resulting health care cost trajectory (that is, percent of GNP allocated to health care) falls between those of the existing scenarios. Other trajectories are possible and also are discussed. The afternoon is devoted to assessing the impact of the chosen trajectory on the health care system and hospital activity.

ORGANIZATION-WIDE OR ASSOCIATION PLANNING STAFFS

Most organizations have developed their own strong internal capabilities for forecasting and planning. For such organizations and groups, the study can be used to augment and extend internally available information and processes. This may be done in several ways:

- Extending planning horizons that often stop at the three-to-five-year horizon.
- Widening and deepening environmental forecasts that normally are shortchanged in organizational planning processes.

- Developing a map of relevant issues so that interconnections among issues can be seen more clearly and priorities set more intelligently.

But perhaps the most important contribution that the study can make at this level is in helping to develop a clearer framework for connecting environmental and industry (or business) scenarios to the organization's option-generating and decision making processes. A useful—and currently popular—vehicle for doing this is the “issue” construct. Analyses of issues can provide two kinds of information:

- linkages back to the scenarios that identify high value-added information that needs to be collected or monitored; and,
- linkages forward to stimulate the generation of options or choices for confronting issues effectively.

For example, health care planners at federal, state, or county levels are generally quite familiar with the most important public policy issues confronting them. High on their list are issues of the so-called vulnerable populations dealing with the uninsured and underinsured, low-income women with children, long-term care for the elderly, and patients with AIDS. Public sector planners and administrators struggle with such issues as they come up: they temporize, they fire-fight, they improvise, and they hold their breath. What they generally lack—and desperately need—is an opportunity to view those issues from a more strategic standpoint;

that is, the interrelationship of issues, their likely future trajectories, the trade-offs that may be made, and the priorities for addressing them.

The starting point here is a set of key issues. Either in small group settings or more formal workshops, the initial set can be expanded by using the specific scenarios as backdrops for a more extended and integrated view of the health care system. The first result may be an “issue map” showing how the issues stem from particular environmental drivers and how they are related to each other. To this may now be added a timeline, extending five to 10 or more years, that shows how different issues develop over time. These are the first steps for estimating resource allocation (money, personnel, programs) requirements in aggregate form and for suggesting priorities.

Using the scenarios, a number of “what if” questions are posed that are traced through the issue map. The result is the ability to see more coherently and explicitly the trade-offs to be evaluated when faced with limited resources, such as between low-income women with children and the elderly requiring long-term care (the so-called intergenerational choices). Without the kind of “global view” that is provided by the scenarios and associated issues, such choices are obscure at best and unexamined at worst.

LINE OR OPERATING MANAGERS

Clinic or hospital CEOs, divisional managers, or group heads are usually

concerned with more regionalized or localized strategic issues—and associated options or choices—that confront them:

- How much should we spend on marketing?
- Should we joint venture with an HMO?
- What should we do with our excess service capacity?
- Is mental health an attractive opportunity for diversification?
- How can we develop prevention and wellness programs that will be attractive and profitable?

For such choices, the study can provide a valuable reality check and framework, provided appropriate linkages are constructed. The steps in this process include:

- Identifying the key external trends affecting each regional or local issue or choice.
- Determining whether regional or local trends are consistent with or different from national trends.
- Identifying the factors that account for the differences and similarities.
- Collecting historical data on regional or local trends and using these as a basis for making provisional forecasts that are extensions or variants of the original scenarios.

- Engaging line managers in workshops for evaluating issues and choices in the context of both local and national trends.

Using such processes, useful bridges can be built between national, macroenvironmental forecasts and the specific choices that line managers face.

For example, health care insurers, more so than other health care executives and managers, are caught in the middle between payers and providers. Almost all are struggling with a key choice: To what extent and how fast should we move forward in partnership with managed care systems? How can I hedge my strategy if we could be sure about the relative success of cost containment? Which regional markets should I concentrate on? What about timing?

In this instance, the path moves backward from decisions to be made, to the health care system, and to the basic environmental assumptions. In so doing, important steps will almost surely have to be filled in. These may require acquiring relevant regional or local data on managed care growth to tie to national trends. Or the data may describe the latest trends on consumer or employee attitudes on managed care systems. The important point is that these backward linkages are added to a coherent framework of assumptions—any of which may be changed but whose effect by so doing may be explicitly examined.

In small group meetings or workshops, line managers and their staffs may be led

through processes for examining the implications of such choices. The starting and ending point is the decision to be made. In between, the evaluation of the choice requires leading the group to underlying assumptions for each scenario about the structure of the health care system (for example, forecasts of managed fee-for-service, contract, and capitated care) and the external drivers shaping it. The key is that these assumptions “fit together” and are not the result of hit-or-miss selections of data or deliberate attempts to shape the outcome to suit preconceived perceptions.