The Richard and Hinda Rosenthal Lectures 2005: Next Steps Toward Higher Quality Health Care

Institute of Medicine

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THE RICHARD AND HINDA ROSENTHAL LECTURES 2005

NEXT STEPS TOWARD HIGHER QUALITY HEALTH CARE

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The serpent has been a symbol of long life, healing, and knowledge among almost all cultures and religions since the beginning of recorded history. The serpent adopted as a logotype by the Institute of Medicine is a relief carving from ancient Greece, now held by the Staatliche Museen in Berlin.

"Knowing is not enough; we must apply.
Willing is not enough; we must do."
—Goethe

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Foreword

In 1988, an exciting and important new program was launched at the Institute of Medicine. Through the generosity of the Richard and Hinda Rosenthal Foundation, a lecture series was established to bring to greater attention some of the critical health policy issues facing our nation today. Each year a subject of particular relevance is addressed through a lecture presented by experts in the field. The lecture is published at a later date for national dissemination.

The Rosenthal lectures have attracted an enthusiastic following among health policy researchers and decision makers, both in Washington, D.C., and across the country. Our speakers are the leading experts on the subjects under discussion, and our audience includes many of the major policy makers charged with making the U.S. health care system more effective and humane. The lectures and associated remarks have engendered lively and productive dialogue. The Rosenthal lecture included in this volume captures three exciting presentations and the ensuing discussion on "Next Steps Toward Higher Quality Health Care."

I would like to give special thanks to Drs. Elliott S. Fisher, George Isham, and Lucian L. Leape for their exciting and informative presentations at the 2005 lecture.

In addition, I would like to express my appreciation to Tyjen Tsai, Bronwyn Schrecker Jamrok, Ricky Washington, Hallie Wilfert, Christie Bell, Tony Burton, Jennifer Bitticks, and Jennifer Otten for ably handling the many details associated with the lecture program and the publication. No introduction to this volume would be complete, however, without a

special expression of gratitude to the late Richard Rosenthal and to Hinda Rosenthal for making this valuable and important education effort possible and whose keen interest in the themes under discussion further enriches this valuable IOM activity.

Harvey V. Fineberg, M.D., Ph.D.
President
Institute of Medicine

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Welcome

Harvey V. Fineberg

DR. FINEBERG: Good evening. I am Harvey Fineberg. I am the president of the Institute of Medicine, and I have the great privilege of welcoming all of you to the annual Richard and Hinda Rosenthal Foundation Lecture.

This lecture series, which started in 1988, is an opportunity for those of us at the Institute of Medicine to present a public discussion each year on a topic of significance in health.

This evening we are privileged to hear from a panel of presenters, all speaking on the topic of next steps toward higher quality health care. Arguably the one topic for which Institute of Medicine studies have had the greatest impact on public awareness and professional thinking is the safety and quality of health care. Our speakers tonight have had a direct and indirect hand in the series of IOM reports on that topic and in the kind of analytic and critical thinking that underlies our nation's efforts to produce safer and higher quality care.

The IOM reports from five and six years ago called attention to the problem. They laid out a blueprint—especially the *Crossing the Quality Chasm* report—for ways to approach the solution. But the questions for tonight are, How well are we doing as a nation? How much progress are we making? What do we need to do looking forward to take the next steps, to make the kind of progress that will produce a quality of health care that we are capable of providing and that patients and the public and our country deserve?

Our speakers tonight are each going to be asked to speak for about 15 minutes. I am going to introduce them individually. They will then make

their presentation, and afterward we will open the floor for questions, comments, and discussion.

I know that you will enjoy these presentations as much as I look forward to hearing them. Each of our speakers has done so much in this field.

Our first speaker is Elliott Fisher, who is a professor of medicine and community and family medicine at Dartmouth Medical School. He also directs the Institute for the Evaluation of Medical Practice at Dartmouth's Center for the Evaluative Clinical Sciences.

I might not have gotten all the titles correct, but I can assure you that the titles are only a small indication of the range of incredibly productive work conducted by Elliott and his colleagues. I am so pleased that Jack Wennberg, Elliott's colleague at Dartmouth, is here as well tonight, along with others who have worked and learned from the contributions that Elliott has made.

Among other important responsibilities, Elliott co-chairs the Performance Measures Subcommittee of the Institute of Medicine's Committee on Redesigning of Health Insurance Payment and Performance Improvement Programs.

So, for all your service here, Elliott, but most importantly for what you have done in the field and to advance the understanding of quality and evaluation in health care, welcome. We look forward to your remarks.

Keynote Presentations: Next Steps Toward Higher Quality Health Care

Elliott S. Fisher, M.D., M.P.H.

Dartmouth Medical School, Hanover, NH

DR. FISHER: Thank you very much. It is indeed a treat to be here. Thanks to Jack Wennberg and Alan Gittelsohn, we've known for over 30 years of the remarkable disparities in spending observed across U.S. regions and communities. More recently we've found similar disparities when we study the populations cared for by major academic medical centers.

The differences in spending are largely due to differences in the quantity of care provided to similar patients. Compared to similar patients at Strong Memorial Hospital, patients cared for at NYU Medical Center spend twice as much time in the hospital, spend two-and-a-half times as many days in the intensive care unit, and have three times as many physician visits.

Only recently has it become clear, however, that we're not getting much—if anything—for all the additional care. In fact, the details emerging from our research point to a "paradox of plenty."

Our earliest studies focused on Medicare enrollees who'd had a heart attack, colon cancer, or hip fracture—and a representative sample of the elderly population. We found a consistent pattern: whether one looks at technical quality, satisfaction with care, perceived accessibility, or long-term survival, higher spending across regions or hospitals offered no benefit. Subsequent studies have confirmed that for technical quality, at least, higher spending is clearly associated with lower quality.

The key to the paradox emerges from a detailed look at the differences in practice. Higher spending—whether at the hospital or regional level—is almost entirely due to greater use of the hospital as a site of care,

more frequent physician visits, a greater propensity to refer patients to specialists, and the higher rates of imaging, diagnostic tests, and minor procedures that accompany more intensive physician contact. We term these "supply-sensitive services" because the variations in their utilization are strongly associated with factors on the "supply side," not only the local supply of physicians, hospital beds, and imaging centers, but also the incentives under which they operate. High-spending regions have a greater per capita supply of physicians (in particular, medical specialists) and more hospital beds. The consequence for patients is an inpatient-based and specialist-oriented pattern of practice.

More recent findings underscore the paradox. We've found that physicians in high-spending regions perceive the quality of care to be worse than those practicing in low-spending regions. They report greater difficulty maintaining the longitudinal relationships with patients that are necessary for high-quality care, and they report greater difficulty communicating with other physicians.

This latter finding fits perfectly with the much greater apparent complexity of care in high-costs systems. Seriously ill patients cared for by the highest cost academic medical centers are more than three times as likely to have 10 or more different doctors involved in their care.

Current work on heart attack outcomes by Jon Skinner, Doug Staiger, and myself underscores the seriousness of the problem and addresses concerns that our earlier work looked only at cross-sectional differences, not growth in spending. Regions with the most specialist-oriented pattern of practice have the greatest growth in spending but the smallest gains in survival, whereas regions that were early adopters of high-quality innovations—such as beta-blockers or timely revascularization—have the least growth in spending and much greater gains in survival. So it's not a question of how much we spend; it's how we spend it.

I think there are three underlying causes that are worth considering—largely because we can do something about them: (1) Most medical decisions require judgment, and our scientific enterprise has provided little help. (2) In the absence of firm guidance, both physicians and patients tend to assume that more medical care means better medical care. (3) We have a payment system that provides strong incentives to provide more care, regardless of whether it's needed or wanted. How can we then move forward?

First, we need much better science to guide clinical practice. Academic medicine—and the NIH—should begin to pay serious attention to the challenge of supply-sensitive services and the remarkable variations observed across regions and delivery systems.

Most of our scientific infrastructure is devoted to exploring the biology of disease and developing new, highly targeted interventions aimed

(usually) at a single molecule or disease mechanism. The gains have been remarkable. But the notion that all the answers to our health problems will emerge from the basic sciences is a naïve and reductionist view that serves neither the public nor our medical students very well. There are a few settings where the answers are black and white and the problem is one of execution. But most medical care is not that simple.

Remarkably little attention has been given to how to help physicians and patients make wise choices. Almost no scientific effort has been devoted to the challenge of supply-sensitive services. Among the most expensive decisions physicians make are when to see their patients again and whether to admit them to the hospital for management. The most expensive decision administrators make is whether to expand a clinical service or recruit new physicians. None of these are currently the focus of serious scientific inquiry. A wonderful question for clinical scientists to pursue would be how all health care systems could achieve the high quality and low per capita costs achieved by Strong Memorial or the Mayo Clinic. Academic medical centers and the NIH need to take the lead in exploring the health implications of the natural experiments inherent in their remarkably different practice patterns and investment. To complement the science of disease biology, we need a serious investment in the science of clinical practice.

Such an investment should help with the second problem, the lack of adequate information on health system performance. Our current performance measures aren't up to the task. Most of our measures focus on technical quality and emphasize individual physician or hospital accountability for a specific clinical service where strong scientific evidence determines correct practice. Such measures reinforce a narrow, technically oriented view of clinical practice. They fail to account for the complexity of caring for patients with multiple chronic conditions, for whom strict adherence to clinical guidelines—as a number of authors have now pointed out—could lead to harm. Such measures will also do nothing to address the differences in practice and spending across health systems. I would suggest several areas of performance measurement that warrant serious attention: measures that promote shared accountability at the health system level; measures that allow us to judge whether a system achieves informed patient choice; and measures of the long-term costs and outcomes of care.

If the public and patients were able to choose between two care systems, one of which cost half as much as the other but achieved equal or better results, it's a fair bet that many would choose the higher quality and less expensive system, especially if they could pocket the savings. Patients and the public largely assume that because medicine is rooted in science, the practice of medicine is currently scientific. Routine public re-

porting of comprehensive quality and cost information would rapidly dispel that myth.

Finally—and perhaps a bit quixotically—I would suggest that real progress will require reform of the payment system. Fee-for-service payment has given us the delivery system we deserve.

Fee-for-service rewards volume, ensuring that whatever resources we have remain fully occupied, regardless of whether they are needed or not. Fee-for-service rewards the growth of high-margin services. The exploding growth of cardiology, orthopedics, interventional radiology, and imaging services can be traced directly to the relatively high profit margins of such services and the needs (or wants) of physicians and hospitals to maintain their incomes.

Fee-for-service payment also rewards fragmentation. If a primary care physician has limited time and is paid little for the visit, the most efficient way to manage a difficult problem—from her perspective—will often be to refer the patient to another physician. Physicians in the highest spending U.S. regions and health care systems are almost three times as likely to refer their patients to specialists. This unnecessary—and probably harmful—complexity is directly fostered by fee-for-service payment.

The remarkable differences in spending and overall intensity observed across regions and health care systems present both a challenge and an opportunity. The opportunity lies in the potential savings that could be achieved. If all U.S. regions could adopt the conservative practice patterns of the lowest spending fifth of the country, Medicare spending—and possibly spending overall—would fall by 30 percent. The challenge, however, is substantial.

Since the publication of the *Chasm* report, we have focused our attention on technical quality, safety, and errors. One unintended consequence may have been to reinforce a public perception that good outcomes can be guaranteed and that the problems we face in medicine represent a few technical glitches that can easily be fixed. The public belief that more medical care means better medical care is deeply entrenched, so I'm afraid that we've got real work ahead of us. That's why I believe that a good place to start would be a serious effort to address the dramatic differences in resource use we see across even our best academic medical centers and the development of meaningful performance measures. With those in place, we might have a shot at reform of the payment system.

Thank you very much.

DR. FINEBERG: Thank you very much, Elliott, for an excellent overview and a wonderful introduction to the systems-level components that may be available for improving quality.

I would like to turn now to our second speaker. He is George Isham,

the medical director and the chief health officer for HealthPartners, a large health care system in Minnesota.

George has been a leader in the field of improving quality and performance of health care from a systems point of view and was quite instrumental along the way for a number of projects here at the Institute of Medicine. He is still active, serving, for example, as a member of our board on population health and public health practice, and he was also the chair of the committee that produced the report on priority areas for national action transforming health care quality.

It is a great pleasure to welcome and introduce to you Dr. George Isham.

George Isham, M.D., M.S.

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HealthPartners, Minneapolis, MN

DR. ISHAM: Thank you very much. I appreciate the invitation to be here, and I bring you greetings from Minnesota. The Institute of Medicine, in its report *Crossing the Quality Chasm,* concluded that the American health care delivery system was in need of fundamental change. In its view, current care systems cannot provide the quality of care that is needed, and simply trying harder will not work, but changing the systems of care will.

It is suggested in that report that high-performing, patient-centered teams are important in producing safe, effective, efficient, equitable, timely, patient-centered care. These teams require organizations that facilitate the work of the teams, and organizations require a supportive payment and regulatory environment. My comments will focus on the next steps needed for the creation of a national environment to support high-quality health care. I think there is a lot of work to be done to create the systematic approach called for in *Crossing the Quality Chasm.*

It is my belief that the United States should begin constructing a national support system to assure health, safety, and quality of health care. In other words, the environment needs to be structured to enable the production of safe, high-quality health care. This new system of supports requires elements that are needed at the national, at the state, and at the organizational levels. Dr. Gail Amundson and I at HealthPartners have described and used a seven-step process model for quality improvement to achieve substantial improvement in health and quality of care at HealthPartners in Minnesota. I will take this model as the organizing framework for my comments.

Step one in the model is to define focus. In other words, set goals or

objectives for the health care system. We did this at HealthPartners in 1994, revised it in 2000, and now have a third edition that we are working with today. The second step is to agree on best practice. In other words, make sure that the best science and evidence is the basis for the interventions that you are going to design to achieve those goals you established in step one. The third step is to establish standard measures and collection methods. The fourth step is to set performance targets against those standard measures. The fifth step is to align incentives in support of achieving the targets that were established in step four. The sixth step is to support the improvement process that is required by the care delivery system to achieve the targets set in step four. The seventh and last step is to assess and report on progress.

We think of these seven steps as a cycle, so that each time around the cycle there is improvement in the steps as well as progress toward the goals. We are now entering our third five-year improvement cycle at HealthPartners.

So, let us take these seven steps one by one and envision how they could be applied to the nation as a whole. Step one is to define focus. In my view the Department of Health and Human Services and other private and public entities should focus on the 20 priority areas that we identified in the IOM report *Priority Areas for National Action*, issued in 2003.

The recommendation from *Crossing the Quality Chasm* was to look at areas that had the potential for significant impact in reducing disability and death. In other words, look where there was a big gap to be closed. In addition, a potential for improvability is important, in that there is a reasonable chance to close the identified gaps. Lastly, inclusiveness is important in that the priorities involve many treatment settings, many ethnic and socioeconomic populations, all age groups, and preventive care through end-of-life care in many types of institutions, rural and urban.

If we were to achieve substantial progress on these 20 priority areas, the nation would be much better off. More important, we would in fact have learned a lot of lessons that we could apply to many other conditions. These could then be applied to creating the new systems of care that we need and to executing that transformation that is called for in *Crossing the Quality Chasm*.

Some progress has been made in the two years since the release of *Priority Areas for National Action*. For example, the priority areas have been endorsed by the National Quality Forum, which develops consensus measurement standards for the nation. But there is a lot more that could and should be done.

For example, for each of the priority areas, specific strategies for the reduction in the gap between current and potential performance need to be identified. These strategies should address the provision of safe, timely,

efficient, effective, and equitable patient-centered care in each of these priority areas.

Overuse as well as underuse needs to be addressed by these strategies. Waste needs to be driven out of the system so that one can use the resources and apply them elsewhere.

The second step is to agree on best practice. Resources such as the Centers for Disease Control's *Guide to Community Preventive Services* and *the Agency for Healthcare Research* and Quality's *Guide to Clinical Preventive Services* provide useful evidence-based tools for us to use in developing best practice. The medical literature and the National Guideline Clearinghouse also provide resources for the creation of evidence-based interventions that address the 20 priority areas.

We need better databases that include the information from all clinical trials, not just those that are published. We need a national system for assessing and displaying the quality of those trials. We need national technology assessments of new health care technologies, so we know what works and what doesn't. We need evidence on the effectiveness of drugs and devices as compared with alternative treatments because we don't know that today. There are, unfortunately, conflicting guidelines and advice out there based on incomplete or missing information on the effectiveness of those treatments.

So, for example, with cervical cancer screening, an old technology, HealthPartners has a pretty good performance level: 80 percent of the women in our system were screened in 2004. The national average that year was 81 percent. The 90th percentile was 90 percent. So our rate is pretty good, but it could be better. We work very hard at getting better, but if you get underneath that figure by using the new electronic medical records capability that we now have at HealthPartners, the appropriate use rate for that test is about 34 percent. In other words, in financial terms, $1.9 million of services could be used or should be used to address Pap smear use in the women who are not getting it, but $8.8 million worth of services are being used by women who have already had hysterectomies or who have had more than the recommended frequency of those tests. One possible reason is that there are conflicting guidelines that make recommendations for that test that create excess demand for the test by women who are concerned about the possibility of developing cervical cancer. So, the U.S. Preventive Services Task Force recommends a Pap smear at least every third year; the American Cancer Society recommends one every year. As a consequence, many women have been educated that they should have that test every year.

If we had clarity and consistency from the authoritative groups recommending screening, and assuming that at least every third year is an effective regimen for screening, the difference of the $8.8 million in pos-

sible excess tests minus the $1.9 million to be spent for those women not receiving the test would be $6.9 million saved. That would provide for just about half of the uncompensated care we provided at our hospital in St. Paul in 2004. So, mobilizing waste from this one screening test and applying it to funding care for those without financial resources in this case would go a long way toward addressing a pressing access-to-care issue in St. Paul, Minnesota. Different clinical practice guidelines based on different recommendations from the different specialty societies are confusing to professionals and the public. Conflicting guidelines are known to be a significant barrier to the effective implementation of clinical practices guidelines. This issue needs to be addressed. Guidelines need to be harmonized across specialty and advocacy groups. Differences in them should drive research agendas, not political advocacy. The country can't afford the consequences of these differences.

The second example of conflicting science as a barrier to better quality of care also comes from Minnesota. There are at least seven different guidelines for preventive care for children in Minnesota, among them one promulgated by the American Academy of Pediatrics, one by the American Academy of Family Practice, one by the U.S. Task Force on Clinical Preventive Services, one by Minnesota Medicaid, and one by the Institute for Clinical Systems Improvement in Minnesota, which is used by 75 percent of the clinicians in the state. Which one should we code in our automated decision support systems that Elliott wants us to deploy in the medical records systems that are now in place in Minnesota? Does the confusion over preventive care standards for children make a difference? I think it does. Does it matter? I think it does.

A solid evidence base for interventions that are directed by strategies that have been devised to close the gaps in performance in each of the priority areas would give a sound scientific discipline to the effort to transform care. It won't be easy, but it will give discipline to a systematic approach to achieve our priorities for improvement. It will also help stimulate innovation and more research on more effective ways to put evidence into practice.

The third step was to establish measurement standards. Much has been said about measurement standards in this town. The whole conversation often seems to be about measurement standards. There are a lot of different measurement standards out there. The health employer data information set, or HEDIS, has standards for health plans; JCAHO has standards for hospitals; and the Consortium for Physicians has measurement standards for physicians. The National Quality Forum has developed a consensus process for measurement standards and approves them, but it hasn't resulted so far in a reduction in the number of measurement standards. We don't have a specific and detailed set of valid, accurate, reliable

standardized measures of quality that are linked to the evidence-based guidelines and interventions that have been determined by the specific strategies we need to adopt to close the gaps in care that cause the IOM 20 priority areas to be our national priority areas. We don't have that logic or consistency or coherence of effort, and that should be changed. Furthermore, and more fundamentally, we do not have a system for the collection of these measurements across all payers and providers of clinical services that produces relevant information for the nation, for states, and for local health care organizations that will guide and drive their efforts at closing gaps in the 20 priority areas.

The Ambulatory Quality Alliance has proposed a national data stewardship board that could set those standards. Regional data collection pilots are being talked about that could set up regional data collection agencies that would engage local health care systems and physicians and give feedback for their performance using the measurement standards. I think that kind of national system of regional support organizations would be a useful direction.

IOM, as we heard earlier, will also soon produce a report on this topic that I eagerly look forward to reading.

The fourth step is to set targets. Aggressive targets need to be established for each of the measurement standards in each of the priority areas. For example, among the 20 priority areas, the aim for diabetes was to prevent the progression of diabetes through vigilant systematic management of patients who are newly diagnosed or at a stage of their disease prior to development of major complications. Our goal at HealthPartners in 1994 was to reduce complications in persons with diabetes by 30 percent by active management of those cases. Another example of an aggressive target for the population of 20,000 people with diabetes is to obtain a measurement for hemoglobin A1C of less than 7.

So there need to be very specific aggressive targets for each of the measurement standards developed to monitor the progress for each of the strategies that help close the gaps identified for each of the priority areas. A national system of targets would be similar to those developed for Healthy People 2010, but these would be focused on closing the quality gaps in the 20 priority areas.

The fifth step is aligned incentives. Elliott has already referred to this in his comments. There are many efforts at the Centers for Medicare and Medicaid Services and in the private sector to pilot this. There are over 100 pay-for-performance demonstrations in the private sector going on today. Incentives need to focus on supporting the achievement of the aggressive targets we set that are assessed by the standard, valid, reliable measures applied to the evidenced-based interventions determined by the

strategies devised to close the gaps of performance identified in the 20 priority areas.

One of the approaches we have used is to embed incentives in product design to identify high-performing networks. The providers are graded against the quality and cost of their services, and co-payment differentials are established to provide incentives for patients to use the high-performing providers. Incentives for quality can also be used in bonus programs, which we have been doing for seven years. We pay bonuses for the achievement of those specific targets that are linked to our priorities, for example, achieving that hemoglobin A1C of less than 7. A third way to deploy incentives is to use contract incentives for individual providers in a way that rewards improvement as well as achievement of specific performance targets. Finally, and most controversially, a way of using incentives is to not pay for things that shouldn't happen, such as the National Quality Forum's "never events." These never events are serious events that the National Quality Forum identified as safety issues that shouldn't happen, for example, cutting off the wrong leg during surgery, sending a mother home with the wrong baby, or giving a contaminated medication or blood supply. We are still the only organization in the country that has such a policy, although it is being discussed by a number of states, some other health plans, and the Physician Payment Review Commission. It is probably not sufficient to put new money in the system in the form of bonuses for quality or to simply establish targets to achieve health targets and goals. Disrupting cash flows that support the wrong thing happening is also needed. A lot of cash is flowing in health care for the wrong thing.

Step six is to support improvement. Care needs to be redesigned by those who are providing it. A series of regional support systems needs to be established that assists providers in the skills and techniques of quality improvement and that is linked to the data collection and reporting for the region and the health information infrastructure. A health technology infrastructure needs to be established that gives guidance on standards for health information exchange and that enables much of what we have discussed so far.

We collectively pay about $3.5 million annually in Minnesota for our quality improvement organization, the Institute for Clinical Systems Improvement, and about $800,000 annually for our collaborative measurement organization, the Minnesota Community Measurement Collaborative, which collects and reports information on the performance of doctors in Minnesota.

If you add those two budgets together and multiply by 50, you get $215 million annually. The country could have such a system of support for quality improvement for $215 million annually. That is roughly the

cost of two of those new F22 fighter jets. It is cheap and well worth it, and we ought to get on with it.

The last step is assessing and reporting progress. Progress has been made. The Agency for Healthcare Research and Quality has established the *National Quality Report* and has been reporting now for two years. Increasingly the focus must be on the 20 priority areas, and the results need to be disseminated more effectively to the public so that we who provide the care can be accountable for it. A version of this report deployed at the regional level that highlights specific performance of local providers in achieving the targets that have been set based on the strategies developed to close the gaps in the 20 priority areas should be established.

In my opinion Congress and the Executive Branch of government also need to provide the necessary support for monitoring the ongoing progress and updating these priority areas over time as called for in the *National Quality Report*.

Priorities should change over time as we achieve our targets. This needs to be a dynamic and living system. Dynamic and living systems require nourishment in the form of adequate funds and leadership.

Using this system at HealthPartners over the past 20 years for the management of diabetes, our average hemoglobin A1C has fallen from 8.7 to below that target of 7.0 to 6.8. Average systolic blood pressure in this population of 20,000 persons with diabetes has fallen from 134 to 122. Amputation, which is a complication of diabetes, has fallen from 10 to 4.5 per 1,000 persons. Heart attacks have fallen from 16 per 1,000 to 12 per 1,000, and new cases of retinopathy or eye complications from diabetes from 78 per 1,000 to 62. The average cost per diabetic patient is estimated to be $2,000 under the predicted cost per diabetic patient at 10 years. For 20,000 diabetics that is roughly $40 million in costs saved over 10 years. Cost and quality are indeed linked.

I think that we need a system that can achieve what is analogous to this performance on a national level. To achieve that, we need leadership from physicians on improving quality of care. I am encouraged to see the American Board of Internal Medicine and leading specialty societies really addressing the issue. In the specialty societies and hospitals, leadership is also needed. The states need to lead as well, by developing regional examples of the seven-step system that I have outlined here. And as I have stated, there is much more that needs to be done by the federal government.

In my opinion the United States should begin to construct a national seven-step support system to ensure health and safety of patients and the quality of their health care. In other words, the environment needs to be restructured to enable the production of safe, high-quality health care.

DR. FINEBERG: Thank you very much, George, for a wonderful consideration of specific actions and steps that are particularly important. There was a commonality with a lot of what Elliott introduced in terms of the relationship between cost savings and improving quality, an important concept.

Our third speaker is Lucian Leape, who has been a sage in this field of quality improvement and improving patient safety. Lucian achieved renown and international distinction as a pediatric surgeon and along the way became increasingly interested in the larger issue of safe and good quality health care.

For the past 20 years or so, he has been increasingly forceful, effective, and outspoken on the importance of the problem and the specific needs for those in the profession and around it to take steps to improve the safety of care.

Lucian was one of the people who served on the Committee on the Quality of Health Care in America, which produced the original reports *To Err Is Human* and *Crossing the Quality Chasm*.

It is a great pleasure to welcome and introduce to you Dr. Lucian Leape.

Lucian L. Leape, M.D.

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Harvard School of Public Health, Boston, MA

DR. LEAPE: Thank you, Harvey. It is a pleasure to be here. Within the past month there were two news items with immense significance for quality and safety. I think they are the most important information I have seen in at least two years.

One was a report in *Health Affairs* from a Commonwealth Fund cross-national study. The headline grabber was that among Americans with at least one medical condition requiring treatment, 34 percent reported a medical error in the past year or so, higher than in any other country. It won't surprise most of you to hear that that didn't surprise me, but what did surprise me was another finding that got much less attention. That was that among these fellow citizens of ours with a medical problem, 51 percent forewent medical care because of the cost. That is, more than half did not get a lab test, did not get a prescription, or did not see a doctor because they couldn't afford it.

I was quoted as calling that a moral outrage, and it certainly is. There is nothing as troubling to me—and I am sure to all of you—as the persistent, shameful unwillingness—not inability, unwillingness—of our country to provide health care for all our citizens. Lack of access is the most serious threat to quality and safety and also the one most easily remedied if we had the will. I am supposed to talk about safety and I will. But I don't think they are so different, and I would even go so far as to say that until we solve the access problem, we can't solve the quality and safety problems.

It was almost exactly to this day in November six years ago that the IOM report *To Err Is Human* shocked the world with the statement that

almost 98,000 people die annually because of preventable medical error. People today ask, "Well, is there any evidence that things are any better? Is health care any safer?" In fact, it has become quite fashionable to say that health care is not safer, but that is not true. We have made a lot of progress. I think there is no question that things are safer—not safe enough—but we have certainly accomplished a great deal.

I think our progress over the past six years can be thought of in three phases. The first phase was awareness. At the time of the IOM report of 1999, the vast majority of people—I would suspect probably most of the people in this room—were not aware of patient safety as a significant problem. There was a small group of people who had been working on the issue for 5 or 10 years, but as we used to say, we could hold our meetings in a phonebooth. It was really in 1999 that the magnitude of the problem became evident and people became aware of the fact that this was something serious.

The response was predictable, very reminiscent of the Kübler-Ross framework for grief. There was shock. There was disbelief. There was denial. There was anger. There was rejection. And then finally there was reluctant acceptance.

You may remember several papers attempting to show that the figures were greatly exaggerated. Sadly not so. If anything, they were an underestimate, but that has all pretty well subsided. That phase, phase one, has pretty much come to an end, at least for most people, with the acceptance of the fact that we really have a problem.

The second phase, which for lack of a better word I call the phase of definition, was where we set out to try to determine what we were going to do about the problem. When the IOM report came out, we had a lot of great recommendations. We could tell you all the things to do, but what we put forth was based largely on human factors theory, and it was based on experience in other industries because there had been very limited experience in health care and therefore very little evidence. So one of the major tasks of the past five or six years has been to develop practices in health care, to bring these into focus and identify safe practices. Indeed, we have done a tremendous job. I say, "we," but I mean mostly the National Quality Forum (NQF), with help from the IOM and support from the Agency for HealthCare Research and Quality (AHRQ), and with some superb work done by Bob Wachter's team at the University of California, San Francisco. They identified safe practices that really are effective and for which there is good evidence. As most of you know it was about two years ago that the NQF came out with a list of 30 safe practices that it recommended all hospitals implement. The Joint Commission was reading off that page, as they have increased the requirements for hospitals each year since.

We made a lot of progress in defining practices. We made a fair amount of progress in research. The only tangible thing that the federal government did to improve safety was an important thing, and that was to appropriate $50 million a year for research.

Now, in the world of research $50 million is barely a blink of the eye, compared, for example, to $28 billion for NIH, but it was $50 million more than we had, and it enabled us to start doing research on these practices. And even more important, I think, it allowed us to attract people and develop a cadre of young investigators who will be our leaders of the future.

So getting started in research was a very important part of this phase of definition. Then we also began to develop some measures. Both the other speakers mentioned the fact that we don't have enough measures. However, we have a lot more than we had five years ago, and so we are making some progress.

The measure that is the most interesting to me and that probably most of you haven't heard about since it hasn't been published is the one that Ben Sachs and his colleagues developed to study the effect of team training in labor and delivery. They decided to train all their people in teamwork, but they faced the very simple question, how would they know if it made any difference? So they developed a measure called the adverse outcome index, in which they assigned a value to every bad outcome that could occur after pregnancy and gave it a weight. Mother death, for example, would warrant a high score. By assigning a score to every adverse outcome and then dividing the total score by the number of deliveries, then came up with an average outcome index.

They found that when they did team training they were able to reduce that measure by 54 percent for pregnancy and about 18 percent overall. So they had a measure of the global measure of safety. We did a lot more of those, but they showed us the way to do it.

This demonstrates the progress I think we have made in the past five or six years, and the end point is that we now know what to do. We have an agenda. We don't really know exactly what to do, but we have a big enough agenda to keep us busy, to get us started. So the question now is moving into the third phase, which is implementation.

How many people in the room actually work in a hospital and take care of patients? The rest of you might not understand what I'm talking about here. What I am trying to get at is that trying to implement changes like safe practice, which seems so simple on the surface—for example, disinfecting your hands before seeing a patient—is not simple because making changes in patterns is incredibly difficult.

The implementation challenge actually has two steps to it. The first is defining what it is you want to do, and the second is figuring out how to

do it, getting people to put it in place, then making sure that it happens every single time. That is difficult.

We had an experience during these past two years in Massachusetts, for example, where we had a statewide effort to implement two safe practices. One was reconciling medications. That means making sure that when patients enter the hospital they are prescribed the same medicines they were getting outside the hospital. That sounds pretty simple, but it's not. Eighty percent of patients don't get the same medications. It's a big deal to reconcile them.

The second safe practice was communicating clinical test results so that when a patient had an important test result their doctor got it. How do you make sure the doctor gets it to the patient? These things turn out to be very difficult to do. We had a year-and-a-half in which we had 80 percent of the hospitals in the commonwealth participate and we had people helping us. We gave them training in PDSA cycles and change. We had hotlines. We had a web site. We had tool kits. We had meetings. We had scores. At the end of that time, 20 percent were succeeding. Another 30 percent had begun to make some progress. That is with the full court press. So putting these things in is not easy, but there has been a remarkable development that I want to tell you about. It is the work of Peter Pamazosh at Johns Hopkins University and some others who decided they would see what they could do about reducing infection in the intensive care unit.

You may have seen the data from the CDC about a year ago. The CDC estimates that annually 2 million people in the United States become infected in the hospital. That is about 1 out of 17, and it is estimated that 90,000 people a year die from nosocomial infections acquired in the hospital. That is almost as big as the number for the total number of preventable deaths. Peter and his team decided to see what they could do about preventing one particular kind of infection—that associated with central venous lines, the plastic tubes that are put in the large vein for all kinds of treatments for patients who are very sick. Many patients in intensive care units, probably about 30 percent, will have them, and about 5 percent to 10 percent of patients will get infected and about 5 percent to 10 percent of the patients who get an infection will die from it. I am going to give you the bottom line: They really eliminated that infection. They went 8 months and then on to 12 months without a single central line infection.

This is of immense significance because it demonstrates something that everybody thought impossible. One of the responses to the IOM report and one of the responses to the stuff that I have been talking about for 10 years is that errors, like the poor, are always with you. We will always have mistakes. But it is not necessary. The whole concept that we could have error-free performance, that we could have defect-free perfor-

mance, what I call "getting to zero"—meaning zero defects—is a very controversial, dramatic, hard-to-grasp concept for most people in medicine. But Peter showed it could work. As a matter of fact, a number of others have done it. Jodius has had his programs going now for several years. A little hospital in De Sota, Mississippi—Memorial Baptist Hospital—has eliminated ventilator-associated pneumonia, a similar nosocomial infection. That is a giant step forward in terms of moving ahead and breaking through the conceptual barrier and saying, "You know, we really could have a defect-free environment." But first you have to concede that it is possible.

There was another aspect of implementation that hasn't done so well, however, and that is the bigger issue of how we change the culture. Medicine has a very dysfunctional culture. I don't know how many of you have read Peter Sanger's work or the work of people who talk about organizations. Most hospitals are certainly not learning organizations as Sanger defines them. They tend to be very hierarchical and autocratic. They tend to have a lot of trouble with unclear lines of authority. Many people have talked about the massive underinvestment in information technology in hospitals, but over and above that hospitals have a very peculiar characteristic—the most important player on the team, the physician, usually doesn't work for the hospital. In 90 percent of hospitals, not true of academic medical centers but essentially all the rest, physicians are independent contractors, meaning they do not necessarily have to do anything anybody wants them to do. Good teamwork and developing a cohesive approach to the problem become very difficult to achieve in that kind of environment.

We are making progress. There have been a lot of interesting things and I think there is no question that the situation is improving, but we have a long way to go, and until we see the CEOs and the physicians move ahead to address issues of safety, we are not going to take the quantum leap forward that we need to.

There have been several recent developments that are worth mentioning. First, this summer Congress, at long last after five years, passed the Patient Safety Act, which provides protection from discovery information about safety errors and adverse events that is shared across state boundaries and therefore escapes state peer review protection. The hope is that this will stimulate the development of reporting systems throughout the country that will improve our learning. I think it probably will. I am not sure it is going to improve safety as much as the people who proposed it think it will, but it certainly won't do any harm and it will make life a little bit safer for some people.

I think we clearly have the will to do something about the informa-

tion gap. I remarked to George Isham earlier that I think it is such a shame that somebody with the talent and commitment of David Brailor has so little in the way of financial backing. The amount of money committed by the federal government for improving information technology, specifically for developing electronic medical records, which is what we desperately need, is off by three zeroes. It is $50 million instead of $50 billion. We're not going to get there that way, but we are going to get there another way and that is when payers suddenly realize that it is in their interest to have an electronic medical record. Many of us believe that the electronic medical record is the single thing that would make the most difference in the improvement of quality and safety. It is only a tool, but it is a tool that we desperately need for a number of reasons. The problem has been that the up-front expense as well as the time and effort that it takes have been sobering for physicians, who have long wanted to do it. There have been a number of other problems, too, but that has been a very major area.

Recently payers have begun to realize that they are able to benefit from this. We did a in-depth study that some of you may have seen that showed that for every dollar invested in the electronic medical record, the payers would get back $3 in three to five years. We have convinced the payers in Massachusetts about this, and we now have a pilot study funded at $50 million by BlueCross BlueShield in three communities. If it is successful, and I have no doubt it will be, it will then lead to wiring the whole state so that all patient medical records become electronic medical records in all doctors' offices and hospitals. There are other experiments going on throughout the country, and therefore I predict that in five years we will be well along and that well over 50 percent of patients, maybe 60 percent or 70 percent, will have electronic medical records. Probably the project will be completed within the decade. It is about time, but it is coming.

The most remarkable development, though, came out on October 13. It was a report of my friend Peter Corngros's activity in Michigan because Peter, again, got BlueCross BlueShield to put up the money and talked almost all—over 70—hospitals in Michigan into joining a project in the intensive care unit to eliminate central line infections and ventilator-associated pneumonia. The news item that came out on October 13 told us the following: Sixty-eight hospitals have now gone more than six months without a central line infection or ventilator-associated pneumonia. On the basis of their previous history, they estimate they have saved 1,578 lives, 81,020 hospital days, and $165 million. This is big stuff. It is no longer an idea. It is no longer one or two hospitals. This is something we all can do, and the rewards are fabulous.

If every hospital would do just that, we would reach Don Berwitz's

"100,000 Lives." So that is a turning point. We are beyond theory now. We are into practice and the payoff is huge, and it is going to be very exciting to watch it go on.

Probably everyone has their own ideas about where we move forward from here, and I don't pretend to have a corner on the market. We clearly need better data. We clearly need to have better measures, and as I said before I think the electronic medical record is the most important thing and I am pretty optimistic that we are going to have it.

How we accelerate the implementation of safe practices is an interesting question. Maybe pay for performance is the way. Pay for performance means that we pay for results, and not whether you give debatable arguments to 100 percent of the patients. We pay on whether you actually eliminate the infection. For example, when I said this to BlueCross they said, "Why don't you give half of that $165 million back?" We need to think about that. I am sure many of you have read writers like Brent James who have noted that as you improve the quality of care you lose money. The classic example is treating patients with asthma. If you do a good job treating patients with asthma you don't see them anymore. They don't get admitted to the hospital anymore, and both doctors and hospitals lose money. There is something wrong with that. That gets at this whole issue of needing to have a different way to pay for health care. Instead of paying for services, we pay for outcomes, and I would suggest it is time to figure some creative ways to pay for results, to pay for having no infections, to pay for having no care of asthma, and so forth. People are thinking about this and so it is an interesting frontier.

Finally, how do we get to the CEOs and physicians? This is one of the tough ones and we haven't got a whole lot of answers, but I think one thing we have to do is create environments where it is the norm to be honest and open to make it safer for doctors to talk about things. That is perhaps a subject for another meeting, but we need to create a different environment. I think paying for results will get their attention. I think there is no question about that, but at the hospital level I have long thought that it is time to seriously consider making hospitals accountable for the cost of injuries.

They are doing some interesting work in Minnesota that George Isham may or may not want to talk about. They are saying that we no longer will pay for "never events," but hospitals by definition don't often have never events. They have a lot of other kinds of problems, and the patients pay for it. The regional medical practice study that generated the number of 98,000 for people dying from medical error found that patients pay one-fourth of the expense of medical injuries out-of-pocket. So it is a huge amount of money, and if we want to do something about improving our systems, it seems to me we ought to hold accountable the organiza-

tion that is responsible for the outcomes, and that is the hospital. Because we believe in systems theory, we believe it is defective systems that lead to problems, and the obvious question is who owns the system. The answer is that the hospital does, and it should therefore pay for the consequences to the patients when things don't go well. That is not an idea that very many people like very much, but I think it would really have a big effect. I think hospitals would then take the whole safety problem a lot more seriously.

In any case I believe this is an exciting time. I think the new results from Peter Pamazosh's experiment and others, and the tremendous amount of activity that is going on, are encouraging. There are lots of problems; we are, after all, changing culture and that is going to be slow and difficult. But we are changing, and I have no doubt that in five years from now we are going to be a lot safer.

Discussion

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PARTICIPANT: I would like to ask for an encore from all three of our speakers. I think they had terrific remarks to make, and I have specific questions for each of them.

Dr. Fisher, you let us know that we have a lot of measures of the numerator of health care—the kinds of services provided, the numbers of services provided—but not very sensitive measures of the denominator. We have to do a lot of things wrong before we statistically significantly increase the mortality rate, but indeed we do them. What can we measure that is more sensitive than mortality rates, that will give us a clue before things get that bad, when we can still do things better?

Dr. Isham, you told us that we need to apply these things to the targeted populations. Could you give some specific examples of things we could be looking at in targeted populations that would help us significantly improve the quality of health care for lots of people and decrease the costs or at least keep them from going up so fast?

Finally, Dr. Leape, you told us that we really need to be thinking about how to improve the safety of health care in lots of ways. If you reject any of the premises that you hear before your turn, then tell us. And tell us the specific things we could be doing to assess what is happening before it gets too bad or maybe even to detect things that are good and alter our practices in the interest of patient safety and better quality for all of us.

DR. FINEBERG: That is what I call an equal opportunity interrogation, and Elliott, you are first.

DR. FISHER: That is a great question. I think the question of whether mortality is a good measure depends a lot on the population. In the population of seriously ill patients, mortality is actually pretty frequent. If you look at survival following heart attacks, or if you look at hip fracture patients or patients with cancer, mortality is not that infrequent. So I would encourage us to think about adopting measures that let us characterize the care of seriously ill patients. In this population, long-term mortality and costs will provide important insights into how delivery systems perform.

Most of my comments focused on the category of care we refer to as supply-sensitive services, that is, how much time patients spend in the hospital and how many physician visits they experience. These events are very frequent and very easily measured. You can see huge differences in utilization rates with almost imperceptible differences in outcomes across delivery systems, suggesting that there are real opportunities to improve efficiency by reducing utilization, and yet sensitive indicators that would let us know when we've cut too close to the bone.

When we get electronic health records in place, perhaps in 10 years, I look forward to having valid measures of functional status to complement the measures of mortality. You could then measure when patients have returned to work or when they have returned to the health status they enjoyed before they came to the hospital.

If we look at the models of health system evaluation that have been implemented in recent years, such as the Medical Outcome Study or the evaluation of the implementation of the DRG system, patient-reported health status has been used as a key measure. So I would look at mortality and functional outcomes to get a more sensitive indicator. And once Lucian has our electronic health records in place, this will all be possible.

I'd like to follow up with a question for Lucian. How many hospital beds and ICU beds closed in Michigan after they reduced all those hospital stays?

DR. ISHAM: I think my question was about applying improvement to targeted populations. How can you improve care for a lot of people in different target populations? We have been doing goal setting at HealthPartners since 1994. When we first started we picked eight areas that were a mix of things, some of which we thought we could do, some of which we knew would be tough, and some of which would be real challenges. Some were chronic disease. Some were preventive services. In that go-round we had some successes and some failures.

The second time around in 2000, when we did our next iteration, we picked the top three drivers for actual cause of death by going back to the McGinnis and Foege article on the actual causes of death published in

JAMA in 1993. Instead of heart disease and cancer and so forth—the causes of death that are typically listed—McGinnis and Foege identified the drivers of those deaths as factors like smoking, lack of exercise, and poor nutrition, the real underlying causes of death in their view. We actually set those drivers of death as our priorities and established targets for them. We also selected three chronic disease; because we felt we really did need to learn how to do chronic disease well. We selected heart disease, diabetes, and cancer. We carried diabetes over from our first set of priorities. We have been working on establishing priorities for our health care system for 10 years.

As a result of 10 years of effort on the tobacco priority, for example, tobacco prevalence in our population of 630,000 has fallen from 26 percent to 15 percent, and exposure to second-hand smoke for children has fallen from 23 percent to 8.6 percent. I think that has long-term implications for future burden of illness that I can't really measure or tell you about today, but I am working on trying to figure it out because it makes a compelling story.

In our inner-city population in St. Paul, we are grappling with the issue again of these different preventive service standards and how you deploy effective interventions to different risk populations. So, for example, some of our efforts there have to do with environmental issues such as lead screening. We have a sense that different standards ought to apply to different risk populations, but I don't really have as much success to talk about on this topic because we haven't had as much coherence or consistency around the guidelines or as much thought applied to this scientific problem as we need. As I mentioned in my talk, this results in confusion and less effectiveness than we ought to have.

We have just completed our third round of trying to set goals, and we now have two types of goals. We have an innovative and simplified list of goals that doesn't sound at all like public health or medical kinds of things. It has to do with transitions in care. It has to do with communication to patients and issues like that. It is focused on care as patients experience it. Then we have the health and care list, which does sound like public health and acute and chronic care. because we have got to relate to the priorities of improving the care that doctors give.

DR. LEAPE: I think the question from Dr. Fisher about the Michigan hospitals is a fascinating one, and maybe he or I should write the Michigan Hospital Association and ask them to do a study to find out. My fears are as yours are. I suspect very few have been closed.

With regard to the question about how to stave off things getting worse or identify accidents about to happen, that, of course, is the objective we have in creating a culture of safety. A culture of safety is the ideal.

What they have achieved in aviation and nuclear power and a few other industries is an environment where people are constantly on the lookout for hazards and are identifying them. People feel not just empowered to do something about hazards, but a genuine internal feeling of responsibility to do something about them, and that is exactly the kind of environment we ought to create. We are light years from that in most institutions, and the reasons are complex.

The first thing is that health care is much more complicated than flying an airplane or even running a nuclear powerplant because it is primarily interactions of people. It is not just a bunch of equipment that we make sure works right. So the challenge is a lot greater. Right now what most people are trying to do is to put in place better systems and better practices to address the obvious problems. But what we also want is to have caregivers feel empowered to do something. A desire for empowerment is one of the things that has led to interest in reporting near misses. One thing that keeps people from reporting adverse events and errors is concern about consequences, that somebody will get in trouble. One way around that is to report actions that didn't happen, a near miss, the hazard that somebody intercepted or recognized. That is a very positive thing, and you can talk about it safely. I think it is very worthwhile and helps change the culture. But our major job right now is doing the obvious work of implementing known safe practices and figuring out how to get the will to make that happen.

PARTICIPANT: Everyone got a laugh out of Elliott's comment that we could do without one-third of the workforce, as if it would be a silly thing to consider, but we did have the wonderful opportunity at the conjunction of the aging of America and this excess capacity. It would take some moving around among geographies and among specialties, but it still is the case that if one-third of our health care is delivered to us in the last few years of life and we are going to double the number of people who are passing through that stage at the same time within the next 20 years, we have a wonderful conjunction of an excess capacity and a growing need where we actually could conceivably hold the line—not that we know how to do that, but we wouldn't have to put anybody out of work, so to speak. We would make a dermatologist be a primary care physician or make somebody actually take hands-on care of a patient instead of running a lab, but the numbers of people are just about right for what we need at the current technology in 20 years. So if we just stop growing we could achieve an awful lot of this, and that seems to be a wonderful opportunity that we won't have on the downside of the population curve. Fifty years later the numbers are starting to have to contract some, and this may be tougher.

PARTICIPANT: A general question for all three speakers. A recent IOM report found that mental and substance abuse conditions were the leading cause of death and disability for women and the second leading cause for men and that any quality health care can't separate the mind and body. They have to be somehow coordinated. My questions to you are, if we are talking about the issues of quality of care and safety, then (1) why no mention of mental and substance abuse conditions and (2) how do we set an agenda that begins to change that and integrates mind and body within the overall system of health care?

DR. FISHER: George Isham can tell you what actually can be done. I will tell you how I would think about it. I think we clearly need performance measures that reflect the quality of the mental health services that patients are receiving. Our Performance Measures Subcommittee has been thinking a lot about it, and the current availability of actual performance measures is relatively thin. It is clearly an area where we need to invest in learning about how to measure performance more carefully.

George can tell you how it actually can be done on a statewide level.

DR. ISHAM: I remind the questioner that the priority report identified a number of mental illnesses and substance abuse problems that were important. In fact, there was criticism of the recommendation for establishing priority conditions that was made in *Crossing the Quality Chasm.* There wasn't enough emphasis on mental health and substance abuse, and there was a lack of emphasis in terms of prevention. Both of these deficits were addressed, I think, by the makeup of the committee and then in the report itself.

So, for example, there is a priority area dealing with the seriously mentally ill and one dealing with depression. The other way to look at this, however, is that once you begin to look at conditions you quickly get into the fact that people don't have just a single condition—they actually have multiple conditions like heart disease and diabetes together. In fact, a significant co-morbidity for both of these chronic diseases is depression. I think it is absolutely critical that mental health and substance abuse issues be addressed in the national priorities.

Biosketches

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Elliott S. Fisher, M.D., M.P.H., is professor of medicine and community and family medicine and also director of health policy research at the Center for the Evaluative Clinical Sciences at Dartmouth Medical School in Hanover, NH. A former Robert Wood Johnson Clinical Scholar, Dr. Fisher is also a general internist at the Department of Veterans Affairs Medical Center in White River Junction, VT, where he co-directs the VA Outcomes Group, a research and training program for physicians. His research interests lie in three areas. First, he has worked to clarify the limitations of administrative databases and develop methods to overcome them. Second, he has developed approaches to resource allocation based on the principles of benchmarking, first as a means of addressing inequities in the levels of hospital resources across communities in Oregon and more recently as applied to the U.S. physician supply. In recent years, he has focused on the health implications of the uneven distribution of health care resources. His current research, funded by the Robert Wood Johnson Foundation, examines the potential adverse consequences of increasing capacity in health care. He is a co-chair of the Performance Measures Subcommittee of the Institute of Medicine's Committee on Redesigning Health Insurance Payment and Performance Improvement Programs.

George J. Isham, M.D., M.S., is medical director and chief health officer for HealthPartners, a large health care organization in Minnesota representing nearly 800,000 members. Dr. Isham is responsible for quality, utilization management, health promotion and disease management, research, and health professionals education at HealthPartners. He is active

in strategic planning and policy issues. Before his present position, he was medical director of MedCenters Health Plan in Minneapolis. In the late 1980s, he was executive director of University Health Care, an organization affiliated with the University of Wisconsin–Madison. His practice experience as a primary care physician included eight years at the Freeport Clinic in Freeport, IL, and three-and-a-half years as clinical assistant professor in medicine at the University of Wisconsin. He was chair of the Institute of Medicine committee that produced the report *Priority Areas for National Action: Transforming Health Care Quality*. He is currently a member of the IOM's Board on Population Health and the Performance Measures Subcommittee of the IOM's Committee on Redesigning Health Insurance Payment and Performance Improvement Programs. Dr. Isham received his medical degree from the University of Illinois and served his internship and residency in internal medicine at the University of Wisconsin Hospital and Clinics in Madison. He also has a master of science degree in preventive medicine/administrative medicine from the University of Wisconsin–Madison.

Lucian L. Leape, M.D., adjunct professor of health policy at Harvard University's Department of Health Policy and Management, is a health policy analyst whose research has focused on patient safety and quality of care. Prior to joining Harvard in 1988, he was professor of surgery and chief of pediatric surgery at Tufts University School of Medicine and the New England Medical Center. Dr. Leape is internationally recognized as a leader of the patient safety movement, starting with the 1994 publication in *JAMA* of his seminal article, "Error in Medicine." His subsequent research demonstrated the success of the application of systems theory to the prevention of adverse drug events. In addition, he has directed research into overuse and underuse of cardiovascular procedures. He has published over 100 papers on patient safety and quality of care. He has been an outspoken advocate of the nonpunitive systems approach to the prevention of medical errors, has testified many times before Congress, and has served on numerous public and private organizational boards and committees. Dr. Leape was one of the founders of the National Patient Safety Foundation, the Massachusetts Coalition for the Prevention of Medical Error, and the Harvard Kennedy School Executive Session on Medical Errors. He is a graduate of Cornell University and Harvard Medical School. He trained in surgery at Massachusetts General Hospital and in pediatric surgery at Boston Children's Hospital. He was a member of the IOM's Committee on the Quality of Health Care in America, which published *To Err Is Human* in 1999 and *Crossing the Quality Chasm* in 2001.