

Harvard Public Health Review

Fall 2008

WILL DIGITAL HEALTH RECORDS FIX U.S. HEALTH CARE?

INSIDE New HSPH Dean Julio Frenk XDR-TB marches on Health and taxes Surgical checklist
Genes and environment Disasters in China and Myanmar Amazing alumni



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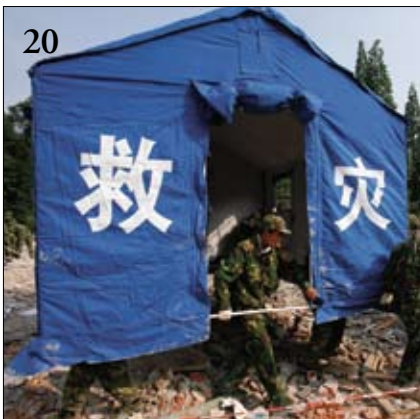
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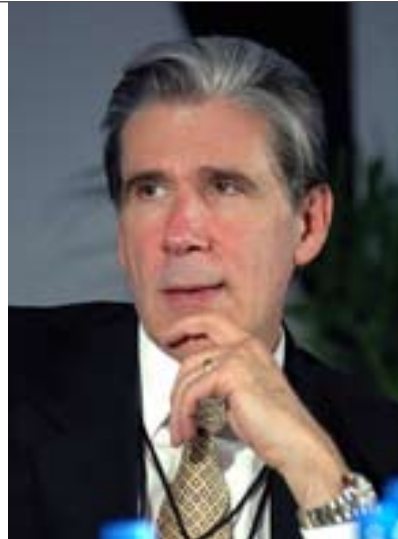
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Julio Frenk New HSPH Dean

Former World Health Organization official, Mexico's minister of health, to take helm in 2009



Julio Frenk, an eminent authority on global health who pushed for major health reforms as Mexico's health minister from 2000 to 2006, was introduced to students, faculty, and staff at the Harvard School of Public Health (HSPH) by Harvard President Drew Faust on September 5. In January of 2009, Frenk will succeed Dean Barry R. Bloom, the Joan L. and Julius H. Jacobson Professor of Public Health, who, after a decade of leadership, will continue at Harvard as a member of HSPH's faculty and as University Distinguished Service Professor.

Frenk, a former visiting professor at HSPH, was the founding director-general of Mexico's National Institute of Public Health, a world leader in health education and research in the developing world, and an executive director of the World Health Organization (WHO). Currently he is a senior fellow in the global health program of the Bill & Melinda Gates Foundation, as well as president of the Carso Health Institute in Mexico City and chair of the board of the University of Washington's Institute for Health Metrics and Evaluation.

GROUNDING POLICY IN SCIENCE

Julio Frenk is "admired worldwide for his leadership, vision, and remarkable record of accomplishment in public health," said Faust when she announced Frenk's appointment on July 29. "He is a highly influential figure at the crossroads of scholarship and practice, known for his profound

concern with how scientific evidence can foster improvements in health systems and policy in societies around the world."

Frenk has a "highly multidisciplinary outlook, a strong commitment to reducing disparities in health, and a deep understanding of the power of education and research to change lives for the better," Faust said. "His leadership experience in government, in the academy, at WHO, and beyond, along with his longstanding connections to HSPH, hold great promise to serve Harvard well."

Thanking Faust for the honor, Frenk said in July that "for the best part of my professional life, I have maintained intense contact with the School and have benefited enormously from interaction with its faculty. I see this appointment as a unique opportunity to continue to advance the notion that has inspired my entire career—namely, that science and scholarship represent the enlightened way to guide purposeful social transformation for the benefit of every human being."

'FOUR REVOLUTIONS'

During his September visit to HSPH, Frenk talked about the importance of building bridges across Harvard, research disciplines, and domestic and global health. Public health, he said, is "at the threshold of a new era" fueled by "four simultaneous revolutions"—in the life sciences; in information and communication technology; in systems thinking;

and “in what Michel Ignatieff, formerly at Harvard Kennedy School, has called the rights revolution, which provides the ethical foundation for so much of what we do in public health.”

Harvard, he continued, offers “the breadth of disciplines, the depth of knowledge, and the wealth of faculty and students to lead this process of renewal, which holds so much promise for the world.”

introducing a program of comprehensive national health insurance, *Seguro Popular*, which expanded access to health care to tens of millions of previously uninsured Mexicans. In 2006, that initiative was the focus of a six-part series in *The Lancet*, a leading British medical journal.

Barry Bloom, who came to HSPH at the start of 1999, says Frenk is “recognized as one of the great visionaries of global health.” From his academic career to his policy

“I see this appointment as a unique opportunity to continue to advance the notion that has inspired my entire career—namely, that science and scholarship represent the enlightened way to guide purposeful social transformations for the benefit of every human being.”

—HSPH Dean-designate Julio Frenk

LEADERSHIP ROLES

Frenk has held prominent leadership roles in public health spanning nearly 25 years. After earning a medical degree from the National Autonomous University of Mexico and a doctorate from the University of Michigan, he served from 1984 to 1987 as the founding director of the Center for Public Health Research in Mexico’s Ministry of Health. From 1987 to 1992, he was founding director-general of the National Institute of Public Health, guiding its emergence as one of the developing world’s most respected and innovative centers of education and research in public health. In 1993 he was named a member of the U.S. Institute of Medicine.

From 1995 to 1998, Frenk was executive vice president of the Mexican Health Foundation as well as director of its Center for Health and the Economy. There he led an analysis of the Mexican health system, laying the foundation for his subsequent reform efforts. As a senior official at WHO from 1998 to 2000, Frenk focused on developing a strong base of scientific evidence to inform health policies and on building the capacity of different countries to enhance the performance of their health systems.

HEALTH CARE FOR MILLIONS

Serving for the next six years as Mexico’s minister of health, Frenk pursued an ambitious agenda to reform the country’s health system. He is perhaps best known for his work in



WELCOME to HSPH Dean-designate Julio Frenk with Harvard President Drew Gilpin Faust and HSPH Dean Barry R. Bloom

work at WHO to putting his ideas into practice in Mexico, Bloom says, Frenk has shown “the highest level of commitment to creating effective health systems focused on improving prevention and care for everyone, particularly the poor and underserved.”

For a video and transcript of Julio Frenk’s remarks, visit <http://www.hsph.harvard.edu/multimedial/JulioFrenk/>. This article is based on a press release from the Harvard University Office of News & Public Affairs and an article originally published in Harvard Public Health NOW.

Doctoring in a Digital World

Boston internist “Dr. Sean James” greets patient “Sara Hill” in an examination room, then sits down at a computer and calls up her electronic health record on a state-of-the-art system. A colorful screen pops up on the monitor, showing Hill’s height, weight, and other statistics in the left column, existing health problems in the middle column, and a list of several drugs—and Hill’s response to each—on the right.

In the top left corner, a red box draws the doctor’s eyes to a reminder: “Patient is overdue for a mammogram.” Dr. James then clicks on a button that brings up Hill’s latest blood test results, showing an elevated LDL cholesterol level of 170. He checks her previous test and, after discussing it with Hill, orders a higher-dose statin drug, emailing the prescription to her local pharmacy. A few more clicks and he has ordered another blood test in three months’ time, along with Hill’s mammogram.

If this scene sounds like science fiction to you, you’re far from alone. As few as 4 percent of physicians today use electronic health records, known as EHRs. And hospitals have been similarly slow to adopt this technology. In response to a recent survey by the Healthcare Information and Management Systems Society, not one hospital reported having achieved the highest level of technology adoption. One-third lacked even the foundation on which to build an EHR system.

continued

Electronic health records could make care safer and save money. So why aren’t more doctors and hospitals using them?

Many people in government and in public health say health information technology—health IT for short—has the capacity to stem skyrocketing

Electronic vs. Personal Health Record: What's the Difference?

Whereas an electronic health record (EHR) is a computer record that originates with and is controlled by doctors, a personal health record (PHR) can be generated by physicians, patients, hospitals, pharmacies, and other sources but is controlled by the patient.

Google and Microsoft are now promoting Google Health and Microsoft HealthVault, respectively, to hospitals and individuals. These services house PHRs on secure networks. Among Microsoft's early partners is Kaiser Permanente's integrated managed care organization. Google's links include Beth Israel Deaconess Medical Center, in Boston; the Cleveland Clinic, in Ohio; the pharmacy chains CVS Caremark and Walgreens; and Medco, a prescription-drug benefit manager.

"Personal health records can be either linked to electronic health records or stand alone, but linking the two is by far the most useful approach," says HSPH's David Bates. "It's a lot to ask a patient to keep track of all their medical data."

U.S. health care costs, which in 2007 amounted to \$2.3 trillion, an average of \$7,600 per person. But given the obstacles to adopting EHR systems—hundreds of vendors vying for clients, hefty installation and operating costs, and a still-developing effort by industry and government to standardize the technologies—implementation of health IT is, at best, inching along. Debate rages as to whether the free market can quickly winnow compet-

on their Web sites. McCain wants rapid adoption of health IT to allow doctors' practices to span state lines. Obama has pledged \$50 billion over five years to help fund the transition to "standards-based" electronic health information systems.

Adoption of health IT's best technologies will transform the U.S. health care system by making it safer, more efficient, and more cost-effective, proponents say.

"Health IT is one of the few things that has the potential to both improve quality and reduce costs at the same time."

—HSPH's David Bates

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ing systems down to a few optimal, compatible choices, or whether government will need to intervene through incentives or mandates.

SETTING PRIORITIES

Getting more doctors and hospitals to use health IT is one of the federal government's top health care goals. In 2004, President George W. Bush set the goal of having EHRs available for most Americans by 2014. By executive order, he established the Office of the National Coordinator for Health Information Technology to lead the way.

Presidential candidates John McCain and Barack Obama have laid out their own ambitious goals

Doctors' offices in Colby, Kansas will be able to exchange records with doctors' offices in Waycross, Georgia—or anywhere else in the country—without having to photocopy a raft of pages and FedEx the paperwork along with X-rays and other test results.

It's a lofty goal, but its realization is a long way off, according to Ashish Jha, assistant professor in the Department of Health Policy and Management at HSPH.

A new physician survey, the results of which were published in the *New England Journal of Medicine* (NEJM) in July, shows just where we stand in this colossal endeavor. According to a representative sample

Anatomy of a Health Record

In this example of an electronic health record, the patient's vital signs and other statistics are at the top left. Body mass index (BMI) is calculated automatically when the weight is entered. The patient's current medications are at middle left, and problems that have been diagnosed or of which there has been a family history are at top center.

<p>Clicking on this "i" brings up a mono-graph on the topic next to it.</p>	<p>The star takes the doctor to guidelines and other decision-support information.</p>	<p>This button leads to the patient's history of key parameters used to measure diabetes, such as blood pressure, hemoglobin A1C, and cholesterol.</p>
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The screenshot shows a complex EHR interface with multiple tabs and sections. The 'Problems' tab is active, showing a list of medical conditions with icons for information (i) and guidelines (star). The 'Allergies' tab shows a table of allergens and reactions. The 'Medications' tab shows a list of drugs and dosages. The 'Health Maintenance' tab shows various care providers and directives. The 'Sticky Notes' section is highlighted in yellow. The 'Patient E-mail' section is at the bottom left. The 'Local intranet' logo is at the bottom right.

Problem	Star Icon	Info Icon
Cardiac catheterization	Star	Info
Diabetes mellitus type 2	Star	Info
Neg h/o headache	Star	Info
Vasomotor rhinitis	Star	Info
Hypertension	Star	Info
Coronary arteriosclerosis - Minor	Star	Info
Pneumonia	Star	Info
Arterial embolism	Star	Info
FH*(Negative) birth defects	Star	Info
FH diabetes mellitus type 2	Star	Info
FH rheumatoid arthritis	Star	Info

Allergen	Reaction
VARENICLINE	- GI Intolerance
PRAVASTATIN	- Hepatotoxicity
LEVOFLOXACIN	- Made me feel weird
SILDENAFIL	- GI Intolerance
Heparin	- Hepatotoxicity
ALLOPURINOL	- makes me feel bad
ACE INHIBITORS	- Anaphylaxis
	- Anaphylaxis
	- Rash
	- Angioedema

Medication	Dosage	Frequency
Atenolol	50 MG (50MG TABLET take 1)	PO Q3-H
Clobetasol PROPIONATE	0.05% LOTION 1 APPLICATION TO	
Colchicine	0.6 MG (0.6MG TABLET take 1)	PO QD
Cyclophosphamide	150 MG (50MG TABLET take 3)	PO QD x 1
Glyburide	5MG TABLET take 1 Tablet(s)	PO BID
Guaifenesin	600 MG + PSEUDOEPHEDRINE 120 MG 1 TAB	PO Q
Insulin LISPRO Variable	(100 U/ML VIAL ML) SC	
Metformin	500 MG (500MG TABLET take 1)	PO BID

Health Maintenance	Star Icon	Info Icon
Care Providers	Star	Info
Advance Directives	Star	Info
BMT Flowsheet	Star	Info
HM Form	Star	Info
Sticky Notes	Star	Info

Sticky Note
Patient prefers to be contacted by email

Pharmacy
Patient M/A List
Oncpro
Customize

Visit
2110 - 2140(0, 187, 31, 0, 1782, 140)

Note
Prolactinoma - 10/24/2007

Physician
2110 - 2140(0, 187, 31, 0, 1782, 140)

Patient E-mail
2110 - 2140(0, 187, 31, 0, 1782, 140)

Procedure
Prolactinoma - 10/24/2007

Problem
Prolactinoma - 10/24/2007

Reminder
Patient is overdue for mammogram (rec: q 1 year). FHx indicates average risk for breast cancer.

Item Name	04/29/2008	09/13/2007	04/12/2007
BLOOD PRESSURE			
TEMPERATURE			
PULSE			
RESPIRATORY RATE			
O2 SAT		99*	
HEIGHT	70 in	70 in*	
WEIGHT		200 lb*	195 lb
BMI	28.8	28.8	27.9
PAIN LEVEL			

Problem
Prolactinoma - 10/24/2007

Pharmacy
Patient M/A List
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HOW HEALTH IT SHOULD WORK

Health IT encompasses several elements. One basic component is the EHR, a health record that physicians enter and maintain for each patient in their practices' computer systems. How the EHR is set up and maintained determines how "functional" it is. Goals set by the federal government call for EHRs to be standardized and interoperable, meaning that multiple clinics and hospitals should be able to access and update them as patients seek treatment at multiple locations. (See "Electronic vs. Personal Health Record: What's the Difference?" Page 8.)

Interoperable EHRs have the potential to improve people's health in a number of ways. In 2006, a review in the *Annals of Internal Medicine* concluded that four benchmark institutions, including Brigham and Women's Hospital/Partners Health Care system in Boston, demonstrated that health IT could provide public health benefits, including:

Fewer medication errors:

EHRs would immediately notify physicians of potential interaction problems among prescription medicines or possible allergic reactions by the patient, among many other such checks.

Increased adherence by doctors to guidelines:

As a physician enters a patient's diagnosis into the record, it would display treatment guidelines and highlight any with which the patient is not already complying.

Results from the *NEJM* survey seem to bear these predictions out. First author Catherine M. DesRoches, a project director at the Institute for Health Policy at Massachusetts General Hospital and Harvard Medical

School, explains: "The findings show that physicians who use this technology really like it. They said it had a positive effect on the quality of their clinical decisions and their communication with other providers, and with their patients. They're very happy with the timely access to medical records. They think it helps them avoid medication errors and they think it helps them deliver care that meets guidelines."

EASE OF ORDERING

One function of an ideal EHR is computerized physician order entry, or CPOE, technical language for Dr. James's way of ordering Sara Hill's statin. When a physician uses CPOE to enter a prescription, the system alerts him or her to potential interactions with other drugs the patient is taking. Common dosages, contraindications such as pregnancy, and patient allergies are also flagged.

Brigham and Women's Hospital (BWH) has helped pioneer the development of CPOE. If set up properly, "it reduces the serious medication error rate by at least 55 percent," says David Bates, HSPH professor of health policy and management and chief of the Brigham and Women's General Medicine Division, who led a BWH study that described this finding in 1998. CPOE's most beneficial aspect is in renal dosing, Bates says, because it "helps the doctor choose the appropriate dose of a drug given a patient's level of kidney function."

If enough indications and contraindications in evidence-based medicine are in the system, the physician can have "Google-like experiences" when entering a diagnosis, says HSPH alumnus Joe Bormel, MPH '95, vice president and chief medical officer at QuadraMed, a



A Tool for Tracking EHR Adoption Rates

Tracking the progress of anything, including health IT adoption, requires reliable record-keeping. The July 3 *New England Journal of Medicine* survey report, funded by the Office of the National Coordinator of Health Information Technology (ONC), set a baseline so that future changes can be measured accurately.

"If you want to get somewhere, first you've got to know where you are," says a co-author, HSPH's Ashish Jha. "What this study does is establish the baseline of, 'Here's where things are in 2008.' The good news is, it tells us exactly where we are; but the bad news is, we're a lot further behind than we'd like to be."

Previous surveys had pegged EHR adoption rates at anywhere from 9 percent to 25 percent of doctors and had relied on various definitions for technology terms. "One of the reasons ONC funded this was for us to develop standardized methods, so that when people do these surveys in the future, the data are compa-

table," explains first author Catherine DesRoches, of the Institute for Health Policy.

To develop questions, the researchers consulted a panel of 20 experts in survey research, health IT, and health care management and policy, plus representatives of hospitals and physician groups. For the survey's purposes, a fully functional EHR system was defined as having the capability to:

- * *Record patients' clinical and demographic data;*
- * *View and manage results of laboratory tests and imaging;*
- * *Manage order entry, including electronic prescription and the ability to order tests and imaging;*
- * *Support clinical decisions, including warnings about drug interactions or contraindications.*

A basic EHR system, for the survey's purposes, is one that allows just some of the first three of those functionalities.

Reston, Virginia company highly active in health IT. "The things that show up at the top of the screen in prioritized order are the things the doctor needs to review, document, or order," he adds, and that means "getting it right every single time."

SUCCESSES SO FAR

The U.S. Military Health System and the Veterans Health Administration have deployed EHR systems with some success. Portability has been an immediate benefit of the VA's system. "Right now the VA's electronic record is such that if you get seen in the Boston VA today and you get on a plane and fly to Honolulu and go to a VA physician there tomorrow, they'll be able to pull up the records from Boston in electronic, real time there," says Jha.

Referring to recent bad publicity about VA health care, Jha says those complaints have mainly to do with health benefits and access to care. "Those are not issues that an electronic health record is going to help you with," Jha notes. "Most of the scientific evidence suggests that the quality of the care is good, and an electronic record has been a key part of that."

One of the leaders in the military's effort is HSPH alumnus Bart Harmon, MPH '95, chief medical officer at Harris Corporation in Falls Church, Virginia. Prior to joining Harris in 2007, Harmon was chief medical information officer and director of information management for the Military Health System, where for more than 10 years he led the transition from paper to computer.

The military implemented its initial EHR functions, including CPOE, in the 1980s. In 2006, it completed worldwide deployment of an outpatient record that normalized elements such as laboratory test names. Planning for the system began in 1997. The immediate benefits from the system, which covers 9.1 million people, were its portability and depth, says Harmon. "We have a global database of electronic records," he explains. "The military wanted data collection mechanisms that supported population health in multiple different dimensions, so the military really drove very hard to a highly structured electronic health record."

The military's EHR is available no matter where a person is when he or she needs medical help. Its structure

continued

is designed to advise physicians on potentially dangerous differences in diagnoses, such as whether a person has a simple cold, or COLD (chronic obstructive lung disease), Harmon says. The prescription medicine aspect of the record can also be delivered to commercial pharmacies, so a prescription written anywhere in the world can be checked for possible adverse interactions or reactions.

SO WHY NOT WIDELY USED?

If EHRs are so good for the public's health, why aren't more doctors'

cation Commission for Healthcare Information Technology (CCHIT).

Jha sums up the deterrents this way: "For most doctors, the question is: 'Do you want to invest in something that's expensive, where the vendor may or may not be around tomorrow, that's going to disrupt the way you work, so that there might be a theoretical financial benefit for the insurance companies that pay you?' That doesn't sound like a great value proposition, so you can completely understand why a lot of doctors have been nervous

Web announcement. The U.S. Congress has asked both Defense and the VA to use a common system.

COSTS UNCLEAR

Confusion also swirls around the perceived cost savings of fully adopting health IT. Some say there won't be any savings at all, or that costs will go up because people will be prompted to make more doctor visits and get more tests than they do now.

Few gross hard numbers exist on costs. In a RAND Corporation study conducted from 2003 to 2005,

"We have a long way to go in achieving the kind of health care system we all can be proud of." —HSPH's Ashish Jha

offices and hospitals using this technology? Basically it boils down to culture, costs, and confusion.

Culture is tough to change. Most physicians are accustomed to writing on paper and, according to recent surveys and reports, many who haven't adopted health IT fear that it will infringe on patient privacy and lead to government directives for their practices.

Costs can run from \$25,000-plus per physician to install a system, plus maintenance and license expenses, and the installation and learning process causes a loss of productivity in the doctor's office that can cost thousands more dollars.

Confusion reigns, owing to the fact that hundreds of vendors offer systems. Sorting through all the specifications is a daunting, time-consuming task. And not all products and services are certified by the proper agencies, such as the Certifi-

cation Commission for Healthcare Information Technology (CCHIT).

Harmon recounts many obstacles to setting up the military's system. "We were changing the types of tools that everyone on the health care team uses to document their care," he explains. "There were small changes to health culture, health practice, health process. Their note reads differently than it used to, because it's a more structured note. Parts of it don't flow as smoothly as something you would just write on paper. There were many challenges, and they're still working through some of those."

Indeed, in August military officials were still considering how to adapt their system so that it is fully interoperable with the VA's system. "There is a strong feeling here and at the VA that the best approach is a convergent evolution of the two systems," Deputy Assistant Defense Secretary Stephen Jones posted in a

researchers estimated health IT's costs to be \$120 billion over 15 years and the savings to be \$80 billion per year at an adoption level of 90 percent. Other cost estimates have ranged from \$150 billion over eight years to \$156 billion over five years. According to an article in the May-June 2006 *Journal of the American Medical Informatics Association* by Bates, Jha, and colleagues, Brigham and Women's saved a total of \$28.5 million over a 10-year period using computerized physician prescribing and ordering.

However, the U.S. Congressional Budget Office (CBO) has disputed the potential cost savings cited by RAND, claiming in a May 2008 report that they "are not an appropriate guide" to projecting savings. Among the reasons: RAND projected *potential* impact rather than *likely* impact.

CBO's director, Peter Orszag, told a U.S. House of Representa-

tives committee in July that health IT “appears to make it easier to reduce health spending if other steps in the broader health care system are also taken,” but he added that active federal intervention will be necessary to spur adoption. Orszag’s position differs from that of Secretary of Health and Human Services Michael Leavitt, who holds that the free market will spur adoption of EHRs because patients will demand it.

Bates says rebuttals are being prepared to the CBO report. “The single biggest issue in health care in the U.S. today is cost,” he says. “We’re spending more on health care than any other industrialized nation. We need to reduce

Also, when the U.S. Congress passed legislation in July to halt a scheduled 10.6 percent pay cut to physicians by Medicare, the new law provided for bonuses to physicians who use electronic prescribing, and for penalties beginning in 2012 to those who don’t. The Department of Health and Human Services estimated that that will save Medicare \$156 million over five years, based on, among other points, the Institute of Medicine’s estimate that 1.5 million Americans are injured every year by prescribing errors.

In June, Representative John W. Dingell introduced a bill in the U.S. House of Representatives that,

but can’t afford it is a trend among hospitals toward helping physicians purchase EHR systems. “Recently, there’s been a relaxation of [regulations] to allow hospitals to give some degree of electronic health record to small practices,” Bormel says. Previously, the hospitals were prohibited from doing that because it was perceived as a conflict of interest. There are some caveats, such as the systems must be approved by the CCHIT, but that should be a benefit to the doctors and their patients to have standardized systems.

Another sign that more doctors are leaning toward broader EHR use comes from the *NEJM* survey. Among



those costs, and health IT is one of the few things that has the potential to both improve quality and reduce costs at the same time.” It’s not a panacea, he adds, but it is a foundational tool.

WHERE TO NOW?

Help is on the horizon for physicians who want to adopt EHR technology but are having difficulty overcoming the barriers. The Centers for Medicare and Medicaid Services launched a pilot program in June that provides incentive payments to doctors in eight states and four metropolitan areas for using certified EHRs.

among other things, would establish a competitive, matching grant program to encourage health IT adoption. Providers would invest \$1 for every \$3 of grant money, and a preference is built into the legislation for small, nonprofit, and rural health care providers, and for practices that will link to a network of multiple providers. Senator Edward Kennedy of Massachusetts introduced similar legislation in the U.S. Senate in 2007.

INKLINGS OF PROGRESS

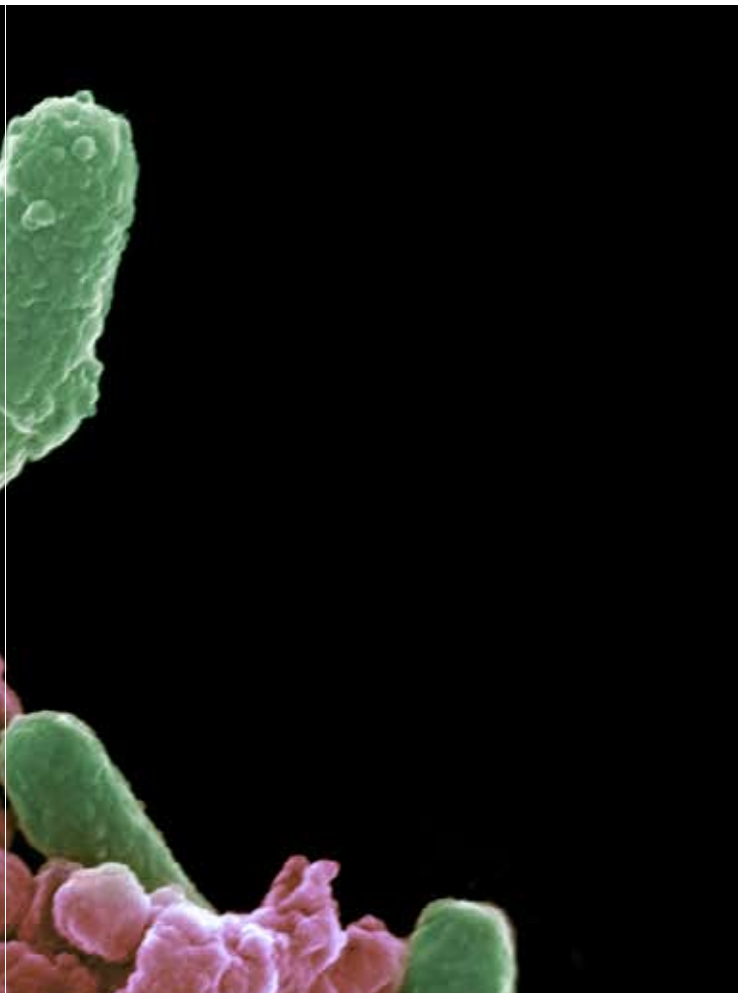
One good sign for small practices that might want to adopt the technology

the respondents, 42 percent noted that they had either bought EHR systems but had not yet installed them (16 percent) or that they planned to buy systems within two years (26 percent). “Should that happen, then we could, in the next three to five years, see a pretty good uptick in the adoption of this technology,” DesRoches says. “Should we be even close to 42 percent, that would be a huge jump forward.”

Larry Hand is associate editor of the Review.

A scanning electron micrograph (SEM) showing a dense field of bacteria. The background is a complex, textured surface of reddish-brown, irregularly shaped particles. Overlaid on this are several elongated, green, rod-shaped bacteria. Some of these green rods are straight, while others are slightly curved. There are also smaller, more rounded, light-colored structures scattered throughout the scene. The lighting creates strong highlights and shadows, emphasizing the three-dimensional nature of the microbial structures.

MARCH OF THE



Covering 200 square kilometers of arid scrubland in South Africa's KwaZulu-Natal Province, the rural district of Tugela Ferry seems to swallow its inhabitants, its parched mountain ridges shutting out the world beyond. Within the region, rural and poor, many villages have neither running water nor electrical service. A lone main road cuts like a jagged scratch through the rocky landscape. Men work the gold mines up north, or in the cities, returning to their families every few weeks or months and bringing HIV home from girlfriends and prostitutes.

Few outsiders had ever heard of Tugela Ferry before a frightening outbreak began unfolding there in 2005: At the Church of Scotland hospital, a group of patients suddenly began dying—succumbing, as it turned out, to a tuberculosis “super-bug.”

TB is rife in the developing world, especially wherever HIV, the AIDS virus, cripples the immune systems of huge numbers of people. In Tugela Ferry, state-of-the-art treatment regimens had begun offering hope to patients infected with both TB and HIV. But in several whose HIV loads were virtually undetectable, thanks to this treatment, TB proved lethal. Against cultures from these patients, every class of the

TB SUPERSTRAINS

HSPH research centers on “extensively drug-resistant” mutants

powerful antibiotics required to vanquish multidrug-resistant disease (MDR-TB) proved powerless.

Similar scattered cases had been recorded by the U.S. Centers for Disease Control and Prevention (CDC) as far back as 2000, but Tugela Ferry's outbreak had no precedent. Of 53 people definitively identified as carrying this strain, most of them HIV positive, 52 died. Alarmed, the CDC sped up one multinational TB survey and released the results in March of 2006. Officials christened the deadly disease “extensively” drug-resistant tuberculosis, or XDR-TB. News reports encircling the globe called it “virtually untreatable.”

No one knows precisely how virulent XDR-TB might be among healthy people whose immune systems aren't already enfeebled. But with \$14 million in new funding from the National Institutes of Health, researchers at the Harvard School

continued

DEFIANT PATHOGEN
An electron micrograph
of *Mycobacterium*
tuberculosis

of Public Health (HSPH) aim to find out. Driving the School's effort is Principal Investigator Megan Murray, an assistant professor at Harvard Medical School and an associate professor of epidemiology at HSPH.

BIG UNKNOWNNS

When the World Health Organization (WHO) first began tracking drug-resistant cases of TB, in 1994, the problem was thought to be confined to populations whose immune systems were compromised—people with HIV/AIDS or cancer, as well as the elderly. But today, drug-resistant strains are more prevalent than scientists ever thought possible. A WHO global survey published in early 2008, the first in four years, found MDR-TB in 72 countries and XDR-TB in 49, including the United States.

According to WHO, TB affects more than 9 million people a year and kills nearly 2 million annually by destroying the lungs. The bacterium, *Mycobacterium tuberculosis*, infects about one in three people on Earth; it lies harmlessly dormant in most but becomes reactivated in one in 10. Garden-variety, drug-sensitive TB is readily curable, as long as doctors prescribe the right medications and patients stick with them.

And there's the rub. Patients must take four different antibiotics over a six-month period, a level of compliance that is hard to maintain. "Many people stop taking their pills once they're feeling better," HSPH's Murray explains. As the bacteria multiply, a few by sheer chance develop genetic mutations that enable them to survive the drugs. These in

LEAD INVESTIGATOR
Professor of
Epidemiology Megan
Murray aims to find
out just how virulent
extensively drug-
resistant TB strains
might be in healthy
people.



turn replicate, threatening the patient; some of these strains may also be "fit" enough to jump to other people. Today, five percent of all new cases worldwide are MDR-TB, defined as being resistant to at least two crucial "first-line" antibiotics, rifampin and isoniazid.

Wiping out MDR-TB is an even longer, more grueling ordeal. Patients must take a complex regimen of six or more "second-line" antibiotic pills and injections for two years, at a cost 100 to 1,000 times higher than the first-line drugs. Side effects can include hearing loss, acute nausea, depression, and psychosis.

When health workers supervise TB patients daily to ensure they take their medications—a strategy backed by WHO



TEAM TB Exploring drug-resistant disease are (left to right) Mercedes Becerra, an HSPH alumna and former doctoral student who is now an assistant professor of social medicine at Harvard Medical School and a research scientist with Partners in Health; Sarah Fortune, HSPH assistant professor of immunology and infectious diseases; Christie Jeon, a doctoral student at HSPH; and Ted Cohen, an HSPH alumnus and former postdoctoral fellow who is now an assistant professor of medicine at Harvard Medical School and an associate scientist at Brigham and Women's Hospital Division of Global Health Equity. Cohen and Jeon trained with the group's lead researcher, Megan Murray, an associate professor of epidemiology at HSPH.

since 1993 called directly-observed therapy, or “DOTS”—cure rates are high. Even for MDR-TB, and even in poor countries, cure rates of 85 percent can be achieved, as demonstrated in 1998 in Peru by the cofounders of the nongovernmental organization Partners in Health: HSPH’s Jim Yong Kim, now director of the François-Xavier Bagnoud Center for Health and Human Rights at HSPH, and Paul Farmer, a Harvard Medical School professor. In response, WHO changed its policies, adding to the DOTS strategy drugs to combat MDR-TB.

In Peru, the duo worked with second-line drugs and with the government to achieve universal access to MDR-TB care. But elsewhere, compliance problems, misdiagnoses, and the inappropriate use of antibiotics paved the way for XDR-TB on an epidemic scale. Particularly in South Africa, Russia, Indonesia, China, and India, HIV and TB are ravaging populations in a worst-case combination.

THE NEED FOR SPEED

Megan Murray grew up caring for TB patients. Her father and mother, an internist and a microbiologist, took the family from their Minnesota home to impoverished Niger on charitable medical missions. Before earning an MD at Harvard Medical School and a ScD at HSPH, Murray worked on TB screening in Thailand. Today she specializes in the molecular epidemiology of the bacterium, tracking strains by their telltale DNA footprints as they migrate.

“We want to understand the genetic changes and mutations that confer resistance when you apply drug pressure on TB,” Murray says, referring to how drugs influence the bacterium’s DNA makeup by killing off all but mutated strains capable of withstanding those drugs. What Murray learns could one day help companies develop new pharmaceuticals. But for now, she says, “Our overarching goal is to create a low-cost technology that can be used to detect resistance to TB drugs immediately, in the field.”

Cheap, rapid diagnostics are most urgently needed in developing countries, especially where both HIV and TB thrive. Until recently, diagnosis invariably took at least three weeks, as a fleet of antibiotics were tested, one by one, against cultures grown from sputum. In the United States, where active TB is rare, hospitals routinely screen suspected cases this way, but low-income nations lack the resources. In June, however, WHO and other entities endorsed new, low-cost tests developed by teams in Germany and South Africa that detect MDR-TB by flagging rifampin and isoniazid resistance in just one day.

continued

THE HIGH COST OF THE WRONG CARE

XDR-TB is rife in HIV-infected patients, but what about people whose immunity is intact? For her 2007 master’s thesis, HSPH doctoral candidate Christie Jeon explored that question at a TB referral hospital in Masan, South Korea.

Looking at 250 patients who were part of a larger TB study, Jeon identified 26 who, upon admission, harbored XDR-TB strains. Patients with XDR-TB were 13 times more likely than non-MDR patients to manifest TB through a sputum culture even after six months of therapy, she found, and four times more likely than patients with known MDR—“an indication of just how difficult it is to treat XDR-TB,” Jeon says.

The longer patients had been taking either first- or second-line antibiotics, the more likely they were to have XDR. “This suggests that drug resistance acquired through past treatment is what led to their disease, rather than recent transmission from other people,” Jeon says.

She is cautious, however, in interpreting these results. “We couldn’t totally rule out a role for transmission, which clearly happens in South Africa in populations with HIV, because we didn’t have patients’ previous drug-resistance profiles or any genotype data to establish new infection. It’s possible that patients who’d been treated longest may not have received an appropriate therapy from the outset, owing to unknown drug resistances.”

The large number of XDR-TB cases in Jeon’s study underscores the need for faster, more accurate diagnostics and novel anti-TB drugs. If a patient gets a first-line drug that turns out to be ineffective, it means they should have been getting second-line drugs all along, she says. By the same token, if they’re put on second-line drugs to which TB organisms are mostly resistant, “It’s yet another futile delay of a more effective regimen,” spelling not only continued misery but also potential for the patient to transmit drug-resistant strains.

Unfortunately, patients in Jeon’s study generally showed high levels of resistance to a second-line stalwart, fluoroquinolone. In South Korea, physicians routinely prescribe this antibiotic for common infections, including pneumonia. “We suspect that TB is too often misdiagnosed as pneumonia,” Jeon says. As a result, the many South Korean patients on fluoroquinolone will be at special risk for TB that resists this vital drug.

TESTING, 1-2-3 ... TESTING XDR-TB scare calls for better, faster diagnostics

XDR-TB landed on page one of the *New York Times* in June of 2007 when a reportedly infected American attorney, Andrew Speaker, flew from the United States to Europe and back. The U.S. Centers for Disease Control and Prevention (CDC) officials feared Speaker might expose others to XDR-TB, whose capacity to spread, and kill, was unknown.

Tests later showed that Speaker, who was symptom-free, was infected with MDR-TB, not XDR. But his story reveals TB diagnosis for what it is: a painstaking process that takes too long. While awaiting results, patients may be unknowingly spreading their disease.

Speaker's infection came to light when he showed up at an Atlanta hospital with a rib injury. Chest X-rays re-

vealed a spot on his lungs, prompting a biopsy and, later, surgery to remove the lesion. Typically, doctors only suspect TB if a person has had contact with someone known to be infected or has symptoms, such as malaise, weight loss, night sweats, and a cough.

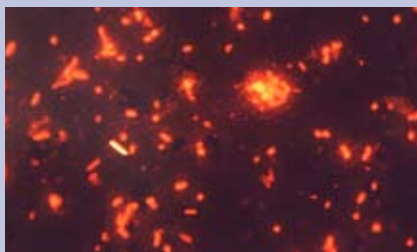
In the developing world, diagnostics have changed little in decades. In June of 2008, however, WHO and other entities endorsed new, low-cost tests developed by teams in Germany and South Africa that detect MDR-TB in just one day by flagging resistance to rifampin and isoniazid—an important first step in containing drug resistance and in preventing the evolution of new XDR-TB strains.



THE SKIN TEST

In industrialized countries, hospital workers and immigrants are routinely screened for TB. A tiny amount of noninfectious protein derivative is injected just under the skin of the forearm. The test is considered positive if a small nodule of hardened tissue forms at the injection site within a few days, indicating that immune cells recognize proteins from a prior exposure to the bacterium.

A positive result is hardly conclusive, however. TB belongs to a group of mycobacteria that also includes harmless varieties. Doctors have no way of knowing whether a nodule reflects infection with TB or another mycobacterium species. Treatment is never initiated on the basis of a skin test.



THE SMEAR TEST

If doctors suspect TB, they look under a microscope for bacteria in a sample of sputum. Fewer than 10,000 mycobacteria per milliliter generally signals a negative result; patients with active (and therefore contagious) TB typically have up to 10 million bacteria per milliliter. On the basis of a positive smear test, doctors will generally initiate treatment. Even the smear test is not conclusive, however, since mycobacteria species can't be distinguished through a microscope's lens.



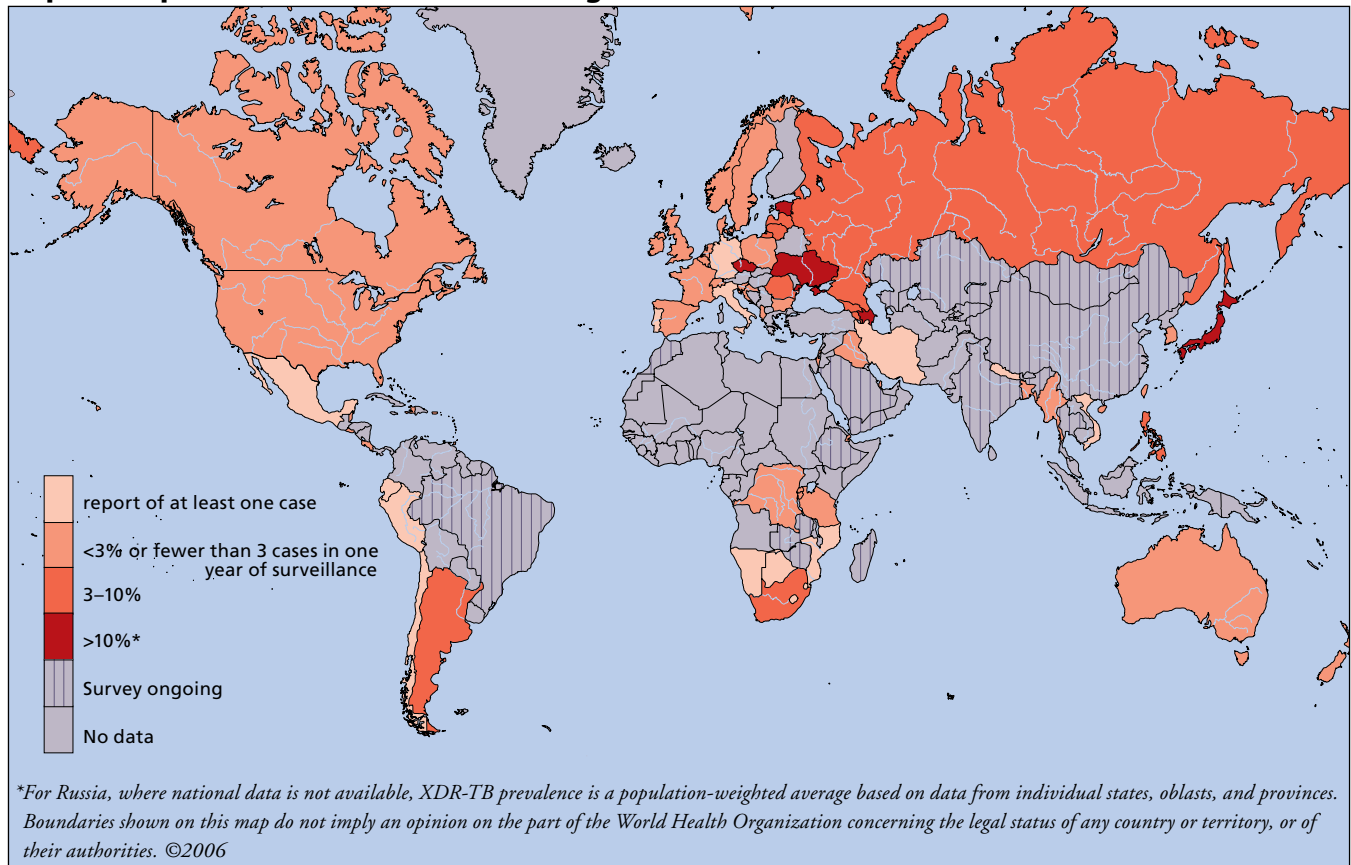
THE CULTURE TEST

A definitive diagnosis requires growing TB in culture—a process that can take weeks or months, depending on the strain. In the United States and other developed countries, hospitals test cultures against at least the four first-line antibiotics to identify any drug-resistant strains. Resource-poor countries will now be able to use new, WHO-endorsed tests for MDR-TB, thanks to funding from WHO, the Gates Foundation, and other entities. But the world still needs tests that reveal resistance to more antibiotics, lest resistance to these become widespread.

In Andrew Speaker's case, the CDC produced a finding of XDR-TB. However, three subsequent culture tests at a leading TB hospital, the National Jewish Medical and Research Center, in Denver, Colorado, showed it was in fact MDR-TB. Because the CDC samples were no longer available, they could not be retested.

According to hospital spokesman William Allstetter, Speaker was started on two years of MDR-TB therapy. His doctors say he is doing well.

Reported prevalence of XDR-TB among MDR-TB cases, 2002-2007



“That’s great news,” Murray says, “but we need to expand the tool,” whose limitations include reliance on pure DNA and the availability of sophisticated laboratory equipment. “What we want to see next is a test that immediately picks up resistance to second-line drugs in the field.” With colleagues at the Broad Institute of Harvard and MIT, where she is an associate of the Broad’s Infectious Disease Initiative, Murray is working toward this goal, which she predicts is at least several years away.

SHATTERING OLD THEORIES

If drug pressure were the only explanation for proliferating MDR-TB strains, there would be less cause for worry. But there’s a simpler way to become infected: through close contact with carriers. Bacteria can travel by air, in the droplets of a cough. Strangers on a train can transmit TB, as can friends, just by breathing. This route is known as transmission.

It was HSPH Dean Barry R. Bloom, an internationally known immunologist and TB expert, and his then postdoctoral fellow David Alland, now a professor at New Jersey Medical School, who helped shape prevailing ideas about TB transmission. Previously, scientists thought most cases

arose from the reactivation of latent infections acquired years, even decades, earlier. But in 1994, using genetic fingerprinting, a then-new technique of molecular epidemiology, Alland and Bloom showed that at least one-third of active TB cases in New York City resulted from recent person-to-person transmission.

The researchers found that certain clusters of patients were infected by identical TB strains. If the illnesses had been caused by the reactivation of latent TB, the strains would have been more genetically diverse, reflecting variations in time and geography at the point patients were first infected, the scientists reasoned. Similar results were obtained in a San Francisco-based study by another team.

These findings unleashed new worries that if drug-sensitive TB were transmissible, drug-resistant strains might be, too. That notion flew in the face of WHO’s treatment policies, however. At that time, WHO officials assumed that genetic mutations conferring drug-resistance also imposed “fitness costs” on TB bacteria, rendering them too weak to achieve human-to-human transmission. Drug-resistant TB “might kill you, but since it didn’t spread well, it wasn’t a public health priority,” explains HSPH’s Megan Murray.

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A TALE OF TWO COUNTRIES



On May 2, Cyclone Nargis hit the coast of Myanmar, devastating the low-lying Irrawaddy delta with 120 miles-per-hour winds and a 12-foot tidal surge. Ten days later, an earthquake measuring 8 on the Richter scale struck China's mountainous Sichuan Province. Both events left thousands dead, missing, injured, and homeless, and focused the world's attention on the actions of China's and Myanmar's governments.

What lessons might be drawn from these terrible events? For an analysis of the responses of these two very different nations and the world community, the *Review* turned to Jennifer Leaning, professor of the practice of international health at the Harvard School of Public Health and co-director of the Harvard Humanitarian Initiative. HHI's role in relieving human suffering in war and disasters is "to train leaders in the field, and to examine with scientific rigor how humanitarian response is delivered," Leaning says. "It is through analytic, population-based inquiry that we can identify more effective ways to deliver humanitarian aid."

The need for research and training is urgent, Leaning says. She has witnessed crisis and conflict in many parts of the world, including Somalia, Kosovo, Rwanda, the Chad-Darfur border, and Afghanistan.



What lessons can the disasters in Myanmar and China teach the U.S.—and the world?



Q: How does the Chinese government's response compare with that of Myanmar's leaders?

A: In China, there was, in general, a rapid, robust, and open response. The Chinese people and government should be given strong acknowledgment and respect for this competent and fast-moving job. The army was mobilized and able to reach the affected area in a matter of hours, which is remarkable in a region that is relatively inaccessible even on a good day.

Within the first week, the Chinese rescued 28,000 people from the rubble. The government sent out medical teams in helicopters to pick people up and bring them to triage sites for stabilization and then, from that place, send them out to receive more thorough care.

Although there appeared to be an initial attempt by the Chinese government to keep the disaster quiet, cell phone traffic and local use of the Internet made it impossible for them to maintain control over the information flow. Then the government apparently

CYCLONE HITS MYANMAR (at left, clockwise from top): Villagers in Bogalay await the delivery of donated rice; a damaged boat near the town of Dedaye; Red Cross and Red Crescent relief goods arrive at dockside in Mawlamyinegyun

EARTHQUAKE ROCKS CHINA (at right, clockwise from top): Residents carry supplies from a Chengdu Air Force helicopter to the Tibetan village of Ganbao in Lixian county; soldiers fix and move tents for survivors in Shang Er, part of Sichuan province; soldiers carry an injured passenger from a train at a railway station in Guiyang

continued



“Looking ahead, climate change will make all parts of the world more dangerous for humans to live in. And ... earthquakes will be more deadly, because as the world population increases, there will inevitably be more people at risk.”

—HSPH’s *Jennifer Leaning*

made a virtue of necessity and began to use the Internet and cell phone communication to describe what it was doing and to mobilize the entire nation. At the highest level of government, they showed they cared.

Premier Wen Jiabao visited the disaster site within just several hours. When he arrived, he was open and accessible to local people and the press. He got very close to the disaster site, which wasn’t safe because there were frequent strong aftershocks in the area. This rapid appearance of a senior government official as part of the organized response stands in marked contrast to what we have seen in other disasters, including Hurricane Katrina in the United States.

Government leaders made it quite clear to the outside world that they were in charge. Offers of help came in from around the world within a matter of hours. The Chinese government was very courteous, but they wanted to wait to assess what they needed before allowing outside resources to flow into the country.

In contrast, Myanmar is an authoritarian government that proved afraid and suspicious of any hint of intrusion from the West. It was difficult for the

international community to get any information to use in assessing the needs of people left stranded in the cyclone’s wake. For several weeks the government refused to grant visas for international humanitarian workers. It accepted supplies but insisted on distributing them.

Those terms were not acceptable to the international humanitarian community. This community has a lot of expertise in how to identify those in need, how to take care of people fairly. Many major donor governments were reluctant to give substantial amounts of goods and cash without knowing whether their donations would be distributed through a proper channel. Offers of help were blocked by Myanmar’s government, and outside aid during the first few crucial weeks was greatly diminished because of this stand-off.

Eventually the government let in small teams from India and Thailand, and then specific teams from countries within the region. A few international experts were also eventually permitted entry. But in general, the potential for massive amounts of aid was aborted. Because of this denial of access for humanitarians who could have conducted

rapid health assessments in affected areas, we do not know the full impact of the cyclone.

Q: What can and should the international community do when a government refuses aid for its people, as in Myanmar?

A: The government of Myanmar’s actions caused much consternation around the world, both within the international relief community and at the government level. The debate about how to approach Myanmar intersected with a separate, ongoing discussion about norms of sovereignty and the needs of people worldwide; it has been taking place at the United Nations and is working its way through policy circles.

There is a doctrine in international circles called the Responsibility to Protect, or “R2P,” which states that the sovereignty of the state is not the highest value in determining states’ collective behavior toward an individual government. This doctrine states that at a certain point of extremity, the international community has a responsibility to intervene against the sovereign government to act on behalf of the people who are suffering under its jurisdiction.

This doctrine was written in response to problems in the late 20th century, with ruthless governments killing segments of their populations.

So when the cyclone hit Myanmar, many people in government and United Nations' circles asked whether R2P applied. The consensus among both war and disaster responders was that it would be inappropriate to disregard the sovereignty of the Myanmar government and send in aid by force. The reasons were, first, that the doctrine of R2P had evolved and been promoted for application in a conflict setting, not in a disaster setting; second, it was unclear how much damage the government of Myanmar had done to its people by refusing outside aid. So a number of us were saying, "Let's not

activate R2P in an unclear context."

All the answers aren't in yet, but there are now indications that survivors in the cyclone-affected areas are getting by. My hope is that, by not invoking R2P, we at least did not make the government of Myanmar more antagonistic toward the West; and that, in the likely event that food support will be needed in the coming months, the international community will be allowed in.

Q: How has the Harvard Humanitarian Initiative been engaged with these two disasters?

A: When the news broke, we determined that there was no need for us to send relief teams to China—and that we would not arrive in time anyway.

We participated in some of the awareness-raising events around Harvard and have been involved in talks about the response of the Chinese government in the context of overall disaster management. And we have a graduate of the HSPH MPH program and our Humanitarian Studies Initiative training, Dr. Emily Chan, who was deployed by Doctors Without Borders. She ran a triage health post in one of the mountain areas for about 10 days. We are working with her to get her report published in medical/public health literature. As people return to the area and contribute to reports on what happened, I think we will find more and more of our graduates and colleagues who were part of that response.

continued



Earthquake epicenter information from U.S. Geological Survey at <http://www.usgs.gov/> Cyclone Nargis path, <http://www.nasa.gov>

We had a senior fellow, Mihir Bhatt, an expert on disaster response in India, who, along with his team, was allowed into Myanmar. He participated in community self-help and preparedness, and in the assessment of public health and shelter issues.

My role, and HHI's role, has been to be present at conferences and high-level meetings discussing what to do, and urging that we keep a certain level of criticism in abeyance and allow these events to play out. Countries all over the world are going to have major disasters. Odds are that they are not going to do a good job responding the first time around.

Looking ahead, climate change will make many parts of the world more hazardous and inhospitable for human populations. And even natural disasters that are not affected by climate change, such as earthquakes, will become more deadly, because as the world's population increases there will inevitably be more people at risk.

As hard as that sounds, countries and local populations have to learn how to deal with the next disaster. And it is in that phase that we might be helpful to Myanmar, and to other countries with the misfortune to get hit by something big.

Q: Are there any lessons for the United States from these events?

A: The U.S. government and populace did the right thing, in my view. When massive disasters occur in other countries, the U.S. is very generous in the short run. This responsiveness builds goodwill, which I believe will come back to help us in international policy arenas.

The U.S. could have a major role improving disaster response worldwide. We

have excellent experts in disaster warning and mitigation. There might be ways to bring together international consortia of scientists who are scanning the world for major disasters, issuing major alerts, supporting mitigation efforts in some of the poorer parts of the world—and do this completely free of politics.

Q: What long-term effects do you predict from these disasters?

A: China has shown itself, at least in the short run, to be a competent and caring government in this highly visible crisis. This is an interesting profile for China; it is not one that most people would have immediately assigned to the Chinese before this disaster response. The mobilization of resources, and the full effort that the Chinese government made in this response phase, have made people look at the country with more positive feelings on a worldwide level.

For all of China's initial attempts to control the news media and censor the Internet, China became a much more open society with respect to this disaster. Can they put that genie back in the bottle? Now that their population has seen the power of open communication, will the Chinese people tolerate a re-imposition of whatever constraints the government may wish to reactivate?

The signs would suggest to me that China is going to be changed somewhat toward a stance of greater openness. But of course these are early days.

With Myanmar, I think the best hope we can have is that the government realizes that, at its point of extremity, it was not invaded by the West. We heard them and we stayed back. That might be marginally helpful

in our future dealings with this regime. Given the ways other relatively closed societies dealt with the outside in the aftermath of major disasters—the Soviet Union after the 1986 Chernobyl disaster, for example, and the 1988 earthquake in Soviet Armenia—the government in Myanmar might be interested in making new, if hesitant, connections.

Other ways in which disasters affect people and change societies include cementing the people to their government or distancing people from it. This consequence is linked to perceptions of the government's response, which are sometimes unfair or unfounded.

Yet an important aspect of disaster management is to recognize that perception is as important as reality. What people believe happened winds up being rooted in popular culture, and then becomes part of history. It is very important for governments to manage people's perceptions early on.

China did a very good job, Myanmar less so. What we see in the short run in China is activation of a very strong national spirit. That nationalism is going to have significant impact on China's role in the world. Whether the people of Myanmar are moved farther away from their government or not remains to be seen.

LEARN MORE

For a video clip from this interview with Jennifer Leaning, visit www.hsph.harvard.edu/news/hphr/fall08/fall08leaning.html. To explore the work of the Harvard Humanitarian Initiative or get involved, visit www.hhi.harvard.edu.



A Simple Checklist That Saves Lives

Fighter pilots use checklists to avoid deadly errors. Why not surgeons, too?

So complex was the new B-17 bomber introduced during World War II that a star aviator crashed the mighty aircraft during its demonstration flight. Then the U.S. Army Air Corps introduced its now-legendary safety checklist for pilots and crews to use in the cockpit. The risk of fatal errors plummeted, and checklists became mandatory.

Like piloting a massive warplane, surgery, too, has its risks. But a new checklist unveiled on June 25 by the World Health Organization (WHO) and collaborators at the Harvard School of Public Health should help prevent avoidable deaths and disability in operating rooms worldwide (see checklist on page 27).

So reported HSPH's Atul Gawande at a press conference in Washington, D.C. An associate professor in the School's Department of Health Policy and Management who also practices general and endocrine surgery in Boston, he spoke as the leader of the WHO's Safe Surgery Saves Lives initiative, an outgrowth of the World Alliance for Patient Safety.

STAGGERING IMPACT

According to estimates published by Gawande, HSPH fellow Thomas Weiser, and other surgeons in *The Lancet* on the same day the Safe Surgery initiative and checklist were launched, about 234 million major operations take place annually around the world. Millions of patients suffer infections, injuries, and other preventable complications. About 1 million die.

Regions that are poor in resources, technologies, and expertise see higher casualties. In sub-Saharan Africa, death by anesthesia occurs in as many as 1 in 150 operations, as compared to a death rate in the United States of 1 in 200,000.

WHO's surgical checklist saves lives by ensuring that a surgical team adheres to standard operating procedures. For example: All patients should receive an antibiotic before the incision is made, a practice known to reduce the rate of surgical-site infections by up to 50 percent. But antibiotics aren't given consistently, even in the most sophisticated health centers, said Gawande, who practices at

continued

Brigham and Women's Hospital, a major teaching affiliate of Harvard Medical School.

Use of the checklist reduces failures to provide six basic surgical standards by half, according to preliminary data from 1,000 patients whom Gawande's team followed at eight hospitals in developing and industrialized countries.

'ABSURDLY SIMPLE'

For more compelling proof of checklists' value to patient safety, look no further than a pioneering 2006 study by Peter Pronovost, an anesthesiologist and critical care physician at Johns Hopkins University Medical School. Pronovost devised medicine's first checklist: what Gawande calls "an absurdly simple" tool for safely inserting a central line, or intravenous tubing, into a patient's chest. This lifeline for delivering medication becomes infected in as many as 4 percent of cases.

Pronovost discovered why. In a study of 100 Michigan hospitals, he found that, 30 percent of the time, surgical teams skipped one of these five essential steps: washing hands; cleaning the site; draping the patient; donning surgical hat, gloves, and gown; and applying a sterile dressing. But after 15 months of using Pronovost's simple checklist, the hospitals "cut their infection rate from 4 percent of cases to zero, saving 1,500 lives and nearly \$200 million," Gawande told reporters.

At the press conference was Susan Sheridan, leader of the Patients for Patient Safety Program, part of WHO's World Alliance for Patient Safety. Sheridan said her aim was "to give voice to those who have suffered and those who are now unheard as a result of unsafe surgery."



LEADING EDGE Atul Gawande (second from right, above) studies surgical errors with the goal of learning to prevent them. Recently he showed that using bar codes and a computer to track and count sponges is a cost-effective way to avoid leaving them in patients. A 2005 recipient of a MacArthur Foundation "genius" award, Gawande has published two bestselling books: *Complications: A Surgeon's Notes on an Imperfect Science* and *Better: A Surgeon's Notes on Performance*.

She spoke for "Mohammed" of Egypt, whose wife died from blood loss after routine gallbladder surgery; for "Natividad," a woman in the Philippines, who died after a hysterectomy because two gauze strips were left inside her; and for "Joan," an American who died in an operating room because anesthesia alarms were turned off and no one noticed her deteriorating condition. The Safe Surgery Saves Lives humble checklist aims to put a stop to tragedies like these.

Ellen Barlow writes about medicine, science, and public health for many Boston-area institutions.

Patient Safety: Now, a Global Movement

In the United States, the patient safety movement has been around since the mid-1990s, thanks in part to HSPH faculty. The movement's acknowledged "father" is Lucian Leape, HSPH Adjunct Professor of Health Policy and Management. Leape and two HSPH colleagues—professors David Bates, a pioneer in studying "adverse events" involving patients and medications, and Donald Berwick, founder of the Institute for Health Care Improvement, based in Boston—put a spotlight on safety issues, calling for research and

action. A turning point came in 1999, when the Institute of Medicine issued a landmark report, "To Err is Human: Building a Safer Health System," co-authored by Leape, Berwick, and others. The report identified "faulty systems, processes, and conditions," not caregivers' recklessness or negligence, as the chief cause of mistakes or failures to prevent them.

Soon thereafter, WHO's World Health Assembly resolved that all the world's citizens deserved safer health systems. As a result, WHO—better

known for its efforts to eradicate HIV/AIDS, tuberculosis, and malaria—enlisted Leape, his HSPH collaborators, and other experts, agencies, and ministers of health, to do better at honoring the medical oath to "First, do no harm."

In 2004, the World Alliance for Patient Safety at WHO was born amid rising concerns that unsafe health care is a global problem. An outgrowth of the Alliance is the WHO's Safe Surgery Saves Lives initiative, which Gawande now leads.

19 Steps to Safer Surgery



SURGICAL SAFETY CHECKLIST (FIRST EDITION)

Before induction of anaesthesia ▶▶▶▶▶▶▶▶▶▶ Before skin incision ▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶ Before patient leaves operating room

SIGN IN	TIME OUT	SIGN OUT
<input type="checkbox"/> PATIENT HAS CONFIRMED • IDENTITY • SITE • PROCEDURE • CONSENT	<input type="checkbox"/> CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE	NURSE VERBALLY CONFIRMS WITH THE TEAM:
<input type="checkbox"/> SITE MARKED/NOT APPLICABLE	<input type="checkbox"/> SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM • PATIENT • SITE • PROCEDURE	<input type="checkbox"/> THE NAME OF THE PROCEDURE RECORDED
<input type="checkbox"/> ANAESTHESIA SAFETY CHECK COMPLETED	ANTICIPATED CRITICAL EVENTS	<input type="checkbox"/> THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE)
<input type="checkbox"/> PULSE OXIMETER ON PATIENT AND FUNCTIONING	<input type="checkbox"/> SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?	<input type="checkbox"/> HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME)
DOES PATIENT HAVE A:	<input type="checkbox"/> ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS?	<input type="checkbox"/> WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED
KNOWN ALLERGY? <input type="checkbox"/> NO <input type="checkbox"/> YES	<input type="checkbox"/> NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?	<input type="checkbox"/> SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT
DIFFICULT AIRWAY/ASPIRATION RISK? <input type="checkbox"/> NO <input type="checkbox"/> YES, AND EQUIPMENT/ASSISTANCE AVAILABLE	HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES? <input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE	
RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)? <input type="checkbox"/> NO <input type="checkbox"/> YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED	IS ESSENTIAL IMAGING DISPLAYED? <input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE	

THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.

This first edition of the WHO's surgical safety checklist (also on the web at www.who.int/patientsafety/safesurgery/tools_resources/technical/en/index.html) has been endorsed by more than 200 professional medical associations worldwide and 20 ministers of health. Three nations, Ireland, Jordan, and the United Kingdom, already have pledged to make it part of their national health care standards.

This fall, WHO plans to publish the full results of the eight-hospital, 3,500-patient pilot study led by HSPH's Atul Gawande, and to engage 2,500

hospitals by the end of 2009.* Study sites will gather information such as numbers of operations and in-hospital death rates.

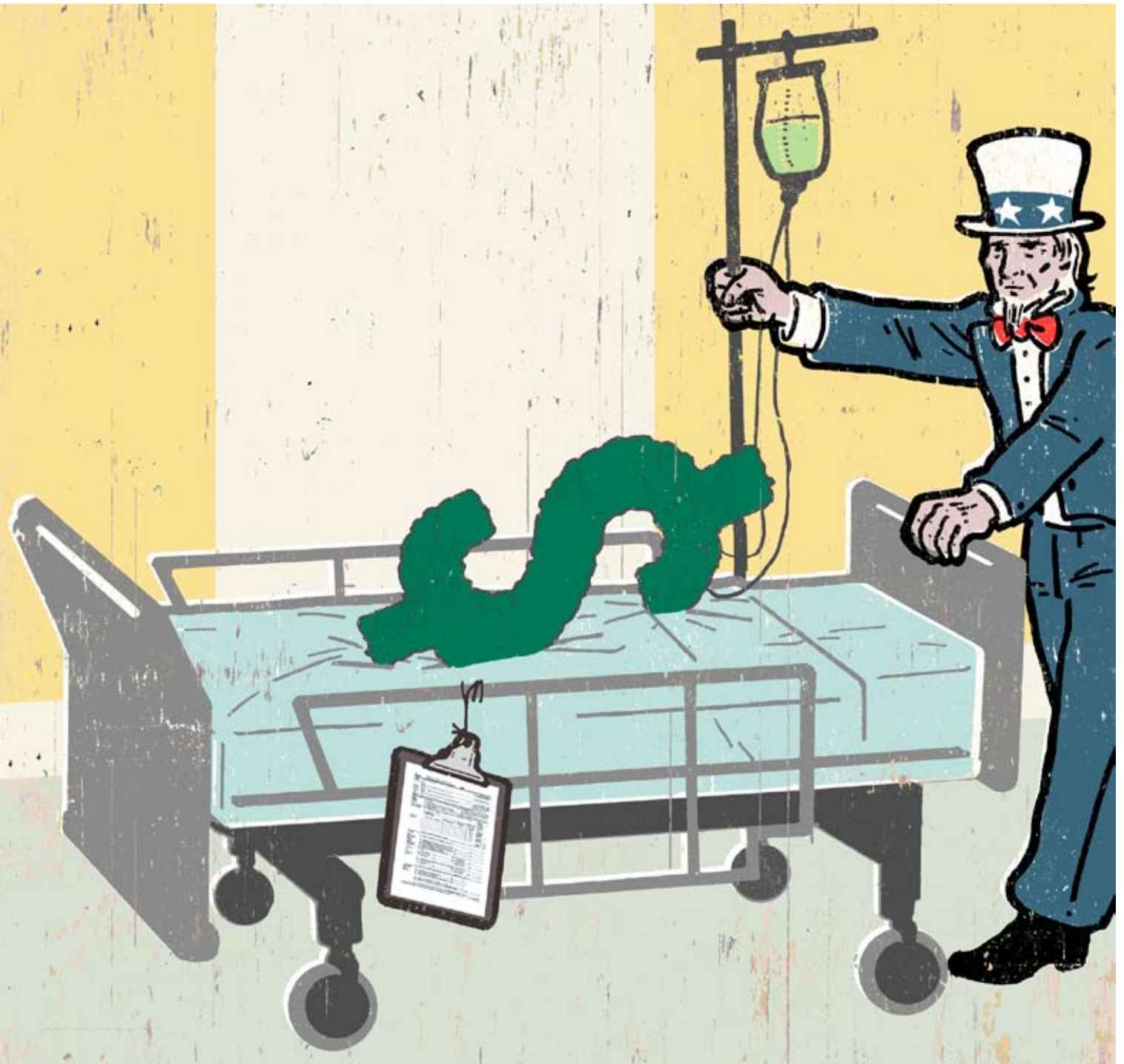
A "surgical Apgar"-like score that Gawande devised, which has been validated by the pilot sites, will also be used as a standard measure of surgical outcomes. Much like the score used to evaluate a newborn's health named for its inventor, anesthesiologist Virginia Apgar, the surgical Apgar measures a patient's condition at the end of an operation, based on such criteria as blood loss and drop in blood pressure.

By gathering more data, Gawande says, "We'll know if we're doing the job of reducing harm."

For more information, visit WHO's Safe Surgery Saves Lives site at <http://www.who.int/patientsafety/safesurgery/en/>; the surgical checklist at http://www.who.int/patientsafety/safesurgery/tools_resources/technical/en/index.html; and a video, introduced by Gawande, of a surgical team's use of the checklist, at http://www.youtube.com/watch?v=w-ylSK_QRCM.

* The eight pilot hospitals include University of Washington Medical Center in Seattle, USA; University Health Network, Toronto, Canada; St. Mary's Hospital, London, UK; Auckland City Hospital, New Zealand; St Stephen's Hospital, New Delhi, India; Prince Hamzah Hospital, Amman, Jordan; Philippines General Hospital, Manila; and St. Francis Designated District Hospital, Ifakara, Tanzania.

Health Insurance & Uncle Sam



To make health insurance more affordable and accessible, reform the federal tax code, says HSPH Professor of Health Economics Katherine Baicker.

Though we Americans bicker about how best to fix our health care system, on this, most agree: The system is fundamentally unfair and fails to deliver good value for our money. A national report card released in July by the Commonwealth Fund of New York, an influential health policy group, finds quality highly variable, costs rising, and access deteriorating since its first-ever report, issued two years ago.

We now spend more than twice per person what other industrialized nations do, yet we're dead last in preventing deaths through the timely, effective use of medical care, the analysis reveals. More than 47 million of us, including about one in five workers, have no health insurance whatsoever. And 28 million more have coverage the Fund's researchers call "inadequate."

The reasons are many, but a key factor—one Democrats and Republicans are talking about—is how private health insurance is financed, says Katherine "Kate" Baicker, a professor of health economics at the Harvard School of Public Health (HSPH), who from 2005 to 2007 was a Senate-confirmed member of President Bush's Council of Economic Advisers. Besides funding the public Medicare and Medicaid programs, which in 2006 cost \$400 billion and \$174 billion, respectively, according to Centers for Medicare and Medicaid Services, the federal government subsidizes the private health insurance to the tune of about \$245 billion annually. That's a "largely hidden" fact that Baicker finds "not just extraordinarily inefficient but also highly regressive," in that it disproportionately benefits the well-paid over low-income workers.

What's unfair, she says, is that the biggest tax benefits go to the highest-wage employees who get the most gener-

ous health insurance through work and pay no taxes on the benefit, while others who must buy it on their own get no tax break. Reforming the federal tax code to "level the playing field," Baicker argues, would be one step we could take both to make health insurance more affordable and available, and to wrest a bigger bang from our health care buck.

Of course, some Americans shout that what we really need is a complete overhaul—a single-payer system, like the U.K.'s or Canada's, at one extreme, or bolder free-market solutions at the other. The political reality, Baicker warns, is that voting Americans aren't ready for big changes like these—and that "neither extreme is likely to produce the high-value care we should expect from our system."

NO SYSTEM AT ALL

During her two years in Washington, Baicker helped shape the President's 2007 plan to revamp the way the tax code subsidizes private health insurance. She says the current system is driven by the fact that employment-provided insurance plans aren't taxed like wages. This subsidy wasn't part of any well-reasoned scheme; rather, it's a "relic" of the World War II era. Some employers began offering health insurance as a new kind of perk to lure workers after the federal government imposed controls on the customary bait—wages—and ruled that workers would pay no taxes on those benefits.

Today, workers who get health insurance through their jobs still don't have to pay taxes on those benefits, but people buying insurance on their own do. They must use their after-tax earnings to shop for nongroup insurance, or pay

continued



ECONOMICAL Formerly a member of President Bush's Council of Economic Advisers, HSPH's Katherine Baicker now serves on the Institute of Medicine's Committee on Health Insurance Status and its Consequences.

for care out-of-pocket without seeing any tax relief for these expenses. This is particularly regressive, since high-wage workers are more likely to get insurance through their jobs, more likely to have very expensive insurance packages, and are in the highest tax bracket (and consequently get the most benefit out of paying with pre-tax dollars).

As if this inequity weren't bad enough, the policy also increases spending on low-value care, Baicker says. "Our tax dollars end up subsidizing costly broad-coverage plans

enrage. There are also real costs associated with tying insurance to employment, such as making it harder for workers to change jobs if they or a family member falls ill, but it would be dangerous to just throw out the whole system and start over," Baicker warns. About 59 percent of Americans got their health insurance through work in 2007, down from 63 percent five years earlier.

"While the employment-based system inhibits job mobility and threatens the insurance coverage of people who lose their jobs or wish to retire," she observes, "policy makers are justifiably reluctant to dismantle an arrangement on which so many rely and that forms the basis of most 'risk pooling' in insurance markets today."

In talks with employers, hospitals, and patient advocacy groups around the country, Baicker learned that "people are really scared of losing their jobs and health insurance—they dread being thrown into the non-group insurance market." Today, she says, that market is expensive and, particularly in some states, does not offer the long-run financial protection enrollees need.

"Give all Americans with private health insurance the same tax benefit, regardless of where they get their insurance or how generous their policy is." — *Professor of Health Economics Kate Baicker*

more heavily than basic plans, and we have evidence that this promotes inefficient use of resources and dulls the incentive to create cost-saving technologies." The tax penalty for cost-sharing is one of the reasons health insurance doesn't look like auto insurance or homeowners insurance and ends up driving up quantity, not quality.

A 2004 study in *Health Affairs* by Baicker and Harvard Kennedy School colleague Amitabh Chandra suggested that spending more money is no guarantee of high quality care. Medicare beneficiaries in parts of the country where more money was spent on their care were less likely to get high-quality care—even after accounting for differences among patients and despite the fact that all had the same insurance coverage.

LEVEL THE PLAYING FIELD

How to tackle U.S. health reform? Start by being realistic, Baicker suggests. What will fly?

"If I were building a system from scratch, I'd never design a subsidy that only went to people who got insurance through their jobs, and that reserved the highest subsidies for the highest-income people with the most generous cov-

One option Baicker likes: Overhaul the current tax subsidy. Instead, she urges, "Give all Americans with private health insurance the same tax benefit, regardless of where they get their insurance or how generous their policy is." Bush's 2007 budget proposed a standard tax-deduction—\$7,500 per individual, \$15,000 per family. According to estimates by the U.S. Treasury and the Lewin Group, a health care policy research firm, this innovation would reduce the ranks of the uninsured by up to 9 million people, Baicker says. A key feature of McCain's health reform proposal is a flat tax credit for all Americans rather than a flat tax deduction, a more progressive option that accomplishes many of the same goals. McCain's proposed credit would be \$5,000 for families and \$2,500 for individuals—worth the same amount no matter where people got their insurance, how much it cost, or (unlike a deduction) which tax bracket they were in.

Implications of replacing the current tax exclusion with a flat deduction or credit would differ for the uninsured, for those now purchasing insurance on their own, and for those getting insurance through their employers.

TIME FOR TAX-CODE REFORM?

KEY POINTS

THE NEED IS NOW

About 47 million Americans have no health insurance.

THE SYSTEM IS UNFAIR

The federal government has long subsidized health insurance premiums for those who get insurance from an employer. The highest tax subsidies go to people with the highest incomes and the most generous health plan coverage, at the expense of those with lower incomes and less generous—or no—insurance.

AFFORDABLE, BASIC PLANS ARE NEEDED

Replacing the current tax exemption for employer-sponsored insurance with a flat tax deduction or flat

tax credit would make insurance more affordable for the uninsured and for those getting insurance on their own in the individual market, and would promote higher-value coverage.

GOVERNMENT SAFEGUARDS AND REGULATORY REFORMS ARE ALSO ESSENTIAL

Tax reforms should be accompanied by regulatory reforms and protections that ensure that people's premiums never go up just because they fall ill, and that low-income earners have the resources they need to be able to afford insurance.

The uninsured would have a new incentive to buy health insurance. According to the Treasury's projections in 2006, for someone in the 15-percent income tax and payroll tax brackets, a \$15,000 family deduction would be worth more than \$4,500. This is a big share of the average individual-market family policy, which would cost about \$5,100, the Treasury estimated. A refundable, flat tax credit would give most of the uninsured an even bigger check to take to the insurance market than a flat deduction would.

People now buying insurance on their own would get a new tax benefit. The insurance that they're already purchasing would now be tax-free.

People receiving insurance through their employer could see their tax bills go up or down. The Treasury estimated that about 80 percent of employees' policies would cost less than the President's proposed standard deduction, which for these workers would result in lower taxes. Since the tax benefit would be flat (under either a flat

deduction or a flat credit), workers and companies might choose compensation packages featuring higher wages but lower-premium insurance plans.

EMPHASIS ON VALUE

Rewriting the federal tax code, Baicker says, would help keep insurance affordable. How? By slowing the growth of health care costs.

A flat deduction or credit "creates an enormous incentive to get at least basic coverage, but no added incentive to get a more expensive policy," she explains. Enrollees are likely to choose plans with greater cost-sharing, and spend their dollars on care of most value to them. In the long run, price-sensitive patients will drive greater competition among providers along with cost-saving technological advances.

What's important to stress is not so much lower cost, but higher value, Baicker cautions. Regardless of how much we spend on health care, we must ask: Are the health gains worth our money? In order for people to be able to shop for high-value care, patients and providers must have at their fingertips more and better information by which to judge health care's quality. Just as more research on "best practices" is needed to help caregivers know which treatments work optimally, so too must more data be generated to help consumers select health plans, care providers, and facilities.

TIME FOR CHANGE

Tax reform is merely one component of Baicker's thoughts on health reform. Tax-code reforms would allow millions more Americans to buy health insurance, but what about populations for whom insurance would be out of reach? Millions with very low incomes need help to afford insurance. Those who are sick and uninsured today need help accessing care.

Creative partnerships with state governments will therefore be crucial, Baicker says. In addition, a host of new regulations will be essential to ensuring that insurers cover services fairly and reasonably. "People's premiums should never rise just because they get sick," she asserts.

Many experts disagree with the notion that tax-code reform will lead to wider availability of more basic, and more affordable, health plans. They note that leveling the playing field in this way could hasten the erosion of the employer-based insurance market and leave vulnerable

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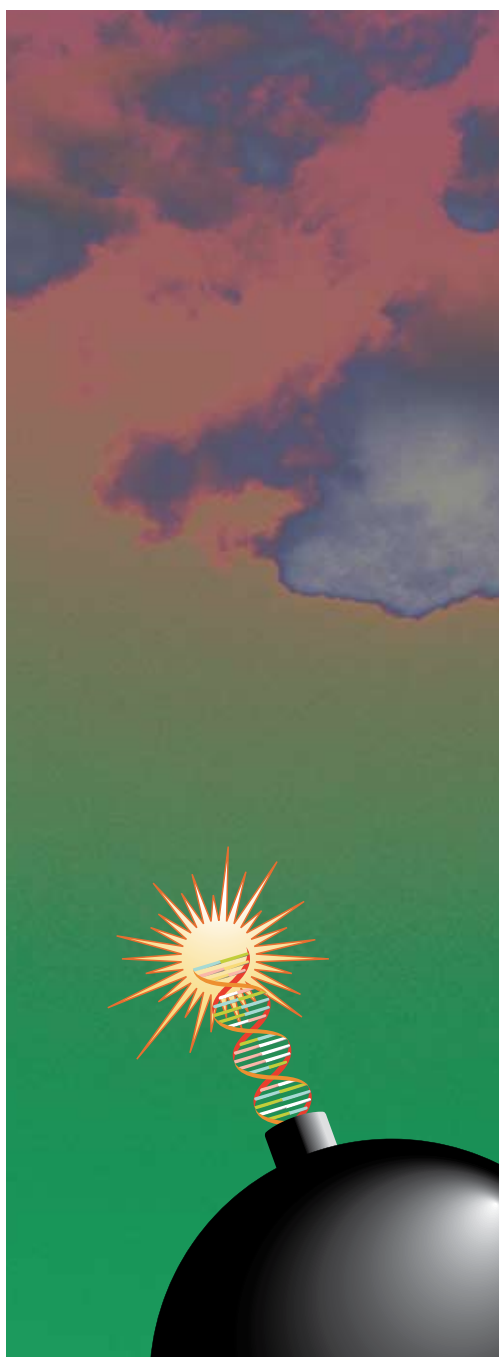
tick,tick,tick,boom

Monica Ter-Minassian is scouring the genome for time bombs. Using gene-reading technology and analytic techniques, this Harvard School of Public Health doctoral student is on the hunt for subtle variations in human DNA that might help identify the causes of rare neuroendocrine and esophageal tumors, or provide a deeper understanding of why smoking provokes lung cancer in some people but not in others.

Like most complex diseases, cancer results not from a single flawed gene, but rather the interplay of multiple genes and any accumulated damage to DNA caused by environmental factors such as exposure to chemicals, or aspects of lifestyle, such as smoking. To gain a better picture of this recipe for human disease, HSPH recently launched the Genes & Environment Initiative, pulling together students and faculty trained in environmental health, population science, biostatistics, and basic biological science.

Few scientists are fully grounded in so many areas. But Ter-Minassian came to HSPH with a range of expertise developed as a researcher in the genetic epidemiology branch of the National Cancer Institute (NCI) from 2002 to 2004. Previously she worked as a genetic counseling intern in Boston-area hospitals, gaining an appreciation, she says, of the need to help patients

HOW GENES AND ENVIRONMENTAL FORCES RAISE CANCER RISK



understand the interplay between their DNA and external forces that influence their risks for disease. Now, based in the School's Department of Environmental Health, she analyzes populations for genetic factors that raise or lower cancer risk.

"Cancer researchers must understand how genes are expressed and interact with environmental toxins or nutrients at different points in tumor development. A strong biology and genetics background helps," says Ter-Minassian, whose talent earned her a prestigious Taplin Fellowship for 2007 and 2008.

"It's hard to find people with Monica's mix of skills," says her advisor, Professor of Occupational Medicine and Epidemiology David Christiani, who has taught at HSPH for more than 20 years. "In the field of gene-environment interactions, she's one of the most capable people I've ever met."

MINING THE SNPS

Ter-Minassian is analyzing common variations in four genes linked to lung cancer, exploring how these subtle points of difference may be modified by age, gender, and smoking status. These variants, known as SNPs ("snips," short for single nucleotide polymorphisms), occur all along the chromosomes without affecting gene function. Because they lie nestled within functional stretches of DNA representing as-yet-unidentified

genes, scientists searching for new genes related to a particular disease like to start by comparing SNPs of people with and without that disease.

After mining online catalogs of SNPs compiled by many scientists, Ter-Minassian, with the Christiani team, chose 1,536 candidate SNPs from genes already linked to lung cancer. A lab tested for their presence in DNA from study subjects at the Massachusetts General Hospital, in Boston. Now Ter-Minassian is searching for SNP patterns that go hand in hand with a confirmed lung cancer diagnosis.

In a second study, Ter-Minassian took a closer look at a subset of four SNPs. “We did see some interesting results in one particular SNP in a gene called *FASLG*,” Ter-Minassian says. “We looked at different subgroups of patients, and the strongest evidence showed this *FASLG* SNP poses the greatest risk for younger people.” The biological reason, she says, is that expression of this SNP’s gene decreases in people over 60.

Ter-Minassian is also exploring possible genetic roots of susceptibility to esophageal adenocarcinoma, for which smoking is a known risk, and neuroendocrine cancers, which have no known environmental factors. She hopes to identify SNPs that not only point to cancer susceptibility, but also hint at patients’ survival times. This is particularly important for esophageal cancer patients, at least one-third of whom die within a year.

POTENTIAL FOR NEW TREATMENTS

Ter-Minassian is still relatively new to these sorts of population-based studies, but her interest goes back to her undergraduate years at the



FULLY GROUNDED: Monica Ter-Minassian, a doctoral student in environmental health, brings a rare depth of expertise in genetics, epidemiology, and biology to her studies of gene-environment interactions.

Subtle variations in human DNA might help identify the causes of rare neuroendocrine and esophageal tumors, or provide a deeper understanding of why smoking ignites lung cancer in some people but not others.

Massachusetts Institute of Technology. “My senior thesis was on bacterial genetics, but I was fascinated with a course in human genetics, where we had an almost ‘grand rounds’ experience of case studies, meeting patients with inherited diseases like Duchenne’s muscular dystrophy and Huntington’s disease,” she says.

It was while studying genetic diseases in families at NCI that Ter-Minassian first began wondering about the role of environmental factors, such as sunlight exposure in familial melanomas in Italy, or alcohol and spicy food consumption in esophageal cancers in north-central China. Since then, she has seen a “dramatic shift” in the way people think about disease susceptibility. “Instead of focusing on inherited gene mutations,” she says, “researchers now consider a mix of genetic and environmental effects.” Inspired, Ter-Minassian sees real potential for research on cancer susceptibility and survival to lead to better patient treatments.

“There is still a lot we don’t know about complex diseases like cancer, where the mode of inheritance is not clear,” says this multi-faceted scientist, who plans to graduate next year. “There’s definitely a lot to be done.”

For information about HSPH’s Genes & Environment Initiative, see page 44. To learn about the Taplin Fellows and their extraordinary benefactors, the late John Taplin and his wife, Virginia, see page 45.

Amy Roeder is the Development Communications Coordinator in the Office for Resource Development.

FINDING A WAY, WHATEVER THE OBSTACLES

Alumni Award of Merit Winners 2008

Standouts in public health tend to view big problems as boulders that must be rolled uphill, however steep those hills might be. This year's recipients of the Alumni Award of Merit have each approached serious health threats to huge numbers of people with strong conviction and a relentless quest for knowledge.

The four who were honored at a special dinner in June are:

- An epidemiologist who didn't know what "epidemiology" meant when he started at the Harvard School of Public Health, but who has helped set world safety standards for radiation exposure;
- A Norwegian "country doctor" who has been a leader in the near-eradication of Guinea worm disease;
- A former commissioner of health for New York City, whose leadership in the early days of the HIV/AIDS epidemic established model programs for controlling its spread;
- A National Cancer Institute deputy director whose research involving occupational and environmental exposures has led to safer workplaces and tougher regulations.

continued



CAUSES FOR CELEBRATION: (clockwise from top right) John Dunning Boice Jr., Sheila Hoar-Zahm, David Sencer, and Anders Seim. Photo, Kent Dayton/HSPH

Harnessing Radiation To Cure—Not Cause—Cancer

John Boice was all set to apply his training in radiation physics to advance the diagnosis and treatment of disease when he entered the Harvard School of Public Health in 1972. Then along came one of those required courses, epidemiology. “At that time, I didn’t know what the word meant,” Boice admits.

While taking the course, taught by HSPH professor Richard Monson, “I became enthralled with the study of what causes disease in human populations,” Boice says, “so I melded my interest in disease causation with my background in radiation.” Boice worked with Monson on a doctoral thesis, studying young women with pulmonary tuberculosis who had received an average of 102 X-ray fluoroscopic examinations over three to five years. This resulted in a groundbreaking paper in the *Journal of the National Cancer Institute* that linked frequent diagnostic X-rays to breast cancer risk.

Now, more than 400 research papers later, Boice calls his earliest studies still among his most influential. The studies showed that small radiation doses accumulated over many years can increase the risk of breast cancer in young women, which prompted development of safer mammography equipment that has reduced each radiation dose more than tenfold. “These studies are still important as we assess risks associated with radiation from medical exposures, environmental exposures, and accidents,” Boice notes.

“Epidemiology can never prove the negative; we can only address these issues with a variety of study designs as new technologies are introduced.”

Today, Boice is studying the children of cancer survivors who received radiation as part of their treatment. So far, “there’s no clear evidence” for increased risk of congenital malformations or complications in pregnancy that could be attributed to radiation’s effect on reproductive cells, he says. “On the other hand, we did find that women who received large radiation doses to their uteruses were more likely to have children who are born prematurely and of low birth weight.” This finding reflects uterine damage, he explains, and not genetic effects.

CELL PHONES AND CANCER RISK

Among Boice’s other best-known studies are investigations into possible cancer risks from cellular phone usage. In a landmark study published in 2006, Boice and colleagues in Denmark examined the records of more than 400,000 cell phone users. The results, which “generated a lot of interest within the public,”



**About John Dunning Boice Jr.,
SM '74, SD '77**

An international authority on radiation’s effects on human health whose work has led to reduced population exposure to radiation and prevention of radiation-associated diseases

Scientific director of the International Epidemiology Institute in Rockville, Md.

Professor of medicine at Vanderbilt University in Nashville, Tenn.

Developed and became the first chief of the National Cancer Institute’s Radiation Epidemiology Branch

Has guest lectured on radiation epidemiology at Harvard for 30 years

Sang an original song, “Epidemiology,” at the awards ceremony with his wife, Jennifer

says Boice, indicate no measurable increased risk of brain tumors or other cancers. “There’s no biological mechanism for which radio waves would, in fact, increase cancer risk,” he adds.

Yet, quite regularly, stories appear in mainstream publications claiming the possibility of such an association. “Everyone

has a cellular telephone—we give them to our children now,” says Boice. So concerns persist about a cell phone-and-cancer connection despite the mounting evidence to the contrary. “The radio signals emitted by a cellular phone are more akin to your own radio’s than to an X-ray machine’s.”

Nonetheless, these studies will go on. “Epidemiology can never prove the negative; we can only address these issues with a variety of study designs,” Boice explains. “There’s always a need to continue research as new technologies are introduced.”

Looking back over his career, Boice says, “Being an epidemiologist has been very rewarding. You work in areas of public importance, and it’s your job to think.” 🌟

For a profile of Boice published previously in the Review, see http://www.hsph.harvard.edu/review/rvw_spring06/rvwspr06_boice.html.

Eradicating Guinea Worm (And Other Threats To Life And Dignity)

Anders Seim was pursuing a general degree at HSPH in 1987, taking courses at Harvard's graduate schools of business and government, when a classmate alerted him to a guest lecture by Donald Hopkins, of what today is the Centers for Disease Control and Prevention.

"I had never heard of Guinea worm disease and had no idea I was going to be a Guinea worm 'stomper' for the next 20 years," Seim says. "Hopkins and I chatted, I ended up getting more involved, and I've been at it ever since."

Today, five countries report fewer than 10,000 cases of guinea worm disease. But at that time, the parasite infected about 3.5 million people in 20 countries in Asia and Africa. Worms up to three feet long emerge from the skin, inflicting a fiery pain, a year or so after victims ingest stagnant water containing larvae.

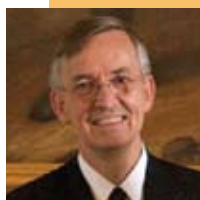
A self-described "country doctor" from Norway, Seim went back home to continue practicing medicine, turning to his new project a few days a week. "Groups working to eradicate Guinea worm were up and down the East Coast of the U.S., but 75 percent of development assistance money for Africa comes out of Europe. So I said, 'Maybe it would be useful if somebody were working in Europe, to get the agriculture groups and the water groups to help us.'"

His idea: Get help to filter unsafe drinking water as an agricultural intervention.

'YOU OUGHT TO START AN NGO'

In 1990, taking a hint from a business school professor, Seim established Health & Development International (HDI) as a vehicle for forming partnerships with organizations such as the

"[Guinea worm] is going to be the first disease ever eradicated with no fancy technology, no vaccines. It's actually the school teachers, the parents, the traditional leaders, the local folks, and the kids who are doing this."



**About
Anders Seim,
MPH '88**

Founded Health & Development International, a non-governmental organization with offices in Norway and the United States

Led efforts to eradicate Guinea worm disease in Africa

Made great strides against the lymphatic filariasis parasite

Initiated the world's first community-based fistula prevention program, in Niger

Lives by a Norwegian fjord with a lighthouse in the back yard

CDC, the World Health Organization, the Carter Center, in Atlanta, and the affected countries. HDI has since distributed more than 9 million water-pipe filters and set up a program that provides monetary rewards to people who report cases and to patients who seek treatment.

In 1997, HDI also took on lymphatic filariasis, which can lead to elephantiasis, focusing on stopping its spread by mosquito and on treating the sick, whose limbs and tissues balloon as parasitic worms damage the lymphatic system. HDI helped countries organize mass drug-distribution programs, produced a manual for pub-

lic health workers, and began teaching modern surgical methods in Africa. In 2004, Togo became the first African country to demonstrate a halt to the disease's transmission.

In 2003, HDI added its program on obstetric fistula, a condition in which new mothers leak urine and/or feces owing to injuries sustained during prolonged labor. Repairs must be made surgically. HDI launched a community-based program to prevent obstetric fistula and related deaths in Niger, training local medical staff and villagers to transport women in distress to facilities that perform cesarean sections.

Seim gives credit where it's due. Regarding Guinea worm, he emphasizes the leadership of former U.S. President Jimmy Carter and adds, "This is going to be the first disease ever eradicated with no fancy technology, no vaccines. It's actually the school teachers, the parents, the traditional leaders, the local folks, and the kids who are doing this—with a little help from their friends."

The three problems Seim has fought to overcome "all have a great deal to do with human dignity," not to mention socioeconomic constraints and poverty prevention and alleviation. "These diseases combine health and development in ways a lot of other diseases don't," he adds. "And they're basically eradicable." 🌸

continued

Setting The Facts Straight About AIDS

Something the late medical anthropologist Benjamin Paul said while teaching a class at HSPH has stuck with David Sencer. “He said one of the biggest problems in providing public health services is language and communication,” says Sencer. In times of crisis, that lesson has served him well.

Sencer was commissioner of health for New York City when AIDS was just emerging. “Nobody wanted to talk about it,” he remembers. In 1982, when he began the job, Sencer recalls, fewer than 20 cases of AIDS had been officially recorded for New York. But when a city sanitation worker was reported to have the disease, New Yorkers were worried.

“We got the mayor [Ed Koch] to give a press statement that, one, we should feel sorry for this man,” Sencer says. “Secondly, we were going to see the disease pop up in school teachers, in social workers, and in bankers, and we shouldn’t be surprised.”

His agency reached out to the people most affected. “We did not do a lot of health education or publicity ourselves, but we supported local organizations to do it, figuring, for instance, that the Gay Men’s Health Crisis was better able to communicate with gay men than officialdom was,” he says. “We would be willing to take unpopular stands if we felt that, scientifically, we were correct.”

“I decided I wasn’t going to go back to the idea of taking care of a person; I was much more interested in dealing with the total community.”

EARLY MISPERCEPTIONS

In those days, AIDS was associated with the four “H’s”: homosexuals, heroin, hemophiliacs, and Haitians. But what mattered was not a person’s national origin, but whether they were homosexual or used drugs. “So we broke from the mainstream and said Haitians were not a risk factor,” Sencer says. Hemophiliacs, having been infected by tainted blood transfusions, were at risk of AIDS, but not of spreading it. “You try and base your assertions on science instead of hysteria.”

Armed with data, Sencer pushed to establish the country’s first needle exchange program. “The mayor

didn’t want to talk about it,” he says. “Finally one night he called me at home. He said, ‘David, if you’ll be the goat, you write me a memo proposing it, and I’ll leak it.’ Next morning we sent him a memo, he leaked it, and all sorts of hell broke loose. But we got it up on the table, and we finally got a very small program started. Now it’s the largest in the U.S.”

Earlier, Sencer had honed his honest, fact-based approach at the CDC, where he spent 17 years. “So many parts of government ask Congress for twice as much money as they really need. We never did that,” Sencer says. “We’d say: ‘There’s a certain need, and this is what we need to meet it.’” One of the most important things that happened while Sencer was there was the eradication of smallpox, he says. He left the CDC after a much-anticipated swine flu epidemic failed to materialize.

Sencer’s public health perspective dates to his early days, working with migrant laborers in Idaho after medical school, where he began to rethink his definition of “patient.”

“I decided I wasn’t going to go back to the idea of taking care of a person,” he says. “I was much more interested in dealing with the total community.” 🌸



About David Sencer, MPH '58

Became assistant director (in 1960) and director (in 1966) of the Communicable Disease Center, today’s Centers for Disease Control and Prevention

Led CDC expansion from communicable diseases to chronic diseases, birth defects, family planning, nutrition, smoking, and environmental and occupational health

Led New York City’s health department during the earliest days of the AIDS epidemic

Is working with Emory University to set up an archive of experiences in eradicating smallpox (<http://gde.emory.edu>)

Shielding Farm Workers From Needless Cancer Risk

Shelia Hoar Zahm's first studies at the National Cancer Institute in the early 1980s centered on cancer risk and agricultural pesticides. When she and her colleagues examined the institute's collection of cancer maps, patterns emerged. "Right down the middle of the U.S. was this red band indicating excess leukemia mortality and a similar, but somewhat less striking, pattern for lymphoma," she says.

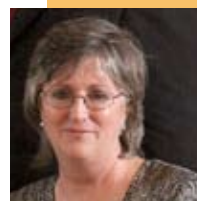
The high rates appeared primarily in agricultural areas. "We found that herbicide exposure increased the risk of lymphoma, and the risk went up with the number of days per year that the farmers applied the pesticides," she says. Risk rose, too, if farmers did not use protective equipment, and with the number of days the farmers wore the same work clothing. Zahm was among

papers since. "In one sense, occupational and environmental exposures are involuntary exposures. You can pick your job, but you may not know or control the exposures at the job. Yet these are preventable causes of disease."

CHARTING THE FUTURE

Zahm and her colleagues continue to use NCI's cancer maps and changes in cancer incidence as clues to what to study next. She has continued to study lymphoma, the incidence for which has doubled since the 1950s. "Something in the environment must be responsible for this kind of change, so we have conducted a series of studies to look for the explanation," she says.

As deputy director of the Division of Cancer Epidemiology and Genetics, where about 300 people conduct a broad range of research,



Shelia Hoar Zahm, SM '77, SD '80

International authority on occupational and environmental causes of cancer

Deputy director of the NCI Division of Cancer Epidemiology and Genetics since 1998; joined NCI in 1980

Work on pesticides and cancer risk led to labeling modifications by the Environmental Protection Agency and changed how farmers handle pesticides

Initiated the first International Conference on Women's Health: Occupation and Cancer

Enjoys metal smithing to make jewelry

"In one sense, occupational and environmental exposures are involuntary exposures. You can pick your job, but you may not know or control the exposures at the job. Yet these are preventable causes of disease."

the first to show a link between farm herbicides and non-Hodgkin's lymphoma. The results of her work helped to spur the Environmental Protection Agency to modify product labels and initiate new user education programs.

She then decided to investigate agricultural populations that might be under-studied, specifically migrant farm workers. "We found it was possible to locate, obtain detailed work histories, and to trace farm workers over time. By going to farm workers' home communities in southern Texas, we were able to locate over 90 percent of our study group 10 years later." She counts these first studies as among her most significant, even after having collaborated on about 250

Zahm helps oversee others' studies. "Figuring out what we're going to move to next and helping to manage the necessary resources has been very satisfying and probably will have a broader impact than my own research."

Growing up, Zahm says she always had an interest in and concern for health. She majored in math as an undergraduate at Tufts University, near Boston, but took courses in epidemiology. That helped her land a job at a cancer registry at what is now Beth Israel Deaconess Medical Center.

But something was missing. "I was collecting all these data but couldn't see that anyone was using them," she says. She consulted Philip

Cole, then an HSPH professor of epidemiology. "He encouraged me to go back to school in epidemiology. He actually sent his assistant upstairs to get an application to the School, then later offered me a training grant so I was able to go full-time."

Prevention, the ultimate goal for any epidemiologist, is what motivates Zahm. Medical treatment is "incredibly important," she says, "but wouldn't it be nice to have people not get diseases at all?" 🌸

Larry Hand is associate editor of the Review.



Alumni News

1960

Dr. Edward J. Burger Jr., MPH, ScD '66, has directed the Eurasian Medical Education Program of the American College of Physicians in Russia for 11 years. This program brings American internists to regional academic medical centers across the Russian federation to share experience and knowledge with colleagues in continuing medical education programs. The goal is to enhance the capacity of physicians to prevent and manage heart disease, diabetes, tuberculosis, and other serious diseases. Nine thousand Russian physicians have participated since the program began in 1997. Through professional exchanges, the program has contributed to health in Russia and to the revitalization of medical professionalism. The program derived from Burger's service in the Office of the President's Science Adviser during détente in the early 1970s, when he helped establish joint U.S.-Soviet research programs for science, health, and the environment. For more information, visit www.emep-online.org.

Burger was a research associate at HSPH in the late 1960s, and held a joint appointment in science and public policy at Harvard's Kennedy School of Government. In the 1970s and '80s, he was a professor of community medicine at Georgetown University Medical Center in Washington, D.C.

1962

Dr. P. William Dysinger, MPH, published *Health to the People* (Trafford Publishing) in September 2007. The book tells the story of public health education and outreach at Loma Linda University, in California, since 1905. Dysinger was associate dean for academic affairs and international health at the university's school of public health for 14 years starting in 1967, when it became accredited. He is now associate dean *emeritus*.

1972

Dr. James Felsen, MPH, published *De-Spamming Health: Reforming the Health System From the Bottom Up* (American Book Publishing), released in July. The book is intended as a resource for local communities to take back control of health care. Felsen, a former staff director of the Office of the U.S. Surgeon General, has more than 40 years of experience in public health. For more information, visit www.localhealthcarereform.com.

1978

Curt Smith, MPH, joined the Alvarez & Marsal Healthcare Industry Group as senior director in March. Prior to joining the company, Smith was for 15 years the president of the Massachusetts Eye and Ear Infirmary, a Harvard-affiliated teaching hospital. He also has held leadership positions with Boston's New England Deaconess and Brigham and Women's hospitals, in addition to the Harper Grace Hospitals in Detroit.

1980

Dr. Ted Mala, MPH, was named Indian Physician of the Year by the Association of American Indian Physicians in June. He is the director of tribal relations at the Traditional Healing Clinic at SouthCentral Foundation in Anchorage, Ala. His work focuses on traditional healing and on mentoring future health professionals.

1984

Clifford Scott, MPH, was named academic dean at the New England College of Optometry, in Boston, in May. He has taught at the college since 1970. Scott also served as chief of the optometry section of the Veteran's Administration Center, in West Roxbury, Massachusetts, and as clinic director of the Massachusetts Laborers' Vision Center. He also had a private practice in Newport, Rhode Island.

1987

Dr. Robert Mittendorf, MPH, DPH '91, who was the volunteer chair of alumni giving for HSPH from 2004 to 2007 and a charter member of the School's Leadership Council, gave the Dr. Robert Norton Ganz Memorial Lecture in Pediatrics at Massachusetts General Hospital (Harvard Medical School) in June. His topic was "The pediatric neuropathology associated with high dose exposures to tocolytic magnesium sulfate: An important contributor to infant mortality in

the United States?" Mittendorf, a tenured professor of obstetrics and pediatrics at Loyola University Chicago, is an HSPH-trained epidemiologist whose research explores the etiology of cerebral palsy.

1988

Barbara Gandek, SM, became senior scientist and director of international research and development at QualityMetric. The company works with health care and life sciences companies to measure health outcomes. Gandek has authored or co-authored more than 40 peer-reviewed articles, many of which fostered the development of health outcomes measurement around the world. She co-edited a special issue of the *Journal of Clinical Epidemiology* that summarized the work of the International Quality of Life Assessment Project, which took place in the 1990s.

Dr. Joel S. Lippman, MPH, was appointed vice president of clinical development and chief medical officer at Noven Pharmaceuticals in July. Lippman will lead all aspects of the clinical, regulatory, and medical affairs functions at Noven. Lippman is an obstetrician-gynecologist with nearly 20 years of clinical development and medical affairs experience in the pharmaceutical and medical device industries. A fellow of the American College of Obstetricians and Gynecologists, he has published widely in areas within women's health, including menopausal hormone therapy and hormonal contraceptives.

1990

Denise Pedulla, MPH, was appointed senior vice president and chief compliance officer of Orthofix International NV, in June. She is responsible for managing the orthopedic products company's domestic and international corporate compliance and government affairs programs. Pedulla previously was vice president, compliance, regulatory, and government affairs; and associate general counsel for Fresenius Medical Care North America.

1992

Dr. N. Anthony Coles, MPH, was appointed president, chief executive officer, and a member of the board of directors at Onyx Pharmaceuticals, Inc., in March. Coles previously held senior executive positions at several pharmaceutical and biotechnology companies, including NPS Pharmaceuticals, Inc., Bristol-Myers Squibb Company, and Merck & Co., Inc.

1994

Dr. Diana Rodriguez, MPH, joined the medical staff of Caritas St. Elizabeth's Medical Center, in Boston, in February. Rodriguez, who is board certified in both obstetrics and gynecology and maternal-fetal medicine, is interested in critical care obstetrics, prenatal diagnosis, HIV in pregnancy, and chronic hypertension

in women. She previously was on the maternal-fetal medicine staff at Boston Medical Center and is a fellow of the American College of Obstetrics and Gynecology.

1995

Dr. Bart Harmon, MPH, chief medical officer of Healthcare Solutions for Harris Corporation, has been named to the American Health Information Community (AHIC) Successor Transition Planning Group. Harmon is one of 16 distinguished public-private sector health care industry leaders in the United States to be named to the group. AHIC is a federal advisory board established in 2005 to make recommendations about how to accelerate the nationwide adoption of interoperable health care information technology.

1996

Dr. Flemming Ornskov, MPH, became corporate vice president and global president, pharmaceuticals, at Bausch & Lomb in June. Ornskov specializes in ophthalmic pharmaceuticals and has held senior leadership positions at companies including LifeCycle Pharma, Novartis, and Merck & Co., Inc.

1999

John Paul SanGiovanni, MD, works as a staff scientist in the Clinical Trials Branch of National Eye Institute of the National Institutes of Health. He also serves as project officer for two 4,000-person clinical trials that are examining

the relationship of nutrients to age-related macular degeneration (AMD). In this capacity, he has planned and now serves as co-principal investigator for a number of projects that have shed light on possible preventive interventions and treatments for blinding retinal diseases, published in *Nature Medicine*, July 7, 2007. He was on one of the first teams to use microarray technology to identify susceptibility loci in a common complex disease, as described in *Science* in 2005. He is currently directing projects at NIH examining the molecular genetics of AMD; and the measurement properties of a noninvasive in vivo imaging system designed to measure retinal metabolism in humans.

2000

Dr. Mutsuhiro Nakao, MPH, is a professor in the Department of Hygiene and Public Health at the Teikyo University School of Medicine, in Tokyo. He also is doing clinical work as director of the Division of Psychosomatic Medicine at Teikyo University Hospital. After earning his MPH, Nakao was appointed an instructor in Medicine at Harvard Medical School, and published several articles on stress management. Nakao earned the Teikyo-Harvard Prize from the Harvard School of Public Health in 2006.

2007

Dr. Sarah Cutrona, MPH, a physician at Cambridge Health Alliance and an instructor of medicine at Harvard Medical School, was first author on a recent article about inequities in the distribution of free prescription drug samples. Her findings, published in the February 2008 issue of the *American Journal of Public Health*, showed that few samples make their way to poor and uninsured patients. Their receipt was consistently highest among non-Hispanics, English-speakers, whites, and those with better access to medical care, the study found.

The Harvard Public Health Review is interested in hearing from you.

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Congratulations to the HSPH Class of 2008

On June 5, HSPH awarded degrees to 485 students in the School's 85th graduating class: 261 master of public health degrees, 144 master of science degrees, three doctor of public health degrees, 46 doctor of science degrees, 26 PhDs, and 5 master of arts in biostatistics. More than half of the graduates were women. The graduates came from 69 countries and 34 U.S. states.

Harvey Fineberg, a former HSPH dean who is currently president of the Institute of Medicine, gave the commencement address. He spoke on the theme of public health as a vehicle for changing the world. "Public health means changing more than yourself, it means using yourself as the vehicle to effect change around you, to effect change through discovery," he said.

Dean Barry R. Bloom, who will step down as head of the School this year after a decade-long tenure, reflected on the School's many accomplishments. Looking ahead, he cited as public health's greatest challenge "the disparities in health that exist within this rich country and between most countries of the world." Bloom will become a Harvard University

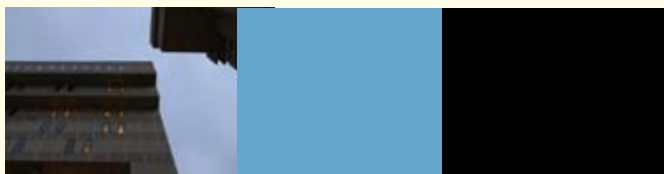
Distinguished Service Professor and continue his research and other activities related to global health as a member of the HSPH faculty.

Student speaker Phillip Blanc, an MPH graduate in Family and Community Health, urged his classmates to give voice to the voiceless. "As students of public health, we are driven to unearth answers in places where others have already stopped looking," he said.

To view photos and videos of the day's ceremonies and celebrations, visit www.hsph.harvard.edu/news/commencement-2008.



COMMENCEMENT 2008
Clockwise from top: student speaker Phillip Blanc, Dean Barry R. Bloom, commencement speaker and Dean *Emeritus* Harvey Fineberg, and HSPH faculty members



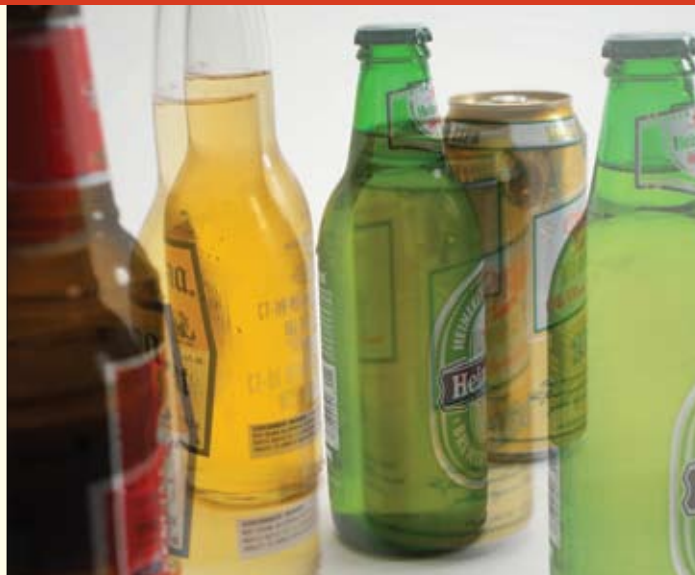
HSPH In Brief

For more information about these topics and other breaking news, visit the HSPH website at <http://www.hsph.harvard.edu/news>. Use the search function to locate detailed press releases and articles.

[Research]

COLLEGE ENVIRONMENTS MAY BOLSTER BINGE DRINKING

Binge drinking among U.S. college students is most prevalent at colleges where there are few alcohol control policies, weak policy enforcement, many alcohol outlets, heavy marketing, and low prices. So concludes a review of findings from the HSPH College Alcohol Study (CAS), published in July in the *Journal of Studies on Alcohol and Drugs*. The landmark CAS surveyed more than 50,000 students at 120 colleges from 1993 to 2001. According to the review's authors (who also led the CAS), HSPH Lecturer Henry Wechsler, and Toben Nelson of the University of Minnesota, students who binge drink—five or more drinks in a row for men, four or more for women—are more likely to have academic and social problems and engage in other risky behaviors. (See www.hsph.harvard.edu/news/press-releases/2008-releases/binge-drinking-tied-to-conditions-in-the-college-environment.html)



TOBACCO BATTLE IS FAR FROM OVER

Cigarettes exchanged for chew and snuff. Higher prices helped curb sales of cigarettes by 3.7 billion packs between 2000 and 2007, HSPH researchers say. However, rising sales of cigars, snuff, and other lower-priced tobacco products offset that public health gain by nearly one-third (the equivalent of 1.1 billion cigarette packs). Professor Gregory Connolly and Research Associate Hillel Alpert reported this trend in the June 11 issue of the *Journal of the American Medical Association* (www.hsph.harvard.edu/news/press-releases/2008-releases/decline-in-cigarette-smoking-in-offset-by-use-of-other-tobacco-products.html).

Menthol additives seduce smokers. Cigarette makers increase menthol in some cigarette brands to retain older smokers while lowering menthol in other cigarettes to make young people's initial smoking experiences less harsh. So concludes a study, published online July 16 in the *American Journal of Public Health* and led by Professor Gregory Connolly and Associate Dean Howard Koh. The researchers, including first author and HSPH Research Analyst Jennifer Kreslake, used the industry's own documents—combined with laboratory tests and survey data—to reach their conclusions. The findings could influence debate in the U.S. Congress on pending legislation that would give the Food and Drug Administration authority to regulate tobacco.



SOCIAL NETWORKS HELP PRESERVE MEMORY

A study of more than 16,000 people born before 1948 shows that, for older men and women who remain active in social networks, memory declines

more slowly than for those who are more socially isolated. Researchers in HSPH's Department of Society, Human Development, and Health—postdoctoral fellow Karen Ertel, Assistant Professor Maria Glymour, and former department chair Lisa Berkman—used data gathered in the Health and Retirement Study (HRS), a biennial survey led by the University of Michigan. The researchers examined HRS data gathered four times between 1998 and 2004 on participants' recall of a 10-word list. They also analyzed social integration, as indicated by marital status, volunteer activity, and frequency of contact with family members and neighbors. In the most isolated subjects, memory declined at twice the rate of those who were most socially active. (www.hsph.harvard.edu/news/press-releases/2008-releases/active-social-life-delay-memory-loss-us-elderly.html).

[New Initiatives]

GENI: OUT OF THE BOTTLE, GENE-ENVIRONMENT STUDIES FLOURISH

In June, three highly interdisciplinary pilot research projects won funding through the School's new Genes & Environment Initiative (GENI), which defines the human "environment" broadly to include nutrition, pharmacology, social and behavioral factors, and toxic substances. The pilot projects are:

Gene-environment interactions relating to arsenic: David Christiani, professor of occupational medicine and epidemiology, Quan Lu, assistant professor of lung biology, and Xihong Lin, professor of biostatistics, will examine the biological results of arsenic exposure within cells, map the mechanisms that

determine cellular responses, and try to deduce how arsenic exposure might lead to diabetes and cancer;

Mercury, selenium, and genes: Dariush Mozaffarian, assistant professor of epidemiology, Gökhan Hotamisligil, chair of the Department of Genetics and Complex Diseases, David Hunter, Vincent L. Gregory Professor of Cancer Prevention, Eric Rimm, associate professor of epidemiology and nutrition, and Christiani and Lin will use genome-wide association studies to examine how genes play a role in an individual's response to mercury and selenium consumed from fish and other foods;

Mitochondria and chronic disease risk: Rimm, David Cox, epidemiology instructor, Ken Mukamal, assistant professor of medicine at Harvard Medical School, Joel Schwartz, professor of environmental epidemiology, and Lin will examine mitochondrial DNA for variants associated with colon cancer, heart disease, breast cancer, or other chronic diseases. The researchers will also look into how risks might be modified by environmental factors such as alcohol, dietary antioxidants, and air pollution.

All three projects will take advantage of data and resources already provided by the Nurses' Health Study

and Health Professionals Follow-up study. For instance, preliminary work using NHS data suggests that an increase in breast cancer risk associated with alcohol consumption is limited to women who carry a specific genetic variant in their mitochondrial genomes.

An interdepartmental committee led by HSPH Dean Barry R. Bloom and Dean for Academic Affairs James Ware spent the past year defining GENI's scope and direction. HSPH researchers will convene for a mini-symposium and poster session on October 3. (see www.hsph.harvard.edu/research/geni).

[Research] *continued*

Much of HSPH's research on lifestyle, diet, and disease risk comes from the all-female Nurses' Health Study (NHS) and the all-male Health Professionals Follow-up Study (HPFS). These ongoing studies gather DNA samples and self-reported data from tens of thousands of subjects.



HAVE ANOTHER MUG O' JOE

Multiple cups of coffee a day do not increase the risk of premature death for men, and for women, just two to three cups daily go hand

in hand with a 25 percent lower risk of death from cardiovascular disease, according to a study published in the June 17 issue of *Annals of Internal Medicine*. HSPH Professor of Nutrition and Epidemiology Frank Hu and collaborators analyzed records for almost 130,000 healthy subjects from the NHS and HPFS. The effects of coffee on inflammation inside blood vessel walls might help explain these reduced heart risks, the researchers say. The study makes no connection between coffee drinking and longevity.

VITAMIN D DEFICIENCY LINKED TO MAJOR DISEASES

Low vitamin D levels might raise the risk of two major but preventable diseases, according to studies published in June by researchers who include HSPH Professor of Nutrition and Epidemiology Edward Giovannucci.



A study in *Archives of Internal Medicine* involving more than 18,000 men from the HPFS links Vitamin D deficiency and heart-attack risk. According to Giovannucci, this association could perhaps be due to vitamin D's power to lower blood pressure, regulate inflammation, and reduce calcification of the arteries. A second study, in the June 20 issue of the *Journal of Clinical Oncology*, associates higher-than-average levels of vitamin D with improved colorectal cancer survival rates.

'PRUDENT' DIET CUTS PREMATURE DEATH RISKS



A diet rich in vegetables, fruit, nuts, fish, poultry, and whole grains can decrease the risk of dying from cardiovascular disease (CVD), cancer, and other

causes, according to a July 15 *Circulation* report by HSPH Professor Frank Hu and others. Such a diet, termed "prudent," was compared to a Western diet featuring red and processed meats and refined grains (e.g., french fries, baked desserts). Judging from records for 72,000 women from the NHS, prudent eaters fared best: They had a 28 percent lower risk of CVD death and a 17 percent lower risk of death from all causes. Western diet fans had a higher risk of death from all causes.

[Supporting the School]

MCGOLDRICK FELLOWSHIPS WILL TRAIN AFRICAN RESEARCHERS

Thanks to generous support from John L. McGoldrick, an alumnus of Harvard's college and law schools, researchers from sub-Saharan Africa will receive intensive training in quantitative methods used to design and analyze studies of people with HIV/AIDS and its complications. In January 2009, the first McGoldrick Fellows in Biostatistics in AIDS Research will come to the United States for non-degree work at HSPH's Center for Biostatistics in AIDS Research (CBAR), part of the School's Department of Biostatistics.

According to CBAR's director, Professor of Biostatistics Stephen Lagakos, McGoldrick Fellows will receive training tailored to their needs. For four to six months, the fellows will complete coursework at HSPH and take part in a recently completed, ongoing, or planned HIV/AIDS prevention or treatment study involving investigators at HSPH or their home university or research institution.

"I hope this will jump-start a sustained program providing world-class biostatistical training to developing world scientists," says McGoldrick (AB '63, LLB '66), a member of the HSPH Visiting Committee who made his gift to HSPH as part of his 45th class reunion. "Anyone who has seen this historic pandemic up close is gripped by it. It rages on—7,000 new infections a day—and all who can must do what they can to end it. Building human scientific capital at a place like HSPH is one important way."

The end goal, McGoldrick and Lagakos say, is to equip promising African scientists with the latest tools for battling the HIV/AIDS pandemic on their home turf, where such tools and expertise are badly needed.



SETTING THE MCGOLDRICK STANDARD Harvard College and Law School alumnus John L. McGoldrick (left) with Director of the Center for Biostatistics in AIDS Research, Professor of Biostatistics Stephen Lagakos

IN MEMORIAM: JOHN TAPLIN, LONGTIME HSPH BENEFACTOR

The Harvard School of Public Health recently lost a good friend and dedicated supporter. John Taplin—who held more than 65 patents, including those for bar code readers and a plastic blood bag that is now used worldwide to handle blood—died April 11 at the age of 94.

Taplin and his wife, Virginia (Ginny), of West Newton, Massachusetts, have made generous donations to HSPH since 1995, when they established the John F. and Virginia B. Taplin Fellowship Fund for exceptional doctoral students. Each year, members of the Taplin family gathered to meet the students, and John Taplin showed tremendous enthusiasm and curiosity for each student's work.

"John and Ginny's commitment to our School has been quite exceptional," says James Ware, Dean for Academic Affairs and Frederick Mosteller Professor of Biostatistics. "Over the years, I have found them to be wonderfully unassuming and authentic people who were passionate about our students, especially those involved in international work."

As an accomplished inventor, John Taplin, who built and sold five companies in his career, saw great potential in new ideas and embryonic concepts. In a similar way, he envisioned the promise of great things to come in each of the Taplin Fellows.

Other HSPH support from the Taplins has come in the form of an equipment fund that enables researchers to obtain the tools needed to analyze massive data sets involved in fields such as genomics. "John was an ardent believer in the power of technology," says Ware. "Taplin grants made possible the purchase of computer and other equipment that has helped to move the School's research agenda to a new level."

In 2003, the Taplins established two charitable gift annuities, one annuity in each of their names, and dedicated them to the benefit of the



HSPH Dean Barry R. Bloom with John and Virginia Taplin

HSPH Department of Biostatistics. A charitable gift annuity to Harvard is a simple arrangement under which Harvard guarantees income to donors. Upon the donor's death, the funds are either spent down for the originally intended purpose or used to create a permanent endowment that generates interest for that purpose in perpetuity. John Taplin's annuity now becomes a permanent endowment for biostatistics.

Faculty Awards, Appointments, and Promotions



Alberto Ascherio was promoted to professor of epidemiology and nutrition in May. His research group investigates risk factors, and early diagnosis of neurological diseases, including Parkinson's disease, multiple sclerosis, and amyotrophic lateral sclerosis, or ALS.

Bruce Auerbach, instructor in the Division of Public Health Practice, was elected president of the Massachusetts Medical Society at the organization's annual meeting on May 9. Auerbach will serve a one-year term as the top officer of the society, a professional association representing more than 20,000 physicians, residents, and medical students in Massachusetts.

Steven Gortmaker, professor of the practice of health sociology, and **S. Bryn Austin**, assistant professor, both of the Department of Society, Human Development, and Health, accepted awards in April from the national Association for Anorexia Nervosa and Associated Disorders. Gortmaker was recognized for the

Planet Health and Eat Well and Keep Moving curricula, which promote healthy eating and exercise habits among school children. Austin received the Healthy Living Award for research demonstrating the protective effect that Planet Health can have in preventing eating disorders in early-adolescent girls.



Christoph Lange was promoted to associate professor of biostatistics in March. His research interests include statistical genetics and generalized linear models. His paper in the *American Journal of Human Genetics* identifies a possible reason why some studies have been unable to replicate associations between genes and traits—namely that the strength of a gene/trait association might vary with age and that current study designs typically fail to take that into account.

Xihong Lin, professor of biostatistics, is the senior author of a paper that has been selected as the best published in the journal *Biometrics* for 2007. The paper, "Semiparametric regression for multi-dimensional

genomic pathway data: Least square kernel machines and linear mixed models," appeared in the December issue. The work was presented at a session organized by the journal's co-editors at the International Biometric Conference, held in July in Dublin.

Xiaole Liu was promoted to associate professor of biostatistics in January. Liu's research is focused on designing statistical and computational algorithms to model the mechanism of transcription and epigenetic regulation.

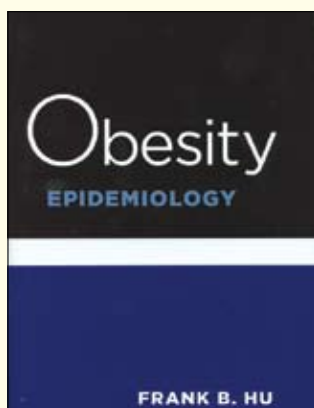
Marie McCormick, Sumner and Esther Feldberg Professor of Maternal and Child Health in the Department of Society, Human Development, and Health, received the 2008 Henry Ingersoll Bowditch Award for Excellence in Public Health at a luncheon at the Seaport Hotel in Boston in May. The award is given by the Massachusetts Medical Society to a physician who demonstrates creativity, commendable citizenship, initiative, innovation, and leadership in public health and advocacy.

Nancy Turnbull, associate dean for educational programs, received the Lemuel Shattuck Award at the Massachusetts Public Health Association's 6th Annual Spring Celebration on May 2. The award recognizes individuals who have championed positive change in

the field of public health and public health practice in the Commonwealth. The Shattuck Award also honors the outstanding achievements of public health educators dedicated to leading and mentoring the next generation of public health leaders.



K. "Vish" Viswanath, associate professor of society, human development, and health, was named chair of the new Board of Scientific Counselors for the U.S. Centers for Disease Control and Prevention's National Center for Health Marketing (NCHM). The board will serve as a professional resource for NCHM, which conducts health marketing and communications research, develops and evaluates strategies for disseminating health information and programs, develops and tests communications messages and programs, and uses multimedia to deliver CDC information and services to the public. Viswanath's research specializes in health communication, especially in documenting its impact on health disparities, and identifying solutions.



Bookshelf

Obesity Epidemiology

Frank Hu

Oxford University Publishing, 2008, 512 pp.

The alarming rise in obesity worldwide has generated a boom in research. While an influx of data has aided understanding of the consequences and causes of obesity, it presents serious methodological challenges; for instance, nutrition and exercise are hard to quantify. Frank Hu, associate professor of nutrition and

epidemiology at HSPH, describes methods of research, measurement, and analysis, considering the strengths and weaknesses of each and their applicability to obesity research. He also reviews evidence gleaned from epidemiologic studies of the consequences and determinants of obesity, presenting a complete picture of the state of obesity research today. In the final section, Hu discusses recent developments and future directions for the field.

In Memoriam

Julius B. Richmond

Former U.S. Surgeon General and Professor of Health Policy, Emeritus

Public health advocates nationwide paused to remember and celebrate the life's work of Julius B. Richmond, former U.S. surgeon general under President Jimmy Carter and Professor of Health Policy *Emeritus* at Harvard University. Dr. Richmond died on July 27 at age 91.

A towering leader who harnessed the power of research findings to transform health policy, Dr. Richmond issued the momentous 1979 report *Smoking and Health* and set measurable targets for the health of the American public with the Healthy People report that same year. He was also the first national director of the Head Start preschool program, which since 1965 has enriched the health, well-being, and future prospects of an estimated 22 million low-income children.



Julius B. Richmond

Bloom. “Whether I was seeking his advice on issues of children’s health or tobacco control, honoring him at the annual Julius B. Richmond Award event, or running into him in the HSPH cafeteria, he was always fully engaged in pursuing his many passionate interests in health with

“Julie Richmond was an intellectual giant and a social activist with a gentle spirit. Through public example and personal relationships, he inspired thousands of leaders who have made the world a better place for millions of children.”

—Jack Shonkoff, director of Harvard’s Center on the Developing Child and the Julius B. Richmond FAMRI Professor of Child Health and Development

At Harvard, Dr. Richmond held positions at the Harvard School of Public Health, Harvard Medical School, and the Harvard Kennedy School. HSPH’s highest honor is the Julius B. Richmond Award, which recognizes individuals who, like Dr. Richmond, have promoted and achieved high public health standards for society’s most vulnerable populations. The award was presented for the first time in 1997 to Donna Shalala, the former U.S. secretary of Health and Human Services. Last fall, the honor went to Michael R. Bloomberg, mayor of New York.

“It was an enormous privilege for me to work with Julie during my deanship,” says HSPH Dean Barry R.

incredible energy. His presence will be sorely missed, but he will continue to inspire us.”

‘MORAL COMPASS’

In 2006, on Dr. Richmond’s 90th birthday, a celebratory symposium honored his life and work while also marking the launch of Harvard’s University-wide Center on the Developing Child, led by director Jack Shonkoff, the Julius B. Richmond FAMRI Professor of Child Health and Development. The event’s co-sponsors included the new Center; HSPH’s Office of the Dean; the François-Xavier Bagnoud (FXB) Center for Health and Human Rights;

continued

Children's Hospital, Boston; Harvard's Graduate School of Education; Harvard Dental School; and the Department of Social Medicine (now Global Health and Social Medicine) at Harvard Medical School.

"Julie Richmond was an intellectual giant and a social activist with a gentle spirit," Shonkoff said. "Through public example and personal relationships, he inspired thousands of leaders who have made the world a better place for millions of children."

"Julius Richmond did as much to improve the health of American citizens as anyone in the last century," noted HSPH's Jim Yong Kim, the FXB Center's director. "His commitment to social justice was a moral compass for us all."



THE NAMESAKE In 2007, the late Julius B. Richmond (third from right) was in Boston to pay tribute to New York City Mayor Michael Bloomberg (far left), that year's recipient of HSPH's Julius B. Richmond Award, established in Richmond's honor in 1997. With them are (from left) Harvard University President Drew Faust; Howard Koh, HPSH's Harvey V. Fineberg Professor of Public Health Practice and Associate Dean and director of the Division of Public Health Practice, which sponsors the Richmond Award; and HSPH Dean Barry R. Bloom.

Trained in pediatrics and child development, Dr. Richmond worked to introduce psychosocial development into pediatric education, research, and services. After graduating from the University of Illinois in 1937, he earned an MD from the University of Illinois School of Medicine in 1939. Richmond served the U.S. Army Air Force as a flight surgeon from 1942 to 1946. He returned to the Department of Pediatrics at the University of Illinois, and served as director of the Institute of Juvenile Research in Chicago.

In 1953, Dr. Richmond became chairman of the Department of Pediatrics at SUNY Upstate Medical Center in

Syracuse, New York, and rose to the position of dean. During his tenure, he completed collaborative work with Bettye Caldwell on the development of young children growing up in poverty, which led to his appointment in 1965 as Head Start's first director. He also served as assistant director for health affairs in the Office of Economic Opportunity.

USING SCIENCE TO CHANGE POLICY

From 1977 to 1981, Dr. Richmond served as both U.S. surgeon general and assistant secretary of the Department of Health and Human Services. As surgeon general, he re-invigorated tobacco-control efforts through the release, in 1979, of *Smoking and Health*, which summarized a bounty of scientific evidence on the dangers of smoking. That same year, Richmond issued the landmark report *Healthy People: The Surgeon-General's Report on Health Promotion and Disease Prevention*. This report for the first time established clear, measurable health goals, setting benchmarks for the nation for the next decade. From 1987 to 1993, Dr. Richmond also chaired the steering committee of the Forum on the Future of Families and Children of the National Academy of Sciences.

Attesting to Dr. Richmond's leadership are his many honors and awards. Among these are the C. Anderson Aldrich Award of the American Academy of Pediatrics; the Gustav O. Lienhard Award and the Walsh McDermott Medal of the Institute of Medicine of the National Academy of Sciences; the John Howland Award of the American Pediatric Society; the Sedgwick Medal from the American Public Health Association; and the Heinz Award for Public Policy.

See the Richmond Symposium proceedings and watch a 2007 interview with Dr. Richmond at www.hsph.harvard.edu/richmond/index.html.

DR. RICHMOND, CITIZEN HARVARD

Professor of Health Policy and Professor of Preventive and Social Medicine, HSPH

Director, University-wide Division of Health Policy Research and Education

Professor of Child Psychiatry and Human Development, Harvard Medical School (HMS)

Director, Judge Baker Children's Center, HMS affiliate

Chairman of Psychiatry, Children's Hospital, Boston (HMS affiliate)

March of the TB Superstrains *continued from page 19*

But in 2004, Murray and Ted Cohen, an HSPH alumnus and then postdoctoral fellow who is now an assistant professor at Harvard Medical School, published evidence to the contrary. By analyzing published TB case data, they concluded that at least some drug-resistant varieties were indeed transmissible. In a paper for *Nature Medicine*, they used a mathematical model to show that if even small numbers of MDR-TB strains weren't appropriately detected and treated, they could eventually overwhelm drug-sensitive TB, creating an even bigger threat.

Today, Murray and colleagues want to find out just how transmissible MDR and XDR-TB really are. With the Broad Institute, they are sequencing strains from around the world in a bid to catalogue as many resistance mutations as possible. They want to learn which mutations impose fitness costs that weaken a bacteria's transmissibility. Conversely, they hope to learn how bacteria compensate for their genetic shortcomings to gain vigor.

MDR and XDR-TB can vary by just a few dozen points of difference within the microbes' 4-million-letter DNA code. Murray and collaborators in South Africa made this discovery in 2007 after sequencing XDR-TB for the first time, specifically the strain that caused KwaZulu-Natal's deadly outbreak.

'SPOOKY' MUTATIONS

James Galagan, the associate director of the Broad's microbial sequencing center, calls a few of these mutations "spooky." For example, one simple DNA spelling error ("single nucleotide polymorphism") called *gidB* confers resistance to streptomycin, which in 1946 became the first TB cure.

"What's kind of scary is that *gidB* disposes bacteria toward sudden leaps from low to high levels of resistance," Galagan says. "That means we have to

be careful how we treat these organisms. They seem to be poised for resistance at the slightest challenge."

Documenting movements of strains with the *gidB* variant—or any TB strain, for that matter—has proved devilishly hard. That's in part because people can remain symptom-free for decades. Scientists tracking TB's travels at the genetic level must wait for new cases to be diagnosed. Among large numbers of HIV-positive people whose immune systems are in tatters, this can happen swiftly, as it did in Tugela Ferry and, since, much of Africa.

But in healthy populations, disease tracking takes time. That's a challenge HSPH alumna Mercedes Becerra, an assistant professor of social medicine at Harvard Medical School, is undertaking now in Lima, Peru, where TB prevalence remains high. With funding from Murray's NIH grant—and working with *Socios En Salud*, the Peruvian affiliate of Partners In Health—Becerra heads the most comprehensive effort yet to follow new drug-resistant cases in households where a family member is already infected.

"We're looking at 7,200 households. We'll capture as many cases as we can and follow their family members over time to see if any get sick," Becerra says. "We'll also be looking at various factors that affect people's susceptibility, such as nutritional status."

In a closely watched display of molecular epidemiology in action, individual TB strains will be genetically analyzed and archived. Ultimately, the project should discover which drug-resistant strains become contagious, and why.

'HYPERMUTABLE' BACTERIA?

Meanwhile, HSPH's Sarah Fortune, an assistant professor of immunology and infectious disease and a collaborator with

Murray's research team, is asking another, related question: Why are some TB strains able to develop so many drug-resistance mutations when doing so requires mutation of the DNA, which is normally deleterious to the organism? One theory, Fortune says, is that highly drug-resistant strains are "hypermutable"—that is, they have acquired the ability to turn off pathways that normally make DNA replication so accurate. This may be a successful survival strategy in clinical cases, where the bacterium must withstand an onslaught of multiple antibiotics.

Ultimately, some of the biggest questions about XDR-TB come down to virulence, the speed with which it kills. One look at the Tugela Ferry experience reveals how quickly patients die in the presence of HIV; nearly all patients in the initial outbreak perished within a few weeks. But whether the disease will behave similarly in people with intact immune systems isn't known.

"As far as we know, based on TB biology, XDR-TB won't spread from human to human any faster than other forms do. It will just be more difficult to treat," observes Murray. In other words, it may kill your friend or neighbor or countryman, but it won't necessarily affect you. Of course, there is as yet no way to know for sure, Murray concedes. "There may be things about XDR that we just don't know yet."

A new study of HIV-negative drug-resistant TB patients in Lima, published in the *New England Journal of Medicine* in August of 2008, raises both hope and concern. On one hand, the study, led by an HSPH alumna turned Harvard Medical School instructor and Partners In Health research associate, Carole Mitnick, showed that with proper drugs, care, and psychosocial support, about 60 percent of XDR-TB patients could be cured—despite having undergone several

March of the TB Superstrains

continued from previous page

failed drug regimens. Moreover, patients recovered at home, outside the confining walls of a hospital, using a model of care suitable for low-income countries.

On the other hand, “Only 60 percent can be cured when they’ve already been subjected to multiple inappropriate drug regimens,” says Mitnick, who calls Murray a mentor and whose research team included Becerra and six other HSPH alumni. She adds, “Changing global policy to permit early screening for, and proper treatment of, drug-resistant TB would lead to more promising prognoses.”

Overcoming hurdles to diagnosing multi-drug-resistance faster is a top priority. So says Christine Sizemore, the microbiologist who heads the TB, Leprosy, and Other Microbial Diseases Section at the National Institute of Allergy and Infectious Diseases, which funds Murray’s project team.

Time won’t wait. The longer patients get no drugs, or drugs that don’t work, Sizemore warns, the harder MDR and XDR-TB will be to contain.

Charlie Schmidt has written for Discover magazine, the Washington Post, Environmental Health Perspectives, Science, and Nature Medicine. Karin Kiewra is editor of the Review.

Health Insurance and Uncle Sam

continued from page 31

populations to fend for themselves in the dysfunctional individual market. Baicker counters that we are already shifting away from employer-based insurance, and that reforming the tax code would give those entering the individual market more resources. She agrees that reform of the individual market should go hand-in-hand with tax-code reform.

NO EASY WAY OUT

Baicker reminds us that “there is no free health care, just as there is no free lunch.” Health care will never come cheap, she stresses. “Given that there is a virtually infinite amount of health care that can be delivered, we face tough decisions about how we’ll allocate our finite resources.” Aspire to high-value care regardless of cost, she repeats.

Given our culture and our partisan political climate, “Reform won’t be easy,” she says, but “doing nothing is no longer an option.” Too many people are uninsured at the same time that “our vast and growing health care expenditures aren’t going where they will do the most good.”

“There’s a fear that changing the current system will force Americans to pay more for their health care,” Baicker says. “But they’re paying for it already—in ways that could be dramatically improved upon.”

Karin Kiewra is editor of the Review and the associate director of development communications in the Office for Resource Development.

MORE TO EXPLORE

For more information, see a paper by Baicker published in the July 2007 issue of *Business Economics* and an “Ask the Experts” panel discussion of tax subsidies and health insurance with Baicker that aired on March 20, 2008, at www.kaisernetwork.org.

For other views on the presidential candidates’ health reform proposals by Harvard faculty, see an analysis by HSPH health economist Katherine Swartz of Republican nominee John McCain’s plan in the September 16 issue of *Health Affairs* (which also ran a critique of Democratic nominee Barack Obama’s plan at www.healthaffairs.org). On September 12, HSPH and the *New England Journal of Medicine* co-sponsored a debate on the nominees’ plans between Harvard’s David Cutler, senior health care advisor to Obama, and his counterpart on McCain’s team, Gail Wilensky. To watch it, go to <http://www.nejm.org/>.

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85	9.0	85, 85	7.5



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