NBER NATIONAL BUREAU OF ECONOMIC RESEARCH
BULLETIN ON AGING AND HEALTH

Organizational Innovation to Improve the Efficiency of Health Care Markets

The high and rapidly rising cost of health care in the U.S. remains a critical issue. High costs burden the federal budget due to the government's large role in providing health care through the Medicare and Medicaid programs, which jointly make up 40 percent of the total U.S. health care market. High costs also make it difficult for individuals to afford health insurance.

High costs are less of a cause of concern if health care is provided efficiently and generates benefits that exceed its costs. Unfortunately, numerous studies suggest that one-third or more of medical resources is not buying improved health. This translates into over $700 Billion of excess spending in the U.S. each year.

In "**Where are the Health Care Entrepreneurs? The Failure of Organizational Innovation in Health Care**" (NBER Working Paper No. 16030), researcher **David Cutler** explores the causes of this inefficiency and the reasons why it has not been eliminated by market forces.

Cutler begins by noting that productivity growth has been much slower in health care than in most other sectors of the economy. In other industries, productivity growth has been driven primarily not by the development of new goods but by new ways of organizing production, distribution, and sales, changes that jointly have resulted in more output per dollar of inputs. In health care, by contrast, there has been very little organizational innovation. This contrast shows up in sources of wealth creation.

Many members of the Forbes 400 richest Americans earned their fortunes by re-organizing the way that consumers buy goods and services, but that is not true of medicine. Success in medicine has almost always been associated with more intensive care or interventions to treat more severe patients.

He details three dimensions of the inefficiency of medical care production. The first is "flat of the curve medicine," a term that refers to the provision of additional medical care that results in little to no health benefit. A key example here is the treatment of prostate cancer, where the majority of patients receive intensive treatments such as a radical prostatectomy or radiation therapy even though there is no evidence that these treatments lead to better outcomes. Another example comes from the treatment of heart attacks, where patients in the U.S. are ten times more likely to receive coronary bypass surgery or balloon angioplasty than patients in Canada, but have no better short-term survival rates.

A second source of inefficiency is poor coordination of care. Many medical conditions require patients to see generalist and specialist physicians, get regular lab tests, take medications, and modify their behaviors, a complex regimen that is almost always left to the patient to plan and coordinate. Diabetes is a natural example. There are consensus guidelines for how frequently diabetics should check in with their doctors, have lab work done, and take medications. Yet fewer than half of diabetics receive the recommended therapy. This failure results in expensive complications as well as premature mortality.

The third aspect of low productivity is the excessive cost of providing services. Numerous studies have documented the substantial cost savings that could result from changes in how health care is provided. These changes include greater use of technology (for example, computerized ordering systems that eliminate adverse drug interactions) or other changes in procedures (for example, the use of surgical checklists or dedicated surgical suites for particular operations).

Cutler estimates that reducing flat of the curve medicine by half could result in savings of $350 Billion per year, while similar reductions in excessive costs could save $100 Billion per year. The savings from poor coordination of care are harder to gauge.

The obvious question is why the

health care market has not evolved to become more efficient. To answer this, Cutler explores the incentives for providers to make investments that will improve quality. He notes that providers cannot charge a higher price for providing higher quality care because prices are typically fixed (for example, by Medicare). Providing higher quality care might result in a greater volume of patients if consumers had ready access to information on quality, but generally this information is not available. In fact, providing higher quality care may lead to lower patient volumes and revenues, since higher quality care may mean patients need fewer services and providers are often reimbursed a fixed amount for each service.

Cutler also examines why insurers and other payers do not impose changes that would improve productivity, such as requiring providers to use electronic medical records. One issue is that any individual payer has both limited ability to change provider behavior on its own and limited incentive to do so because it will not reap the full benefits. A lack of public information on insurer quality (which greatly reduces the insurer's ability to benefit from quality improvements) and turnover in a plan's patient base may also create weak incentives for insurers to improve quality.

In short, "lack of information and poor incentives are the key barriers to new organizational models." However, recent legislation has made changes in both of these areas. The American Recovery and Reinvestment Act of 2009 committed $30 Billion to fund the creation of a national system of electronic medical records over the next five years. Similarly, the Patient Protection and Affordable Care Act of 2010 will make Medicare data available to insurers, employers, and others for the purposes of forming quality measures. This legislation also introduced alternative payment systems designed to stress value more than volume, systems that have met with some success in small-scale experiments. Cutler concludes "whether the legislation addresses these problems sufficiently is something that only time will tell."

Is Obesity Rational?

The rise of obesity in the U.S. is a major public health concern. Nearly one in three adults were obese in the early 2000s, up from one in seven a quarter-century earlier. If current trends continue, the obesity rate will rise to over 40 percent by 2020. Obesity is linked to diseases such as diabetes, hypertension, and asthma and to premature mortality — if left unchecked, the rise in obesity threatens to reverse historical gains in life expectancy. The rise in obesity is also an important contributor to the growth of health care costs in the U.S.

To understand the rise in obesity, it is important to understand how individuals make decisions about eating and other behaviors that affect body weight. In "**Understanding Overeating and Obesity**" (**NBER Working Paper 16149**), researcher **Christopher Ruhm** lays out two models of eating and weight regulation and examines empirical evidence to test which model is more consistent with people's behavior.

Ruhm begins with the rational economic model. In this model, individuals trade off the utility (or happiness) from eating food today against the expense and disutility of future weight gain. Individuals make the best decisions they can given the information they have and the constraints on their income and time. Under specified conditions, decisions are optimal (utility-maximizing) at the time they are made, even if the arrival of new information makes the decision look like a mistake in retrospect. In this economic model, factors such as falling food prices are the most likely explanation for the rise in obesity.

Of course, eating decisions may reflect biology as well as economics. Humans have been genetically programmed over millions of years to eat, with the primary goal being to obtain enough calories for survival. In an environment where food is cheap and readily available, biological programming may lead to overeating.

Ruhm formalizes this intuition in a "dual decision" model. The key insight of the model is that eating decisions are influenced by two parts of the brain, the "affective" system and the "deliberative" system. The affective system coordinates sensory inputs to generate emotional states like anger or happiness. This system responds to cues and stimuli — for example, the presence of food may generate endorphin and dopamine responses. The deliberative system incorporates higher cognitive processes, such as abstract thinking and planning, which account for long-term consequences of actions. In the dual decision model, "eating behaviors reflect the combined influence of a utility-maximizing deliberative system and an affective system that responds quickly and impulsively to external stimuli, without accounting for the long-term consequences."

The dual decision model has a number of implications for body weight and eating behavior. First, this model predicts that many people will be heavier than their utility-maximizing weight and will attempt to lose weight. In the rational model, by contrast, weight gain is utility maximizing and will rarely be accompanied by weight loss attempts.

Second, the dual decision model suggests that people with poor self-control or strong affective systems will be particularly susceptible to making eating mistakes. Since these people tend to have high body-mass index (or BMI, a measure of body weight calibrated by height), behaviors such as weight loss attempts will be concentrated among this group. In the rational model, there is no expected correlation with BMI.

Third, in the dual decision model

there is more potential for "food engineering" (the strategic manipulation of food characteristics such as fat, sugar, and salt content to increase food consumption) to affect weight. In the rational model, food engineering can change an individual's optimal weight by affecting the pleasure obtained from eating, but in the dual decision model it can activate the affective system as well. Affective system responses will be stronger among those with high BMI, so overeating and the consumption of engineered foods will increase more over time among this group.

Ruhm uses data from the National Health and Nutrition Examination Surveys and the Behavioral Risk Factor Surveillance System to explore which model better explains trends in body weight, weight loss attempts, overeating, and consumption of engineered foods.

He has several key findings. First, body weight has risen rapidly over time, particularly in the right tail of the distribution — the BMI of men at the 90th and 95th percentile rose by 4.5 and 5.5 points over the past 25 years, versus 2.1 points at the median. Explanations related to the rational model, such as falling food prices, appear insufficient to explain these trends, since food prices fell only during the early part of the period while the rise in BMI continued throughout the period.

Second, the desire to lose weight strengthens with BMI, is pervasive among overweight and obese individuals, and has become more common over time. High-BMI individuals also experience greater fluctuations in their weight, which is consistent with their having periods of heavy eating combined with repeated efforts to lose weight.

Third, obese individuals consume disproportionate amounts of salt and fat, and the relationship between BMI and this consumption of salt and fat has strengthened over time. This is consistent with a greater role for food engineering as a cause of obesity over time.

In summary, the available evidence on body weight, weight loss, and food consumption is consistent with eating "mistakes" related to the dual decision model and is hard to reconcile with the standard utility-maximizing model.

These findings have important implications for policy. If the affective system plays an important role in eating decisions, this will tend to reduce the effectiveness of anti-obesity policies that rely on rational decision-making, such as taxing foods with high fat, sugar, or salt content or providing more information on the content of foods. A strong affective system may also point to the usefulness of policies advocated by behavioral economists, such as altering the location of food in a cafeteria line or reducing portion size in order to manipulate food-related stimuli.

Ruhm concludes "mistakes are a central feature of dual decision-making, implying a wider potential role for policy." However, he cautions "the specific interventions will often be complicated and, if poorly implemented, will reduce rather than increase utility. The general reluctance of economists to engage in policy activism therefore retains merit."

Out-of-Pocket Health Care Expenditures at the End of Life

While virtually all Americans age 65 and above are covered by Medicare, they may nonetheless face significant out-of-pocket health care expenditures. Medicare includes numerous deductibles and copayments, and many people do not have a "medigap" policy to cover these costs. Home health care and nursing home expenditures must be paid for out-of-pocket, unless individuals are poor enough to qualify for Medicaid or have purchased an expensive long-term care insurance policy. Even those with generous insurance coverage may face the costs of specialized food or medical equipment to manage their health conditions.

As health generally declines with age, these out-of-pocket expenditures may be particularly high towards the end of life. High out-of-pocket medical expenditures may strain the finances of older households, for example by draining a couple's assets when one spouse gets sick and leaving little for the other spouse later in life. The risk of high expenditures may also be an important factor in household decisions regarding how much to save and how quickly to spend assets in retirement.

In "**The Risk of Out-of-Pocket Health Care Expenditures at End of Life**" (NBER Working Paper 16170), researchers **Samuel Marshall, Kathleen McGarry,** and **Jonathan Skinner** estimate the magnitude of these expenditures. They focus not only on the average amount but also on the distribution of expenditures, to better understand the risks that older households face.

The authors use the Health and Retirement Study (HRS) for their analysis, a data set which includes detailed information on the health care expenditures of older individuals. Notably, the HRS conducts an "exit interview" after the death of a survey respondent in order to collect data on the period up to the person's death from a surviving spouse or other family member.

Despite the rich data available in the HRS, the authors nonetheless face a number of challenges in estimating these costs. First, individuals may not answer questions about some expenditure categories or may only be able to provide a range rather than an exact amount. Second, as the survey is administered at fixed two-year intervals but respondents may die at any time, information on spending since the last survey will cover different periods of time for different individuals. Third, some respondents report expenditure amounts that appear to be implausibly large. The authors may overstate the risk of medical expenditures if they use this data but may understate the risk

if they do not. Much of their analysis focuses on their strategies for dealing with these challenges.

The authors find that out-of-pocket expenditures toward the end of life are large — the average amount is $11,618 in the last year of life. There is also considerable variation in end-of-life expenditures, with ten percent of respondents spending more than $29,000 per year and the top one percent of respondents spending more than $94,000 per year. These values are large relative to the non-housing wealth of a typical older household, which is about $25,000.

The authors find that the largest single category of spending is nursing home and hospital expenditures, which average $4,731 in the last year of life; roughly two-thirds of that amount is for nursing home care. Here too the distribution is skewed, with the top one

percent spending more than $75,000 per year in this category. Other big expenditure categories include insurance ($1,746 on average), prescription drugs ($1,496), home health care and helpers ($1,966) and spending to make houses accessible ($721).

The authors also explore whether out-of-pocket health care expenditures vary with the respondent's income or wealth. They find that they do, particularly with respect to wealth — the richest 20 percent of households spend an average of $18,232, versus $7,173 for the poorest 20 percent of households. These differences appear to be driven mostly by greater spending for nursing homes, home health care, and items related to making houses accessible. The greater spending by wealthier households in these categories may reflect their ability to "buy" both the ability to stay at home longer and more com-

fortable living arrangements once they move to nursing home care, but could also indicate that low-wealth individuals do not receive needed health care.

In short, the authors find that out-of-pocket health care expenditures "represent a numerically large and potentially important drain on financial resources, particularly for households as time of death nears." They note that their results are "thus consistent with the view that many elderly may continue to hold (or even accumulate) wealth as a hedge against uninsured costs surrounding expensive end of life care-giving for themselves or their spouse."

NBER Profile: *Amitabh Chandra*

Amitabh Chandra is a Research Associate of the NBER's programs in aging, health care, children, education, and labor economics. Chandra is a Professor at the Kennedy School of Government at Harvard University.

Dr. Chandra is a Co-Editor of the *Journal of Human Resources,* and a member of the Editorial Boards of the *American Economic Journal: Applied*, the *Forum in Health Economics* and *Policy and Economic Letters.* He is a Research Fellow of the Institute for the Study of Labor (IZA) in Germany.

Dr. Chandra is the winner of several research awards, including the Arrow Award for the Best Paper in Health Economics and the Garfield Award for Economic Impact on Medical Research, as well as the W.E. Upjohn Institute Dissertation Award. His research has been supported by the National Institute on Aging, the National Institute of Child Health and Human Development, and the Robert Wood Johnson

Foundation. His work has been published in journals including the *American Economic Review,* the *Journal of Political Economy* and the *New England Journal of Medicine*, and has been featured in media outlets including the New York Times, CNN, and National Public Radio.

Professor Chandra holds a Ph.D. and B.A. in Economics from the University of Kentucky. Prior to joining the faculty at Harvard, he taught at Dartmouth College. At the Kennedy School, he teaches courses in health economics and empirical methods.

Professor Chandra's research focuses on productivity and cost growth in health care, and on understanding the sources of racial disparities in health. In some of his recent work, he has examined whether higher patient cost-sharing leads to increased hospitalizations, the role of productivity spillovers in explaining geographic variation in medical care, and using economic insights to evaluate the case for provider prejudice in healthcare.

In his spare time, he enjoys any activity involving German cars and sailing with his coauthors, Jonathan Skinner and Doug Staiger.

Abstracts of Selected Recent NBER Working Papers

15841

Jessica Wolpaw Reyes

The Effect of Malpractice Liability on the Specialty of Obstetrics and Gynecology

Using data from a 2003 survey of 1,476 obstetrician-gynecologists, the effects of malpractice pressure on the specialty are investigated. Physicians report having made substantial changes to their practice in response to the general environment and to liability pressures. Regression analysis finds that liability pressure increases reports of income and practice reductions, but direct effects on actual income and productivity are less clear. Liability pressures may lead to a specialization effect, with some physicians concentrating more in obstetrics and others in gynecological surgery. Overall, the evidence suggests that liability pressure has moderate but significant effects on the specialty.

15858

Richard Frank, Thomas G. McGuire

Mental Health Treatment and Criminal Justice Outcomes

Are many prisoners in jail or prison because of their mental illness? And if so, is mental health treatment a cost-effective way to reduce crime and lower criminal justice costs? This paper reviews and evaluates the evidence assessing the potential of expansion of mental health services for reducing crime. Mental illness and symptoms of mental illness are highly prevalent among adult and child criminal justice populations. The association between serious mental illness and violence and arrest is particularly strong among individuals who are psychotic and do not adhere to medication. Two empirical studies augment the empirical research base relating mental illness to crime. In a recent community sample of adults, we find higher rates of arrest for those with serious mental illness and with substance abuse. Among youth, even with family fixed effects, antisocial personality scores predict future school problems and arrests. A large body of research tracks mental health and criminal justice outcomes associated with treatments and social policies. Reviews of the cost-effectiveness of treatments for children with behavioral problems, mental health courts, and mandatory outpatient treatment are inconclusive.

15969

Dhaval Dave, Henry Saffer

The Impact of Direct-to-Consumer Advertising on Pharmaceutical Prices and Demand

Expenditures on prescription drugs are one of the fastest growing components of national health care spending, rising by almost three-fold between 1995 and 2007. Coinciding with this growth in prescription drug expenditures has been a rapid rise in direct-t o-consumer advertising (DTCA), made feasible by the Food and Drug Administration's (FDA) clarification and relaxation of the rules governing broadcast advertising in 1997 and 1999. This study investigates the separate effects of broadcast and non-broadcast DTCA on price and demand, utilizing an extended time series of monthly records for all advertised and non-advertised drugs in four major therapeutic classes spanning 1994–2005, a period which enveloped the shifts in FDA guidelines and the large expansions in DTCA. Controlling for promotion aimed at physicians, results from fixed effects models suggest that broadcast DTCA positively impacts own-sales and price, with an estimated elasticity of 0.10 and 0.04 respectively. Relative to broadcast DTCA, non-broadcast DTCA has a smaller impact on sales (elasticity of 0.05) and price (elasticity of 0.02). Simulations suggest that the expansion in broadcast DTCA may be responsible for about 19 percent of the overall growth in prescription drug expenditures over the sample period, with over two-thirds of this impact being driven by an increase in demand as a result of the DTCA expansion and the remainder due to higher prices.

16012

Jonathan Kolstad, Amanda Kowalski

The Impact of an Individual Health Insurance Mandate on Hospital and Preventative Care: Evidence from Massachusetts

In April 2006, the state of Massachusetts passed legislation aimed at achieving near universal health insurance coverage. A key provision of this legislation, and of the national legislation passed in March 2010, is an individual mandate to obtain health insurance. In this paper, we use hospital data to examine the impact of this legislation on insurance coverage, utilization patterns, and patient outcomes in Massachusetts. We use a difference-in-difference strategy that compares outcomes in Massachusetts after the reform to outcomes in Massachusetts before the reform and to outcomes in other states. We embed this strategy in an instrumental variable framework to examine the effect of insurance coverage on outcomes. Among the population discharged from the hospital in Massachusetts, the reform decreased uninsurance by 28% relative to its initial level. Increased coverage affected utilization patterns by decreasing length of stay and the number of inpatient admissions originating from the emergency room. We also find evidence that outpatient care reduced hospitalizations for preventable conditions. At the same time we find no evidence that the cost of hospital care increased. The reform affected nearly all age, gender, income, and race categories. We identify some populations for which insurance had the greatest direct impact on outcomes and others for which the impact on outcomes appears to have occurred through spillovers.

16013

Damon Clark, Heather Royer

The Effect of Education on Adult Health and Mortality: Evidence from Britain

There is a strong, positive and well-documented correlation between education and health outcomes. There is much less evidence

on the extent to which this correlation reflects the causal effect of education on health — the parameter of interest for policy. In this paper we attempt to overcome the difficulties associated with estimating the causal effect of education on health. Our approach exploits two changes to British compulsory schooling laws that generated sharp differences in educational attainment among individuals born just months apart. Using regression discontinuity methods, we confirm that the cohorts just affected by these changes completed significantly more education than slightly older cohorts subject to the old laws. However, we find little evidence that this additional education improved health outcomes or changed health behaviors. We argue that it is hard to attribute these findings to the content of the additional education or the wider circumstances that the affected cohorts faced (e.g., universal health insurance). As such, our results suggest caution as to the likely health returns to educational interventions focused on increasing educational attainment among those at risk of dropping out of high school, a target of recent health policy efforts.

16066
Courtney Coile, Phillip B. Levine
Recessions, Reeling Markets, and Retiree Well-Being

This paper examines the impact of late-career investment returns and job loss on subsequent retiree well-being. Specifically, we explore whether there is a link between the income of retirees aged 70 to 79 and the stock market and labor market conditions that existed around the time of their retirement. We use data from the 2000 Census and the 2001 through 2007 American Community Surveys and consider both total personal income and income by type. We find that a long-term decline in the stock market in the years leading up to retirement leads to a modest reduction in investment income a decade or so later for those in the top third of the income distribution. The consequences of approaching retirement when the labor market is weak are more severe. A higher unemployment rate around the time of retirement reduces Social Security income for those in the bottom two-thirds of the income distribution; we estimate that an unemployed worker experiences a roughly 20 percent drop in Social Security income, consistent with claiming benefits several years early. Overall, our results indicate the importance of the challenges faced by lower-income workers who face a weak labor market as they approach retirement.

16077
Andrew Cook, Martin Gaynor, Melvin Stephens, Jr., Lowell Taylor
The Effect of Hospital Nurse Staffing on Patient Health Outcomes: Evidence from California's Minimum Staffing Regulation

Hospitals are currently under pressure to control the cost of medical care, while at the same time improving patient health outcomes. These twin concerns are at play in an important and contentious decision facing hospitals — choosing appropriate nurse staffing levels. Intuitively, one would expect nurse staffing ratios to be positively associated with patient outcomes. If so, this should be a key consideration in determining nurse staffing levels. A number of recent studies have examined this issue, however, there is concern about whether a causal relationship has been established. In this paper we exploit an arguably exogenous shock to nurse staffing levels. We look at the impact of California Assembly Bill 394, which mandated minimum levels of patients per nurse in the hospital setting. When the law was passed, some hospitals already had acceptable staffing levels, while others had nurse staffing ratios that did not meet mandated standards. Thus changes in hospital-level staffing ratios from the pre- to post-mandate periods are driven in part by the legislation. We find persuasive evidence that AB394 did have the intended effect of decreasing patient/nurse ratios in hospitals that previously did not meet mandated standards. However, our analysis suggests that patient outcomes did not disproportionately improve in these same hospitals. That is, we find no evidence of a causal impact of the law on patient safety.

16088
Ryan Edwards
Trends in World Inequality in Life Span Since 1970

Previous research has revealed much global convergence over the past several decades in life expectancy at birth and in infant mortality, which are closely linked. But trends in the variance of length of life, and in the variance of length of adult life in particular, are less well understood. I examine life-span inequality in a broad, balanced panel of 180 rich and poor countries observed in 1970 and 2000. Convergence in infant mortality has unambiguously reduced world inequality in total length of life starting from birth, but world inequality in length of adult life has remained stagnant. Underlying both of these trends is a growing share of total inequality that is attributable to between-country variation. Especially among developed countries, the absolute level of between-country inequality has risen over time. The sources of widening inequality in length of life between countries remain unclear, but signs point away from trends in income, leaving patterns of knowledge diffusion as a potential candidate.