THE BUSINESS OF MEDICINE  In this three-part feature on the health care industry: Natalie Mizik weighs the costs and benefits of marketing drugs to doctors
• Linda Green assesses systemic overcrowding and dangerous delays in hospitals •
Frank Lichtenberg examines the impact of new drug development
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In his best-selling novel, The Rule of Four, Dustin Thomason ’03 solves a Renaissance mystery that has eluded scholars for centuries.
Dear Alumni:

As my first year as dean of Columbia Business School draws to a close, I am proud and pleased about what we as a community have accomplished in 12 short months.

One significant initiative is the recent launch of the Columbia Ideas at Work Web site. This knowledge portal showcases the intellectual capital embodied by Columbia Business School's faculty and highlights how our research bridges business theory and practice. See pages 5 and 44 for details about this exciting venture.

A notable area of faculty research is the health care industry. In this issue, Professors Natalie Mizik, Linda Green and Frank Lichtenberg and executive in residence Ken Freeman examine some of the most important issues facing this industry. From the cost of prescription drugs to emergency responsiveness to empowering patients, they explore ways in which better business decisions can help address these issues.

Research also played an integral part in the literary success of Dustin Thomason ’03, coauthor of the best-selling novel The Rule of Four. In this issue's profile, Thomason details how he and his best friend from childhood cowrote this intellectual thriller while he was at the School.

At this time last year, I spoke in HERMES about the “need to continue building a two-way bridge for alumni—offering value and networks to alumni, while asking alums to contribute their time, talents and resources.” The spring term offered several opportunities for such bridge building. In March, I made a 10-day trip to Asia to meet with alumni, business leaders and government officials and strengthen the School’s ties in the region. In April, more than 1,000 alumni and guests gathered on campus for Reunions 2005, and in May more than 1,000 alumni, corporate partners and friends attended the School’s 29th Annual Dinner. You can read more about these events in NewsMakers.

I hope you enjoy this issue of HERMES. I look forward to our continued collaboration to strengthen the School’s brand as a great business school whose intellectual capital and graduates benefit business and society at large.

With regards,

Glenn Hubbard
Dean and Russell L. Carson Professor of Finance and Economics
Henry R. Kravis ’69, founding partner of Kohlberg Kravis Roberts & Co. (KKR), has agreed to cochair the Columbia Business School Board of Overseers with Russell L. Carson ’67, general partner at Welsh, Carson, Anderson & Stowe. The board works with the School to extend its reach into the forefront of business in the global marketplace.

Kravis has maintained a strong and active relationship with the School over the years, serving on the board since its inception. He generously supported the construction of Warren Hall and the establishment of the Henry R. Kravis Professorship of Business Leadership, and he chaired last year’s Annual Dinner, raising a record $10 million to establish the Meyer Feldberg Distinguished Fellowship Program, which helps the School continue to attract outstanding MBA students.

After serving as vice president of Katy Industries, where he designed and implemented its acquisition program, and partner at Bear, Stearns & Co., in 1976 Kravis cofounded KKR. This merchant-banking firm pioneered the development of the management (leveraged) buyout. Kravis has been involved in some of the largest and most successful leveraged buyouts, including RJR Nabisco, Safeway, Beatrice and Duracell.

Kravis is founder and cochairman of the New York City Investment Fund and chairman emeritus of the Partnership for New York City. He is a member of the Council on Foreign Relations and serves on several corporate boards and the boards of trustees of the Metropolitan Museum of Art, Mount Sinai Hospital, Public Television Channel 13/New York and the Rockefeller University.

He also founded the Kravis Leadership Institute at Claremont McKenna College, from which he earned his BA in economics.

Building Bridges with Asia

Underscoring the School’s commitment to educating international business leaders for a changing world, in March Dean Glenn Hubbard traveled to Asia to meet with alumni, friends and university, corporate and government leaders.

He opened the 10-day trip in Hong Kong with the announcement of a $1 million gift from the family of Sir Gordon Wu to establish the Wu Distinguished Speaker Forum for Chinese Business Leaders, which will be launched in the fall. Paul Calello ’87, chairman and CEO of Credit Suisse First Boston (CSFB) Asia Pacific, welcomed Hubbard, who delivered the closing keynote address at the 2005 CSFB Investment Conference, a gathering of more than 1,600 delegates from companies around the world. Professor Joseph Stiglitz was the opening speaker, and board of overseers’ member Art Samberg ’67 was a panel participant midweek, giving a strong Columbia footprint to the week.

Board members Linda Ho McAfee ’73 and Peter Woo ’72 hosted alumni events in Hong Kong. In addition, the dean visited Manila, Taipei, Seoul and Tokyo, where board members Wash SyCip ’43, Alfonso Yuchengco ’50, Yuzaburo Mogi ’61 and Nobuo Tateisi ’62 hosted various alumni events. The dean also met with President Gloria Macapagal-Arroyo of the Philippines and President Chen Shui-bian of Taiwan.

The trip was the first of several to Asia, expanding the School’s international presence and reaching out to prospective students as well as corporate partners.

After the trip, the dean was pleased to announce the addition of two new board members, Arthur Ty ’91 from Manila and Steven Pan ’88 from Taipei.
quotable: “My research in emergency responsiveness leads me to believe that most hospitals are not well equipped to handle everyday emergencies. Yet hospitals must also handle demand surges resulting from natural occurrences, such as HIV/AIDS, SARS and flu, and, in our current environment, from terrorist attacks.”

Linda V. Green, the Armand G. Erpf Professor of the Modern Corporation and a founder and codirector of the Columbia Alliance for Healthcare Management, on streamlining hospital management (“Wait Control: Improving Responsiveness to Medical Emergencies,” page 13)

New Books by Faculty Members on Customer Valuation, Growth Strategy and Globalization

Sunil Gupta, the Meyer Feldberg Professor of Business, and Donald Lehmann, the George E. Warren Professor of Business, are coauthors of a new book on customer valuation, Managing Customers as Investments: The Strategic Value of Customers in the Long Run (Pearson, 2005). In it, the authors discuss customer lifetime value, the method they developed for valuing customers so that companies can make better strategic and tactical business decisions. They use practical examples and case studies to demonstrate how the application of the method can add to marketing, valuation and M&A decision making. “A business runs on revenue,” Lehmann says. “Revenue comes from customers. If I can project customer revenue, I can project the value of a business.”

Rita McGrath, Executive Education faculty member, and Ian C. MacMillan cowrote Market Busters: 40 Strategic Moves That Drive Exceptional Business Growth (Harvard Business School Press, 2005), a hands-on guide for identifying and maximizing growth opportunities. While most growth strategies, they say, are fatally flawed, the method shows that good strategies can exploit opportunities within a company’s existing business platform, thereby transforming its market position.


Zeevi Named to Endowed Chair

In March, the Columbia University Trustees appointed Assaf Zeevi the Gantcher Associate Professor of Business. The endowed associate professorship was established this year with a gift from Nathan Gantcher ’64, a member of the School’s board of overseers and a longtime friend and supporter of the School. Zeevi, a member of the Decision, Risk and Operations Division, teaches a core course on managerial statistics and a doctoral course on stochastic modeling, the focus of his research.

Earlier this year, Zeevi also received the National Science Foundation’s Faculty Early Career Development (CAREER) Award, which recognizes teacher-scholars most likely to become future academic leaders. The $79,969 award supports Zeevi’s research in developing new methods for the design, control, performance analysis and pricing of technologically advanced service operations—for example, the pricing of Internet-based information services and the monitoring of Web-hosting service providers.

Zeevi, who joined the faculty in 2001, is a past recipient of the Dean’s Award for Teaching Excellence. He holds a PhD from Stanford and earned undergraduate and graduate degrees in electrical and industrial engineering, respectively, from Technion University, in Israel.

Assaf Zeevi
The Idea: Make the Leap from Business Research to Business Practice

Use the new Columbia Ideas at Work Web site to gain insight into trends and issues that affect your business. Through magazine features showcasing recent faculty research, a searchable database of faculty publications and research briefs offering practical applications, Columbia Ideas at Work helps you make quick connections to new ways of doing business.

For a sample research brief, see page 44.

In the online magazine’s inaugural issue, focused on entrepreneurship, Dean Glenn Hubbard explains how public policy can help or hurt new entrepreneurs, while other articles explore venture capital, founder succession and product development.

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**CWIB: ‘Embrace the Female Advantage’**

On February 25, more than 700 women—nearly all of the School’s female students along with many alumnae, faculty members and staff—filled Lerner Hall and overflow rooms in Low Library for the 12th annual Columbia Women in Business (CWIB) conference.

The theme, “Embrace the Female Advantage: Winning in the Workplace and the World Beyond,” focused on women’s unique skills and abilities and how they can leverage them to succeed professionally and personally.

“I do think it’s possible to have it all,” said Susan Whiting, president and CEO of Nielsen Media Research, in the morning keynote address. “I’m just not sure it’s possible to have it all at once.” Being a CEO is a seven-day-a-week job, she said, and it is important to make time for friends, family and philanthropic hobbies, all of which keep her grounded.

In the afternoon keynote address, fashion designer Dana Buchman reflected on the differences in opportunity for her generation and the students’ and said she hoped her legacy paved the way for women to be better able to balance work and life. She also advised students to think honestly about what is important to them and not let their careers stop them from having families.

The conference also featured panels—all moderated by students—and workshops on an array of topics; it concluded with a gala reception. For more details, visit www.gsb.columbia.edu/students/organizations/cwib.

**Remembering Peter K. Loeb**

The School community was deeply saddened by the death of board of overseers member Peter K. Loeb ’61, who passed away suddenly on November 16 at the age of 68.

“Peter will be missed greatly and remembered fondly,” says Dean Hubbard. “His successful career, active participation in the securities industry and many civic contributions demonstrate the magnitude of the mark he has left.”

Loeb was a respected business leader who served most recently as managing director at Neuberger Berman. He began his career on Wall Street at Loeb Rhoades & Company and went on to become managing director at PaineWebber, partner at Shufro, Rose & Co. and president of Delta Capital Management. He served as governor and vice chairman of the National Association of Securities Dealers and as governor of the Securities Industry Association.

In 1980, Loeb began a relationship with the Special Olympics as a coach and games official, and for nine years he was a member of the board of Special Olympics International. He also lent his management expertise to the boards of several other nonprofits, including the City Center Theater Foundation and City Harvest. From 1979 to 1985, he was a Columbia University alumni trustee.

Loeb is survived by his wife, Jeanette W. Loeb, four children and three grandchildren.

**Annual Dinner Honors Wright and Lautenberg**

At the 29th Annual Dinner, held on May 2 at the Waldorf-Astoria, the School honored two eminent guests for distinguished leadership in business and government: Bob Wright, vice chairman and executive officer of General Electric Company and chairman and CEO of NBC Universal, Inc., and U.S. Senator Frank R. Lautenberg, BS ’49. More than 1,000 alumni, friends, corporate sponsors and guests attended the gala event, which was chaired by Lulu C. Wang, MS ’83, CEO of Tupelo Capital Management, L.L.C. The $2.2 million raised by the dinner will support curriculum development, student financial aid, faculty research and the day-to-day operations of the School.
UN Taps Erskine Bowles for Tsunami Relief

On March 16, United Nations Secretary-General Kofi Annan appointed Erskine Bowles ’69, senior adviser at Carousel Capital and a member of the School’s board of overseers. He serves with former President Bill Clinton, the UN’s special envoy, to help the General Assembly develop recovery and reconstruction plans for the 12 countries affected by the December 26 tsunami.

Bowles left for Indonesia on the day of his appointment to survey the impact of the disaster. He then attended the Asian Development Bank conference on March 18 in Manila, where a forum was held on regional coordination of the recovery efforts.

Bowles started his career in corporate finance and investment banking before becoming administrator of the U.S. Small Business Administration under Clinton. He later became Clinton’s chief of staff, serving on the National Security and National Economic Councils. “The United Nations will greatly benefit,” said Annan in a statement issued on the day of the appointment, “from Mr. Bowles’s extensive experience in international affairs and his deep commitment to ensuring that the world does not turn its back on the tsunami victims.”

Team GSB in High Gear for MS Society

In late October, 19 members of the classes of 2005 and 2006 assembled in Lower Manhattan to participate in the National Multiple Sclerosis (MS) Society’s annual MS Bike Tour. Donning T-shirts donated by the School, Team GSB joined hundreds of cyclists who rode routes of 30, 60 or 100 miles from the South Street Seaport to either Chelsea Piers or the George Washington Bridge.

Surpassing the original fund-raising goal of $6,000, Team GSB’s donor pledges totaled $10,773. Jon Gordon ’06 (third from left in photo) spearheaded the effort by recruiting student riders and overseeing the fund-raising. Nick Daft ’05 was the team’s leading fund-raiser, bringing in $4,500.

Annual Reunion Weekend

More than 1,000 alumni from the classes of 1980, ’85, ’90, ’95, 2000 and ’04 returned to campus April 8–10 to reconnect with friends, classmates and faculty members at the annual reunion weekend. The festivities began Friday night with a cocktail party in Lerner Hall.

On Saturday, a day of workshops and panels, Bruce Greenwald, the Robert Heilbrunn Professor of Finance and Asset Management, hosted the first session on investing in a difficult environment. A panel of alumni explored marketing best practices and innovations in a session moderated by Sunil Gupta, the Meyer Feldberg Professor of Business. Willie Pietersen, professor of the practice of management, followed with a session on strategy, and Dean Hubbard spoke about shaping the School’s future within the changing global environment.

Warm temperatures and sunny skies made the outdoor family picnic a huge success, but afternoon enrichment workshops drew the crowds back inside. Saturday night’s class cocktail parties and dinners were well attended. Alumni came from around the world, some from as far away as Hong Kong and Australia.

Mark your calendar for Reunions 2006, April 7–9!
The Business
Are Physicians Easy Marks?
The widespread practice of marketing prescription drugs directly to physicians is coming under close scrutiny.

Wait Control
As the U.S. health care system struggles with overcrowding and delays, the threats raised by terrorism underscore the urgency of rethinking how decisions on capacity and resources are made.

A Better Pill to Swallow
New drugs consistently increase life expectancy and productivity, yet current policies may curtail their development.
According to estimates by IMS Health, the leading provider of business intelligence for the pharmaceutical and health care industries, in 2003 the pharmaceutical industry in the United States spent more than $25.3 billion to promote prescription medications (by comparison, the industry spent about $33 billion on R&D). Direct-to-physician (DTP) activities accounted for the bulk of this spending: $5.3 billion was spent on detailing—pharmaceutical sales representatives (PSRs) visiting physicians in offices and hospitals to promote their firm’s drugs—and the retail value of the free drug samples distributed during these visits is estimated at $16.4 billion. Prescription drugs are projected to remain the fastest-growing portion of health care expenditures; by 2012, they are expected to account for 14.5 percent of $3.1 trillion in total health care expenditures, compared with approximately 10 percent of $1.4 trillion in 2001. No wonder the impact of pharmaceutical industry marketing practices is of keen interest to policymakers, the business community and the general public.
Competing Views

Heated debate surrounds DTP activities and their effect on physicians’ prescribing behavior. Many public policy organizations and consumer advocacy groups contend that PSRs compromise physicians’ integrity and significantly influence their prescribing decisions and that this influence has a negative impact on patients’ welfare. Those who hold this view say that PSRs induce physicians to prescribe more expensive branded drugs needlessly, even when generic medications are available.

For its part, the pharmaceutical industry does not dispute that PSRs significantly influence physicians’ decisions on prescriptions. But it argues that the representatives’ influence benefits patients because physicians are provided with valuable information about drugs and, as a result, can make better choices for their patients.

While both sides differ as to whether the influence of PSRs is socially beneficial or harmful, they agree that physicians are significantly influenced by detailing. But is this so? Are physicians “easy marks” for PSRs?

An Empirical Assessment

The controversy surrounding pharmaceutical marketing practices and the ongoing debate about the impact of PSRs’ influence motivated my colleague Professor Robert L. Jacobson of the University of Washington and me to undertake a study to assess the effectiveness of DTP activities. Despite the substantial resources pharmaceutical companies invest in promoting their products and the public attention to the issue, surprisingly little is known about the magnitude of the impact that detailing and sampling have on physicians’ prescribing decisions.

Before our study, much of the evidence about PSRs’ effectiveness was anecdotal. We, however, were able to obtain access to a large database that allowed us to assess the impact that PSRs’ interactions with physicians have on the number of new prescriptions issued by them.

The data were provided by a large U.S. drug manufacturer on one condition: that we ensure the anonymity of the company and the drugs in the study. The study sample involved 74,075 U.S. physicians and three drugs over 24 months, for a total of more than four million PSR interactions with physicians. The three drugs came from different therapeutic areas, had been on the market from less than 1 year to 11 years and had annual sales ranging from less than $500 million to more than $1 billion.

For each drug, we empirically assessed the effect that changes in the amount of detailing and sampling had on the number of additional new prescriptions the physician issued. Our results show that physicians are “tough sells,” not “easy marks,” because DTP activities have only a modest influence on prescribing decisions. For the three drugs in our study, the empirical results indicate that it would take an additional 0.64, 3.13 and 6.54 PSR visits, respectively, to induce one additional new prescription, and it would take 6.44, 25.64 and 73.04 additional free drug samples, respectively, to induce one new prescription.

The Research Findings

The graph below shows average effects across the three drugs over time and serves to highlight three main findings. First, the effect of both detailing and sampling is small; for example, a detailing visit generates only 0.05 new prescriptions for the month that visit occurs. Second, the effect persists for a number of months but dissipates over time; at 12 months after the visit, the effect is almost fully dissipated. Third, detailing has a greater effect than sampling.
Finally, we used our results to estimate the total financial returns for detailing and found that for two of the three drugs the returns were negative. In other words, the spending on detailing for two drugs was not recouped by the increases in prescribing. The third drug had positive returns for detailing, which probably stemmed from both the larger physician response to detailing of this drug and the drug’s high price.

**Influences on Prescribing Decisions**

Several factors can explain why physicians’ decisions on prescriptions are affected, albeit modestly, by interactions with PSRs. First, PSRs provide physicians with information about new and existing drugs and can induce trials of new drugs or new indications. The use of samples makes this easier. Further, PSRs are trained to persuade physicians by effectively presenting—and, sometimes, misrepresenting—facts about the drug.

There are, however, other factors at work that tend to minimize or even neutralize PSRs’ influence. The most important one, perhaps, is that PSRs are not physicians’ only source of information; scientific papers, advice from colleagues and physicians’ own training and experience also affect prescribing decisions. Indeed, most physicians regard these influences as far more important than that of PSRs.

In addition, many physicians view PSRs skeptically or even negatively and recognize that the information PSRs present is biased toward the promoted drug. Thus, physicians often discount information received from PSRs.

The minimal effect of DTP activities might also be tied to the PSR “arms race” undertaken by pharmaceutical companies: expenditures on detailing doubled between 1996 and 2002. Companies were sending out more representatives to promote the same drugs, often with nothing new to say. Recently, pharmaceutical companies may have realized that this escalation was not fully warranted; in sharp contrast to the previous years, detailing expenditures in 2003 decreased by 17 percent from those in 2002. While the decrease in detailing expenditures was a step in the right direction, pharmaceutical firms need to acknowledge that the returns on detailing for some drugs are negative and consider a more radical change to their sales model.

**Government Intervention**

The concern that pharmaceutical marketing practices compromise physicians’ integrity and have exacerbated increases in public health costs has prompted government action at both the federal and state levels. In 2002, the federal government issued a warning to the drug industry to curtail some of its marketing practices. A number of states have undertaken counterdetailing initiatives in which state employees visit physicians in hopes of persuading them to switch from prescribing branded drugs to lower-cost generic drugs. The results of our study suggest that such costly counterdetailing initiatives are unlikely to be effective and that states' resources would be better spent elsewhere.

While our study shows that physicians’ prescribing decisions are only moderately affected by DTP activities, we are not implying that this aspect of pharmaceutical marketing practices should not be viewed as a public policy concern. The rationale that is given for high prescription drug prices and against efforts to reduce them—whether through importing lower-priced drugs or allowing the government to negotiate prices—is that pharmaceutical companies need high prices and profits to enable them to undertake the R&D necessary to develop new drugs. Our analysis suggests that the added costs incurred through wasteful detailing either take away from R&D or result in unwarranted costs that are passed along in the form of higher prices.

Natalie Mizik is an assistant professor of marketing. In addition to direct-to-physician pharmaceutical marketing activities, her research interests include the valuation of firms’ intangible marketing assets.

For further detail on this research, see “Are Physicians ‘Easy Marks’? Quantifying the Effects of Detailing and Sampling on New Prescriptions” (from the December 2004 issue of Management Science) by visiting Columbia Ideas at Work, www.gsb.columbia.edu/ideasonwork/researcharchive.
Trained primarily as a queuing theorist, I was drawn to health care because it is riddled with delays. Almost all of us have waited for days or weeks to get an appointment with a physician or schedule a procedure, and upon arrival we wait some more until being seen. In hospitals, it is not unusual to find patients waiting for beds in hallways, and delays for surgery or diagnostic tests are common.

**Causes of Poor Performance**

Why are there so many examples of poor performance in an industry with per capita expenditures of about $5,000 a year? Consider the biggest source of care and expenditures: hospitals. Until recently, hospitals were paid on a fee-for-service basis, prices were controlled by the states and there was little or no competition. Since most care is paid for by insurance, customers exert little or no pressure on costs. Quality ratings are based primarily on the status of affiliated physicians, creating a culture that is physician-oriented rather than patient-oriented. Though hospitals are beginning to focus more on efficiency, service and quality, they are still often managed using intuition and rules of thumb rather than service standards, data and decision-support systems.
Emergency Department Overcrowding

A lot of the problems prevalent in hospital care show up in emergency departments (EDs). A survey of EDs in the United States in 2002 found that more than 90 percent of directors cited overcrowding as a problem, with almost 40 percent reporting overcrowding on a daily basis. When EDs experience significant overcrowding, they often go on diversion, redirecting ambulances to other EDs. A nationwide survey of hospitals in 2002 found that nearly 13 percent of urban hospitals were on diversion more than 20 percent of the time. However troubling on the surface, these reports are even more ominous given the current environment of terrorist threats. So what can be done to improve this situation?

Emergency department directors report that patients back up primarily because no inpatient beds are available. Yet, there has been a widely held perception in the health care community that there are too many hospital beds. This belief is primarily due to the discrepancy between what has historically been considered the optimal hospital occupancy figure of 85 percent and the actual average occupancy rate for nonprofit hospitals, which recently has been about 66 percent. Largely because of this perception, the number of hospital beds has decreased almost 25 percent in the last 20 years.

Inappropriate Measures and Dangerous Delays

My research has shown that determining bed capacity based on occupancy levels can result in very long waiting times for beds. This is of particular concern for intensive care units (ICUs), which are used for the most critically ill patients.

Using data from 1997 on all ICU units in New York State, I found that the average occupancy level was 75 percent, which might indicate to some that there was an excess of beds in these units. But given the critical condition of a patient who needs an ICU bed, there should be enough beds to insure that the probability of having one available when it is needed is very high. Based on this criterion, my findings indicated that between 74 percent and 95 percent of hospitals in New York State did not have enough ICU beds.

This apparent shortage was consistent with national reports that the longest ED delays are for patients waiting for a critical care bed. Yet there was a 20 percent decrease in ICU capacity between 1995 and 2001!

Financial Pressures and Misconceptions

Why have hospitals cut beds, particularly ICU beds, thereby subjecting patients whose needs are urgent to potentially
dangerous delays? There are many likely reasons. Since most hospitals don’t collect or analyze data on patients’ delays, they may be unaware that the policy of high bed use results in long delays for beds. Nursing shortages and prospective payment systems that create disincentives to treat certain patients also may play a role. But probably the biggest reason is that hospital managers are under unrelenting financial pressure and believe that this means they must operate clinical units, particularly expensive ones like ICUs, at high occupancy levels.

Ironically, this approach could be costing the hospital money. How? I have found that hospitals with an insufficient number of beds in one type of unit (e.g., ICU and cardiology) may have more beds than needed in another unit. This misallocation often results in patients being placed in the “wrong” bed temporarily and then transferred, frequently resulting in a longer hospital stay. And each additional day costs the hospital money since most “payers,” including Medicare and many insurers, base compensation on a fixed, diagnosis-based fee schedule regardless of the length of stay. Also, backups in the ED ultimately lead to ambulance diversions, resulting in loss of potential patients and their associated revenues.

Is There a Doctor in the House?
The most critical component of ED delay may be the initial wait to be seen by a physician. Yet in many hospitals, patients spend hours waiting before they see a doctor, and many leave without being seen (LWBS). Studies have shown that LWBS patients are indeed sick, and one study estimated that 46 percent of LWBS patients require immediate medical attention.

Though these delays may be due to understaffing, my research demonstrates that another important factor is the staffing pattern. ED arrivals are very unpredictable, and the volume changes dramatically over the course of the day and the week. Hospital managers, while aware of the variability, usually don’t collect and analyze demand patterns and instead allocate staff based on general perceptions and intuition. As a result, they don’t do a good job of matching staffing levels to arrivals.

The value of basing staffing on data and decision-support tools was demonstrated in a study I conducted in collaboration with the directors of a New York City hospital ED. Using a queuing model I developed, we were able to reduce delays and decrease the number of LWBS patients by almost 20 percent without adding any physicians. This result was even more impressive given that the arrival volume had increased by 7.3 percent over the study period.

Patients at Risk
No one likes to wait, but do delays endanger patients? To explore this issue, my colleagues and I examined the connection between ambulance diversions and mortality from myocardial infarction (heart attack) in New York City.

We collected data on all ambulance diversions and all deaths from myocardial infarction in New York City for 1999 and 2000. During the study period, on average three hospitals a day citywide were on critical adult diversion status, with each diverting ambulance admissions for approximately five hours. The number and length of diversions were significantly greater in the winter, during the week and in the evening hours. Even worse, hospitals tended to be on diversion at the same times, resulting in increased ambulance travel times for patients and increased unavailability to pick up new patients.

We found that high levels of diversion can be deadly. Using multinomial regressions, our analysis showed that on days when more than 20 percent of a borough’s total ED hours were spent on diversion, fatalities from myocardial infarction increased 46 percent boroughwide; and when at least 25 percent of a borough’s hospitals were on diversion simultaneously, these deaths increased 16.5 percent.

My research in emergency responsiveness leads me to believe that most hospitals and communities are not well equipped to handle everyday emergencies. Yet hospitals must also handle demand surges resulting from natural occurrences, such as HIV/AIDS, SARS and flu, and, in our current environment, from terrorist attacks.

Though hospital administrators and policymakers are becoming increasingly aware of the need for significant changes in the ways that hospitals are managed and financed, the threats raised by terrorism require us to rethink fundamentally how capacity decisions are made and resources are managed. Incentives and education are necessary to bring hospital management into the 21st century and to develop coordinated care across hospitals and other health care facilities to more effectively deal with patient demand, whether it be the everyday or the extraordinary.

Linda V. Green is the Armand G. Erpf Professor of the Modern Corporation in the Decision, Risk and Operations Division. She also is a founder and codirector of the Columbia Alliance for Healthcare Management, which provides a multidisciplinary approach to education and research in health care.

To read more about her research, visit Columbia Ideas at Work, www.gsb.columbia.edu/ideasatwork/researcharchive.
Many economists believe that new goods are at the heart of economic progress and that, compared to older ones, they provide more “product services” in relation to the cost of their production. The pharmaceutical industry is among those industries most likely to generate new goods; it is one of the most R&D intensive. Moreover, in part because of extensive FDA regulation, unusually good data about the launch and use of new pharmaceutical goods are available.

Using these data, I have done several econometric studies at the individual, disease and country level in order to assess the impact of the development and use of new drugs on public health and the economy. Most of my studies are based on data covering all medical conditions (diseases) and all drugs. They therefore provide evidence about the effects of new drugs in general, not about specific drugs or their effects on particular diseases.

I hypothesize that people may obtain several kinds of benefits from using newer, as opposed to older, pharmaceutical products. These benefits include longer life, reduced limitations on activities (including work) and reduced spending on hospitals and long-term care. In this article, I describe two of the studies I have conducted to estimate the magnitude and value of these benefits and compare them to the cost of using newer drugs.

Longevity

In a study entitled “The Impact of New Drug Launches on Longevity: Evidence from Longitudinal, Disease-Level Data from 52 Countries, 1982–2001” (International Journal of Health Care Finance and Economics, March 2005), I provide evidence that in the last two decades new drug launches have added greatly to longevity in these nations, both developed and developing.

Over the past 50 years, average life expectancy around the world has increased sizably, from 46.5 years for a child born
in 1950–55 to 65 years for a child born in 1995–2000. Also, the gap in average life expectancy between rich and poor countries has been halved, from 25 to 12 years. Sorting out the causes for improvements in longevity, however, has proved difficult. Many health researchers have primarily credited more education, higher income, a healthier lifestyle and a safer environment for increased longevity.

Focusing in this study on the remarkable two-year increase in longevity between 1986 and 2000, I calculate that about 40 percent of the increase can be traced to the introduction of new drugs, which account for a substantial fraction of medical innovations. On average, the introduction of new drugs lengthened the life of people in these 52 countries by just short of three weeks each year.

By combining data from the IMS Health Drug Launches database and the World Health Organization Mortality database, I was able to link the number of new drugs launched since 1982 with changes in the probability of surviving to certain ages, such as 55 and 65 years, for each major disease category, country and year. An increase in the cumulative number of new chemical entities—drugs whose key ingredient has not previously been available in the country to treat disease—boosts the survival rate to age 65.

Three to six years after a drug is introduced, the effect on longevity is more than twice as large as in the first three years, which suggests that it takes several years for a new drug to reach more consumers and have its full impact on survival rates.

Using these results, I calculate an upper limit to the cost per life-year gained from the launch of new drugs to be $4,500, a sum far lower than most estimates of the value of a life-year—at least $50,000 in the case of Americans. So my study suggests that spending on new drugs may be a cost-effective way to increase longevity.

**Ability to Work**

Another study, “Availability of New Drugs and Americans’ Ability to Work” (Journal of Occupational and Environmental Medicine, April 2005), examines the impact of the introduction of new drugs during a 15-year period on the ability of nonelderly adult Americans to work.

Several previous case studies have examined the impact of specific new drugs on the ability to work. For example, one study found that terbutaline, an asthma drug approved by the FDA in 1974, reduced the number of work or school days missed due to asthma by 57 percent. These case studies were based on relatively small samples of individuals with the same condition at the same time, and it is difficult to estimate from them the average or aggregate effect of new drugs on the ability to work.

I used a different approach, basing my analysis on data on about 200,000 Americans, observed between 1982 and 1996, with 47 major chronic conditions. I investigated whether people with conditions for which many new drugs were introduced exhibited a greater increase in ability to work than did people with conditions for which few new drugs were introduced, controlling for other factors.

Using multiple regression analysis, I assessed the effect of the cumulative number of drugs approved for a condition on the ability to work. The estimates implied that during 1982–96 the introduction of new drugs reduced the probability of being unable to work because of the 47 chronic conditions by 1.8 percent a year. If the probability of being unable to work had not been reduced by new drug introductions during 1982–96, this probability would have been 30 percent higher in 1996 than it actually was—5.2 percent instead of 4.0 percent.

In 1996, the average employer spent about $131 a day, or $34,000 a year, on employee compensation (including fringe benefits). Hence, the per capita annual value of the estimated reduction in the probability of being unable to work at all was about $395 (= 5.2% - 4.0% × $34,000). I estimate that the average expenditure on new drugs for the 47 sample chronic conditions per working-age person was $51. The estimated benefit of the new drugs, in terms of the value of the increase in workforce participation, is much greater than the estimated cost of the new drugs.

My findings suggest that policies that broadly reduce the development and use of new drugs—such as weak intellectual property protection and large-scale importation from countries with strict drug price controls—may ultimately reduce the rate at which longevity increases and the ability of Americans to work.

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To read more about his research on new drug development and use, visit Columbia Ideas at Work, www.gsb.columbia.edu/ideasatwork/researcharchive.
DUSTIN THOMASON ’03 AND IAN CALDWELL, BOTH 29, HAVE BEEN BEST FRIENDS SINCE THEY MET IN THIRD GRADE AT A BIRTHDAY PARTY. THEY HAVE BEEN WRITING TOGETHER—STARTING WITH SHORT STORIES, PLAYS AND SKITS FOR ELEMENTARY SCHOOL TALENT SHOWS, MOVING ON TO MORE ELABORATE PROJECTS IN HIGH SCHOOL AND CULMINATING IN A BEST-SELLING NOVEL, THE RULE OF FOUR, PUBLISHED LAST YEAR.

by Abigail Moses

The authors started writing the novel just after they graduated from college. Thomason went to Harvard, where he studied writing and won the Hoopes Prize for outstanding scholarly work, and Caldwell to Princeton, where he studied history and graduated Phi Beta Kappa. The separation was difficult for them, so in 1998, their senior year, with college graduation and adulthood looming, they decided to reconnect by collaborating on a novel about academia and friendship.
In the years it took them to write *The Rule of Four*, the authors managed to balance their writing with graduate school, jobs and relationships. Thomason earned his MBA and MD from Columbia Business and Medical Schools in 2003. Caldwell worked full-time as a software engineer and then as a teacher, and he got married. “We both just feel like there’s time in the day to do more than one thing,” Thomason says. “You can’t write all day, every day.”

So, in their free time, the authors assigned themselves reading lists—books about the Renaissance and novels in the historical-mystery genre. The latter included *The Name of the Rose*, *The Secret History* and *The Alienist*. “There’s certainly a rich tradition of those kinds of books,” Thomason says, preempting a comparison with Dan Brown’s *The Da Vinci Code*, the runaway best seller against which *The Rule of Four* is inevitably—and favorably—judged.

The *Hypnerotomachia Poliphili* and the Italian Renaissance

Critics praise *The Rule of Four* for its scholarly handling of the *Hypnerotomachia Poliphili*, a dense and esoteric 15th-century text written in seven languages and made even more inscrutable by hidden messages in anagrams, acrostics and ciphers. *The Hypnerotomachia Poliphili*, which translates as “Poliphilo’s Struggle for Love in a Dream,” has been variously described as “the most beautiful book in the world, and also the most unreadable,” “an encyclopedia masquerading as a novel, a dissertation on everything from architecture to zoology” and “the world’s longest book about a man having a dream,” one that “makes Marcel Proust, who wrote the world’s longest book about a man eating a piece of cake, look like Ernest Hemingway.”

Thomason and Caldwell chose the *Hypnerotomachia* as their subject after Caldwell began researching it for a class taught by the acclaimed Princeton history professor Anthony Grafton. It is a text that has baffled scholars for centuries, and critics have enjoyed—though not endorsed—*The Rule of Four*’s creative resolution of the book’s two main mysteries: the identity of the book’s author and its meaning.

The former has been presumed partially solved ever since the discovery of an acrostic formed by the first letters of each chapter spelling out, in translation, “Brother Francesco Colonna loved Polia tremendously.” While most scholars believe the author was a 15th-century Roman nobleman named Francesco Colonna, others argue it was a Dominican monk in Venice of the same name.
Thomason and Caldwell chose the Venetian Francesco Colonna, whose story they linked to such figures and events of the Italian Renaissance as the Florentine religious leader Girolamo Savonarola and “the bonfire of the vanities.” Grafton, while praising *The Rule of Four* in the *New York Review of Books*, disagreed with their choice of the author’s identity. “We knew that the consensus of scholarship was pointed in the other direction,” Thomason says, “but the story was much more interesting to go in the direction we chose.”

*The Rule of Four*’s story about friendship, love, loyalty and betrayal makes for a good read. But what sets the novel apart is its scholarship—its appreciation of Renaissance history and intellectual discovery—and its fictional weaving of real people and events with Colonna and his text. The meaning of the *Hypnerotomachia*, according to *The Rule of Four*, can be found only by true lovers of scholarship.

Thomason and Caldwell devised secret codes, hidden messages and riddles based on art, science, engineering and other disciplines for their protagonists to decipher. In the process, the authors strove to be faithful to the ideas on which these puzzles were based. “We tried really hard to use as much real history as we could,” Thomason says. “We steered away from making enormous culture-shifting claims.”

**BUSINESS TRAINING AND VERSATILITY**

Now business partners as well as friends, Thomason and Caldwell credit *The Rule of Four* with strengthening their relationship. “If Ian and I hadn’t written this book, we would probably talk once every two weeks or so on the phone,” Thomason says. “We would still be friends, but you know, people get older and relationships change . . . . Our relationship has changed as a result of this, but at least it’s changed in a way that forces us to spend more time together.”

They have sold the movie rights to *The Rule of Four* to Warner Bros. and are writing a second book, although they will not discuss the details. “I would say it’s like a brother to *The Rule of Four*, but not an identical twin,” Thomason says. And they have written a television pilot with a character-driven story line that explores male friendship. Thomason is producing the pilot for ABC Television.

“I always wanted to work as a writer and work in books and in TV and in movies,” says Thomason. “We had some very good fortune with the book, and that kind of opened up some doors. I’m very happy about that and doing exactly what I love now.”

Thomason wants to combine both the creative and business sides of the entertainment industry, and he thinks his MBA training will help him in Hollywood. He has found a mentor in John Wells of such shows as *ER* and *The West Wing*, who embodies the executive producer/writer combination.

“A lot of times, people in the entertainment business—especially artists, creators—tend not to think much about . . . the kind of big-picture stuff that businesspeople fancy themselves very good at thinking about,” Thomason says. “Hopefully, I can use my business training to do a little of the stuff that artists tend not to do.”

“One of the big themes of the book is the effect of time on friendships and the transition between youth and adulthood at that kind of seminal moment of graduation.”
The Health Care Advantage?
by Kenneth W. Freeman

The health care industry’s great obligation, its moral imperative, is to help improve the well-being of people. The opportunity to rally employees around improving health for patients—from our families and friends to complete strangers—is unique to the health care industry.

If the higher calling of improving patient health is so compelling, why do some say that health care is such a poorly managed industry? Why can’t we eliminate medical errors that cost lives? Why do we subtly distrust the health care system, as evidenced in part by an epidemic of second and third medical opinions?

The system’s shortcomings boil down to a lack of process discipline, a reluctance among health care providers to communicate and collaborate and a level of pride or arrogance that makes some health care professionals unwilling to consider new ways of doing things.

The offended will say, “But every patient is unique, with a different physiology and needs. We aren’t robots. This isn’t like manufacturing an automobile.” Full agreement, but complexity isn’t an acceptable excuse. And the answers are plain to see:

Give patients the same opportunity to manage their health that they have to manage their wealth. Develop and share quality data from health care providers so that patients can make informed decisions based on outcomes about where they will receive care. The Centers for Medicare & Medicaid Services has begun to do this on a pilot basis. Poor performers will correct their problems or disappear, leaders will emerge and the quality of care will improve. Oh yes, malpractice lawsuits lurk nearby. But after the initial shakeout, if providers aren’t delivering health care of high quality, why should they be immune from paying the price?

Federally fund the development of an electronic patient medical record that provides confidential and secure historical patient information, available anywhere, anytime. Much as the Federal-Aid Highway Acts enabled construction of the interstate highway system in the last century, a way must be found to fund the information highway for health care. Such efforts will reduce total health care costs and increase patient satisfaction. Improvement in quality doesn’t cost more, it saves money.

Change the rules of engagement between physicians, providers, payers and patients to approaches based on reliable facts and data. Have you ever wondered why you often must provide the same personal information whenever you visit a new specialist or clinic? Or why lab tests that provide information for your doctor to make an informed diagnosis are generally ordered after your physical exam? Or why you don’t have access to your personal medical information?

We know more about the “medical histories” of our cars than about ourselves! We can blame providers all we want, but the fact is that most of us don’t have enough passion for our own health care to force needed changes in the system until it is too late—when we or a close family member or friend become seriously ill.

If we were talking about our finances, we wouldn’t accept inefficient processes that yield inconsistent service and mistakes. So what’s more important: your wealth or your health?

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