

INNOVATION IN HEALTHCARE: HEALTH SYSTEMS & THE FUTURE OF ACCOUNTABLE CARE

INSIGHTS FROM THE GOVERNANCE INSTITUTE'S SYSTEM INVITATIONAL

SEPTEMBER 30–OCTOBER 2, 2012

THE PHOENICIAN • SCOTTSDALE, ARIZONA



A service of  NATIONAL RESEARCH
Corporation

The Governance Institute®

The essential resource for governance knowledge and solutions®

9685 Via Excelencia • Suite 100 • San Diego, CA 92126

Toll Free (877) 712-8778 • Fax (858) 909-0813

GovernanceInstitute.com

About the Author

Larry Stepnick is vice president and director of The Sevryn Group, Inc., a Virginia-based firm that specializes in conducting qualitative and quantitative research, and writing and producing publications on a wide range of healthcare management issues. In addition to printed materials, The Sevryn Group creates Web site content and electronic presentations for training and education purposes. Sevryn's clients include a broad spectrum of organizations that represent virtually all aspects of healthcare, including financing, management, delivery, and performance measurement. The Sevryn Group assists clients in resolving their most critical strategic concerns.

Prior to cofounding The Sevryn Group in 1994, Mr. Stepnick served as senior vice president and an elected officer of The Advisory Board Company, a for-profit membership of more than 1,000 hospitals and health systems. Mr. Stepnick received his bachelor's degree from Duke University, where he graduated summa cum laude. He also holds an M.B.A. from the Wharton School of the University of Pennsylvania, where he graduated with honors.

Mr. Stepnick can be reached at (703) 723-0951 or via email at larry@sevryngroup.com.

The Governance Institute

The Governance Institute provides trusted, independent information and resources to board members, healthcare executives, and physician leaders in support of their efforts to lead and govern their organizations.

The Governance Institute is a membership organization serving not-for-profit hospital and health system boards of directors, executives, and physician leadership. Membership services are provided through research and publications, conferences, and advisory services. In addition to its membership services, The Governance Institute conducts research studies, tracks healthcare industry trends, and showcases governance practices of leading healthcare boards across the country.



A service of  NATIONAL RESEARCH
Corporation

The Governance Institute®

The essential resource for governance knowledge and solutions®

9685 Via Excelencia • Suite 100 • San Diego, CA 92126

Toll Free (877) 712-8778 • Fax (858) 909-0813

GovernanceInstitute.com



Charles M. Ewell, Ph.D. Founder

Jona Raasch Chief Executive Officer

Gregg Loughman Vice President

Cynthia Ballow Vice President, Operations

Kathryn C. Peisert Managing Editor

Glenn Kramer Creative Director

Kayla Cook Assistant Editor



The Governance Institute is a service of National Research Corporation. Leading in the field of healthcare governance since 1986, The Governance Institute provides education and information services to hospital and health system boards of directors across the country. For more information about our services, please call toll free at (877) 712-8778, or visit our Web site at GovernanceInstitute.com.

The Governance Institute endeavors to ensure the accuracy of the information it provides to its members. This publication contains data obtained from multiple sources, and The Governance Institute cannot guarantee the accuracy of the information or its analysis in all cases. The Governance Institute is not involved in representation of clinical, legal, accounting, or other professional services. Its publications should not be construed as professional advice based on any specific set of facts or circumstances. Ideas or opinions expressed remain the responsibility of the named author(s). In regards to matters that involve clinical practice and direct patient treatment, members are advised to consult with their medical staffs and senior management, or other appropriate professionals, prior to implementing any changes based on this publication. The Governance Institute is not responsible for any claims or losses that may arise from any errors or omissions in our publications whether caused by The Governance Institute or its sources.

© 2013 The Governance Institute. All rights reserved. Reproduction of this publication in whole or part is expressly forbidden without prior written consent.

Table of Contents

v Preface

vii Faculty

1 Executive Summary

5 It's a New Game Now:

The Evolution of Innovation at UCLA

5 Transforming UCLA through a Process for Innovation

5 Applying Innovation throughout the UCLA Health System

8 First Step: Creating the Burning Platform

10 Examples of Innovation at UCLA Health System

11 Lessons Learned

**13 Innovations in Quality, Safety, and Care Delivery:
The Essential Ingredients for System Success in 2012**

13 Learning from Other Industries

13 Eight Lessons on Innovation

15 Hospitalists: An Example That Highlights Many of These Lessons

17 The Checklist: Another Illustrative Example

17 Applying Complexity Theory to Healthcare Innovations

18 The Leader's Job in Promoting Innovation

18 Facilitated Discussion

19 Going Beyond Medicine to the Best Care Possible

19 Upfront Preparation and Discussion with All Patients

20 Shared Decision Making

20 Teamwork

20 Integration of Treatment and Palliative Care

21 A Functional Health System

21 Family and Community Support

21 Facilitated Discussion

**23 The Future of Healthcare:
Digitizing Human Beings—A New Medicine**

23 A Technology-Driven Transformation

23 Next Step: Digitizing Humans

24 Implications for Medicine and the Healthcare Industry

**27 Innovations That Drive Performance
at Geisinger Health System**

27 Geisinger in Brief

27 Key Process Redesign Strategies

28 Major Reengineering Initiatives

33 Key Characteristics of Geisinger Health System

33 Spreading Innovation in Response to Payment Changes

Preface

Held September 30 through October 2, 2012, at The Phoenician in Scottsdale, AZ, The Governance Institute's *System Invitational* brought together a distinguished group of faculty with 26 representatives from eight health systems in the U.S. to discuss critical issues facing their organizations in today's rapidly changing environment.

THE MEETING REPRESENTED THE GOVERNANCE INSTITUTE'S fourth member-only invitational focused on governance and leadership within integrated care delivery systems. Such meetings are held twice a year, with each session building on the previous one.

The inaugural *System Invitational*, held April 3–5, 2011, in Scottsdale, AZ, focused on the unique and ever-changing business and governance needs of healthcare systems, featuring interactive plenary sessions and small-group discussions designed to prepare organizations for the future. After the meeting, The Governance Institute produced a white paper, entitled *System–Subsidiary Board Relations in an Era of Reform: Best Practices in Managing the Evolution to and Maintaining “Systemness.”* This paper laid out concrete strategies for managing system–subsidiary board relationships, expanding on many of the themes and ideas covered in the meeting.

The second *System Invitational*, held November 6–8, 2011, in Washington, D.C., built on the first, focusing on promoting change and forging better relationships with key stakeholders, particularly physicians. The third gathering, held March 4–6, 2012, in Washington, D.C., continued this discussion with a focus on the need to move from focusing on volume to promoting value, including how to deal with the transition from volume- to value-based payments. After both sessions, The Governance Institute produced proceedings that summarized the key messages from the sessions.

This most recent invitational focused on another critical imperative as healthcare systems transition from treating individual sickness to managing population health—the need for constant or even accelerated innovation that simultaneously improves quality and reduces costs. The meeting featured faculty who are at the frontier of innovation in the healthcare arena. As with the previous sessions, these proceedings summarize the presentations and discussions. Additional proceedings will be released after future meetings in our *System Invitational* series.

As this report makes clear, innovation will play a critical role in allowing health systems to succeed in the future. The Governance Institute's *System Invitational* highlighted many strategies and actions necessary for organizational leaders to embed a culture and processes that foster continuous innovation, and laid out key lessons that can help ensure success. As always, other Governance Institute tools and resources are also available to support member CEOs and boards in these efforts.

Please direct any questions or comments about this document to:

Kathryn C. Peisert
Managing Editor
(877) 712-8778
kpeisert@GovernanceInstitute.com
GovernanceInstitute.com



Faculty

The Governance Institute thanks the faculty of the *System Invitational* for being so generous with their time and expertise:

Donald M. Berwick, M.D., M.P.P.¹

Former Administrator, Centers for Medicare & Medicaid Services

Ira Byock, M.D.

Director of Palliative Medicine, Dartmouth-Hitchcock Medical Center, and Professor, the Geisel School of Medicine at Dartmouth

Molly J. Coye, M.D., M.P.H.

Chief Innovation Officer, UCLA Health System

Earl Steinberg, M.D., M.P.P.

Executive Vice President of Innovation and Dissemination, and Chief, Healthcare Solutions Enterprise, Geisinger Health System

Eric J. Topol, M.D.

Director, Scripps Translational Science Institute

Robert M. Wachter, M.D.

Professor and Associate Chairman of the Department of Medicine, University of California, San Francisco

¹ Dr. Berwick presented on innovation and patient-centered care; however, he requested that The Governance Institute refrain from publishing the summary of his presentation in this proceedings report.

Executive Summary

Held September 30 through October 2, 2012, at The Phoenician in Scottsdale, AZ, The Governance Institute's *System Invitational* brought together a distinguished group of faculty with representatives from eight health systems to discuss critical issues facing their organizations in today's rapidly changing environment.

THE MEETING FOCUSED ON A critical imperative as healthcare systems transition from treating individual sickness to managing population health—the need for constant or even accelerated innovation that simultaneously improves quality and reduces costs. This section serves as a high-level summary of the presentations and discussion that took place at the meeting; additional details can be found in the main body of the report.



It's a New Game Now: The Evolution of Innovation at UCLA

Molly J. Coye, M.D., M.P.H., chief innovation officer at UCLA Health System, reviewed the lessons learned from her organization's experiences on how to use innovation to transform a large organization:

- **Create the burning platform:** Everyone must understand and buy into the need for major transformation. Without this buy-in, innovative ideas will stall.
- **Think process, not product or technology:** Innovation should be thought of as organizing a process rather than inventing a new product or technology.
- **Steal shamelessly:** Success requires constant scanning of the horizon and “shameless stealing” of the best ideas.
- **Partner with operational staff:** Innovation should not be the lead or endgame. Rather, innovate in partnership with operational staff members who will have to carry out the innovations.
- **Address stakeholder concerns:** Key stakeholders may have legitimate concerns, and the failure to address them can doom an innovation from the start.
- **Create transformation groups:** Do not hand off innovations directly to busy operations staff. Rather, create the capacity for transformation through dedicated project staff charged with figuring out how to integrate the change into operations.
- **Secure leadership support (and resources):** Underfunded innovations will generally fail. To avoid this problem, rigorously screen ideas and make sure that executive leaders support them and are willing to dedicate the resources needed to succeed.
- **Avoid fads:** Innovation is not about following the latest fad or trend, but rather needs to be a core strategy of the organization.

- **Learn from others:** Key staff, including physicians and front-line workers when possible, should visit pioneering organizations to see how innovations work firsthand, including how they affect patient flow and workflows.
- **Monitor and share data on program impact:** Constant monitoring and data sharing help to maintain enthusiasm for innovation among key stakeholders.

Innovations in Quality, Safety, and Care Delivery: The Essential Ingredients for System Success in 2012

Robert M. Wachter, M.D., professor and associate chairman of the Department of Medicine at the University of California, San Francisco, built on Dr. Coye's presentation by reviewing “on-the-ground” innovations that can be put in place. He stressed the need to learn from other industries, such as aviation, that have achieved great success in terms of safety, and encouraged healthcare organizations to use information technology more effectively and to create systems to manage complexity. Dr. Wachter shared eight lessons on innovation, and used two innovations—hospitalists and the checklist—to illustrate these lessons:

- **Recognize the possibility of big-time change:** Simple, good ideas can make a huge difference at the grassroots level, as illustrated by the rapid spread of hospitalists and the use of a checklist to cut the incidence of central line-associated bloodstream infections in half.
- **Anticipate pushback:** Innovations that truly change things will generate pushback, particularly those that reduce costs, since one person's cost savings is another person's income.
- **Expect unintended consequences:** Innovators should conduct a “pre-mortem” to identify potential unintended consequences, and then develop strategies to prevent or mitigate those that are negative (while remembering that some can be positive).
- **Remember that innovation does not need to be complicated:** As noted, some of the best ideas are quite simple, including the hospitalist and checklist ideas.
- **Emphasize bottom-up change:** Change that comes from within the organization will be more effective and long-lasting than change dictated from “on high.”
- **Make the burning platform clear (and real):** As Dr. Coye mentioned, all stakeholders must understand and accept the burning platform driving the need for change.
- **Look locally first:** In many cases the seeds of innovation exist within a unit or department of an organization. It can often be

easier to identify and spread these innovations than to import ideas from distant, unfamiliar places.

- **Understand and address physician culture:** Innovations cannot succeed if physicians are not on board.

Dr. Wachter also advocated the application of complexity theory to innovation, and reviewed a leader's role in creating the right conditions for innovation, including the burning platform, skill-building among physicians, a clear message that failure is not an option, celebration of successes, and learning from defeats.

Going Beyond Medicine to the Best Care Possible

Ira Byock, M.D., director of Palliative Medicine at Dartmouth-Hitchcock Medical Center and professor at the Geisel School of Medicine at Dartmouth, challenged hospital and health system leaders to take innovation to a new level, with the goal of going

beyond medicine to deliver

the best care possible to

those who are severely ill.

Achieving this goal requires

a different way of thinking

about illness and the dying

process, which are only

partly medical. The goal

should be to provide the

best care possible, not just

in terms of treatment, but

also in terms of the experi-

ence of the patient and

family, including their feel-

ings, hopes, and fears. So in

addition to providing care

consistent with evidence-

and consensus-based recom-

mendations, standards, and

guidelines (which apply to

curative, life-

prolonging, and disease-

modifying treatments),

providers need to

promote comfort and

quality of life in a manner

consistent with

individual and family

values and preferences

that will, by defini-

tion, be different for

each person.

Achieving this goal

requires upfront

preparation and

discussion with

all patients, a

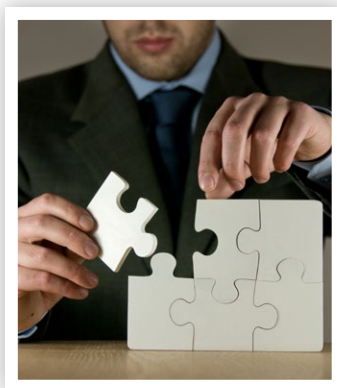
process that can

be quite difficult,

since most

physicians are

uncomfortable



The Future of Healthcare: Digitizing Human Beings—A New Medicine

Eric J. Topol, M.D., director of Scripps Translational Science Institute, discussed the ability to “digitize” individuals, which represents a newfound capability over the last decade that promises to be a disruptive innovation, yet is not generally known about and/or accepted within the medical community today.

Between 2001 and 2010, various “smart” devices—first music players followed by phones and more recently tablets—have had

a profound impact on the way people communicate. Many social networks have been set up in the field of health, including sites that bring together patients and families facing similar medical challenges. Millions of patients use such resources, many finding them to be valuable sources of information on how to cope with illness.

Digital technology in particular has advanced at an amazing pace within medicine. In the last decade, advances have included genomic sequencing, social networks, super-computing, and cloud computing. The coming together of these technologies promises to create the largest “shake-up” in the history of medicine, just as it has in other arenas, even resistant ones such as education. Within medicine, these technological advances mean that doctors can now have a “pixilated” view of humans that will become much more precise over time. Examples of technologies that allow for such digitalization include the following:

- **Home electroencephalogram:** Worn at night, this low-cost device senses brain waves during sleep and prints the resulting data on a nightstand clock or mobile device (which can then relay the information to a doctor or elsewhere). This information helps to address sleep disorders and other sleep-related issues.
- **Automatic blood pressure and glucose readings:** New devices that connect to smartphones can be used to record blood pressure much more frequently, with data automatically recorded and sent to others if so desired.
- **Home-based electrocardiogram (EKG):** A smartphone application allows someone to perform his or her own EKG.
- **“Laboratory on a chip”:** Applications are being developed to turn a smartphone into a “laboratory on a chip,” with patients wearing patches that monitor blood chemistry.
- **Digitized pills to promote compliance:** Digitized pills have been created that contain a small, digestible computer chip that sends a signal after coming in contact with gastric juices.
- **Pocket imaging devices:** While the stethoscope has managed to survive for 200 years, its usefulness may soon come to an end as a result of high-resolution ultrasound and other pocket-sized imaging devices that provide better images and more information.

Additional applications are on the horizon with equally disruptive capabilities, such as the ability to monitor lung health or determine if an asthma attack is imminent by having patients blow into the microphone on their smartphone. The digitizing of humans has profound implications for medicine in general and for key stakeholders within the healthcare industry, as outlined below:

- **“Squeezing out” the doctor and hospital:** The ability to digitize humans may make the in-person office visit a thing of the past. The advent of high-tech home monitoring equipment will also significantly reduce the need for hospital stays.
- **Transition from population-based to personalized medicine:** Many healthcare organizations are in the midst of a transition from treating individuals to managing population health. However, the advent of digital information—including genomics—promises to change that approach, stimulating a transition to a more personalized, customized approach based on a person's unique situation.

- **Need to embrace consumerism:** Physicians must accept and even embrace the fact that consumers can, should, and will have access to much more information than in the past. Patients will look at their physicians in a new way, seeing them as partners who can help them make decisions based on their values and preferences.

Innovations That Drive Performance at Geisinger Health System

Earl Steinberg, M.D., M.P.P., executive vice president of Innovation and Dissemination, and chief of Healthcare Solutions Enterprise at Geisinger Health System, discussed various innovations that drive performance at Geisinger. While Dr. Steinberg agreed with Dr. Topol that the future will feature an enhanced ability to personalize treatment (and that this ability is a good thing), he emphasized the critical need for health systems to do as much as possible to manage the health of populations.

To that end, Geisinger focuses on “process” innovations that promote the consistent, reliable delivery of care through standardized processes and workflows. The goal is to have as little variation as possible when best practices are known, which stands in contrast to most organizations where practice patterns and processes vary considerably. Key strategies for redesigning processes are to emphasize quality and efficiency, standardize production functions, eliminate unnecessary steps, automate as much as possible, delegate to non-physician staff (letting everyone practice at the top of his/her license), support agreed-upon workflows through the electronic medical record, and activate and engage the patient and family.

One program that illustrates this approach is ProvenCare®, Geisinger’s name for the consensus- and evidence-based protocols that guide acute care and the management of chronic conditions. This approach has been used successfully with patients undergoing coronary artery bypass graft surgery and with

newborns potentially in need of neonatal intensive care. It has also been used in managing chronic conditions such as diabetes and in improving the provision of preventive care and screening services. A variation on this program has improved care for the sickest patients through use of a specially trained nurse embedded in primary care practices.

As noted, Geisinger focuses on basic building blocks that allow the organization to perform well on the front lines of care. The following unique characteristics largely account for the system’s success:

- Strong physician leaders paired with administrative partners (a “dyad” leadership structure)
- An organizational culture that prioritizes quality, efficiency, and innovation
- Employees who embrace the culture
- Integration of the clinical enterprise and the health plan
- A team and system orientation
- Heavy investment in infrastructure, including information technology and data analytics
- Use of separate innovation and transformation units
- A focus on workflow and reliability
- Emphasis on performance measurement and feedback
- Aligned incentives throughout the organization

Recognizing that other organizations could benefit from what Geisinger has done, the system’s board approved formation of a new company, xG Health Solutions, that licenses intellectual property from various parts of Geisinger, with the goal of teaching other delivery systems how to implement and operate these innovative programs, and in some cases doing it for them. xG Health Solutions offers a variety of services that support the provision of value-based care, including population health data analytics, case management, and consulting services.

It's a New Game Now: The Evolution of Innovation at UCLA

Molly J. Coye, M.D., M.P.H., chief innovation officer at UCLA Health System, reviewed the lessons learned from her organization's experiences promoting and adopting innovation within a large organization.

SINCE SEPTEMBER 2010, DR. COYE HAS served in a unique role that does not exist in many organizations. While a few pioneering organizations (such as Humana) have had an innovation officer for several years, a few large health systems have created this position only recently. UCLA was relatively early in adopting the trend, as leaders recognized that innovation can accelerate needed changes, often through disruptive ways that are critical to successful transformation.



Transforming UCLA through a Process for Innovation

UCLA's commitment to innovation began before Dr. Coye's arrival. In 2008, the CEO (a psychiatrist) took over the health system after previously serving as head of UCLA's neuropsychology institute. In that job, he ran a department in which half the patients were there involuntarily, which, not surprisingly, led to low morale among both patients and staff. Yet within 18 months of his arrival, the patient experience and patient and staff morale had completely turned around, with 90 percent of patients stating they would return to the institute if they required inpatient care again and they would recommend that others go there as well.

This success led to the psychiatrist's promotion to CEO of the Ronald Reagan UCLA Medical Center, a well-known institution with world-renowned researchers. Upon his arrival, he discovered that the facility could best be described as a "ratty old building." In addition, patients often did not have needed supplies and services (e.g., the hospital did not have enough bedpans), and staff routinely exhibited a condescending attitude toward patients, as if they were "lucky" to be at such a well-known facility. The new CEO committed to turning around the patient experience at the medical center. Through the CI Care initiative (CI stands for "continuous improvement"), the medical center's performance on patient satisfaction metrics rose from the 38th percentile to number-one in the country among academic medical centers (a position that UCLA has held for three years in a row). UCLA now ranks between the 96th and 98th percentile among all hospitals in the country. Even with this performance, however, roughly 20 percent of patients do not have a wonderful experience at the hospital, meaning there is still room for substantial improvement.

Strong leadership drove this turnaround, combined with a commitment to a process that everyone understood (in part due

to it being regularly reinforced by leaders). Every two weeks, the top 200 managers at the medical center conduct CI Care rounds in which they meet with patients (often on their beds or in a private room) and hear firsthand about their experiences. Managers hear about problems and learn what else can be done to improve the patient experience. These rounds provide real-time feedback and help keep the managers "grounded" in their work. Initially done only in the inpatient setting, rounds have now been expanded to primary and specialty ambulatory clinics as well. At the time they were introduced, UCLA's leaders did not think of the rounding

process as "innovative," but in hindsight it was. In fact, this rigid commitment to continual, real-time feedback allowed UCLA to move forward at an accelerated pace. Interestingly, many of the insights gleaned from the rounding cannot be considered novel or pioneering. In most cases, the problems that surface are familiar ones, and the potential solutions do not seem particularly novel, as they often draw on the experiences of others who have already addressed the problem.

"Despite the name, 'innovation' need not be invented. Ninety percent of what needs to be done to transform the U.S. health system and our organizations can be 'borrowed' from others...but that often goes against the grain of someone with the title 'chief of innovation.'"

—Molly J. Coye, M.D., M.P.H.

Applying Innovation throughout the UCLA Health System

Since her arrival, Dr. Coye has worked to apply lessons from the medical center turnaround to the entire health system. Like at the medical center, most of these "innovations" are not new—rather, they come from others, with some customization to meet local needs and circumstances.

Large, historically successful organizations often face challenges when it comes to innovation, as there are often entrenched, "dug-in" interests that resist doing something a different way. Inertia can become a powerful force within these

enterprises. As in the movie *Moneyball* (Billy Beane, general manager of the Oakland Athletics baseball team, faces major resistance when he tries to institute a new system for evaluating the value and talent of prospective players), large organizations often resist change and miss important opportunities, leaving innovation to smaller, non-traditional players. In fact, history is full of market-dominating organizations that failed to foresee innovation, instead leaving it to smaller, more nimble companies. For example, leaders at CBS did not see the same opportunities as did those at CNN. IBM missed the opportunity to create an operating system for personal computers, leaving the start-up company Microsoft to do so. Other large companies also missed out on important opportunities, such as General Motors (which largely missed the move to minivans), Sotheby's (which got upstaged by online auctioneer eBay), and Borders Books (which ceded online book sales to Amazon.com). More recently, the now-dominant Microsoft has missed major opportunities seized by Apple, which has also become dominant and faces threats from new and perhaps more nimble organizations. A similar phenomenon exists in the healthcare industry. In Los Angeles, for example, many large hospitals failed to see the competitive threat posed by independent physician organizations and new types of health plans and insurers.

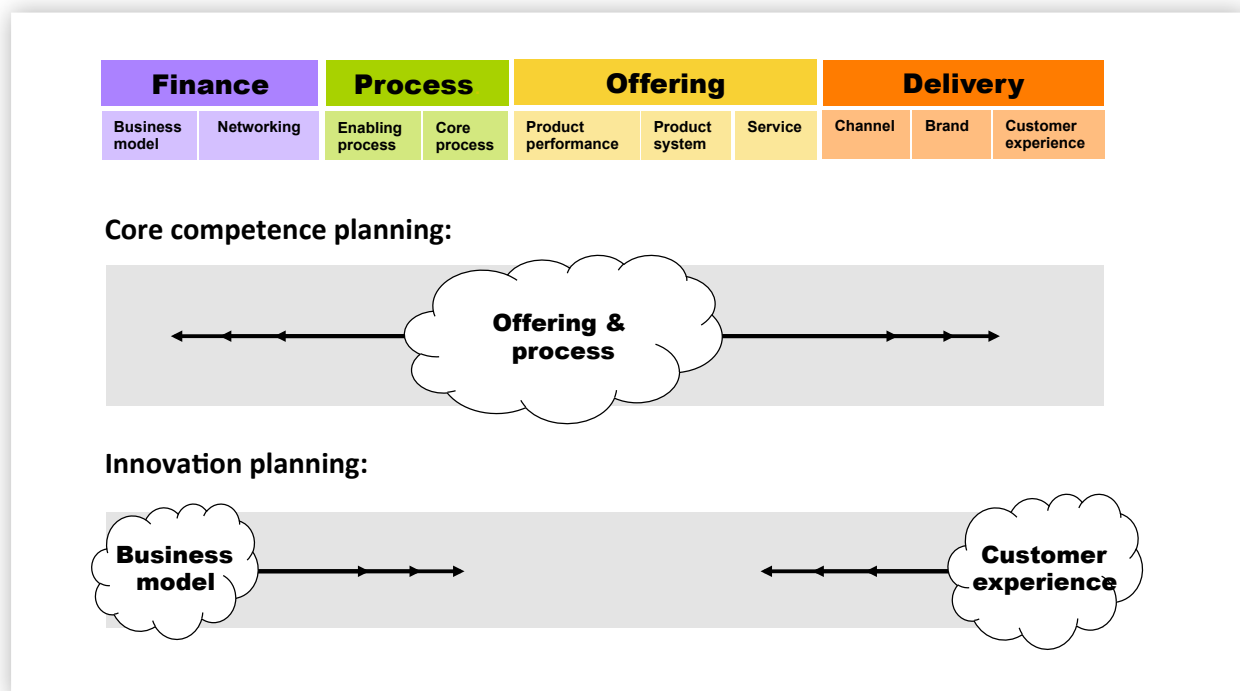
Avoiding this type of inertia and resistance to change is not easy. Rather, it takes strong leaders who are committed to an ongoing, substantial, concerted effort to scan the environment for new opportunities and possibilities, and to take advantage of them when they come along. UCLA Health System has begun to take this approach and to reap the rewards of doing so. The effort

began with the adoption of programs pioneered elsewhere—by the Virginia branch of Bon Secours Health System. Bon Secours put in place a variety of initiatives to control healthcare expenses for its 10,000 Virginia employees, turning a projected 12 percent increase in costs into a 2 percent decline. UCLA has now adopted some of these practices, customizing them to local circumstances.

Success with this type of approach depends on the ability to organize a process and a willingness to do things differently than they have been done in the past. The goal is to find credible programs that have worked in other institutions and adapt them to local circumstances. These programs need not be tested through rigorous controlled trials (which may take three years to complete), but rather should be constantly evaluated and refined as appropriate on a rapid-cycle basis that can be completed in six months or less.

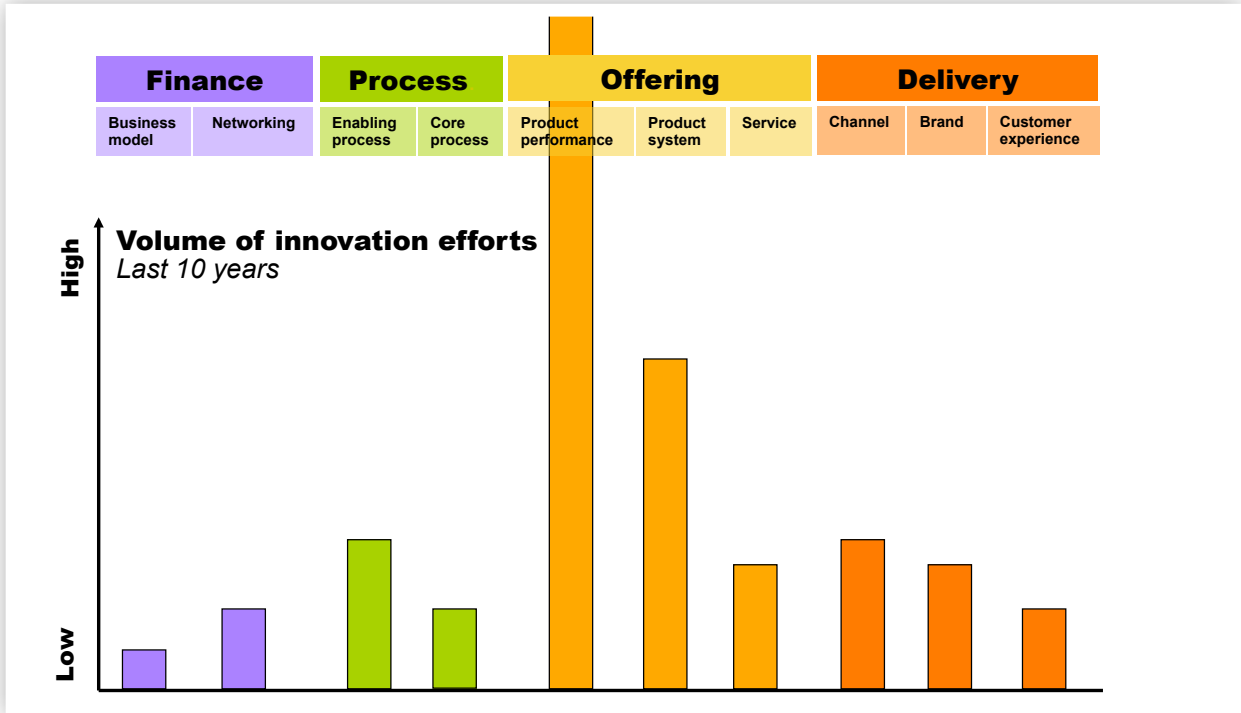
Joseph Schumpeter, often referred to as the father of modern economics, distinguished between an “invention” and “innovation.” An invention requires the spending of cash to create a new idea or product. By contrast, an “innovation” involves taking ideas and turning them into cash, or in the case of healthcare organizations, using them to make progress against established performance targets related to patient satisfaction and other areas. This definition distinguishes between the creation of a new product or service (invention) and the adoption of new ideas or even business models within an organization (innovation). As Exhibits 1–3 illustrate, there are various types of innovation, including those related to finance, processes, product offerings, and delivery. Over the last 10 years, however, large healthcare organizations have focused disproportionately on the middle, emphasizing new

Exhibit 1: Using Innovation Types Strategically



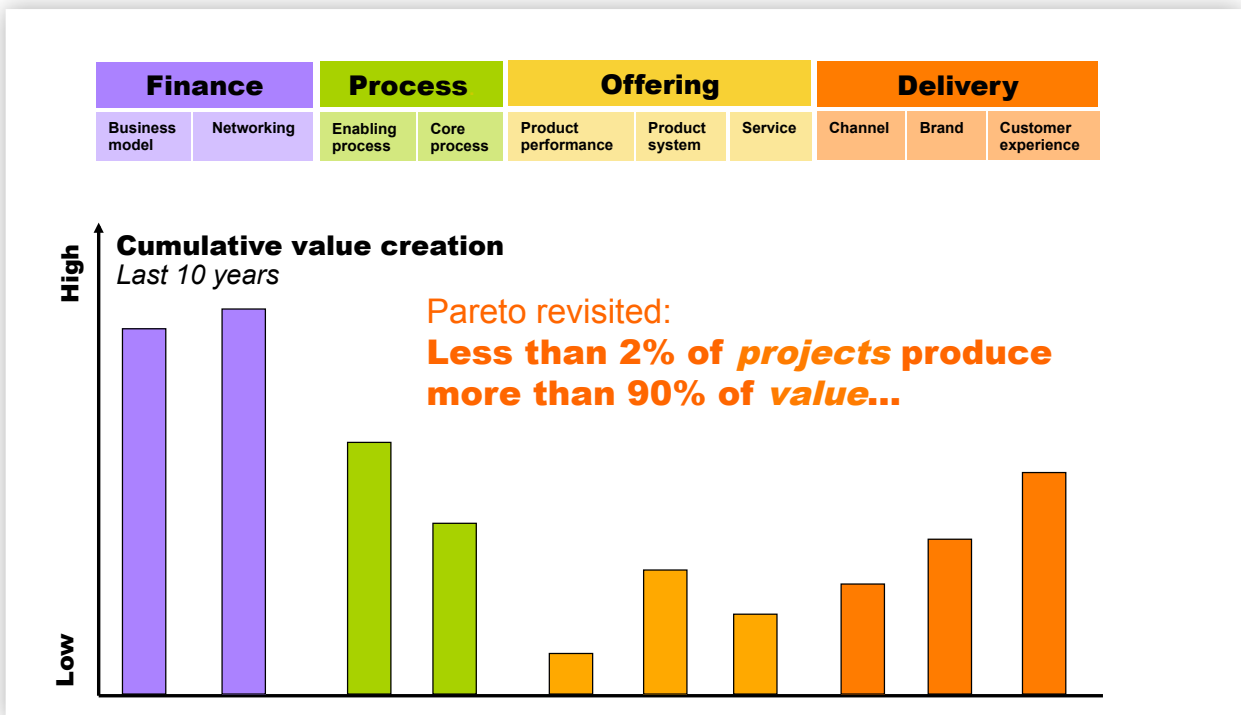
Source: The Doblin Group.

Exhibit 2: Leading to a Shift in Value Creation



Source: The Doblin Group, Doblin analysis.

Exhibit 3: Leading to a Shift in Value Creation (continued)



Source: The Doblin Group, Doblin analysis.

products such as heart valves or hip implants. However, the projects on the edges—those focused on new financial arrangements or delivery models—create the lion’s share of the value.

The key is not to fall in love with a particular gadget or high-tech “gizmo.” As **Exhibit 4** illustrates, innovations come in a variety of forms, ranging from new business models to entirely new customer experiences. For example, Nike created a whole new distribution channel (NikeTown) to connect with customers in resort and tourist cities, an approach that helped make Nike products “glamorous” to young children. Virgin Airways completely reinvented itself to become a “hip” airline, while Lexus became the first organization to create an entirely new customer experience.

First Step: Creating the Burning Platform

Like most academic medical centers, UCLA faces a large, never-ending set of strategic challenges, as outlined in **Exhibit 5**.

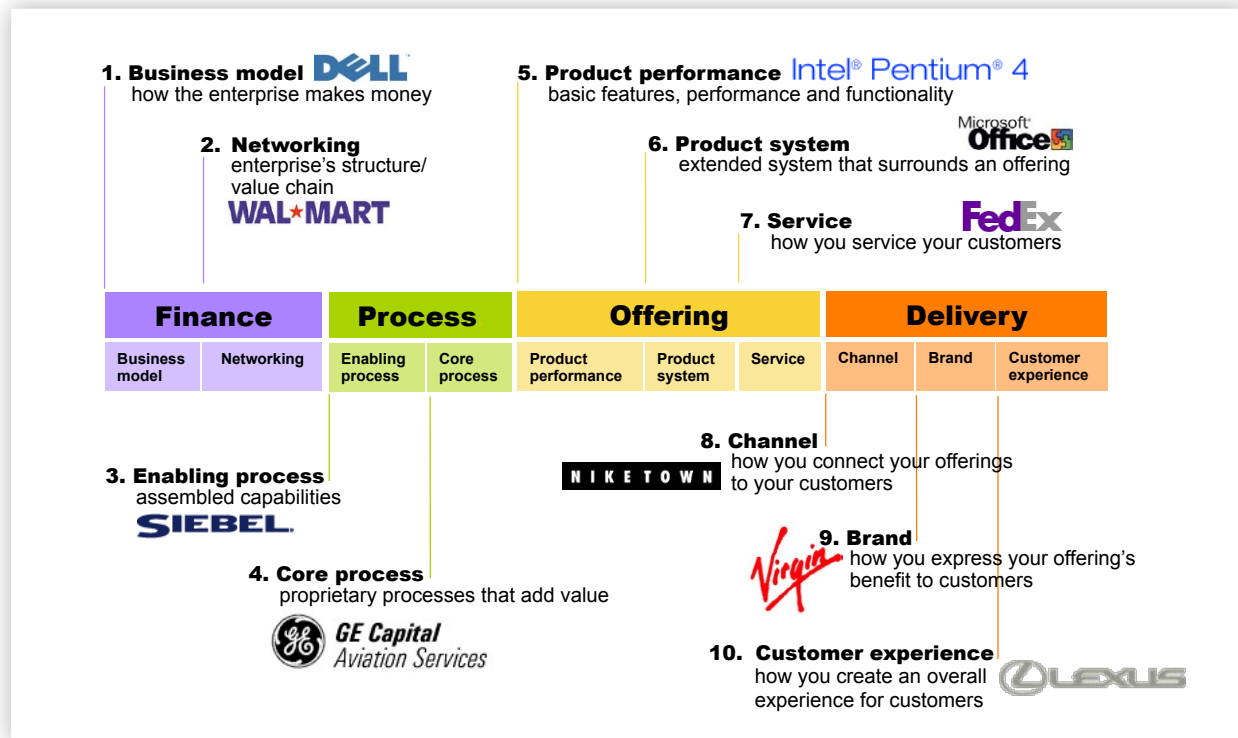
To illustrate the severity of these challenges to key stakeholders within the organization, UCLA contracted with an outside company (Navigant) to work with internal finance and strategic planning staff to model what would happen if the organization maintained the status quo. While UCLA is doing well today, this analysis made it clear that impending cuts to Medicare reimbursement and other changes would quickly lead to financial problems, with all financial reserves exhausted shortly after 2015.

Like other academic medical centers (some of which are already going out of business), UCLA had no choice but to transform itself.

Additional analyses (depicted in **Exhibit 6**) made it clear, moreover, that no single strategy could solve the organization’s problems. For example, cutting unit costs alone would not be enough, nor would aggressive marketing of the organization’s advanced specialty care services (this approach was the first thing suggested by specialists within the organization, who view their services as one of UCLA’s unique core assets). In fact, even a doubling of specialty volumes (an unrealistic goal) would delay the organization’s financial reckoning by only about a year. Similar conclusions were reached about the merits of substantially increasing primary care capacity and creating an insurance product.

This analysis served to create a burning platform that laid out a realistic picture of what the organization faced in the absence of major transformation. It helped to turn the conversation around internally, convincing key stakeholders of the need for comprehensive changes. In fact, the only approach that seemed likely to work was to embark on a wide range of strategies, including an ambitious plan to create a larger provider network and a cost-cutting program designed to take 20 to 30 percent of all costs out of the system within the next two or three years. (This approach is reflected in the top line of **Exhibit 6**.) This analysis set the stage for major innovation, as it laid out explicit targets of where the organization needed to go and how it would attempt to get there.

Exhibit 4: 10 Types of Innovation: It’s Not Just Products



Source: The Doblin Group.

Exhibit 5: Analyzing the Core Strategic Challenges

Threats to Clinical Revenues

- ✓ Medicare payment reductions: lower base payments, lower market basket adjustments, productivity adjustments (all in the ACA)
- ✓ P4P: nonpayment for readmissions or HAI
- ✓ State Medicaid funding reductions
- ✓ Commercial payment following governmental lead
- ✓ Disproportionate Share Hospital (DSH) payment reductions
- ✓ MAP Clinic Patient/Payer pushback and SGR “Doc Fix”
- ✓ Increased governmental and regulatory burden

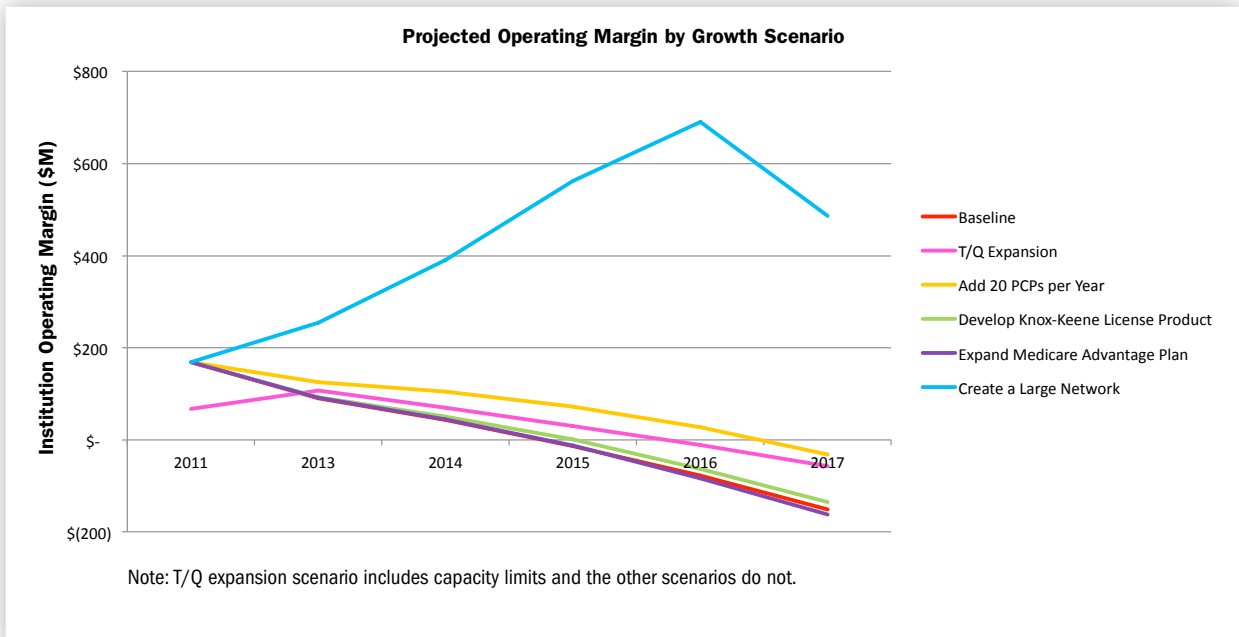


Threats to Medical Education and Research Revenues

- ✓ Reduced IME payments
- ✓ Limits on tuition income
- ✓ Reduced grants and contracts (both funding and wage limits)
- ✓ Potential GME reallocation
- ✓ Unfunded UC costs (\$200M by 2017 for UCLA)

Source: Navigant.

Exhibit 6: Investigating Strategic Options—and Discovering the Urgency of Innovation



Source: Navigant.

Examples of Innovation at UCLA Health System

UCLA leaders believe that innovation will serve to accelerate the organization's transformation from a fee-for-service (FFS) to value-based system. To that end, UCLA has embarked on an ambitious effort to pioneer innovations that promote achievement of the national goals for healthcare reform through the Institute for Healthcare Improvement's "Triple Aim,"² which seeks to improve the patient care experience, enhance population health, and reduce the costs of care. UCLA has added a fourth aim as well—improving the experience of those who provide care to patients, as the only way to sustain transformation is to make the experience satisfying and engaging for everyone involved. To that end, UCLA measures physician and staff satisfaction with all new initiatives; the goal is to generate strong enthusiasm for the changes, rather than just tolerance.

As shown in **Exhibit 7**, these innovations span the entire continuum of care (primary, secondary, tertiary, quaternary), and involve a variety of affiliations and partnerships with key stakeholders.

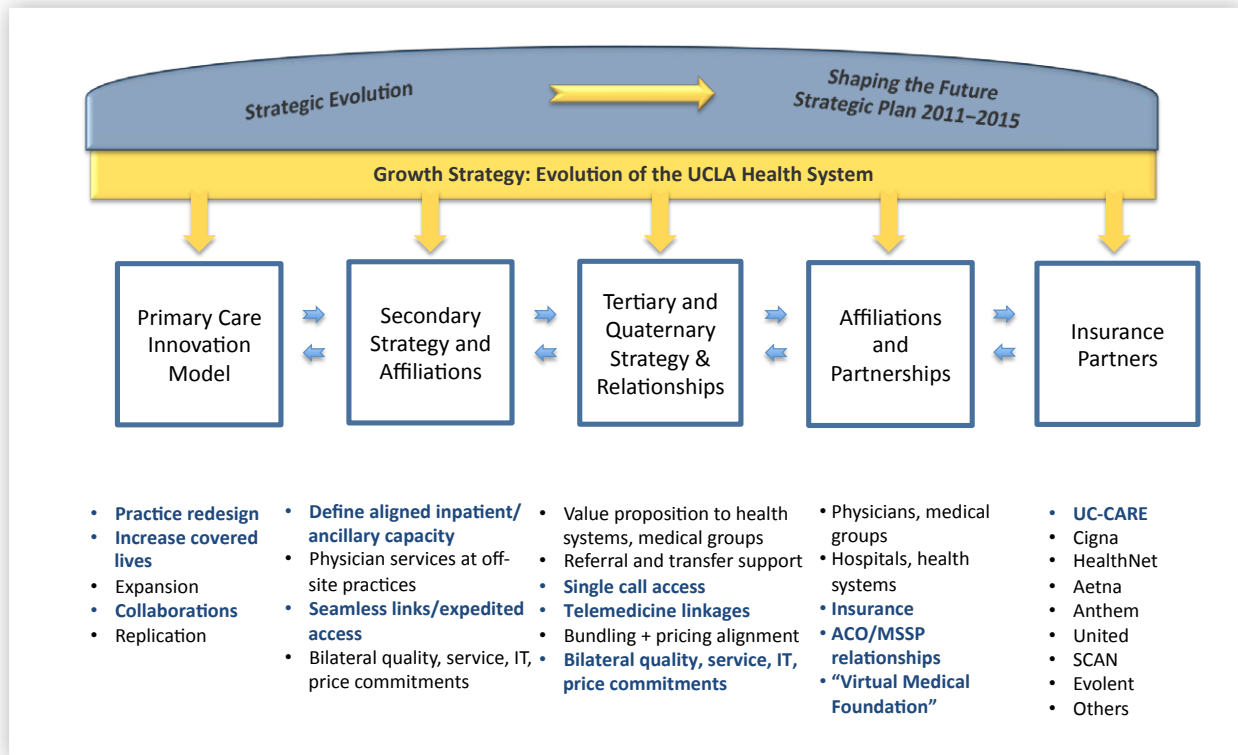
Examples of a handful of UCLA's most successful innovations include:

- In-home palliative care:** UCLA is adopting and customizing a program pioneered by Kaiser Permanente Southern California in which community-based providers (often social workers) begin having conversations with seriously ill patients and their families and caregivers in the home about how they want to handle end-of-life care when the time arrives. The program does not

require that a doctor testify that a patient has six or fewer months to live. Rather, the goal is to have these conversations earlier, rather than waiting for the patient to end up in the hospital or clinic. A well-controlled trial at Kaiser found that this approach reduced the net costs of care by 30 percent in the last year of life while also improving quality of life for patients and families. Kaiser is now spreading the innovation throughout the region and may adopt it in other parts of the country as well. Dr. Coye's innovation group is now adapting this innovation to the unique needs and environment at UCLA.

- Electronic access to specialists:** UCLA is building tight relationships with community hospital systems, helping them to provide specialty care within their organizations through electronic technologies. This approach serves to strengthen partnerships with these hospitals, rather than the traditional conflict where academic medical centers are accused of trying to "steal" patients from community hospitals. (UCLA leaders have no interest in alienating these potential partners, particularly since the medical center does not have the capacity to care for these patients.) For example, UCLA plans to adopt use of the e-ICU (electronic intensive care unit) program that monitors ICU beds in remote hospitals through a central hub staffed by specialists. The hub allows for real-time electronic audio and video feeds, with clinicians in the hub even able to read changes that occur on a patient's monitor. They can also communicate with the patient and family members, and can support ICU nurses by giving them instant access (with the push of a button) to an advanced

Exhibit 7: UCLA Strategic Response



Source: UCLA Health System.

² For more information, visit www.ihl.org.

specialty nurse in critical care nursing and an intensivist physician. This program has reduced ICU mortality by an average of 20 percent in more than 40 hospitals and health systems that have adopted the technology in the U.S.; currently 13 percent of all ICU beds in the country are monitored with the tele-ICU. UCLA plans to implement this in a collaborative approach that will offer the program to hospitals throughout the state, in collaboration with intensivists at the University of California, Davis and other participating hospitals. Community hospitals benefit from this approach, as they get to keep more severely ill patients (and the revenues they generate) without adding significant costs. UCLA benefits by leveraging its expertise and avoiding the need to build additional ICU capacity. Constructed appropriately, this approach can serve as an enduring platform that facilitates long-term collaboration among hospital partners. In addition to the e-ICU program, UCLA has a variety of other programs within an “e-Access hub” that allows clinicians to talk to patients and doctors at remote facilities.

- **Retail clinics:** UCLA recently signed a contract with CVS Caremark to co-brand its MinuteClinic facilities in Los Angeles County and establish UCLA physicians as medical directors for the clinics. Research suggests these clinics offer high-quality, guideline-based care, with nurses working according to evidence-based protocols. Most clinic patients have insurance, and roughly half do not have a primary care provider (creating the potential to generate new referrals for UCLA primary care clinics). These clinics can interface electronically with UCLA’s EHR, allowing UCLA to know when one of its patients goes to the clinic, and allowing clinic staff to see the hospital records of patients they are serving. Rather than building its own retail network, UCLA leaders feel that this strategy allows them to meet the growing demands of patients for convenient, timely primary care. A recent study found that MinuteClinics offer better quality and generate higher levels of satisfaction than the typical primary care office.

Going forward, UCLA will continue to build on these innovations. For example, within the e-Access arena, UCLA will be putting in place a system to allow a primary care doctor to securely email a specialist for advice about a patient. Depending on the situation, the specialist can give the physician advice on how to treat the patient and/or suggest that the patient be referred for a specialty visit. This approach has been used at Mayo Clinic (in internal medicine) and within the San Francisco Medicaid program (in 18 different specialties), and has led to a 40 percent decline in the number of patients needing a specialty visit. At Mayo, it helped to free up time slots in capacity-constrained programs. UCLA is also considering contracting with an outside company, Teladoc, that employs physicians who take patient phone calls and use protocol-driven questions to determine the appropriate next course of action, such as no action required (i.e., the patient is fine or will be fine without further medical intervention), an office visit, or an emergency department (ED) visit. This approach has been adopted by a number of employers, leading to a 50 percent drop in absenteeism. The company now offers the same service to hospital systems that do not have enough capacity to handle demand for primary care services. Using these and other types of

innovations, the average primary care doctor will one day be able to handle between 6,000 and 10,000 patients, as each physician will be supported by sophisticated technology and a team of non-physician providers.

The ultimate goal is to create a “neural network” for regional distribution of specialist expertise, with UCLA being the leader of the network in some areas and a partner in others. The network will offer electronic consultations and referrals; supervised training and education; tele-health “hubs” reaching into the home and community; and remote management of services or institutions through the extension of expertise and leadership. It will be supported by advanced technology, a clinical data repository, clinical decision support, and a workforce with new knowledge, skills, and capabilities.

“Leaders must be humble...do not assume you offer the best care possible or that every patient wants to go to a physician. Observe what patients do when given the opportunity, and liberally borrow others’ ideas.”

—Molly J. Coye, M.D., M.P.H.

Lessons Learned

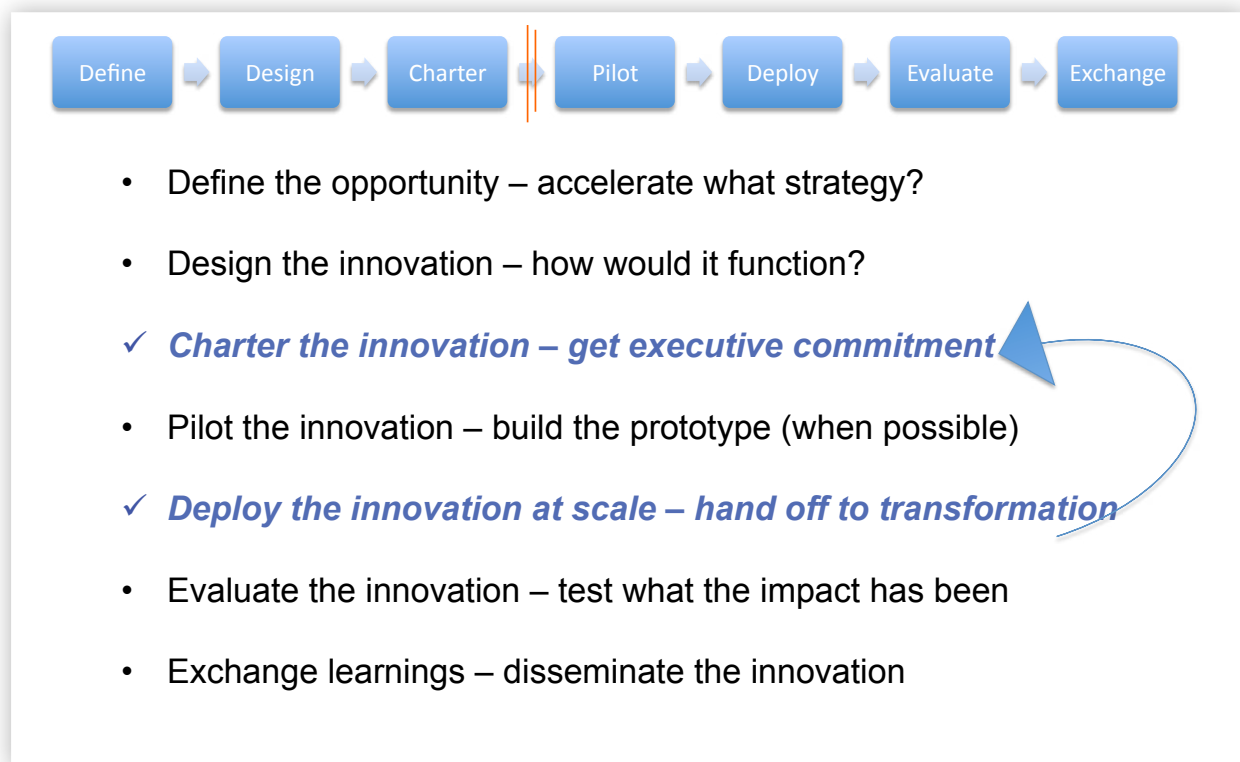
Dr. Coye’s experiences have generated a variety of lessons learned on how best to use innovation to transform a large organization:

- **Create the burning platform:** Everyone must understand and buy into the need for major transformation. Without this buy-in, innovative ideas will stall. The goal is to create an “instinct” within the organization for new ways of doing things, something that has been foreign to staff in most large entities.
- **Think process, not product or technology:** Innovation should be thought of as organizing a process rather than inventing a new product or technology. Innovation often stems from a new business model or service plan, not a “flashy” new gadget.
- **Steal shamelessly:** The process involves constantly scanning the horizon for the best performers and “stealing shamelessly.” Many best performers will be honored to see others using their ideas.
- **Partner with operational staff:** Innovation should not be the lead or endgame. Rather, innovate in partnership with operational staff members who will have to carry out the innovations, including the chief operating officer, the head of nursing, and nurses with front-line responsibility.
- **Address stakeholder concerns:** Key stakeholders may have legitimate concerns, and the failure to address them can doom an innovation from the start. For example, UCLA faced pushback from clinic physicians who were concerned that e-Access programs could cut patient volumes and hurt their revenues. Leaders agreed to keep these physicians “whole” financially if this problem materialized. To date, revenues have held up, but the commitment from leaders convinced the doctors to support the programs. Now primary care doctors are proactively approaching UCLA because they want to join the system, which offers better options for them than other organizations.

- **Create transformation groups:** Do not hand off innovations directly to busy operations staff. Rather, create the capacity for transformation through dedicated project staff charged with figuring out how to integrate the change into operations. For example, Geisinger Health System has a dedicated transformation office that includes staff with expertise in data and analytics, quality and safety, and finance. This group is “on the hook” for actually accomplishing the change, something that those in the innovations group are not in a position to do.
- **Secure leadership support (and resources):** Underfunded innovations will generally fail. To avoid this problem, rigorously screen ideas and make sure that executive leaders support them and are willing to dedicate the resources needed to succeed. (**Exhibit 8** outlines the life cycle of a lasting innovation at UCLA, which includes the key step of getting executive commitment.)

- **Avoid fads:** Innovation is not about following the latest fad or trend; it must be a core strategy of the organization.
- **Learn from others:** Key staff, including physicians and front-line workers when possible, should visit pioneering organizations to see how innovations work firsthand, including how they affect patient flow and workflows.
- **Monitor and share data on program impact:** Constant monitoring and data sharing help to maintain enthusiasm for innovation among key stakeholders. For example, Dr. Coye is a member of a small executive group that runs the UCLA Health System. She routinely shares key data with this group demonstrating the impact of various programs and how they help the organization meet key strategic objectives. Data sharing should also extend beyond the executive group to involve other key stakeholders, including front-line employees who will be energized when they see how innovations are making a difference for patients.

Exhibit 8: The UCLA Innovation for Impact Life Cycle



Source: UCLA Health System.

Innovations in Quality, Safety, and Care Delivery: The Essential Ingredients for System Success in 2012

Robert M. Wachter, M.D., holds several positions at the University of California, San Francisco (UCSF), including professor and associate chairman of the Department of Medicine. He is a national expert in patient safety and quality, and is currently the chair of the American Board of Internal Medicine. Dr. Wachter built on Dr. Coye's presentation by focusing on "on-the-ground" innovations that can be put in place.

Learning from Other Industries

The Institute of Medicine recently released a new report entitled, *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*. While not unearthing any major new revelations, the report emphasizes the ability of those in the healthcare industry to learn from other industries, and includes a high-quality graphic (depicted in Exhibits 9 and 10) that highlights two key strategic imperatives: to use information technology (IT) more effectively and to create systems to manage complexity. Other industries have leveraged these strategies to a much greater extent than have healthcare organizations, and—while there are key differences that must be respected—there is much that healthcare organizations can learn from airlines and companies in other industries about achieving 100 percent reliability with respect to safety and service.

However, like healthcare, companies in other industries do not get it right all the time. Any industry that involves people, complexity, and time and money pressures will inevitably run into problems. The healthcare industry hardly has a monopoly on problems, nor does it do everything wrong—in fact, the system does many things quite well. However, the stakes are higher when it comes to healthcare, as errors can end up killing someone.

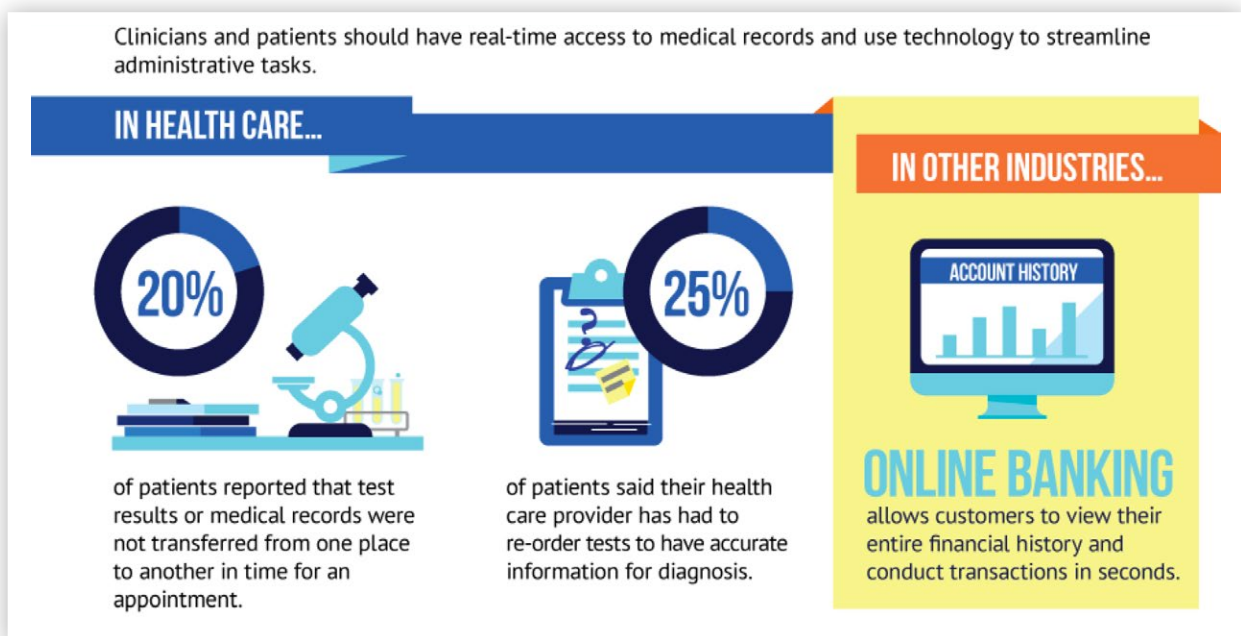
Eight Lessons on Innovation

Dr. Wachter shared the following eight lessons on innovation, including illustrative examples whenever possible.

Recognize the Possibility of Big-Time Change

Simple, good ideas can make a huge difference at the grass-roots level, as illustrated by the rapid spread of hospitalists (discussed later in this report). The key is to focus on ideas that can

Exhibit 9: Use Information Technology More Effectively



be implemented within an organization that do not require large capital outlays for IT systems or physician practices. The most powerful ideas often involve relatively simple reorganizations in the way work gets done (e.g., schedule changes) and/or the use of low-cost tools such as checklists.

Anticipate Pushback

Innovations that truly change things will generate pushback, particularly those that reduce costs, since one person's cost savings is another person's income. Few innovations make everyone happy, but pushback can be anticipated and addressed. Physicians are most likely to object, as many innovations that seek to pull costs out of the system threaten physician income and/or their beliefs in how medicine should be practiced.

Expect Unintended (Sometimes Positive) Consequences

Innovators should conduct a "pre-mortem" designed to identify potential unintended consequences, and then develop strategies to prevent or mitigate those that are negative. While most people focus on negative unintended consequences, some can be positive. One example is the unanticipated positive effects of placing a hospitalist on the neurosurgery service at UCSF, which is described in more detail below.

Remember That Innovation Need Not Be Complicated

As noted, some of the best ideas are quite simple, including the hospitalist and checklist ideas discussed below. Another example comes from UCSF, which put in place a new structure for root-cause analysis (RCA) that connects front-line personnel with senior leaders. Enacted six years ago, this change transitioned

RCA from an *ad hoc* process organized only after an untoward event to a weekly process done during a scheduled hour-long meeting. Senior leaders routinely attend these sessions, as they are now planned events. (They generally could not participate in RCA in the past, as it was never clear when it would occur.) As a 600-bed institution, something deserving of a RCA can be expected to happen nearly every week (if an RCA is not required, then the meeting is simply cancelled). This simple scheduling change has transformed the process. Senior leaders, chief medical officers, senior nursing officers, and other leaders now routinely hear about and understand problems firsthand (rather than reading about them in a report). In addition, this approach sends a strong signal throughout the organization about the importance of analyzing and fixing problems in a timely manner. The change also allowed for the creation of a standing committee to conduct RCAs, which has helped the hospital improve the process, including recognizing patterns and systemic problems.

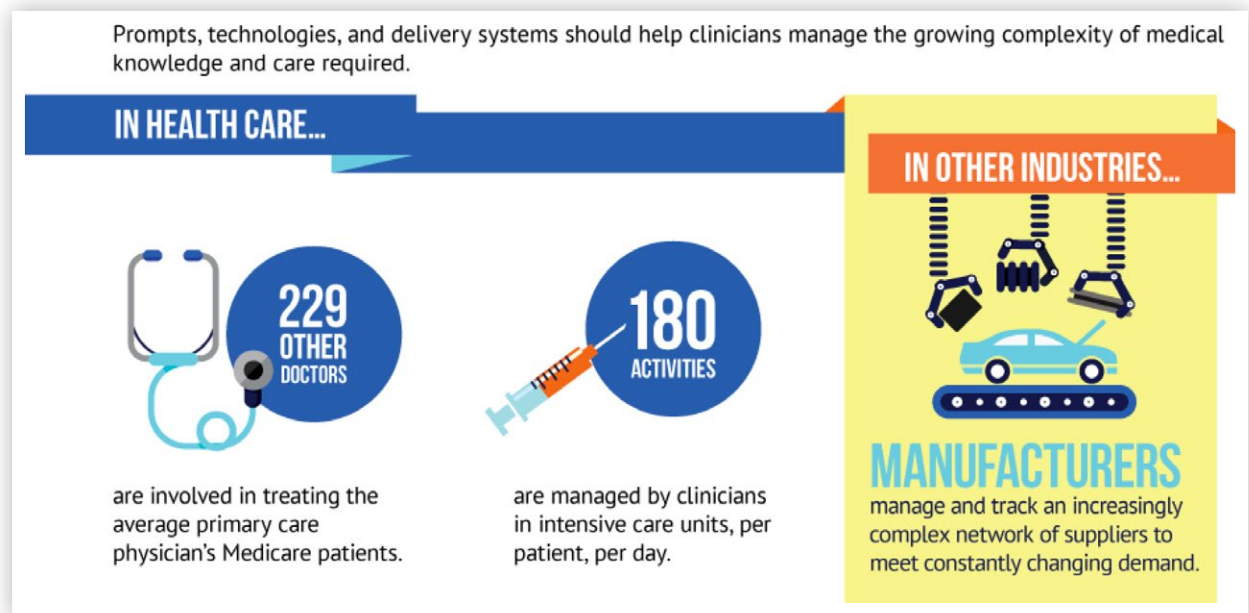
Emphasize Bottom-Up Change

Change that comes from within the organization will be more effective and long-lasting than change dictated from "on high." (The checklist example that follows illustrates this lesson quite well.)

Make the Burning Platform Clear (and Real)

As Dr. Coye mentioned, all stakeholders must understand and accept the burning platform driving the need for change. At UCSF and many other organizations, the burning platform is often quite clear. The U.S. healthcare system provides evidence-based care only about half the time; wide variations unrelated to quality

Exhibit 10: Create Systems to Manage Complexity



exist across and within organizations; and too many patients end up being admitted and readmitted to the hospital for things that could have been prevented. In addition, the costs of healthcare are wreaking havoc on the deficit, the economy, and the ability to make other investments vital to the nation's future prosperity. The latest "disrupter" in healthcare—patients becoming much more engaged in their own care—promises to have a major impact on providers. The Medicare pay-for-performance (P4P) program targeted at readmissions just launched, and hospitals will soon discover the financial hardship that comes with not improving quality in this area, as well as the other areas that make up the value-based purchasing program (including clinical outcomes and patient satisfaction). This burning platform has gotten the attention of hospital and health system leaders, but it is not clear that P4P programs targeted at hospitals and physician groups should be transferred down to individual providers. Dr. Wachter is skeptical of the ability to change physician behavior by paying them differently. A recent review of 128 experiments came to the conclusion that monetary rewards tend to have a substantially negative effect on intrinsic motivation. Any performance benefit that P4P provides is likely minimal—in fact, a recent analysis by Werner, et al. in *Health Affairs*³ found that simple transparency (public reporting of performance) provides roughly the same benefit on its own as does the combination of transparency and P4P, with any incremental benefits in the first few years tapering off by the end of the fifth year, leaving little or no net benefit over the entire period.

Look Locally First

In many cases the seeds of innovation exist within a unit or department of an organization. It can often be easier to identify and spread these innovations than to import them from distant, unfamiliar places. Spreading innovation internally often avoids pushback from stakeholders, as it diffuses the argument that the program cannot work in the local environment.

Understand and Address Physician Culture

Innovations cannot succeed if physicians are not on board. In the "old days," physicians were viewed as the hospital's customer and hence CEOs and board members were unwilling to address problematic behaviors, such as high costs, poor quality, disruptive behaviors, and/or the refusal to accept certain standards or

follow evidence-based protocols. Today, however, this hands-off approach is no longer viable. Physicians must understand and accept the need to work to provide high-quality, safe, low-cost care. To do that, they must accept that great physicians are no longer like Chuck Yeager and other early test pilots who often acted as "lone wolfs" and believed they were infallible. These pilots often died due to safety issues. Instead, physicians need to act more like John Glenn, a disciplined pilot who knew he was fallible and believed in checklists. Any airline passenger would prefer a pilot taking the John Glenn approach, and this approach has helped the airline industry compile a fantastic safety record for decades. Unfortunately, most doctors above a certain age have been trained to be like Chuck Yeager—autonomous professionals who eschew discipline or following rules. Yet the doctor of the future must be more like John Glenn. It remains difficult, however, for physicians to change their mental models when they have historically been so suc-



cessful with the other one.

Fortunately, most medical schools and other training organizations are beginning to embrace this new approach, and young physicians and those in training are far less resistant to this type of practice. However, older physicians tend to find it more difficult. To overcome this challenge, hospital and system leaders should leverage physicians' innate competitiveness by sharing performance information and, over time, taking action against those outliers who consistently perform poorly. At UCSF, physician leaders are required to share performance data with other department chiefs, deans, and chief medical officers, forcing them to defend their performance. This small change has helped to engage them in quality improvement by making them accountable to organizational leaders for their performance. Other simple tools, such as "forcing functions" embedded in IT systems, can also help reign in outlier performance.

Hospitalists: An Example That Highlights Many of These Lessons

Dr. Wachter shared the story of hospitalists, an innovation that highlights many of these lessons. While some people credit Dr. Wachter with inventing the idea of a hospitalist, the reality is that he coined the term "hospitalist" (in a 1996 *New England Journal of Medicine* article⁴) to describe a trend already underway. When he first wrote about the concept roughly a decade ago, a few

3 Rachel M. Werner, Jonathan T. Kolstad, Elizabeth A. Stuart, and Daniel Polsky, "The Effect of Pay-for-Performance in Hospitals: Lessons for Quality Improvement," *Health Affairs*, Vol. 30, No. 4 (April 2011), pp. 690–698.

4 R.M. Wachter and L. Goldman, "The Emerging Role of 'Hospitalists' in the American Health Care System," *New England Journal of Medicine*, Vol. 335, No. 7 (August 15, 1996), pp. 514–517.

hundred hospitalists were practicing in a small minority of hospitals. As shown in **Exhibit 11**, the concept has grown quite rapidly; as of 2012, roughly 80 percent of hospitals employ approximately 35,000 hospitalists.

Hospitalists have become the fastest-growing specialty in the history of medicine. This rapid growth was not a response to changes in the payment system or to enabling legislation, nor did it require a new training model. Rather, the hospitalist concept grew at breakneck speed in large part because it was a good idea that was “sold” to physicians correctly. It also benefited from the following:

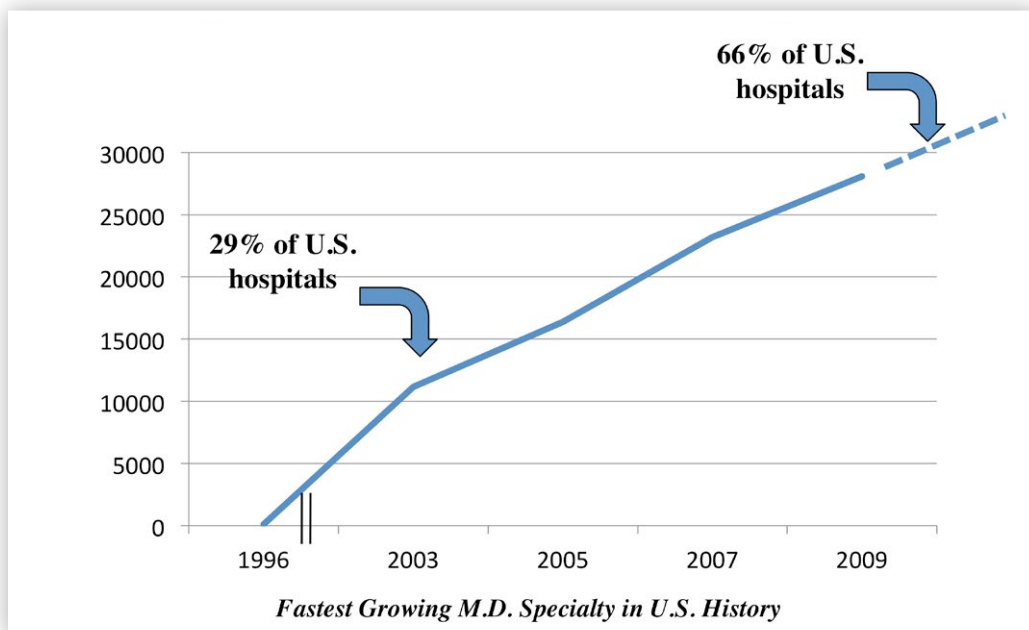
- **Burning platform:** Hospitals had faced an imperative to reduce length of stay (LOS) and costs per admission since the mid-1980s (spurred by the DRG payment system), and primary care doctors found it challenging to manage costs and LOS in the hospital setting.
- **Ready supply:** Many general internists found the hospitalist job to be attractive, as they could self-declare their interest and did not face many barriers in making the transition.
- **Available funder:** Hospitals were willing to support hospitalist programs because they generated a positive return on investment. Roughly 90 percent of programs receive some type of support from the hospital.
- **Advocacy, with an openness to other ideas and a commitment to research:** Program leaders listened to the reasonable concerns of primary care doctors about “losing” their patients in the hospital, put in place systems to help address those concerns, and committed to research to monitor and evaluate the impact of the program so as to ensure that it benefited patients.

- **Nimble and adaptive model:** Hospitalist programs quickly embraced new ideas to improve quality and safety, including the creation of multiple roles for the hospitalists over time. The position has morphed into various roles within organizations as problems needed to be addressed. In some cases, these new roles produced unexpected, positive consequences. At UCSF, for example, hospitalists have been embedded on a 50-bed neurosurgery service, with the hospitalist co-managing the sickest patients in partnership with the neurosurgeon. The approach has vastly improved nurse and physician satisfaction and their perceptions of the quality of care. While there has been no change in “harder” clinical outcomes, physician and nursing satisfaction is sky high and the hospital has saved roughly \$3.5 million a year, yielding a return on investment (ROI) of approximately seven to one. Neurosurgeons report that the approach has improved care and made it easier for them to do their job. Department leaders are so pleased with the approach that a hospitalist recently won the department’s annual teaching award, and the chief of neurosurgery hired a hospitalist to oversee quality and safety within his department.
- **Purposeful messaging:** Hospitalists were sold to key stakeholders using a carefully constructed message emphasizing their round-the-clock “presence” in the hospital (enabling them to more closely monitor patients and more quickly address problems) and their “expertise,” which allows them to improve quality and patient satisfaction. The messaging did not emphasize cost control, but rather how the program leads to better care.

The Checklist: Another Illustrative Example

As noted earlier, innovations need not be complicated to have a major impact. In fact, the most important innovation within

Exhibit 11: Hospitalist Growth, 1996–Present



Source: American Hospital Association Annual Survey.

healthcare since the IOM's *To Err Is Human* report (released in 1999) is not computerized physician order entry, RCA, or some other complex innovation, but rather the simple checklist, an innovation that shows how powerful a low-technology advance can be.

The checklist developed as a bottom-up innovation at Johns Hopkins. Peter Pronovost, M.D., Ph.D., led an effort to identify key, evidence-based processes to prevent central line-associated bloodstream infections (CLABSIs), bundled them into a package, and then created a checklist to ensure that they always occurred. Dr. Pronovost successfully implemented the program within his organization, but then faced roadblocks in expanding it statewide throughout Maryland. So he collaborated with the Michigan Hospital Association on a statewide study that clearly demonstrated the effectiveness of widespread use of the checklist. Findings were published in the *New England Journal of Medicine*, which led to partnerships with the Agency for Healthcare Research and Quality and other government agencies to expand the program nationwide. Atul Gawande, M.D., also popularized the approach in his book, *The Checklist Manifesto*, which further accelerated adoption. In addition, the World Health Organization (WHO) worked with Dr. Gawande to extend the concept to surgery, and has promoted use of this checklist throughout the world. The effort has been an unqualified success, with CLABSI rates throughout the country having fallen by 40 percent, making the checklist the greatest success story of the last decade in the area of patient safety.

Even with this success, however, the checklist has proven much less effective when introduced as a top-down mandate, which is how the WHO surgical checklist arrived in the U.K. The National Health Service (NHS) mandated use of the checklist in a ruling handed down by the NHS agency overseeing patient safety. Despite clear evidence of the effectiveness of the approach, most surgeons viewed it as “just another government mandate” and consequently ignored and/or worked around it. What had historically been a bottom-up, highly effective approach (in the U.S.) very quickly turned into an ineffective mandate from “on high.” To succeed, organizational leaders must resist the temptation to mandate change through new rules or edicts, as such an approach will inevitably stimulate pushback and resistance. The key to success is to instill change from the bottom-up, ensuring that those implementing the change own and customize it. While it may be tempting to bypass this time-consuming stage, those who do face a significant risk of undermining the effectiveness of the entire effort.

Applying Complexity Theory to Healthcare Innovations

Complexity theory divides the world into three types of problems, as outlined below:

- **Simple:** These problems can be solved by following a recipe. Examples from outside of healthcare include baking a cake. One example within the healthcare arena is choosing the appropriate antibiotic to treat a straightforward condition.
- **Complicated:** These problems involve substantial uncertainties, with the solution not yet being known. However, the solution may be knowable if sufficient time and resources are dedicated to finding it. An example from outside of healthcare is flying a rocket to the moon. Within healthcare, an example is finding a better way to treat septic shock or stroke.
- **Complex:** The formula for solving complex problems may well be unknowable. An example from outside of healthcare is raising a child successfully; within healthcare, a good example is how to implement an electronic medical record (EMR) system within a large organization.

As Brenda Zimmerman, professor of policy and strategic management at York University, has noted, healthcare is a complex adaptive system where systems and external environments constantly change and uncertainty and paradox are inherent parts of the environment. Understanding complexity theory, therefore, is critical to successfully building and implementing effective innovations.



Problems cannot be solved in a “machine-like” fashion, although they may sometimes move forward in that manner. Individuals are independent—but also highly interdependent—decision makers who need to be involved. In this type of environment, solutions often emerge from minimal specifications and simple rules, while over-specification can often impede progress. The adoption of change tends to be the exception, not the rule. Successful adoption requires finding “attractors” to the innovation, with adoption generally starting small and building slowly over time.

Complexity theory explains the evolution of checklists quite well. As Dr. Pronovost and colleagues wrote in *The Lancet* in 2009,⁵ “the mistake of the ‘simple checklist’ story is in the assumption that a technical solution (checklists) can solve an adaptive (socio-cultural) problem. To improve safety, healthcare needs to get the technical and adaptive work right. Without attention to adaptive work, checklists would probably suffer the same fate as guidelines—they would be left unused, even when very robust...the answer to the question of what a simple checklist can achieve is: on its own, not much.” In other words, the checklist intervention is actually much more than just the checklist; it also involves teamwork, training, sharing of data, and other key processes.

5 Charles L. Bosk, Mary Dixon-Woods, Christine A. Goeschel, and Peter J. Pronovost, “Reality check for checklists,” *The Lancet*, Vol. 374, Issue 9688 (August 8, 2009), p. 444.

The Leader's Job in Promoting Innovation

The leader's job in promoting innovation is to create the right conditions, including the burning platform, skill-building among physicians (e.g., leadership training programs), a clear message that failure is not an option, celebration of successes, and learning from defeats. Leaders also need to carefully introduce ideas from elsewhere, looking first for innovations within the organization before looking to the Mayo Clinic or other industries such as aviation. Finally, leaders must always remember that innovation has to be facilitated, not forced, and remain aware of and proactively address potential resistance from key stakeholders trying to stifle change.

Facilitated Discussion

System Invitational attendees engaged in a facilitated discussion about the implications of Dr. Wachter's remarks for their organizations. Key points are outlined below.

Overcoming "Cowboy" Culture

Many systems still must overcome "cowboy" cultures within the medical staff, with physicians steadfastly maintaining their autonomy. Transitioning to a "pilot" culture (such as that of John Glenn) remains a work-in-progress. Some physicians—particularly younger ones—have come on board, but others have not. In addition, many hospitals and health systems have made progress in dealing with poor-performing and/or disruptive physicians, but they still need to figure out how to help "mediocre" performers (those in the 50th and 60th percentiles) become better. Credentialing can be a blunt-force tool for dealing with the worst performers, but other tools (e.g., sharing performance data, tying compensation to performance) are needed as well.

Need to Prioritize and Promote Innovations

Many senior administrators and boards have become quite creative in stimulating innovations, but few have found a way to centralize them so that the best ideas can be identified, prioritized, and spread across the organization. The key is to "hard wire" the best innovations into the organization by tying them to strategic objectives, integrating them into EMR systems, and other actions. The goal is to have a system-wide "funnel" to identify the best ideas, and then to ingrain them within the organization's culture and systems.

Merits of Incentive Compensation

The jury remains out on the incremental value of incentive compensation for individual providers. While the instinct may be to treat everyone as an "economic animal," it is not clear how effective that approach will ultimately be when used with clinicians.

Specialty Hospitalists

Where adequate patient volumes exist, some hospitals are embracing the hospitalist model and applying it to specialty services, creating what Dr. Wachter calls "hyphenated hospitalists." As he described in a 2012 *Journal of the American Medical Association* article,⁶ we are seeing the rapid emergence of obstetric-hospitalists, neurology-hospitalists, and others.

Need for Good Transitions

The hospitalist model has the potential to create discontinuities with outpatient care, since the same doctor is not treating the patient in the inpatient and ambulatory settings. The key is to build in systems to ensure smooth transitions. EMRs can help with this task, as can follow-up phone calls to patients after discharge. Some hospitals are experimenting with having hospitalists or advance practice nurses follow the sickest patients into the outpatient setting for a period of time (one or two visits). However, this model cannot be extended too far without a return to the old system of having a single physician follow the patient in all settings, thus negating the benefits of the hospitalist model.

Need to Create Burning Platform in Academic Medical Centers

Health systems affiliated with medical schools face unique challenges, as medical school leaders tend to view most innovations as a potential threat to their funding streams. Medical schools often have significant political influence, and can frequently thwart attempts to innovate. To overcome this problem, all key stakeholders (including health commissioners and other public officials) need to understand the burning platform facing health systems and academic medical centers. In addition, steps should be taken to get the academic side of the organization to focus on quality, safety, and efficiency; as noted earlier, UCSF has taken a step in this direction by requiring department chairs to present performance data to their peers. The ultimate goal should be to create an environment where the academic side of the organization views innovation and quality improvement favorably. Many students and trainees love innovation; this love needs to infiltrate academic leaders as well.

6 J.R. Nelson, L. Wellikson, and R.M. Wachter, "Specialty Hospitalists: Analyzing an Emerging Phenomenon," *Journal of the American Medical Association*, Vol. 307, No. 16 (April 25, 2012.), pp. 1699–1700.

Going Beyond Medicine to the Best Care Possible

Ira Byock, M.D., director of Palliative Medicine at Dartmouth-Hitchcock Medical Center and professor at the Geisel School of Medicine at Dartmouth, challenged hospital and health system leaders to take innovation to a new level, with the goal of delivering the best care possible to those who are severely ill.

ACHIEVING THIS GOAL REQUIRES A DIFFERENT WAY OF thinking. Illness and the dying process are only partly medical, and they have a profound, personal affect on both the patient and his or her family. Yet the tools available to providers tend to be medical in nature and hence do not fit the job at hand.

The goal should be to provide the best care possible, not just in terms of treatment, but also in terms of the experience of the patient and family, including their feelings, hopes, and fears. So in addition to providing care consistent with evidence- and consensus-based recommendations, standards, and guidelines (which apply to curative, life-prolonging, and disease-modifying treatments), providers need to promote comfort and quality of life in a manner consistent with individual and family values and preferences that will, by definition, be different for each person.



directives are not specific or recent enough to guide care in a particular situation. However, advance directives are quite important.

They are not prescriptions, care plans, or do-not-resuscitate orders. Rather, they serve as communication tools that assist people in clarifying values and preferences related to healthcare in the event of a serious, potentially life-limiting condition. They help patients project their caring for their family into an uncertain future, and ensure the ability of patients who cannot speak for themselves to assert their wishes for care. They also serve as a counseling tool to support and guide family members in making decisions during stressful situations. (Most seriously ill people do not

want to be a burden on their family.) Without such a document, spouses and/or children in some states do not have the legal right to speak on behalf of the patient.

Like everywhere else, physicians at Dartmouth-Hitchcock Medical Center do not like to talk to sick patients about advance directives, believing that patients will think they are giving up on them. To get around this problem, Dartmouth has set expectations that physicians or other staff members talk to all patients about end-of-life preferences, even when they are perfectly healthy and years or decades away from terminal illness or death. Everyone dies at some point, so the conversation is relevant to every patient. Physicians can introduce the conversation by noting that they too have created an advance directive so that their families have guidance on decisions related to treatment, thus reducing their burden.

To have such conversations, physicians need to be caring and competent. No one is born knowing how to talk about these difficult issues. Medical schools, moreover, seldom teach physicians how to do so, nor are there many opportunities to teach or reinforce the skill once in practice. It is no surprise, therefore, that physicians are not usually comfortable with talking to patients about end-of-life preferences.

Physicians can be taught to have these conversations—not in a lecture, but through longer sessions that involve role-playing and/or simulation laboratories. At Dartmouth, students can go through a short (one- or two-week) rotation where they learn this skill. Practicing doctors can learn in workshops that last several days.

“We work in a system that treats diseases, but we need systems that care for whole persons.”

—Ira Byock, M.D.

Achieving this goal requires upfront preparation and discussion with all patients, shared decision making that reflects patient values and preferences, teamwork, integration of palliative care and treatment of disease, a functional health system, and family/community support. These requirements are discussed in more detail below.

Upfront Preparation and Discussion with All Patients

Providing the best care possible takes preparation. While most people do not want to think about their preferences related to end-of-life care, they need to do so, ideally before they get seriously ill. Instead, too often, the reluctance to discuss end-of-life issues often becomes more entrenched as an individual's condition deteriorates.

For their part, physicians generally do not like to discuss end-of-life preferences with patients, and often complain that advance

Shared Decision Making

Daniel Callahan, a medical ethicist, noted in the *New England Journal of Medicine* that “medical training in the provision of care at the end of life has improved, but remains far from satisfactory, with death still being denied, evaded, and, in the case of many clinicians, fought to the end, regardless of the patient’s wishes.”

Addressing this problem requires shared decision making, something that is increasingly being used at Dartmouth-Hitchcock Medical Center. Shared decision making recognizes the fact that patients and families are experts in their own values and preferences, while doctors are experts in the science of medicine. By working together, decisions can be reached about care that are consistent with and respond to the patient’s preferences and values. Physicians at Dartmouth use shared decision making every day, matching individual values and preferences to available courses of action and expected outcomes. The goal is to compare expected or potential benefits to both known and potential risks and burdens, and then apply the individual’s values and preferences related to those benefits and risks. The end result will be that different people will make different decisions with the same information. For example, a terminally ill cancer patient who still has good quality of life but faces many negative consequences from treatment may shy away from it, while a cancer patient who is suffering grievously may choose treatment as a way to improve quality of life during whatever time he or she has left. Most people will choose treatment if they have a reasonable chance to live longer and well. However, no one is immortal and most people want to die gently when their time has come, typically at home surrounded by loved ones. Those who plan in advance will likely have their wish granted, while those who do not have a good chance of dying in the hospital or ICU.

Teamwork

Providing the best possible palliative care takes teamwork from an interdisciplinary group of providers who work together to care for those with life-threatening illness or injury by addressing physical, emotional, social, and spiritual needs, with the goal of improving quality of life for the ill person and his or her family. Team members often work in the same room together, allowing them to engage in creative collaboration. At Dartmouth, the interdisciplinary team meets for an hour every weekday morning, planning how to coordinate and manage care for each patient.

Dartmouth also uses volunteers who are a part of the team. Like hospice volunteers, these individuals spend time with patients who do not have family visiting them, thus preventing them from being left alone. Volunteers provide support in a variety of ways, including handing out newspapers, playing music, bringing snacks to those able to eat, and other activities designed to make patients as comfortable as possible.

Integration of Treatment and Palliative Care

The best care possible integrates treatment of disease with palliative care. Components of palliative care services include clarifying goals, engaging in shared decision making, performing advance care planning that incorporates advance directives, assessing and treating pain and symptoms, preventing complications and crises,

managing crises early when they occur, assessing and addressing spiritual needs, providing family support during illness and in grief, offering counseling and anticipatory guidance adapted to the illness and prognosis (including dealing with issues such as life completion), and discharge planning and management of care transitions to a nursing home, home care, or hospice services.

“The healthcare system generally does a poor job in providing palliative care. It’s almost as if providers have never before seen someone who faces serious illness and death.”

—Ira Byock, M.D.

While palliative care grew out of the hospice care movement, palliative care is broader. Unlike hospice care, patients do not have to be dying to receive palliative care, meaning that no doctor has to attest to the likelihood of death within six months. More importantly, patients do not have to agree that they are dying or forego treatments in order to receive palliative care (in contrast to hospice care, which is not covered by Medicare unless patients sign something acknowledging that they are dying and agreeing not to be treated). The evidence suggests that many patients are reluctant to give up disease-modifying treatments and hence refuse to go into hospice care, remaining instead in the expensive acute care system for a long time.

Patients need not make that choice to receive palliative care. They can receive targeted treatments intended to extend life and/or improve the quality of life, while also receiving palliative services that can also extend survival. In fact, both anecdotal reports and research studies have found that hospice and palliative care can extend life. Columnist Art Buchwald wrote a best-selling book after leaving hospice care. In another well-known case, a man expected to die quite soon ended up getting stronger during his hospice care, so much so that he returned home for nine months before dying, a period of time when he was even able to play golf. A retrospective study comparing similar groups of patients who did and did not receive hospice care found that those receiving it lived an average of 29 days longer. A more definitive randomized controlled trial of lung cancer patients found that palliative care improved all major indices of quality of life and extended survival by 2.7 months, the magnitude of life prolongation achieved by an expensive drug that comes with many unpleasant side effects.

To allow for the integration of high-quality treatment and palliative care, Dartmouth-Hitchcock creates “Get to Know Me” posters for each patient as a way to humanize care and deliver patients from anonymity. As a result, nurses and doctors are more likely to treat patients as whole people. The top priority for palliative care is to alleviate symptoms and suffering, but this is not the ultimate objective. Rather, palliative care is intended to help patients and families achieve meaningful and measurable goals at the end of life, such as providing opportunities to communicate, get personal affairs in order, complete and resolve relationships (e.g., getting in touch with an ex-spouse or child), grieve, review

life's meaning and purpose, and explore spiritual and transcendent realms. Most people value these opportunities; having them before dying helps individuals feel more complete, and provides a sense of closure. For example, many patients want one last chance to ask for or offer forgiveness, thank someone, or say, "I love you."

A Functional Health System

Providing the best care possible requires a functional health system, something that often does not exist today. While at least 70 percent of people want to die at home, most do not get their wish. In fact, 70 percent die in institutions (usually hospitals or nursing homes). Huge variations exist across the country in terms of where people die, with the likelihood of dying in a hospital being greater in those areas with more inpatient beds. The FFS payment system seems to have some impact on where people die and the type of care they get in their last days. Many cancer patients end up getting chemotherapy in the last two weeks of their life, although the proportion dropped significantly after passage of the Medicare Modernization Act (which eliminated the financial incentive for such treatment). As payments transition from FFS to value-based systems, the financial incentive to provide more care at the end of life will diminish, with a greater incentive to focus on managing quality of life. As this transition occurs, growth in hospital and palliative care programs should accelerate. As shown in Exhibit 12, this growth has already started to occur, with the number of programs having more than doubled in the past decade.

Dartmouth-Hitchcock Medical Center recently funded a major expansion of its palliative care program. An analysis of the program's financial impact found that the costs of caring for those in palliative care were \$450 to \$500 less per day than those for similarly ill patients not receiving palliative care. This cost differential more than covers the incremental salaries and benefits of the staff

providing palliative care to patients and families. As a result, Dartmouth-Hitchcock Medical Center has experienced a meaningful decline in the proportion of deaths that occur in the hospital and the ICU. This information convinced the hospital's board of governors to double the size of the palliative care program in the midst of a very tough economic environment.

Family and Community Support

The best care possible takes care of the family. While an individual gets a diagnosis, families get the illness. Dartmouth-Hitchcock Medical Center's palliative care program defines the family in the broadest sense possible (i.e., anyone to whom the patient's illness matters). Obviously, this definition includes the 61 million Americans engaged as caregivers, a job that creates a great deal of strain and increases the risk of death. Supporting these individuals is not easy or inexpensive, but it is critical to think broadly about who may need support.

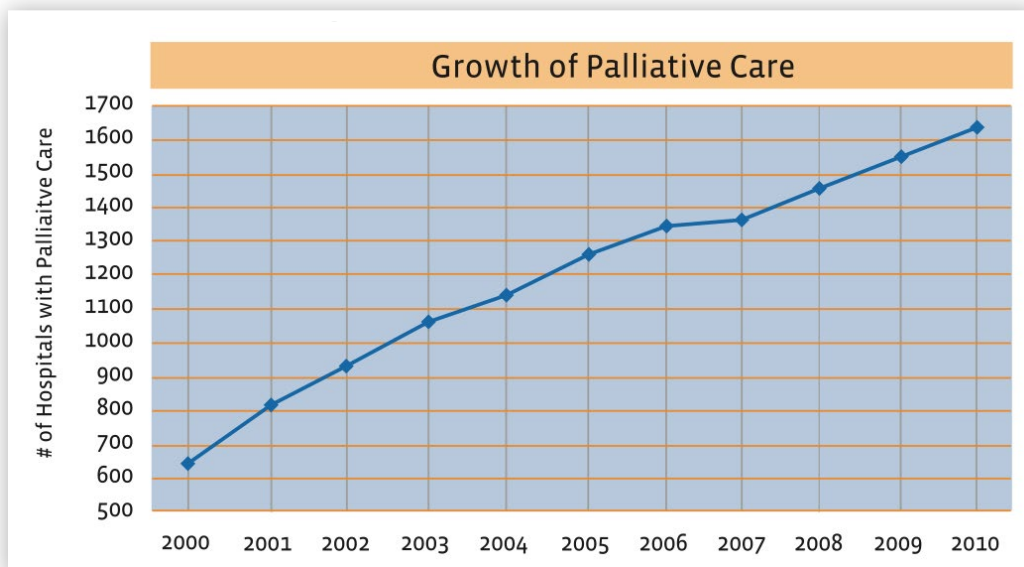
Providing such support requires the entire community—not just a geographic community, but also organizations that touch the patient or family, including service clubs, book clubs, faith communities, schools, employers, and others. Good palliative care programs work to enhance the human responsiveness of those in each of these communities.

Facilitated Discussion

System Invitational attendees engaged in a facilitated discussion about the implications of Dr. Byock's remarks for their organizations. The discussion highlighted the need for the following to promote better palliative care:

- **Provider training, including cultural sensitivity:** Advance directive discussions still tend to occur in the hospital, after a patient already faces a serious, life-limiting illness. As Dr. Byock emphasized, these conversations need to occur earlier—ideally

Exhibit 12: Growth of Hospice and Palliative Care



Source: 2002 to 2012 American Hospital Association Annual Hospital Surveys for FY 2000 to 2010; and data from the Center to Advance Palliative Care's (CAPC) National Palliative Care Registry.™

in a medical-home setting while the patient is still doing well. However, many providers are not comfortable with having these conversations. Safety-net and other providers serving a diverse patient population face an additional hurdle, as they need to handle these conversations in a culturally sensitive way. In addition, patients and/or their families may need to be educated on the need for such conversations, as many patients (particularly older ones) will simply follow their doctor's advice. For these patients, palliative care must be presented as a real, robust option. As noted, physicians can be taught to have these conversations. The key is to make the "right way" of providing care the "easy way," and to emphasize that the cost savings generated by palliative care programs can be used to provide an enormous amount of support services that improve quality of life, including symptom relief, home visits, and crisis management and prevention.

- **Provider reminders and support:** Physicians and nurses must learn not only how to have conversations about end-of-life preferences, but also about how to conduct symptom assessments and reassessments that inform the direction of palliative care services. They also need regular reminders about the need to have these conversations. Even at Dartmouth-Hitchcock, not every patient engages in a conversation with the physician about end-of-life issues, even though the medical center's policy is not to perform any major procedure without an advance directive in place. To facilitate these conversations, the hospital created an advance care planning note embedded within the EMR that takes roughly 60 seconds to complete. While not as comprehensive as an advance directive, it provides the information that providers and families need.

- **Resources:** Some specialties, such as oncology, have created resources to assist physicians in working with patients to develop advance directives and pain management plans. Hospital and health system leaders can use these resources to support physicians, and also hold them out as an example of external pressures to move in this direction, in this case from the profession itself.
- **Transparency:** Several measures of the quality of end-of-life care are being developed, including whether advance directives are in place before surgery and whether chemotherapy is provided in the last two weeks of life. Performance on these measures can be monitored and shared liberally. This information will serve to stimulate conversations about tough societal issues, and also allow other caregivers (e.g., nurses) to take responsibility for having these conversations if physicians are not performing well and/or not comfortable doing so.
- **Public education:** Between 20 and 30 percent of the public equate hospice and palliative care to assisted suicide. This misperception needs to be addressed, as very few healthcare services are as life affirming as palliative care. The issue needs to be framed and discussed openly in a culturally positive way.
- **A coordinating center:** Two years ago, St. Charles Health System in Bend, OR, reorganized its care delivery into 10 centers, one of which is "advanced illness management," the system's term for broad-based palliative care. This center coordinates care for terminally ill patients across settings, including hospice. The goal is to identify patients up to two years before their expected end of life. The health system board, management team, and ground-level physician leaders have embraced the concept. The health system began the program in the inpatient setting, and it is now being rolled out to the outpatient arena as well.

The Future of Healthcare: Digitizing Human Beings—A New Medicine

Eric J. Topol, M.D., director of the Scripps Translational Science Institute, discussed the ability to “digitize” individuals, which represents a newfound capability over the last decade that promises to be a disruptive innovation within medicine, something that is not generally known about and/or accepted within the medical community today.

THIS RADICAL INNOVATION WILL lead to “creative destruction” (a term coined by Austrian economist Joseph Schumpeter)—that is, a major transformation within the healthcare arena.

A Technology-Driven Transformation

Between 2001 and 2010, various “smart” devices—first music players followed by phones and more recently tablets—have had a profound impact on the way people communicate. These technologies have helped to reduce the average attention span of an individual from 12 minutes in 1998 to less than five minutes today. At the same time, social networks have changed the way people interact with and respond to one another. These networks can be quite powerful and effective—for example, a recent study in *Nature*⁷ presented the results of the largest randomized trial ever conducted, a study of 61 million individuals in the 2010 election, with one group getting a message reminding them to vote and a second group getting the same message along with pictures of friends who had already voted. The pictures increased the likelihood of voting significantly, with 1.5 million more individuals casting votes in the group receiving them.

Many social networks have been set up in the field of health, including sites such as Patients Like Me and others, which bring together patients and families facing similar medical challenges. Millions of patients use such resources, many finding them to be valuable sources of information on how to cope with illness. One such network brings together several thousand individuals who suffer from Crohn’s disease, giving them a place to store and share practical strategies for managing the disease. In most cases, patients seem to trust the information provided by “virtual peers” and find it more useful than that given by their own doctors. Yet the medical community remains largely unaware of these networks or “in denial” about their existence or importance. A recent



poll of 4,000 physicians found that 89 percent had no idea that such social networks existed.

These networks also provide an inexpensive way to do clinical research, essentially serving as a free digital infrastructure of accurate, self-reported data from patients. Several peer-reviewed studies have already been published based on data from online health communities and other social networks.

Next Step: Digitizing Humans

Digital technology has advanced at an amazing pace—the first cell phone was introduced in 1973, followed by the personal computer in 1980, the Internet in the mid-1990s, and digital devices in the early 2000s. In the last decade, advances have included genomic sequencing, social networks, super-computing, and cloud computing. The coming together of these technologies promises to create the largest “shake-up” in the history of medicine, just as it has in other arenas—even resistant ones such as education.

The impact is already being felt. For example, WellPoint (a large insurer) has contracted with IBM to have “Watson” (the company’s super-computer) assist in the diagnosis of difficult cases. Memorial Sloan-Kettering has taken the same approach, contracting with IBM and McKesson to assist with development of personalized cancer treatments based on a patient’s genomic sequencing.

The development of cloud computing will bring the power of super-computing to individuals—in fact, IBM is working to allow anyone to access Watson on their smartphone via the cloud. Such capability would allow individual patients and physicians to analyze two million pieces of content in roughly three seconds. It would allow the industry as a whole to keep up with the massive amounts of data being generated by social networks and other sources.

Within medicine, these technological advances mean that doctors can now have a “pixilated” view of humans that will become much more precise over time. Examples of technologies that allow for such digitalization include:

- **Home electroencephalogram:** This low-cost device (roughly \$100) looks like a headband. Worn at night, it senses brain waves and prints the resulting data on a nightstand clock or mobile

7 Robert M. Bond, Christopher J. Fariss, Jason J. Jones, Adam D. I. Kramer, Cameron Marlow, Jaie E. Settle, and James H. Fowler, “A 61-Million-Person Experiment in Social Influence and Political Mobilization,” *Nature*, Vol. 489 (September 13, 2012.), p. 295.

device (which can then relay the information to a doctor or elsewhere). It tracks brain waves while an individual sleeps (or tries to do so), recording them during time spent awake, in deep sleep, in light sleep, and in deep and restorative sleep. Tracking this information assists in figuring out how to help those who struggle with insomnia and other sleep disorders. The device also facilitates a social network for those with sleep disorders, as it feeds into a database that compares thousands of others who have used the device for at least a week. As a result, people can compare their experiences to peers, including those of the same age (since sleep patterns tend to vary by age). Many professional athletes use this device, including the silver-medal-winning U.S. women's cycling team at the 2012 Olympics.

- **Automatic blood pressure and glucose readings via a smartphone:** Instead of using a traditional blood pressure monitor at home, new devices that connect to smartphones can be used to record blood pressure much more frequently (at the push of a button), with data automatically recorded and sent to others if so desired. This approach allows patients and physicians to better understand how blood pressure varies over time. Eventually, these devices will automatically monitor blood pressure on a continuous basis. The same approach is being used to monitor blood sugar levels in those with diabetes, using glucometers that attach to smartphones and sensors that can be worn on the abdomen or arm that measure glucose on a continuous basis without the need for regular finger sticks. (The patient need only calibrate the device once or twice a week using a finger stick.) Evidence suggests that those who can view their glucose levels at any time tend to think more carefully about their food intake, in some cases resisting the temptation to eat something that may cause problems.
- **Home-based electrocardiogram (EKG):** A smartphone application allows someone to perform his or her own EKG, using leads that attach to the chest and sensors for fingers, with the information transmitted automatically to a physician if desired.
- **“Laboratory on a chip”:** Applications are being developed to turn a smartphone into a “laboratory on a chip,” with patients wearing patches that monitor blood chemistry, including potassium, creatinine, and other key blood levels. Other applications allow for monitoring of thyroid and liver function, and the ability to identify disease pathogens such as malaria. In the near future, smartphones may continuously display a person's vital signs on the screen, including oxygen concentration, respiratory rate, pulse, blood pressure, EKG, and temperature. This information could be quite helpful for patients, including the millions unable to keep their high blood pressure under control.
- **Digitized pills to promote compliance:** Half of those taking prescription drugs do not comply with the prescribed regimen, costing the nation roughly \$290 billion a year. To address this issue, digitized pills have been created that contain a small, digestible computer chip that sends a signal after coming in contact with gastric juices. Recently approved by the Food and Drug Administration, these digitized pills help to monitor not only compliance (i.e., whether someone took their medicine), but also track what time the medicine was taken and absorbed into the

bloodstream. This information can be useful for certain indications and conditions.

- **Pocket imaging devices:** While the stethoscope has managed to survive for 200 years, its usefulness may soon come to an end as a result of high-resolution ultrasound and other pocket-sized imaging devices that provide much more information. (Stethoscopes are not “scopes” at all, as they provide audio but not video images.) These low-cost devices provide much better images than a \$300,000 echocardiogram machine, imaging the heart in multiple views and tracking blood flow and movement of heart valves within a few seconds as part of a normal physical exam. If the patient or doctor does not know how to read the information provided, it can be transmitted in seconds to someone who can.

Other applications are on the horizon with equally disruptive capabilities, such as the ability to monitor lung health or determine if an asthma attack is imminent by having patients blow into the microphone on their smartphone. A similar type of device will one day be able to identify early-stage lung cancer by analyzing a person's breath. In addition, skin chips are being created that can measure motor and brain activity in those with Parkinson's disease, enabling physicians to better titrate their medicine.

Implications for Medicine and the Healthcare Industry

The “digitizing of humans” has profound implications for medicine in general and for key stakeholders within the healthcare industry.

“Squeezing Out” the Doctor and Hospital

The ability to digitize humans and the real-world manifestation of that capability (as illustrated by the examples above) creates the potential to dramatically change the role of physicians and hospitals going forward, including the basic need to visit a physician in person. Just as the hardback book may be rendered obsolete through the advent of digital books and the U.S. Postal Service is being threatened by electronic mail and other online applications, the in-person office visit could one day be a thing of the past. A recent *Economist* article entitled “Squeezing Out the Doctor”⁸ reviewed the challenges facing doctors going forward, noting that the physician could become a victim of the kind of “creative destruction” that Dr. Schumpeter referred to many years ago.

In the midst of many forecasts of looming physician shortages, others are predicting the widespread replacement of physicians by machines. In fact, many examples exist suggesting that demand for physician services will decline over time. Going forward, dermatologists may not need to conduct as many biopsies, as high-quality pictures can be analyzed to determine if a skin lesion is suspicious and hence needs to be removed and biopsied. (Today, the general approach is to remove and biopsy as a first-line strategy.) Low-cost attachments to smartphones are being developed to refract a person's eyes, thus allowing someone to create his or her own prescription without the need for eye exam by an

8 “Squeezing Out the Doctor: The Role of Physicians at the Centre of Health Care Is under Pressure,” *The Economist*, June 2, 2012.

optometrist or ophthalmologist. A different type of attachment allows for magnified, high-quality images of a child's ear, with an accompanying algorithm that can determine if it is infected.

These technologies and others may make the in-person office visit a thing of the past. In fact, some physician practices already routinely use secure video and audio communication technologies in lieu of office visits. Some estimate that 80 percent of all office visits could be eliminated through this type of approach. The quality of the visit may also increase, as today's in-person visit provides very little time for true communication with the doctor—in fact, the average first-time visit involves 12 minutes with the doctor, while a repeat visit allows for only seven minutes. In both cases, much of that time is spent with the doctor writing notes.

The advent of high-tech home monitoring equipment will also reduce the need for hospital stays, with hospitals ultimately being used only for major procedures and ICU stays. Given the dangers of medical errors in the hospital, many patients will prefer to receive their care at home.

“One day the idea of going to the doctor's office will be as foreign as going to a video store.”

—Eric J. Topol, M.D.

Transition from Population-Based to Personalized Medicine

Many healthcare organizations are in the midst of a transition from treating individuals to managing population health through preventive care, mass screenings, and the management of chronic conditions through standardized approaches (e.g., using the drug metformin as a first-line treatment for type 2 diabetes).

However, the advent of digital information—including genomics, which is essentially digital data about an individual person—promises to change that approach, stimulating a transition from managing population-level health to a more personalized, customized approach based on a person's unique situation. Treating all humans with a similar disease in the same way does not always produce optimal results. For example, a quarter of patients with diabetes are resistant to metformin, rendering the drug ineffective. Genomic sequencing can help to determine which patients will and will not respond to the drug, allowing the creation of a more personalized, precise approach.

People's lives are already being saved and/or improved through genomic sequencing, particularly for those with idiopathic conditions (conditions with no known cause). At Scripps, for example, genomic sequencing helped a 15-year old with an unknown neurological condition. She experienced severe motor, movement, and sleep disorders, and in fact had been unable to sleep virtually all her life. Based on her genetic sequence, physicians identified a drug that allowed her to sleep, greatly improving her quality of life.

Within the field of cancer (a genomic disease), genomic sequencing will allow physicians to identify the specific genetic mutation(s) responsible for the cancer, thus transforming the entire field. The approach is already paying dividends. A genome

scientist at Washington University was able to identify a drug normally used for kidney cancer to help save the life of a patient with a severe form of leukemia who had recently relapsed (normally a death sentence). Three recent articles in *Nature*⁹ describe how genomic sequencing has helped to identify mutations in patients with various types of cancer affecting an organ. This approach has led to the identification of four distinct types of breast cancer and two types of multiple sclerosis. While mutations tend to vary across cancer patients, each cancer and mutation has common pathways. Figuring out what is driving a mutation can have profound implications, potentially allowing for the eradication of the disease. In some cases, however, patients may relapse, due to the existence of other pathways and mutations. Due to this “intra-tumor heterogeneity,” it is critical to sequence multiple parts of a tumor. For this reason, cancer patients may want to consider requesting that part of their tumor be frozen, allowing it to be sequenced at some point after the initial diagnosis.

In the future, techniques will allow for “hyper-individualization,” with scientists able to re-create diseases in a dish by using skin cells, and then testing drugs in the dish to see how the patient will likely respond. Scientists have also begun to study the genomic sequence of the “welderly”—older individuals who have never been sick. This approach has led to the identification of a protective genetic mutation that may guard against Alzheimer's disease. Researchers are already working on developing a class of drugs to simulate this mutation. Another example comes from cardiac care, where today roughly a third of people who get a stent receive a drug to which they do not respond, thus increasing the risk that the stent will become clogged, causing a heart attack and/or death. In the future, physicians will perform rapid genotyping at the point of care, allowing for use of a different drug for these patients. In the future, doctors will be able to sequence the genome of newborns who have serious, undiagnosed conditions within 48 hours (now it takes six weeks), using only one tube of blood. They may also be able to predict an impending heart attack through use of an implantable chip that can detect when arteries are shedding cells into the bloodstream, a warning sign of a heart attack. The same approach could potentially be used in those with diabetes to provide an early warning of an impending glycemic shock.

All these examples demonstrate how and why genomics will have such a profound impact on medicine in the future. Yet they also show how threatening these changes will be. For example, in 2012, the three largest selling drugs (each with annual sales around \$9 billion) are used to treat rheumatoid arthritis and psoriasis. At best, however, only four in 10 individuals respond to these drugs. Genomics could help to identify those who will benefit, and thus limit use of the drugs to these individuals. Pharmaceutical companies fear this approach, as it would significantly reduce sales.

9 The Cancer Genome Atlas Research Network: “Comprehensive Molecular Characterization of Human Colon and Rectal Cancer,” *Nature*, July 18, 2012; “Comprehensive Genomic Characterization of Squamous Cell Lung Cancers,” *Nature*, September 9, 2012; and “Comprehensive Molecular Portraits of Human Breast Tumors,” *Nature*, September 23, 2012.

Need to Embrace Consumerism

The changes described above suggest that the “doctor-knows-best” approach to medicine must end. Physicians must accept and even embrace the fact that consumers can, should, and will have access to much more information than in the past. They will have access to their doctor’s notes (a recent study found that such access improved adherence and outcomes) and should have direct access to their test results, including genetic testing.

Yet most physicians and the field of medicine in general continue to resist this trend. Over two-thirds of physicians will not communicate with their patients via secure email under any circumstances. The profession is fighting against direct access to test results and physician notes. The American Medical Association is lobbying against allowing DNA data to go directly to patients, even

though technologies exist that allow patients to read and understand it, perhaps even better than their doctor. This resistance to consumerism needs to change. Physicians need to learn to take on a new role, helping patients who have direct, unfiltered access to this information understand and interpret it, and offering them guidance on what to do. Patients will look at their physicians in a new way, seeing them as partners who can help them make decisions based on their values and preferences. Many algorithms and tools will assist with this process. New physicians and those currently in training understand and are generally comfortable with this digitalized future. Those who have been in practice for a while, however, need support in making this transition.

Innovations That Drive Performance at Geisinger Health System

Earl Steinberg, M.D., M.P.P., executive vice president of Innovation and Dissemination, and chief of Healthcare Solutions Enterprise at Geisinger Health System, discussed various innovations that drive performance at Geisinger. While Dr. Steinberg agrees with Dr. Topol that the future will feature an enhanced ability to personalize treatment (and that this ability is a good thing), he emphasized the critical need for health systems to do as much as possible to manage the health of populations.

Geisinger in Brief

As shown in **Exhibit 13**, Geisinger Health System is an integrated health service organization that owns multiple facilities (including six hospitals), employs roughly 1,100 physicians and more than 500 advanced practitioners, and operates a 300,000-member health plan. The system is not “closed”—that is, many physicians who are not employees of the system practice at Geisinger facilities and the majority of members of the Geisinger Health Plan are cared for by non-Geisinger providers. The health plan has been an extremely important driver of innovation at Geisinger. The existence of health plan members who receive care from Geisinger clinicians reduces the financial risk associated with testing innovations to promote population health. For these patients, Geisinger is indifferent as to which portion of the enterprise (the health plan, hospital, or physician offices) benefits

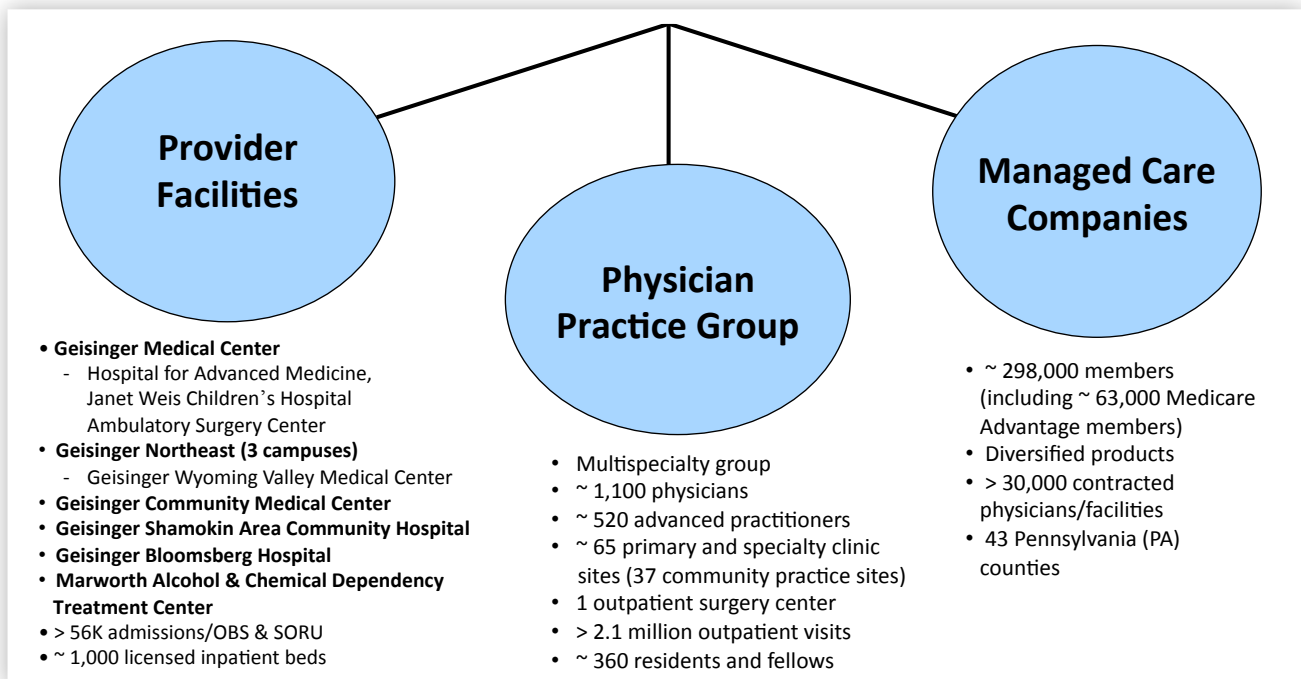
financially from these innovations, which makes organizational leaders more comfortable with experimenting.

Key Process Redesign Strategies

Geisinger focuses on “process” innovations that promote the consistent, reliable delivery of care through standardized processes and workflows. The goal is to have as little variation as possible when best practices are known, which stands in contrast to most organizations where practice patterns and processes vary considerably. Key strategies for redesigning processes are outlined below:

- **Emphasizing quality and efficiency:** Geisinger focuses primarily on enhancing quality, but also pays attention to efficiency and cost, which is not considered “a dirty word” within the organization.

Exhibit 13: Geisinger Health System: An Integrated Health Service Organization



©2012 Geisinger Health System.

- **Standardizing production functions:** Geisinger seeks to standardize care strategies and practices through use of consensus- and evidence-based guidelines that lay out what should be done for different types of patients. The focus is identifying the most important things that need to be done and developing clear operational definitions for inadequately defined recommendations.
- **Eliminating unnecessary steps:** Industrial engineers work in collaboration with clinical teams to eliminate any and all unnecessary steps.
- **Automating everything possible:** The engineers and teams seek to automate all work that can be automated, often leveraging the EMR to do so. For example, once a clinical team decides that all patients in a particular category should receive a particular test, the order is automated so that the physician does not have to remember.
- **Delegating to non-physician staff:** To promote efficiency, Geisinger routinely delegates work to appropriately trained non-physician staff whenever possible, with all personnel operating “at the top of their license.” Many tasks can be performed by non-physicians. For example, after nurses took responsibility for urine protein tests for those with diabetes (facilitated by a prompt in the EMR), testing rates doubled in a month, from 40 percent to 80 percent.

- **Supporting agreed-upon workflows:** Geisinger uses various types of EMR reminders, decision support tools, and other workflow facilitators to increase the reliability of care. Geisinger implemented an EMR in the outpatient setting in 1996 and expanded it to inpatient care in 2001, making the organization a very early adopter of this technology. Over the years, Geisinger has embedded within its EMR system many functions and programs that facilitate compliance with preferred practices.
- **Activating and engaging patient and family:** Geisinger is at the forefront of efforts to engage and activate patients and their families. For example, Geisinger was one of three organizations to participate in a study on the value of giving patients access to physician notes.¹⁰

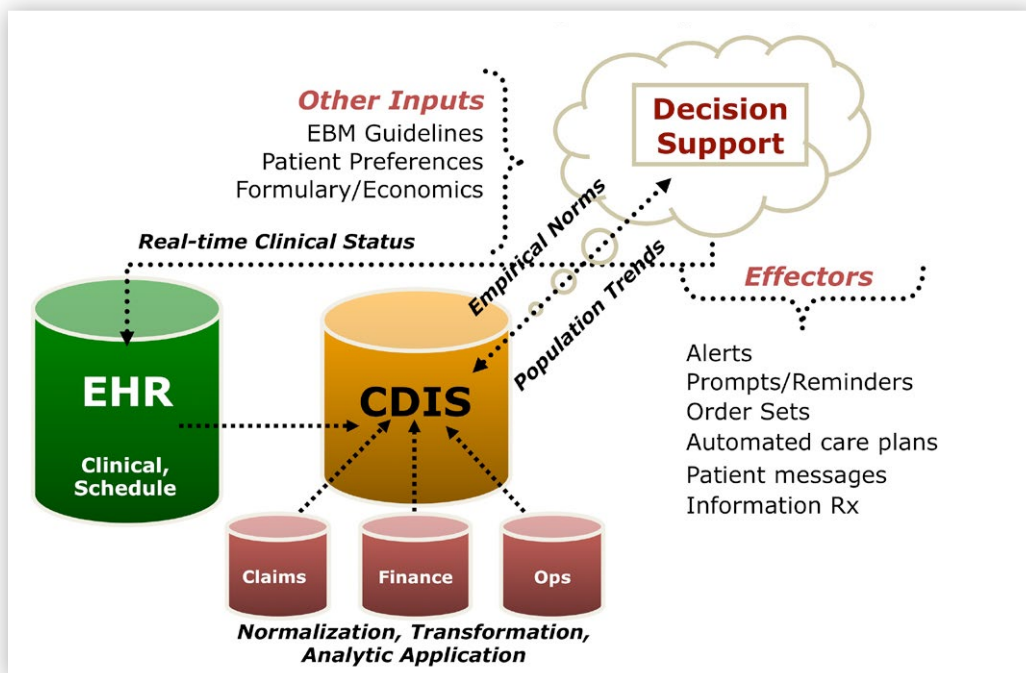
Major Reengineering Initiatives

Geisinger does not focus on figuring out what the optimal treatment is for a particular disease. Rather, it focuses on innovations that promote standardized, high-quality care at low cost. Key initiatives are described below.

Enterprise Data Warehouse

Geisinger has developed an enterprise data warehouse. Known as Clinical Decisions Intelligence System or CDIS, this system imports data from the EMR every night into a data warehouse.

Exhibit 14: Clinical Decision Intelligence System (CDIS)



©2012 Geisinger Health System.

10 Jan Walker, R.N., M.B.A., Suzanne G. Leveille, Ph.D., R.N., and Long Ngo, Ph.D., et al., “Inviting Patients to Read Their Doctors’ Notes: Patients and Doctors Look Ahead: Patient and Physician Surveys,” *Annals of Internal Medicine*, Vol. 155, No. 12 (December 20, 2011.), pp. 811–819.

Data are analyzed, with conclusions sent back into the EMR on a daily basis. (See **Exhibit 14** for a graphic description of this process.) In the warehouse, EMR data are integrated with claims data and other information. A large number of analyses of these data are performed on a daily, monthly, and annual basis, producing, among other things, a variety of prompts and other decision support for clinicians at the point of care. This type of analytic infrastructure is critical to managing population health.

Making the EMR a Member of the Team

Geisinger has invested roughly \$135 million thus far in hardware, software, manpower, and training related to the EMR. Approximately 200 full-time equivalent (FTE) employees and 70 contracted FTEs work on programming and customizing the system (an Epic® system). Geisinger spends roughly \$25 million a year running the EMR system, which is fully integrated across all ambulatory and inpatient sites of care. The system has more than 3.8 million distinct patient records, and can be used by the more than 4,000 non-employed physicians who care for Geisinger patients.

Primary Care Redesign and Clinical Reengineering

As illustrated in **Exhibit 15**, Geisinger has redesigned its approach to primary care and to clinical care in general. The focus is on identifying individuals who fall within a clinically important patient population (e.g., all those with diabetes) and then figuring out what services these individuals need. The system uses “quality-of-care bundles” (an approach pioneered by the Institute for Healthcare Improvement that lays out the key evidence-based processes that these patients need) to measure quality of care. Geisinger

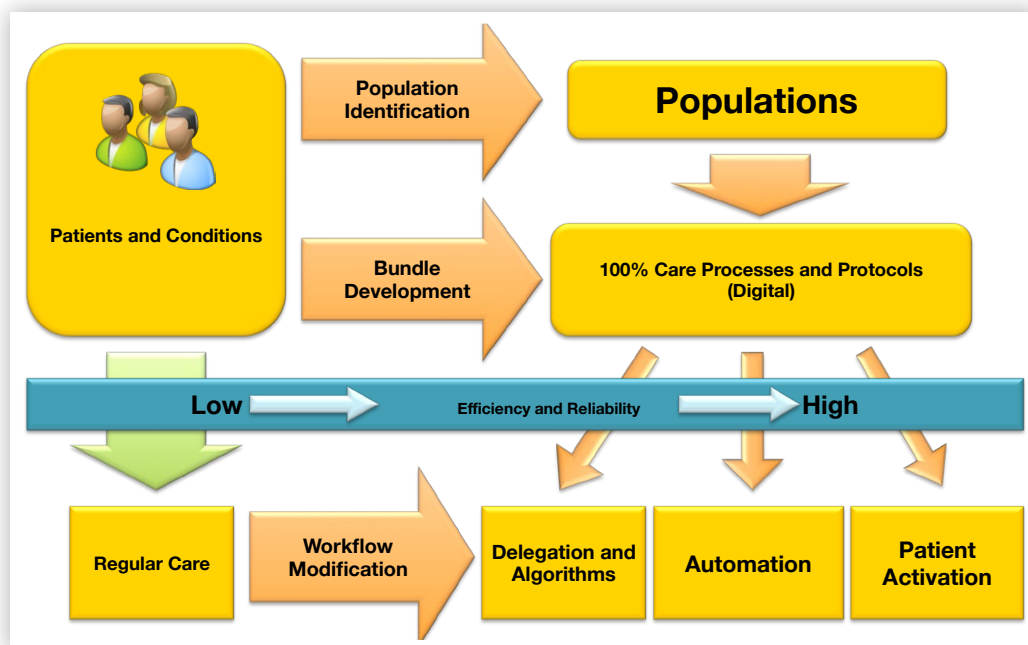
monitors practice sites’ and individual physician performance using “all-or-none” measurement—in other words, credit for providing appropriate care is not given unless the patient receives all elements of the bundle. To promote quality improvement, however, data are shared on the performance of each individual component, allowing practice sites and clinicians to determine where performance is lagging. To facilitate this process, Geisinger has mapped out most aspects of care and has put in place algorithms and automated processes to facilitate the provision of appropriate care. As shown in **Exhibit 16**, the overarching goal is to close gaps in care by providing the right information to the right people at the right time, with health IT serving as a facilitator.

ProvenCare®

ProvenCare® is Geisinger’s name for the consensus- and evidence-based protocols that guide both acute care and the management of chronic conditions. The process for developing and using these protocols includes the following key steps.

- Identify best practices.
- Develop operational definitions when needed.
- Obtain physician buy-in.
- Develop and implement tools to facilitate compliance with best practices and integrate them into workflows.
- Provide financial incentives to comply. Everyone involved in primary care at Geisinger—ranging from the clerk at the front desk to senior-level physicians—is evaluated in the same way and has an incentive to improve.
- Monitor performance.

Exhibit 15: Reengineering Clinical Care



©2012 Geisinger Health System.

Exhibit 17 shows how ProvenCare® works for patients undergoing coronary artery bypass graft surgery. The approach lays out what steps should be taken at each point in the process, beginning with the clinic visit and continuing until the first clinic visit after the surgery. The EMR facilitates the provision of recommended care throughout the process, and all clinicians and staff have a financial incentive to perform well and they receive feedback on their performance. Many of the EMR prompts are quite simple, such as prompting the clinician to order appropriate drugs and to

discontinue inappropriate ones (e.g., discontinuing warfarin prior to surgery).

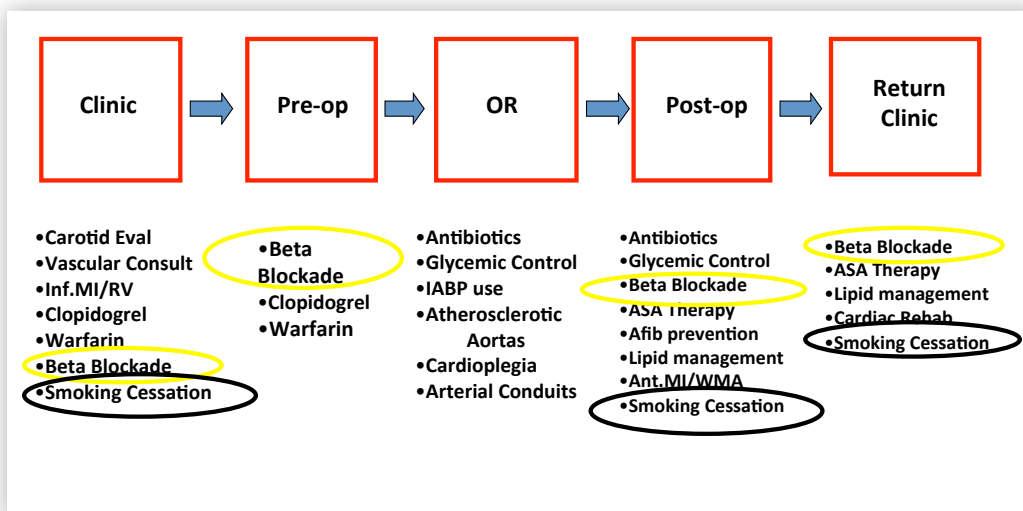
As illustrated in **Exhibit 18**, this approach has allowed cardiac surgeons to generate very high levels of compliance with 40 best-practice elements of care, with adherence to all identified practices quickly jumping from 70 percent at implementation to between 90 percent and 100 percent in less than a year, with rates remaining at these high levels ever since. More importantly, greater adherence has led to significant improvements in clinical outcomes, with mortality rates being cut in half and use

Exhibit 16: Closing Care Gaps: Content, People, and Health Information Technology (HIT)

Content	People	HIT
Prevention	Outpatient Reengineering and Innovation Oversight	Diagnosis Naming Conventions
Diabetes	Care Gaps Team	Problem List Manager
CAD	Clinical Workgroups	Clinical Data Capture
CKD	Innovation	Patient Reported Data Capture
Heart Failure	Medical Informatics	Office-Based Decision Support
Vascular Disease	EPIC Design Team	Automating Orders
Osteoporosis	Analytics and IT	Automating Outreach
Obesity	Scheduling Services	Real-Time Opportunity Reports
HTN and Lipids		Data Visualization
Asthma/COPD		Care Gaps Manager
End of Life		Patient Communication
Medication Safety		
Atrial Fibrillation		

©2012 Geisinger Health System.

Exhibit 17: ProvenCare® CABG: Process Flow



©2012 Geisinger Health System.

of prolonged ventilation falling by 20 percent. (See **Exhibit 19** for other examples of improvements.)

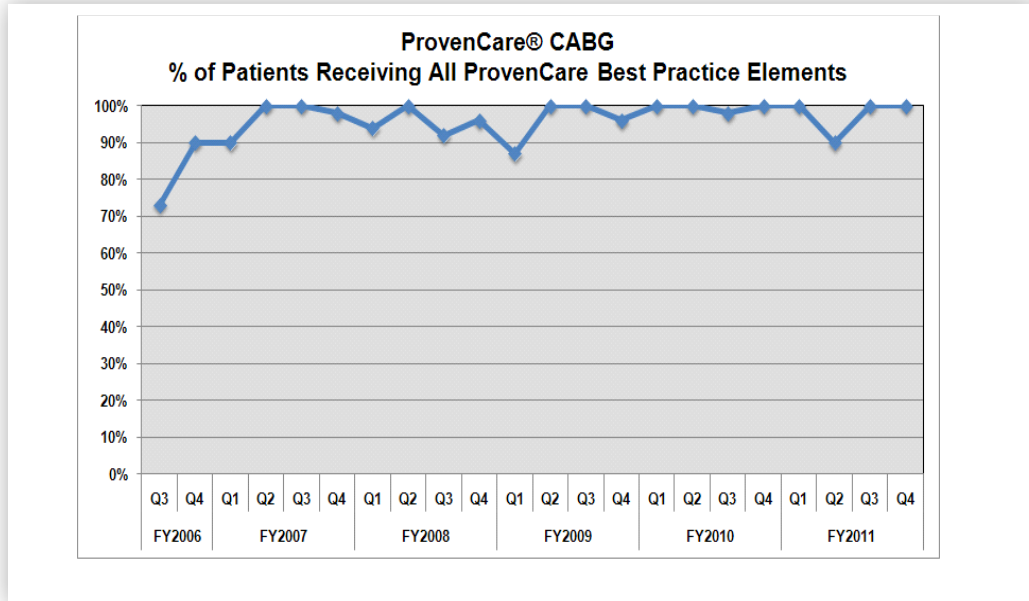
These enhanced outcomes have also yielded financial benefits, with CABG care having become more efficient (e.g., average LOS fell from 7.60 to 6.28 days) and more profitable for the organization.

Geisinger has taken a similar approach in another area of acute care—the neonatal ICU (NICU). This approach has reduced the need to admit newborns to the NICU, and reduced average LOS for those admitted. Geisinger has also extended the approach

to managing chronic disease. For example, within diabetes care, ProvenCare® has yielded significant improvements in performance on standardized measures, as illustrated in **Exhibit 20**.

As with CABG care, improved compliance with best practices has led to better health outcomes for those with diabetes, including fewer heart attacks, strokes, amputations, and cases of retinopathy. The same approach has been used for patients with coronary artery disease and to improve the provision of preventive care, as illustrated in **Exhibits 21 and 22**.

Exhibit 18: ProvenCare® CABG: % Of Patients Receiving All ProvenCare Best Practice Elements



©2012 Geisinger Health System.

Exhibit 19: Clinical Outcomes: O/E Ratios for STS Risk-Adjusted Outcomes

	Before ProvenCare® N = 132	After ProvenCare® N = 554	% Improvement (Deterioration)
Mortality	0.85	0.46	46%
Prolonged ventilation	1.22	0.97	20%
Deep sternal wound infection	1.15	0.41	64%
Re-operation	1.14	1.07	6%
Patients with <i>any</i> complication (STS)	1.00	1.08	(7%)
Permanent stroke	1.04	1.18	(13%)

©2012 Geisinger Health System.

ProvenHealth Navigator® (Advanced Medical Home)

Launched seven years ago, ProvenHealth Navigator® is Geisinger’s version of an advanced medical home. This low-tech innovation has proven critical to managing the care of very sick patients over time. In the primary care setting, ProvenHealth Navigator® operates as a partnership between Geisinger primary care physicians and the Geisinger Health Plan. The program embeds specially trained and selected health plan nurses into high-volume primary care practices. Selected based on their personality and willingness to take responsibility, these nurses continuously monitor and care

for the sickest patients, making themselves available around the clock. The nurses develop a close, trusting relationship with the patients, making them feel comfortable in reaching out to them at any time. Their work consists of the following key elements:

- Easy, reliable phone access for patients
- Follow-up calls after hospitalizations and ED visits
- Telephonic and digital monitoring
- Group visits and educational services
- Personalized tools (e.g., chronic disease report cards)

Exhibit 20: Improved Care for 25,071 Diabetics

	3/06	3/07	8/10	8/11
Diabetes Bundle Percentage*	2.4%	7.2%	13.0%	12.5%
% Influenza Vaccination	57%	73%	75%	76%
% Pneumococcal Vaccination	59%	83%	83%	82%
% Microalbumin Result	58%	87%	78%	78%
% HgbA1c at Goal	33%	37%	52%	50%
% LDL at Goal	50%	52%	54%	55%
% BP < 130/80	39%	44%	55%	57%
% Documented Non-Smokers	74%	84%	85%	85%

* Represents % of patients in whom all indicated services were provided.

©2012 Geisinger Health System.

Exhibit 21: Improved Care for 15,532 CAD Patients

	9/06	3/07	8/10	8/11
CAD Bundle Percentage	8%	11%	22%	23%
% LDL < 100 or < 70 if High Risk	38%	37%	50%	52%
% ACE/ARB in LVSD, DM, HTN	65%	66%	76%	77%
% BMI measured	79%	86%	99%	99%
% BP < 140/90	74%	74%	79%	81%
% Antiplatelet Therapy	89%	91%	92%	93%
% Beta Blocker use S/P MI	97%	97%	97%	97%
% Documented Non-Smokers	86%	86%	87%	87%
% Pneumococcal Vaccination	80%	80%	86%	86%
% Influenza Vaccination	60%	74%	78%	78%

©2012 Geisinger Health System.

The program has significantly reduced hospitalizations, readmissions, and costs in both Medicare and commercial populations. Data suggests that the benefits of the program increase over time—that is, patients benefit more as they gain experience working with the nurse.

Key Characteristics of Geisinger Health System

As noted, Geisinger focuses on basic building blocks that allow the organization to perform well on the front lines of care. Dr. Steinberg highlighted the following characteristics that contribute to the system's success:

- **Strong physician leaders paired with administrative partners:** All major divisions have a physician leader who works in close collaboration with an administrative partner.
- **Organizational culture that prioritizes quality, efficiency, and innovation:** The CEO drives this culture. For example, after learning about an unusually high number of patient falls, Geisinger's CEO probed deeply into the reasons for the problem, and then persisted in asking questions at subsequent meetings for six to nine months until the problem had been fixed.
- **Employees who embrace the culture:** Those who come to Geisinger buy-in to its culture; in many cases, that culture is what attracted them to the organization in the first place.
- **Integration of clinical enterprise and health plan:** At Geisinger, health plan leaders view the Geisinger Clinical Enterprise as a partner in improving care (and vice versa), not as "sparring partners" in rate negotiations.

- **Clear, shared aims:** Everyone at Geisinger understands the organization's goals and how their performance will be evaluated with respect to achieving those goals.
- **Team and system orientation:** Geisinger focuses on how well the team and overall system performs, not how good someone may be as an individual practitioner.
- **Infrastructure:** Geisinger has invested heavily in its EMR and other health IT, along with data analytics.
- **Innovation and transformation units:** Successful innovation is facilitated by the existence of units that focus exclusively on developing innovations in partnership with those who will implement them on the front lines.
- **Focus on workflow and reliability:** As noted, Geisinger employs industrial engineers who focus almost exclusively on enhancing workflows and standardizing care processes.
- **Emphasis on performance measurement and feedback:** Geisinger constantly monitors performance and shares data with key stakeholders, with the goal of encouraging sharing of best practices and friendly competition.
- **Aligned incentives:** All key stakeholders at Geisinger have the same financial incentives.

Spreading Innovation in Response to Payment Changes

Dr. Steinberg came to Geisinger in mid-2011, with the goal of spreading some of the innovations pioneered by the system to other organizations. Geisinger leaders felt that changes in payment systems were creating a new need within the marketplace, as many other providers began to look for ways to change how

Exhibit 22: Improved Preventive Care for 220,946 Patients

	11/07	8/11
Adult Preventive Bundle	9.2%	31%
Breast Cancer Screening (q 2 40-49, q 1 50-74)	46%	61%
Cervical Cancer Screening (q 3 yr Age 21-64)	64%	71%
Colon Cancer Screening (Age 50-84)	44%	66%
Prostate Cancer Discussion (Age 50-74)	72%	77%
Lipid Screening (Every 5 yr M > 35, F > 45)	75%	87%
Diabetes Screening (Every 3 yr > 45)	85%	90%
Obesity Screening (BMI in Epic)	77%	97%
Documented Non-Smokers	75%	78%
Tetanus Diphtheria Immunization (every 10 yr)	35%	72%
Pneumococcal Immunization (Once Age >65)	84%	86%
Influenza Immunization (Yearly Age >50)	47%	59%
Chlamydia Screening (Yearly Age 18-25)	22%	37%
Osteoporosis Screening (every 3 yr Age > 65)	52%	73%
Alcohol Intake Assessment	84%	92%

©2012 Geisinger Health System.

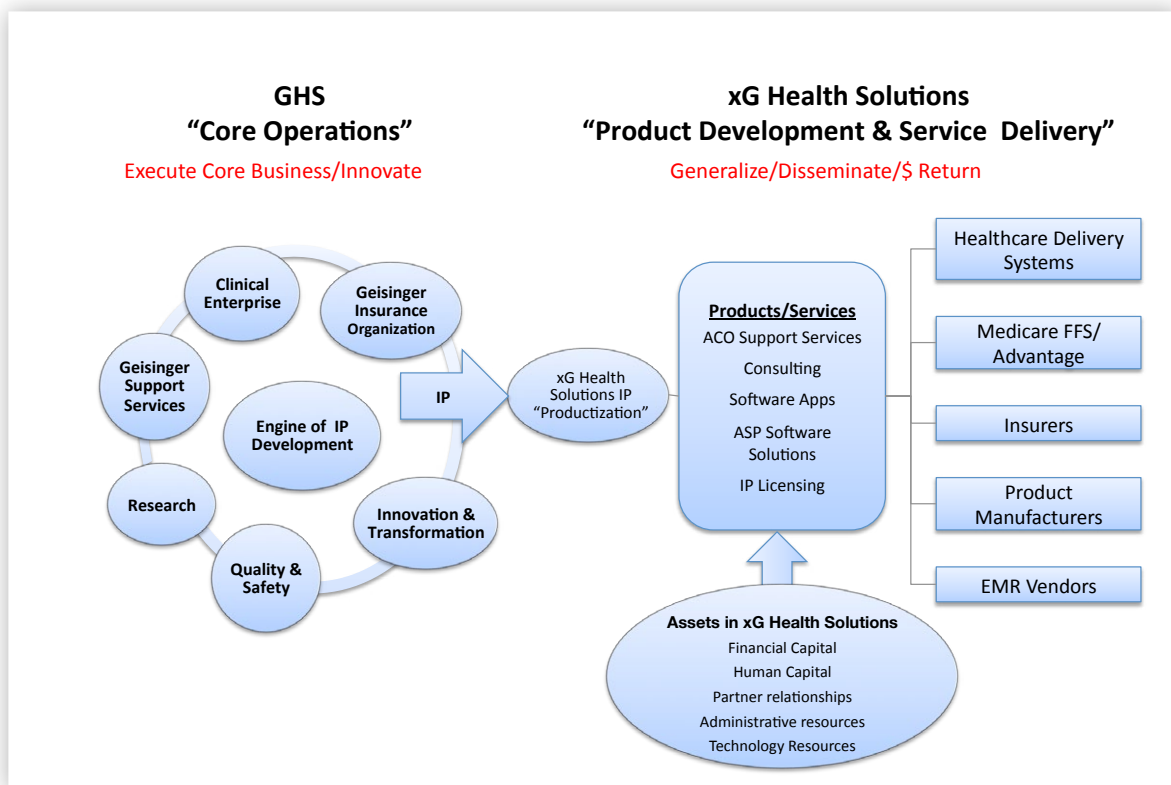
they organize and deliver care. Most of these providers lack the requisite capabilities to succeed under risk- and/or performance-based payment systems, and need help transitioning from a volume- to value-oriented approach. Over time, progressive reductions in FFS payments will reach a point where transformation will make financial success for these organizations, and the traditional business model for hospitals will be turned upside down (e.g., hospitals will benefit financially from keeping people out of the hospital rather than filling beds).

Recognizing this market need, Geisinger’s board approved formation of a new company, xG Health Solutions (as illustrated in **Exhibit 23**), to which it has licensed the healthcare improvement intellectual property from all parts of Geisinger, with the goal of helping other delivery systems perform better under risk- and performance-based payment arrangements. xG will teach other delivery systems how to implement particular innovative programs, or operate the programs for them. For example, in most instances, it would be easier and less expensive for xG to implement and operate a data warehouse and perform population health data analytics for a healthcare delivery system than

it would be for that system to do so on its own. The experience of xG will enable Geisinger to determine whether what Geisinger has done (including the results achieved) can be reproduced elsewhere, and if so, if it can be done in a scalable manner.

The new company already serves roughly 25 organizations, offering a variety of services that support the provision of value-based care, including population health data analytics, case management, and consulting services. The company also licenses Geisinger intellectual property to product manufacturers and healthcare delivery systems. These licenses may include software applications, if Geisinger can overcome issues limiting EMR interoperability (which has historically been a problem). Consulting services include organizational strategy, leadership and transformation; physician compensation and alignment; assessment of readiness to be an ACO; primary care redesign (including implementing a patient-centered medical home model); EMR optimization, implementation of ProvenCare®; certification and training of embedded case managers; management of care transitions; bundled payments; and improving inpatient efficiency.

Exhibit 23: Relationship Between xG Health Solutions and GHS



©2012 Geisinger Health System.

