Δlgør1☤hms
for innovation

SEARCHING FOR SOLUTIONS TO

IMPOSSIBLE
PROBLEMS

UNIVERSITY OF UTAH
HEALTH SCIENCES
INNOVATION REPORT 2013

THE DIFFICULT
WE DO RIGHT AWAY.
THE IMPOSSIBLE TAKES
A LITTLE LONGER.

UNIVERSITY OF UTAH
HEALTH SCIENCES

THERE IS NO ROAD MAP TO NAVIGATE THROUGH THE CONSTANTLY SHIFTING

LANDSCAPE OF HEALTH CARE.

Like the dramatically beautiful yet sometimes inhospitable natural environments of Utah, our fractured health care system presents obstacles that often seem insurmountable. Impossible.

We know there are ways around them, and we believe that academic medicine is poised to lead the way. It will take ingenuity, perseverance and vision. It will demand preparation, the right tools and a willingness to forge ahead into unknown territory. It will also require that we work together.

Since there are no maps to guide us, we're creating algorithms to solve what we believe are some of the Impossible Problems in academic medicine: reducing inefficiencies, controlling our costs, working in teams, sharing resources and creating a system that values everyone's contribution. Just like the landscape, our algorithms continue to change and evolve.

In many ways, we are still at base camp. We know that we can't scale the peak alone. And so we invite you to join us in creating a new path forward.

WWW.ALGORITHMSFORINNOVATION.ORG

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David Entwistle, M.H.A.
Chief Executive Officer
University of Utah Hospitals and Clinics

Sean J. Mulvihill, M.D.
Associate Vice President for Clinical Affairs
CEO, University of Utah Medical Group

Dean Y. Li, M.D., Ph.D.
Associate Vice President for Research and Chief
Scientific Officer, University of Utah Health Sciences

Elizabeth D. Winter, J.D., B.S.N.
Chief of Staff
University of Utah Health Sciences

Wayne Samuelson, M.D.
Vice Dean for Education
University of Utah School of Medicine

Carrie L. Byington, M.D.
Vice Dean for Academic Affairs and Faculty
Development, University of Utah School of Medicine

Patricia G. Morton, Ph.D., R.N.
Dean, College of Nursing

Alone,
we go fast.
TOGETHER,
WE GO FAR.

Rena N. D'Souza, D.D.S., Ph.D., M.S.
Dean, School of Dentistry

Robin L. Marcus, Ph.D., P.T.
Interim Dean, College of Health

Jean P. Shipman, M.S.L.S.
Director, Spencer S. Eccles Health Sciences Library

Chris M. Ireland, Ph.D.
Dean, College of Pharmacy

THE DAYS OF BUSINESS-AS-USUAL IN HEALTH CARE ARE OVER. *Academic medicine and our nation's health system face unprecedented challenges that demand unprecedented transformation. At the University of Utah, we've been identifying the cultural changes we need to make, creating the appropriate governance structures, developing infrastructure and critical tools, preparing the workforce, and more.*

Along the way, we've defined some "Impossible Problems" that we need to tackle to be successful, and in this year's report, we share some of the lessons we've learned. One thing we know is that the rapid pace and the remarkable scope of this change will require us to work together like never before. We've built a team at the University of Utah that brings a richness of perspectives, a diversity of backgrounds, an innovative and entrepreneurial spirit, and a willingness to tackle tough problems and lead change. The respectful collaboration and the positive energy in Utah are unrivaled. I feel privileged to work in an environment with so much talent.

Our goal is to help move the nation forward, and we know that dissemination of best practices among our colleagues across the country is vital for a system-wide transformation. We invite you to join the conversation at algorithmsforinnovation.org, where we share voices, perspectives and ideas from across the country. These conversations enrich all of our perspectives, inspiring and enabling us to go faster and farther.

IMPOSSIBLE PROBLEM

No. **1**

FOCUS ON *QUALITY*, NOT MERE COST CUTTING

THINK
beyond Lean
HEALTH CARE
buzzwords

JOIN
– WITH THE –
BUSINESS

EMPOWER
FRONTLINE
STAFF TO FIX
problems

HOW DO WE TACKLE **INEFFICIENCY?**

FORGING A PATH TO BETTER HEALTH CARE DELIVERY AND PATIENT CARE

INVEST IN THE IDEAS *with* GREATEST POTENTIAL

TRACK PERFORMANCE
and standardize
BEST PRACTICES

IMPOSSIBLE PROBLEM

No.

1

FOCUS ON *QUALITY,* NOT MERE **COST CUTTING**

THINK
beyond Lean
HEALTH CARE
buzzwords

JOIN FORCES
— WITH THE —
BUSINESS
school

EMPOWER
FRONTLINE
STAFF TO FIX
problems

INVEST IN THE **IDEAS** *with GREATEST* **POTENTIAL**

TRACK PERFORMANCE
and standardize
BEST PRACTICES

OUR HEALTH CARE SYSTEM IS UNDENIABLY BROKEN.

In 2013 alone, the U.S. health system will harm one in three patients during their hospital stays. Of the staggering $2.8 trillion Americans will spend on health care this year, an estimated $750 billion will be squandered on wasteful practices and unnecessary work.[1]

The mandate for all health care systems is clear: improve outcomes, reduce cost and eliminate waste. How to achieve these ambitious goals throughout a profoundly complex organization is much less obvious.

A good place to start is to give people hope that they can make things better. Health care professionals are arguably the greatest do-gooders around. Yet in a recent survey conducted by the Physicians Foundation, three-quarters of the 14,000 surveyed physicians stated they were somewhat or very pessimistic about the future, and 82 percent said they have little ability to change the health care system.

If these physicians are representative of health care professionals in general, the first order of business is to inspire and empower the millions of people who work in health care to believe they can be part of the solution. Working in the inherently inefficient worlds of medicine and academia has trained people to become masters of the workaround. "Those who are doing the work know where the waste is, where the inefficiencies are and where there are opportunities," says Robert Pendleton, M.D., chief medical quality officer for our hospitals and clinics.

It's human nature to want to fix problems. So how is it that we can be so incredibly ambitious adopting cutting-edge technology and life-saving treatment options, and so surprisingly accepting of completely avoidable conditions, such as bedsores? Most of the time, it's because they require more than one person doing the right thing—they require coordination among many people and a process in place to ensure best practices happen across the system. "If we could harness the imagination of the 12,000 people in our organization to improve our system, we could create an endless well of opportunity," says Pendleton.

Is there really a single tool that can change culture and erase inefficiencies from our system—or at least significantly reduce them? Over the past few decades, many health care institutions have tried more than a few process improvement tools, some borrowed from lessons in manufacturing. Comprehensive, measurable and sustained success has been elusive for most. Part of the problem is buy-in. These tools are often perceived to be an assembly-line approach to the practice of medicine. Lean, for example, was developed in Toyota factories in Japan, and physicians take care of people, not cars. Hospitals deal with lives, not widgets. And academic medical centers are purpose-driven institutions, not profit-driven factories.

> *"If we could take all the harmful stuff we do out of our system, we wouldn't have to worry so much about payment reform."*
>
> —ROBERT PENDLETON, M.D., Chief Medical Quality Officer

> *"If I'm going to speed up, I tell my techs that they're going to need to slow down."*
>
> —NORM ZABRISKIE, M.D., Vice Chair and Medical Director of Clinical Services and Director of Clinical Operations for the John A. Moran Eye Center

THE EFFICIENCY FREAK

Norm Zabriskie, M.D., describes himself as an "efficiency freak." You'd never know it by talking with him. His calm, unhurried demeanor belies the high-speed intensity of his glaucoma clinic, where before recently switching to an electronic health record, he saw an average of 80 patients per day. There are no signs of the blistering pace in his waiting room, either. In fact, it's just a bunch of empty chairs. That's because the patients are all in exam rooms. Within minutes of arriving, their care has already begun.

In Zabriskie's clinic, patient care looks a little different too. Here, the start of each visit isn't just about taking vitals and patient history. It's about actual visiting. Patients are attended to first by one of Zabriskie's five highly trained ophthalmic technicians, each of whom sees an average of only 16 patients a day. In addition to collecting every piece of medical data that Zabriskie needs before he walks into the exam room, the techs are empowered to order tests they think are needed, and listen to plenty of patient stories that have nothing to do with glaucoma. "If I'm going to speed up, I tell my techs they're going to have to slow down," he says. They talk about new grandbabies, minor aches and pains, major family milestones and, eventually, eyesight issues. By training his techs to handle the data-collecting and relationship-building side of medicine, Zabriskie, who follows a strict scheduling template, can quickly zero in on treating his patients.

While many health care organizations worry about how they'll be able to survive on Medicare rates, Zabriskie's hyper-focus on patient flow has it nearly figured out. More than half of his patients have Medicare, yet he has been able to maintain a profitable practice. But it's more than that. While sustaining the kind of daily patient volume that many would equate with conveyor-belt medicine, Zabriskie and his techs consistently deliver the kind of individualized care that's exactly the opposite of a factory. And his patient satisfaction scores prove that it works—640 online patient reviews, filled with glowing remarks, rate him on average 4.8 out of 5.

Zabriskie is quick to point out two things: First, his efficiency strategies are specific to a glaucoma clinic, and second, his volume and patient satisfaction scores have dipped slightly since switching to an electronic health record. "Every patient takes a little bit longer, so we have to re-engineer things to find where we can shave off a little bit of time," he says.

What's not specific to his clinic, however, is his belief that it's the physician's job to "bring the magic." Zabriskie checks his own bad moods and crises at the door every day, and he expects everyone on his staff to do the same. "I don't ever think that it's the patients' privilege to see me," he says. "It's just the opposite. It's my privilege to see them."

*"I'm never sure if my patients are here to see me or my techs," says Zabriskie. From top to bottom: certified ophthalmic assistant **Kari Hansen**, patient service coordinator **Steve Christensen**, certified ophthalmic assistant **Kelene Rowley**.*

CENTRAL LINE INFECTIONS: THE ZERO TOLERANCE CREW

Nearly 15 years after the landmark Institute of Medicine report "To Err Is Human" laid out a comprehensive plan to reduce preventable medical errors, tens of thousands of patients continue to die each year from infections they catch in hospitals. For hospital epidemiologist Jeanmarie Mayer, M.D., and critical care pulmonologist Boaz Markewitz, M.D., even one of these deaths is unacceptable. "Zero harm is the only reasonable goal," says Markewitz, "even if you don't think you can reach it."

As part of their commitment to zero harm in health care, they set out to eliminate central line–associated bloodstream infections (CLABSIs). By re-engineering the central line dressing change process on the University Hospital's Intermediate Care Unit, they've proven that Lean error-proofing techniques can be as effective in heath care settings as they are in Toyota factories. For more than two years, they haven't had a single CLABSI on their unit. They changed the system. And the culture. "We can't have the mindset that even one preventable infection is okay," says Mayer.

How did they do it? By first acknowledging that to err is human—especially in a fast-paced hospital environment where constant distractions are the norm. They asked every nurse and medical assistant on the unit to make a grim prediction: how the next patient would be harmed. Staff resisted at first, not wanting to point fingers or expose problems. But as monthly quality improvement meetings were replaced with daily safety rounds, people started talking and sharing their concerns and their solutions for fixing problems.

With the leadership of Frank Drews, Ph.D., M.S., associate professor of psychology, they identified and addressed the "human factors" that caused infections. Nurse Manager Carrie Charlesworth, R.N., B.S.N., C.C.R.N. and her staff in the Intermediate Care Unit were enthusiastic in piloting the new foolproof dressing changing kit that built in the realities of their work environment. Individual pouches hold supplies needed for a single step, along with clear, concise, and specific instructions. The pouches are ordered, guiding nurses to perform the procedure in the safest sequence. "The process improvements we've made have been driven by our frontline team members, not the people at the top," says Mayer. "Our nurses are the people who are doing it every day. They are the ones who should be making the decisions."

Initially, many practitioners on other units were insulted by the very idea of it. As highly trained thinkers, they felt they didn't need anyone or anything to walk them through a simple process that they learned in nursing school. "But there are so many more important ways to use high-level thinking. So why use it on something that can be made rote?" said Mayer. And who can argue with the data, as in zero harm?

*The entire staff of University of Utah Hospital's Intermediate Care Unit worked on a process to eliminate central line–associated bloodstream infections. Representing the unit here are (front row, from left to right) **Carrie Charlesworth, R.N., B.S.N., C.C.R.N.,** nurse manager, **Stevi Gire, R.N., B.S.N.,** nurse educator, **Trell Inzunza, R.N., B.S.N.,** clinical nurse coordinator, and **Jeanmarie Mayer, M.D.,** associate professor of internal medicine. Back row (from left to right): **Robert Pendleton, M.D.,** associate professor of medicine and chief medical quality officer, **Boaz Markewitz, M.D.,** associate professor of internal medicine, and **Frank Drews, Ph.D., M.S.,** associate professor of psychology.*

"People are in health care with their hearts, and methods like Lean can seem really impersonal," says Quinn L. McKenna, M.H.A., chief operating officer for our hospitals and clinics, noting that efficiency and cost-cutting have never been big motivators for people who have dedicated their lives to caring for patients. "We knew that we needed to show how efficiency connects with doing good and adding value."

So with eyes wide open, this past year we ventured on a journey to see what we could borrow from the automaking industry, and how we could personalize it to our culture to create more value for our patients. Here are a few of the things we've learned along the way.

JUMP-START MOMENTUM WITH ALL-IN EXECUTIVE SPONSORSHIP.

Let's be honest. What's the most likely way to get a busy surgeon to spend 13 weeks learning how to be more efficient? Have her boss ask her to do it. That's how our Lean initiative was launched, with a loud-and-clear call to action from senior leaders, in particular Vivian S. Lee, M.D., Ph.D., M.B.A., senior vice president for University of Utah Health Sciences and CEO of University of Utah Health Care. Executive leaders received training, provided the time for their staff to do the same, and focused resources and attention on projects implemented by faculty and staff.

> *"We've taken the Lean principles and reimagined them in the Utah vernacular. As a culture that likes options and thrives on innovation, an overly prescriptive approach wouldn't work for us."*
>
> —CHRISSY DANIELS, M.S., Director of Strategic Initiatives

PROCESS IMPROVEMENT ISN'T ABOUT REDESIGNING THE WAY PRACTITIONERS TAKE CARE OF PATIENTS.

That's a distinction that needs to be clear from the beginning, says Pendleton. "Lean can never replace the relationship with the patient. What it can improve is all the processes that surround those interactions, so that caring for the patient is more productive and meaningful."

A STRICT, TEXTBOOK APPROACH TO LEAN HEALTH CARE WON'T WORK IN AN ENTREPRENEURIAL CULTURE.

"We've taken the Lean principles and reimagined them in the Utah vernacular," says Chrissy Daniels, M.S., director of strategic initiatives for our hospitals and clinics. She helps support and monitor the 300-plus Lean initiatives that are currently underway throughout our academic medical center. "As a culture that likes options and thrives on innovation, an overly prescriptive approach wouldn't work for us."

APPLYING BUSINESS METHODOLOGIES DEMANDS GOOD BUSINESS MINDS.

Lee recognized an opportunity to cross academic boundaries and started a partnership with a whole team of Lean gurus at the University of Utah's David Eccles School of Business. According to Glen Schmidt, Ph.D., M.S., interim chair and David Eccles Professor of Business in the Department of Operations and Information Systems, the partnership broke the mold to create something quite different: system-wide transformation. "We don't just want to impact a single project," he says. "We want to infuse Lean throughout the entire academic medical center."

"I realized we were all doing the same processes a little bit differently. And we were a little too accepting of the resulting chaos and errors."

— RAGHBIR MAKHAR, University Hospital's Inpatient Pharmacy Technician Supervisor

THE LEAN CHAMPION

University Hospital's inpatient pharmacy technician supervisor Raghbir Makhar was always looking for ways to optimize the processes that were around him. What he was missing was a framework to systematically implement some of his ideas. After attending a performance excellence training workshop, where he learned about Lean tools and techniques, he became unstoppable. "It's like his inner Leanness has been unleashed," says Linda Tyler, Pharm.D., professor (clinical), associate dean of pharmacy and the administrative director of pharmacy services. "He's on a relentless quest to make everything more efficient."

He went on to study an advanced Lean curriculum and with the support of a project mentor, Makhar began to envision efficiencies across the system. "I realized we were all doing the same processes a little bit differently," he explains. "And we were a little too accepting of the resulting chaos and errors." Using Lean methodologies, Makhar analyzed what each tech did every day and then engaged the techs in creating more than 100 standard operating procedures. "I didn't do it," he says. "It's the team." They created a streamlined medication cart fill process, standardized training, and increased automation for an expensive robot used for drug packaging. His vigilance about managing drugs has suppliers questioning why there are no expired drugs to pick up. It's about the discipline of "always." "If we want to keep patients safe, we need to do it right 100 percent of the time," says Makhar.

Change didn't happen overnight. "Initially there were people who said it wouldn't work," recalls Makhar. "I had to keep explaining how the new processes would save us money and keep patients safer." With Makhar's dogged persistence, he's found new standardizations for even the smallest pharmacy tasks. One project alone has freed up more than 250 hours of technician time per year and saved the pharmacy more than $30,000 in labor, drug and supply costs, not to mention the avoidance of other costs and dangerous medical errors.

Makhar is making a difference one task at a time, saving money and improving quality. "We don't have to wait for a million-dollar project to come along," says Sandi Gulbransen, value engineering manager and Lean educator. "If everyone in our institution improves where they can, and focuses on the things they can control, we have the power to really change things."

MAKE THE CONNECTION BETWEEN LEAN AND SCIENTIFIC METHODOLOGIES.

"Health care professionals are used to applying the 'scientific method,' and at its core, that's what Lean is all about," says Schmidt. Lean requires providers to define the current problem, develop a hypothesis about how to improve it and measure the improvements that are made. "The idea is to find the best way to do something and then make sure you do it that way every time—while always looking to find the 'new best way.'"

EMBRACE SMALL, CONSTANT IMPROVEMENTS AND LET GO OF PERFECTION.

Trying to get the process perfect from the start can be paralyzing. Instead, nurture an inquisitive mindset that empowers staff to start small, even with one patient, and then refine the process and try it with two patients. Consider the medical center a laboratory and health care a continuously learning organization.

CONNECT EFFICIENCY WITH SURVIVAL.

"We have to show staff that Lean is actually one of our best economic preparation strategies," says Daniels. Pendleton agrees. "If we could take all the harmful stuff we do out of our system, we wouldn't have to worry so much about payment reform."

REDESIGN HEALTH CARE DELIVERY AROUND THE PATIENT, NOT THE PROVIDER.

Create a system of respect focused on the patient. Evaluate whether processes are offering value to the patients, and let their values help drive decision-making.

MASS PARTICIPATION REQUIRES MAJOR PRIORITIZATION.

With total executive support, floodgates to innovation were flung wide open, and the Lean initiative launched a thousand ships to sea. At that point, another vexing problem naturally unfolded: How do you prioritize while still keeping people engaged? For David Entwistle, M.H.A., CEO of our hospitals and clinics, the filter is simple. "If it's not driving a better clinical outcome, then we don't need to do it." As Pendleton puts it, "Process improvement takes discipline. We can't just chase all the shiny things." To ensure that, we created the Innovation Station (see description on next page), which helped us to "stop working on all the pretty good ideas, and to start working on the truly great ones," says Daniels.

PROGRESS MUST BE MEASURED, TRACKED, AND SHARED IN A TRANSPARENT WAY.

There's a certain thrill about creating something new. The part that takes more discipline is monitoring and tracking. While collecting ideas, prepare the system to measure results through dashboards and analytic tools that determine which ideas increase the value we offer to patients through outcomes, cost and patient experience.

DON'T LEAVE ANYTHING TO CHANCE.

"We can't leave best practices to chance. We have to re-engineer the system so we can be certain they will happen," says Sean J. Mulvihill, M.D., CEO of our faculty practice group and associate vice president for clinical affairs. Pendleton agrees. "We can't settle for an academic medical center that's safe, reliable and efficient some of the time. We must build a system that's all of these things, all of the time."

The ultimate goal is to become the leading academic medical center in the value of care that we deliver to our patients: safe, effective and efficient. There's a lot of learning and work left to do, and barriers that need to be removed. But change is clearly in the air. "The question we need to relentlessly ask is: Are we heading in the right direction?" says Entwistle. Pendleton agrees. "This isn't about a beginning and an end. It's about a journey. It's about having a vision that we can always do better."

GETTING LEAN

INNOVATION STATION An easy-to-use Web platform
that creates a centralized hub to submit and browse ideas for improvement.

With thousands of faculty, 12,000 staff, dozens of locations . . . how does an organization this diverse unite to become a highly efficient, highly effective force shaping the future of health care? Consider an Innovation Station. This Web platform, housed on our intranet, standardizes the way diverse groups across the organization engage in process improvement and provides a clear road map for staff to turn good ideas into projects focused on value.

When a staff member submits an idea, he or she is asked to measure the value of that idea in three key areas: patient satisfaction, financial efficiency and better outcomes. An algorithm compares all submitted ideas and plots them on a graph according to impact and effort. Managers can review the ideas and green-light those with the most potential. An idea can impact one goal or all three; it can be simple or complex. We've opened the doors to ideas from across the organization, created a means of prioritizing them, and are transparent with our employees about how we're able to respond to their ideas.

Innovation Station by the Numbers *338 Ideas Submitted, 65 Active Projects* since April–Sept. 2013

SIX STAGES OF THE INNOVATION STATION:

1. **BROWSE IDEAS** ———————————————————>
2. **SUBMIT AN IDEA** ————————————————>
3. **REVIEW IDEAS (MANAGERS)** ——————————>
4. **ASSIGN TIMEFRAMES (MANAGERS)** ————————>
5. **MANAGE PROJECTS** ————————————>
6. **MONITOR AND REPORT ON WORK** ————>

JAN.–SEPT. 2013

165 participants formally trained

102 projects sparked

536 staff involved in projects

$7.1M projected annual savings

HOW TO GET LEAN IN:

3 HOURS 6 ONLINE MODULES
For an introduction to basic Lean concepts and tools you can begin to use immediately. (CME credit available.)

6 HOURS LEAN PRINCIPLES WORKSHOP
For all staff and faculty. Experienced Lean practitioner facilitates workshop that covers Lean principles and how they support University of Utah Health Care strategic goals. Participants learn about different tools and basic process improvement techniques to implement Lean solutions in their work areas.

12 WEEKS
PERFORMANCE EXCELLENCE FACILITATION COURSE
6 Fridays of classroom instruction + project work + presentation of project
For staff and faculty interested in working on a Lean project. A value engineer provides instruction on foundational concepts for continuous performance improvement principles taken from Lean, Six Sigma and other methodologies. Fictional health care case studies and real project work guide participants through implementation of a Lean project in their area with mentoring from a value engineer.

13 WEEKS HEALTH SCIENCES LEAN TRAINING
1.5 days of classroom work + 12-week project + presentation
For managers, leaders and faculty seeking in-depth training. Through an innovative partnership with the David Eccles School of Business, operations experts and a master black belt train participants in Lean principles and then mentor a multidisciplinary team created by participants to work on a specific project, which they present to senior leaders.

6 MONTHS QUALITY IMPROVEMENT SCHOLARS PROGRAM
11 hours online curriculum + assigned reading + 14 hours classroom labs + project
For physicians who want to make quality improvement a part of their career. The University of Utah Medical Group program provides a fast-track curriculum that includes a deep dive into principles and tools from Lean and Six Sigma. Each participant creates a value-directed improvement project with 1:1 coaching from faculty and a value engineer.

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5 WAYS WE GOT LEAN IN 2013

1 /
GENERAL SURGERY:
Seven team members standardized how pre-op tasks are completed before patients go to OR. Improved on-time first start cases by 17 percent, and decreased average delay by five minutes. Estimated annual savings: $113,000.

2 //
MATERNAL NEWBORN CARE UNIT:
Eight team members identified four areas of discharge inefficiency and used IDEO framework to create patient communication tool. Decreased average discharge time by one hour, increased patient and staff satisfaction, and created capacity in Labor and Delivery.

3 ///
PALLIATIVE CARE AT HUNTSMAN CANCER INSTITUTE: Team members from eight areas standardized a process for screening, assessing and documenting palliative care needs. Goals: reduce interventions/costs over last three days of hospitalization, decrease by 20 percent the number of ICU patients who die or discharge to hospice, and improve patient and family experience.

4 ////
PHYSICAL MEDICINE AND REHAB:
By working on care pathways for specific patient populations, 12 team members reduced the wait time for a new patient to see a provider from 91 days to 39 days and first-time access to the Baclofen Pump Refill Clinic from 38 days to 13 days.

5 /////
COMMUNITY CLINICS PHARMACY:
A seven-member team standardized the centralized refill process at the Community Clinic's pharmacies. Improved communication, reduced staff time, and created quality and performance metrics resulting in estimated annual savings of $300,000 per year.

TO LEARN ABOUT OTHER LEAN PROJECTS OR TO SHARE YOURS, VISIT

algorithmsforinnovation.org

IMPOSSIBLE PROBLEM

No.

2

FORGET

CHARGES.

FOCUS ON

COSTS

HOW CAN

INSIST ON

CLEAN

data

WE CONTROL

OUR COSTS?

CONNECT COSTS WITH OUTCOMES

costing data

TO ALLIES

first

CONTRIBUTE

TO A

nationwide

SOLUTION

SHINING NEW LIGHT ON COSTS
TO IMPROVE THE VALUE
OF HEALTH CARE

IMPOSSIBLE PROBLEM

No. 2

FORGET *CHARGES.* FOCUS ON **COSTS**

INSIST ON **CLEAN** *data*

CONNECT **COSTS** WITH **OUTCOMES**

GIVE *costing data* **TO ALLIES** *first*

CONTRIBUTE TO A *nationwide* SOLUTION

HOSPITALS ARE IN THE HOT SEAT.

Every week in the media, some article lasers in on the outrageously high and variable costs of health care and how those costs are bankrupting both individuals and the country. No one can argue the point. This year, the U.S. is projected to spend $2.8 trillion on health care—18 percent of the entire U.S. GDP—which is more than Canada, Japan, Germany, France, China, the U.K., Italy, Brazil, Spain, and Australia will spend combined.

The high cost of health care in the U.S. has been reported in the media for years. What has changed is the intensity of the public's focus on the issue, as well as the shifting of blame from insurance companies to the hospitals themselves. In his scathing *Time* magazine exposé on hospital medical bills, Steven Brill spotlights egregious charges, like a 10,000 percent markup on acetaminophen, a $77 price tag for a box of gauze pads, and lab work that costs more than a car.

What's not garnering as much attention is a more complicated, if no-less-disturbing, angle to the health care cost story. The truth is that we are in the dark about where all that money is going. Health care systems like ours, much less individual providers, have very little idea what their actual costs really look like, or how they break down over the full cycle of a patient's care. We're not referring to the charges billed or reimbursements paid, but the true, real-world costs. "There's a lot of fiction floating around here, and nobody's been able to get to the truth," admits Chief Financial Officer Gordon Crabtree, M.B.A. Moreover, we have even less of an idea how, or if, all the money we're spending is improving patient outcomes or experiences.

In our defense, the current structure of health care pricing is unlike that of any other industry. Former Secretary of Health and Human Services Michael Leavitt once said, "The way we price health care cannot be understood by a human being of average intelligence and limited patience." And the sheer numbers are overwhelming. A knee replacement without complications, for example, racks up an average of 1,300 cost allocations under 20 different organizations using 13 different costing methods. The box of gauze pads would be one of those charges.

If that sounds like an excuse, it's not. Rather, the complex nature of health care pricing makes an even stronger case for the imperative to know where our money is going and how it's impacting the health of patients.

COSTING KNOWLEDGE IS POWER

It was Michael Porter, Ph.D., and Robert Kaplan, Ph.D., who thrust this decades-overdue costing conversation into the spotlight two years ago with a game-changing paper, "The Big Idea: How to Solve the Cost Crisis in Health Care." Published in *Harvard Business Review*, the paper zeroed in on providers' "complete lack of understanding" about the costs of health care delivery. This costing void, they explained, makes it nearly impossible to improve processes, eliminate unnecessary procedures, and deliver better outcomes. According to the Harvard business professors, figuring out the cost crisis would be the "single most important lever to transform the value of health care."

On the heels of the Kaplan-Porter article, Senior Vice President Vivian S. Lee, M.D., Ph.D., M.B.A., met with the department chairs of the School of Medicine in the spring of 2012 and challenged them to find a way to lower costs. The conversation turned out to be a pivotal moment that brought to light a huge missing piece of the costing mystery: There was no way for the chairs, or anyone, to tackle costs because the data didn't exist.

The next day, Lee used a rare opening in her calendar to rally together a group of senior leaders from finance, decision support, quality improvement, biomedical informatics, and IT. By the end of the impromptu hour-long meeting, the group had arrived at an ambitious goal: to create a tool by the end of the summer that would provide access to real-time, accurate costing data at the provider or patient level—better yet, a tool that could also overlay outcome and patient satisfaction data against costs.

"We're looking to change the value proposition altogether," says Lee, "so we can deliver the best outcomes at the lowest possible cost and with the greatest patient satisfaction."

"Just making this data available, without a single directive, has the power to really change things."

—KENSAKU KAWAMOTO, M.D., PH.D., Assistant Professor of Biomedical Informatics and Associate Chief Medical Information Officer

THE VDO ARCHITECTS: *In April of 2012, **Kensaku Kawamoto, M.D., Ph.D.**, assistant professor of biomedical informatics and associate chief medical information officer, **Cheri Hunter**, IT director of the data warehouse, and **Charlton Park, M.B.A., M.H.S.M.**, director of decision support and cost accounting, and their teams and colleagues were sequestered in a nondescript cubicle-filled room for six months. When they emerged in September, they had created a tool that revolutionized the way we analyze and access costs throughout the system. "So many things should be run like this," says Hunter. "It was the ideal blending of business, technical, medical, and top-level leadership expertise." The remarkable Value Driven Outcomes (VDO) tool they created was recently awarded a 2013 Innovator Award from **Hospitals and Health Networks** magazine.*

THE DATA WAREHOUSE VISIONARY

Twenty years ago, Jim Livingston saw an opportunity he couldn't pass up. Working as a software developer building our electronic health record, he was charged with capturing data from a host of different sources, all of which were proprietary about their ownership. Anyone who wanted data had to request it from the owner, which then could take months to receive. Wouldn't it be great, he thought, since I'm collecting it anyway, to store it all in one place.

Livingston took the initiative—along with a few career risks— to begin collecting and storing our health system's data two decades ago, under the radar. The rogue project "ruffled a few feathers," Livingston admits, "but I believed strongly in the value of what I was doing," he says. "I knew we needed it."

*Today, **Jim Livingston, M.B.A.,** is associate chief information officer for University of Utah Hospitals and Clinics, which has won Most Wired awards from **Heath Forum** and **Hospitals and Health Networks** magazines. The mature data warehouse he set in motion two decades ago serves as the bedrock for the new VDO tool. "Jim Livingston is a visionary," says IT data warehouse director Cheri Hunter. "He understood the importance of developing a centralized data warehouse, with integrated clinical and financial data, long before it was the industry standard and provided us with the solid infrastructure we needed to build VDO."*

THE SUMMER OF SEQUESTRATION

Six months later, we had a revolutionary tool that we call Value Driven Outcomes, or VDO. To get an idea of the Herculean effort behind the creation of VDO, visualize this: Each year, the costing data set for the University of Utah Health Care system includes approximately 135 million rows of data, with each row as wide as a football field.

To develop the tool, we took some of the brightest minds from four key areas (decision support, biomedical informatics, IT, and the medical group), released them from the responsibilities of their day jobs, put them in a room together and shut the door. In short, we sequestered them. The team brought together expertise across a variety of disciplines to work on a single task: getting a clinically focused costing tool up and running within months, not years. The group's makeshift command center was a 25-by-25-foot room devoid of any furnishings or decorations except rows of office cubicles and, occasionally, stacks of empty pizza boxes. For the next six months, that nondescript room became their second home as many of them virtually spent their entire summer working.

In the sequestered environment, the team was able to speed up the process of collaboration and innovation. "Being sequestered meant we could say no to everything else," says Charlton Park, M.B.A., M.H.S.M., director of decision support and cost accounting. Communication also flowed freely. "Instead of sending an email and waiting days or weeks for a response, we could just stand up and talk to each other over the cubicles. We got our answers immediately." Every single person in that room was so vital, says Kensaku Kawamoto, M.D., Ph.D., assistant professor of biomedical informatics and associate chief medical information officer, that if someone was sick, important aspects of the project would come to a screeching halt.

As the deadline drew near, some team members were working 100-hour weeks. "It was intense but needed," says Cheri Hunter, IT director of the data warehouse, who saved some of the instant messaging conversations had at 2 and 3 a.m. "We were willing to work late because we felt like we were doing something that would really add value." Hunter believes that kind of sequestered environment is a model for how teams can speed the pace of innovation. "So many things should be run like this," she says. "It was the ideal blending of business, technical, medical, and top-level leadership expertise."

Park agrees, calling it "the perfect project." Released from their siloed everyday jobs, collaborating across disciplines and reporting directly to the senior vice president and her executive team, each person on the team had a tremendous opportunity to add value to the tool they were creating. The team members also realized that the work they were doing could potentially be the transformational lever that Porter and Kaplan called for.

DIVING INTO THE DETAILS TO FIND THE TRUTH

With a mature data warehouse that had been painstakingly built over two decades, we had institutional data for billing, clinical, general ledger and payroll already in place at the start of the project. The team's mission was to harness these masses of data and figure out how to allocate costs at the patient-visit level—from the cost of gauze pads to individual chemotherapy treatments to minutes of nursing labor. Each of these expenses was itemized for more than 1,200 operating units in our academic medical center, effectively creating general ledgers for each and every unit. "In the accounting world, the gospel of finances is the general ledger," says Park. "You can't get to the truth without it."

Taking institutional expenses and applying them to the patient level was only the first step. To create a meaningful tool, variations in clinical activity had to be considered too. Filters were created that enabled users to adjust for a variety of situations, including the severity of a case, different types of patients, and the length of a patient visit. "We're dealing with complex paths of care and a heterogeneous population of patients," says Hunter. "Physicians need to have precise data that they can filter."

HOW CAN YOU KNOW YOUR TRUE COSTS?

5 Steps for Transforming Big Data into Actionable Information

1. IDENTIFY DATA SOURCES

The goal is to provide real-time, comprehensive and accurate data down to the patient level. To do that, the VDO tool harnesses huge amounts of data from sources throughout the system, including the general ledger, medications, EHR, supplies, vitals, labor, O.R., billing, outcomes, imaging, orders, labs, benchmarking and coding.

2. EXTRACT DATA FROM DIFFERENT SOURCE SYSTEMS

Almost all these disparate data sources speak a separate language. Through a process called Extract, Transform and Load (ETL), the data moves from the source system into the data warehouse, where it is integrated into simplified data tables. These data tables are used to support the VDO costing process as well as the reports and analytics that the end users can create.

3. LOAD DATA INTO THE ENTERPRISE DATA WAREHOUSE

The costing data set for the University of Utah Health Care system each fiscal year includes approximately 135 million rows of data, with each row as wide as a football field. The reason the data is so massive is because it accounts for every single clinical item used for every patient visit and assigns unit costs for labor associated with the care.

4. TRANSLATE DATA INTO FAMILIAR BUSINESS AND CLINICAL TERMS

The data is only as meaningful and useful as the quality of its organization. We've developed a VDO semantic layer that maps the data so that information is presented to the end-users in familiar business and clinical terms. Item-level information is grouped within one or more levels of categorization so that users can intuitively navigate both the big picture and the individual details.

5. CREATE REPORTS, DASHBOARDS, BUSINESS ANALYTICS, SCORECARDS, ETC.

The final VDO product is a Web-based, self-service, open-access environment that is interactive and drillable. Decision support analysts and value engineers are collaborating with providers and service lines to identify areas for improvement. Once identified, they use VDO to leverage these opportunities for improving value and progress.

FROM DATA TO INSIGHT TO ACTION

After the first iteration of the VDO tool was released, the team threw themselves into phase two. Now sequestered for just two days a week, the group is integrating quality data, including mortality, length of stay, readmissions, bleeding and infection rates, into the tool. With costs on an x-axis and outcomes on a y-axis, the tool now enables users to see direct correlations between the cost of every choice made and how it affects the quality of care. "We need to debunk the myth that high costs go hand-in-hand with quality," says Park. "When mistakes happen, they cost." As we refine the outcomes data, the team is also integrating patient satisfaction data and developing measures of patient-reported outcomes.

"The tool's ability to drill down to the most granular of details is a powerful way to get physicians thinking differently about care delivery," says Chief Medical Quality Officer Robert Pendleton, M.D. For instance, when the VDO tool alerted physicians that a $15 bronchodilator could deliver the same outcomes for most patients as the $200 bronchodilator they were habitually prescribing, it was easy to switch. "We can take the VDO data, have a 15-minute conversation between physicians, and within two days we can change care delivery to save several hundred thousand dollars a year. And in the case of the bronchodilators, we're just talking about one tiny grain of sand in the beach of opportunity."

> "We need to debunk the myth that high costs go hand-in-hand with quality. When mistakes happen, they cost."
>
> —CHARLTON PARK, M.B.A., M.H.S.M., Director of Decision Support and Cost Accounting

The VDO tool doesn't just drive individual decision making about treatments and medications. By looking at information in aggregate, we can ask larger questions about overall health care delivery—and find new ways to redesign care pathways. "The tool allows us to do the good, hard work of redesigning care," says Pendleton.

TAKING COSTING DATA TO THE POINT OF CARE

"Just making this data available, without a single directive, has the power to really change things," says Kawamoto. But his vision for VDO is much more ambitious. He wants to take the standardized care pathways that we create from the data and design clinical decision support tools that hardwire best practices into the electronic health records. Protocol-based computer reminders can then help guide practitioners to make evidence-based decisions right at the point of care. His ultimate goal? Make the tools as easy to implement as an automated Windows update.

"We've known for a long time that this is the right thing to do," says Kawamoto, citing a 1976 article by C.J. McDonald on the use of computer-based care suggestions to reduce errors. "But we've failed as a field to take information published more than 30 years ago and make it happen. Our new financing model gives us an opportunity to do it now."

CONTRIBUTING TO THE NATIONAL CONVERSATION

As the entire nation tries to figure out how to control health care costs, will every health care institution have to scramble to build its own proprietary costing tool? Kawamoto would like to share the VDO technology with institutions nationwide to show them how we've managed to measure costs and outcomes throughout our patients' entire cycle of care. He even entertains the idea of making the tool open-source and creating an open consortium for enabling collaborative, cross-institutional refinement and deployment of the tool. "If we can empower other institutions to reduce costs, avoid unneeded care and deliver safer, better experiences to patients," says Kawamoto, "just think what we'd all be getting in return."

> "It's unfair to saddle anyone—the patients, the payers, or the government—with unnecessary costs."
>
> —RAMINDER NIRULA, M.D., M.P.H., Associate Professor of Surgery and Trauma Medical Director

Like most physicians in the United States, Trauma Medical Director Raminder Nirula, M.D., M.P.H., associate professor of surgery, had no idea how much his patients were charged or what the thousands of surgeries he's performed have cost the system. The truth is, there was no way for him to know what the costs were. "Health care is the only industry in the United States where we don't talk about costs," says Nirula, who went to medical school in Canada and had cost-consciousness ingrained in his psyche. "No one would blatantly ignore financial details when buying a car or a house."

Nirula admits that years of practice in the U.S. eroded his cost-containing fervor, but his frustrations about resources being wasted remained intact, regardless of who's paying the bill. "It's unfair to saddle anyone—the patients, the payers, or the government—with unnecessary costs." His frugal mindset made him the perfect early adopter of the VDO tool. "We want to give the VDO tool to the physicians who are most excited about its potential, and who want to take the lead in redesigning clinical care," explains Robert Pendleton, M.D., chief medical quality officer. A year ago, Nirula was in the first cohort of physicians trained in Lean principles through a partnership with the business school. Around that time he was also granted access to our brand-new VDO tool, which allowed him to dive into the details about his team's costs for procedures, supplies, equipment and support staff.

Nirula has overlaid cost information from VDO on quality improvement opportunities identified through the American College of Surgeons National Trauma Registry to create projects that range from improving management of patients presenting with gallstone disease in the ED, to eliminating multiple head CT scans, to leaving the cervical collar that first responders place on patients instead of replacing it. He's also one of a shrinking number of surgeons who still performs open appendectomies instead of laparoscopic, because it costs $5,000 less and the literature shows it has similar outcomes for select patients.

Conviction aside, he admits that it's hard to break habits. When he found that using a reusable metal bile duct clip instead of a disposable one was less expensive, he confesses with a sheepish grin that it took him months to make the switch. "The first step is to accept that there's a cheaper way to do it. But then you have to actually make the change," he says. "And changing habits isn't easy."

TOTAL JOINT REPLACEMENT: HOW A HIGH-LEVEL VDO REPORT LED TO A NEW CARE PATHWAY

The huge blue dot on the scatter plot cried out for attention. A high-level VDO report that graphs coefficient of variation on the y-axis and average cost per visit on the x-axis clearly indicated that major joint replacement was an opportunity to reduce variability. Within minutes, the decision support analyst had pulled up another report that indicated a variation of $19,000 per procedure among the 10 surgeons.

They brought that data to the attention of Bart Adams, M.B.A., executive director of the University of Utah Orthopaedic Center, who then gathered the surgeons to discuss. "Doctors want to see data. Valid data. VDO makes the data very transparent," says Adams. "And when you get all of the surgeons and the chairman in a room together to talk about it, that has power."

Data, no matter how accurate and real-time it is, will always need experts to interpret it. The group of orthopaedic surgeons looked at the data and immediately came up with a more nuanced story. Although the VDO costing data is granular, precise and real-time, it is limited by a blunt tool that lumps procedures together, namely DRGs. In this case, the very name (DRG 470 for Major Joint Replacement or Reattachment of Lower Extremity) reveals its lack of specificity. Using a drop-down menu, the surgeons were quickly able to remove the trauma and cancer surgeons from the analysis. They were then ready to compare apples to apples and figure out what the cost variation was and what could be done about it.

Part of the strength of VDO is the visualization tool. Immediately, it was clear that the tall gold bar had the greatest variation. No surprise it was the implant, and they discovered the highest variability was from a surgeon who used an implant that wasn't under a supply chain purchasing contract. Beyond the implant, they were then able to drill down and look at the cost of labs, pharmacy, radiology, supplies and literally 1,000 other charges at the provider and patient level.
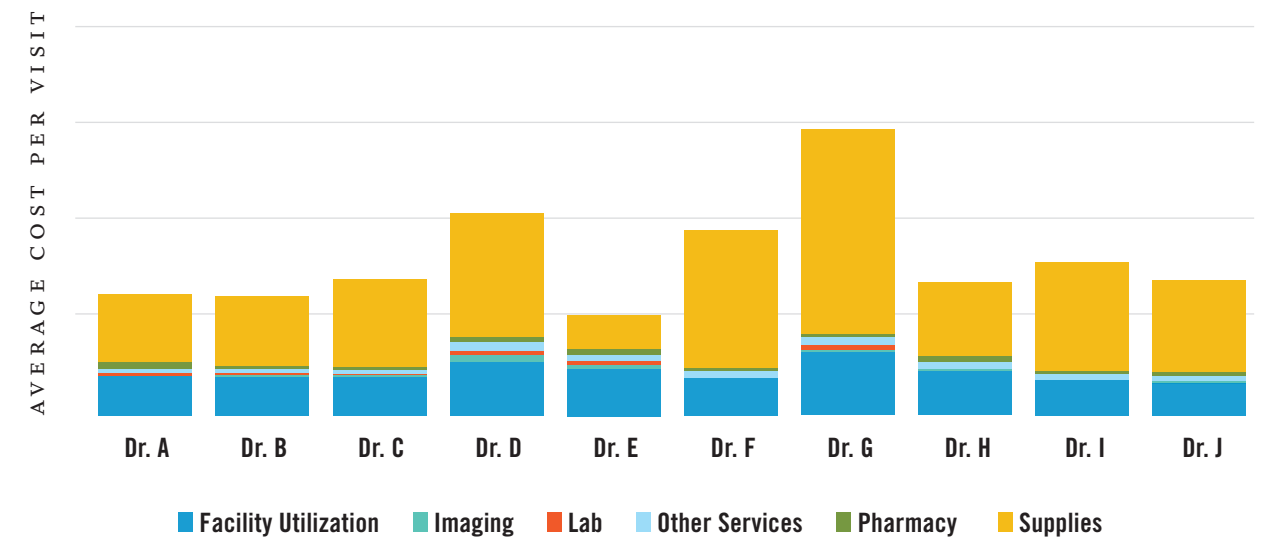
It turned out that the variation between the two surgeons who do the vast majority of total hip and knee replacements, Christopher L. Peters, M.D., professor of orthopaedic surgery, and Christopher E. Pelt, M.D., assistant professor of orthopaedic surgery, was minimal. But the discussion on cost then segued into the discussion that Pelt and Peters really wanted to have on quality and outcomes.
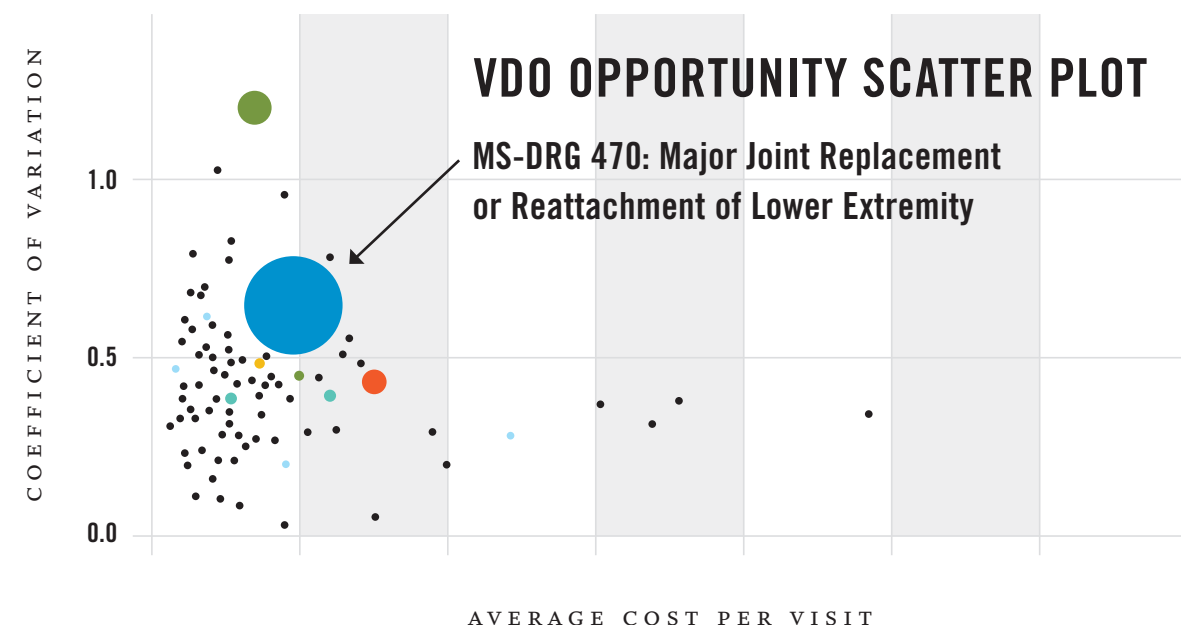
VDO AVERAGE COST CHART

MS-DRG 470—Major Joint Replacement or Reattachment of Lower Extremity

Discharges from July 2011 through June 2013

AVERAGE COST PER VISIT

Dr. A   Dr. B   Dr. C   Dr. D   Dr. E   Dr. F   Dr. G   Dr. H   Dr. I   Dr. J

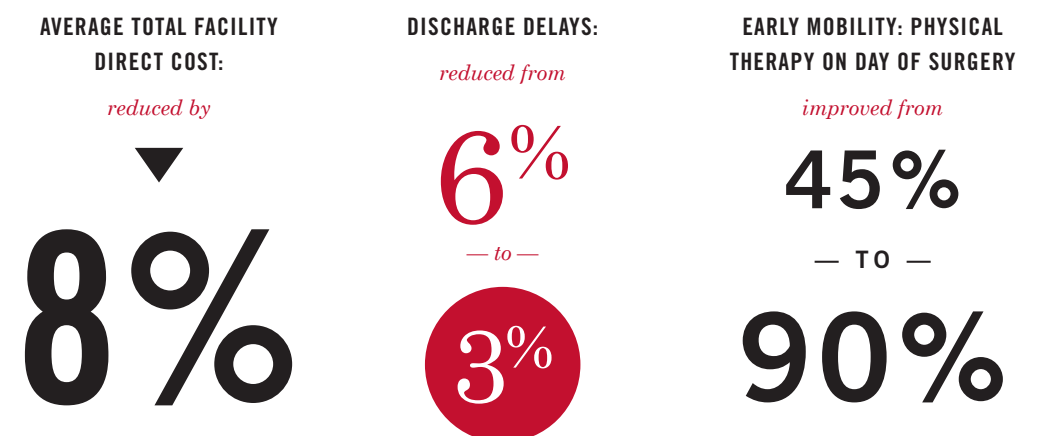■ Facility Utilization   ■ Imaging   ■ Lab   ■ Other Services   ■ Pharmacy   ■ Supplies

The entire team gathered with Chief Medical Quality Officer Robert Pendleton, M.D., to figure out a care pathway, a 90-day Lean rapid-improvement process that helps identify opportunities, design solutions and hardwire results. "Joint replacement is one of the most performed and one of the most quality-of-life-restoring surgeries," says Pelt. "So much can be protocolized with this procedure to reduce the variability that leads to bad outcomes."

By including everyone in the conversation (surgeons, anesthesiologists, nurses, physical therapists, physician assistants, case and clinic management staff), they were able to identify not only best practices but also the barriers to implementing them. Having patients walk on the same day as surgery, for example, was identified as critically important. When the team discovered that physical therapists ended their daily shifts at 3 p.m., they scheduled one therapist to work a swing shift to ensure consistency for afternoon cases. To reduce discharge delays, they created a new post-discharge order set that included the 17 most frequently missed orders, and improved educational materials so that patients were better informed about follow-up care before they were even admitted. In addition, five quality measures were added to the VDO tool so that providers can create reports that track compliance and overlay cost data with quality metrics and outcomes.

The team identified more than a dozen opportunities that they continue to work on to ensure perfect care 100 percent of the time. "There's an inherent variability and complexity to patient care. And getting to the best and most standardized care is a delicate, consistent march," says Adams. "VDO has given us a new way to organize and visualize the data. The tool's not perfect, but the greatest advantage of VDO is that it has people engaged."

VDO OPPORTUNITY SCATTER PLOT

COEFFICIENT OF VARIATION

1.0

0.5

0.0

MS-DRG 470: Major Joint Replacement or Reattachment of Lower Extremity

AVERAGE COST PER VISIT

JOINT REPLACEMENT PATHWAY HIGHLIGHTS

156 cases since the initial care pathway was created

AVERAGE TOTAL FACILITY DIRECT COST:

reduced by

▼

8%

DISCHARGE DELAYS:

reduced from

6%

— to —

3%

EARLY MOBILITY: PHYSICAL THERAPY ON DAY OF SURGERY

improved from

45%

— TO —

90%

IMPOSSIBLE PROBLEM

No.

3

START
— THE —
CONVERSATION

WHAT
EXPAND
the definition
SHOULD WE DO
OF

ABOUT TENURE?

EDUCATE **FACULTY** ABOUT *what* COUNTS

NAVIGATING THE ACADEMIC

ECOSYSTEM TO REWARD A BROADER

measure impact

RANGE OF SCHOLARS

— NOT —

IMPACT FACTOR

EVOLVE

TENURE,

DON'T

eliminate it

IMPOSSIBLE PROBLEM

No.

3

START
— THE —
CONVERSATION

EXPAND
the definition
— OF —
scholarship

EDUCATE **FACULTY** ABOUT *what* COUNTS

measure impact
— NOT —
IMPACT FACTOR

EVOLVE
**TENURE,
DON'T**
eliminate it

SHOULD THESE PEOPLE GET TENURE?

AS WE EXPLORE MORE PROGRESSIVE DEFINITIONS OF SCHOLARSHIP AND DISSEMINATION, FACULTY WHO WERE NOT TENURE-BOUND AT THE OUTSET OF THEIR CAREERS NOW EMERGE AS STARS. IS IT TIME TO RETHINK TENURE? DO WE NEED NEW WAYS TO RECOGNIZE AND REWARD INDIVIDUALS MAKING SIGNIFICANT CONTRIBUTIONS?

Consider these faculty:

1.

2.

3. The Community Changemaker

Created a first-of-its-kind life skills training program that connects occupational therapy students with new Americans who arrived with refugee status. Publishes and presents both nationally and internationally on refugee resettlement and community-based practice.

4. The Global Teacher

Leads the only continuing medical education program for physician assistants in Ghana. Selected as the liaison for the Physician Assistant Education Association to the Consortium of Universities for Global Health. Collaborates with the World Health Organization to increase the physician assistant workforce worldwide.

5. The Implementation Scientist

Invented and implemented the e-Asthma Tracker, a tool for patients that shifts asthma care to a new model that is continuous and proactive. It focuses on preventing rather than managing exacerbations and dramatically reduces asthma readmission rates. The tool generated $1.2 million in a grant from Agency for Healthcare Research and Quality (AHRQ) and recently earned a $1.9 million grant from the Patient-Centered Outcomes Research Institute (PCORI).

3.

1. The Digital Anatomist

Revolutionized anatomy education with the development of the first comprehensive, Web-based anatomy portal. Has earned national recognition in medical pedagogy for his research on the impact of cadaver dissection. Has authored multiple anatomy texts, including *Gray's Dissection Guide for Human Anatomy.*

2. The Multimedia Educator

Directs the most widely used online genetics resource in the world, which received more than 47 million page views in 2012, and won the 2010 Prize for Online Resources in Education from the journal *Science.* Currently holds four NIH grants.

4.

5.

1.

DAVID A. MORTON, PH.D., M.S.

Associate Professor (Lecturer), Neurobiology and Anatomy

"People ask if having a non-tenure track position makes me nervous. But I'm not too concerned. If a professor excels in education, scholarly activity and service, that's the highest form of job security there is."

ON TENURE TRACK OBSTACLES: "Grant funding is a key element in the tenure process. My scholarly activity deals with educational research, and funding in education is not very robust."

ON CURRICULUM REFORM: "Every national meeting I attend includes presentations on the movement away from lecture and toward student-focused education. But I rarely hear discussions on what it really means to be an engaging teacher."

ADVICE FOR NEW INSTRUCTORS: "Find mentors and seek out their counsel. They can help point your career in the right direction."

2.

LOUISA A. STARK, PH.D.

Research Associate Professor, Human Genetics; Director, Genetic Science Learning Center

"Innovation in education should be recognized as scholarship and counted toward tenure, just as innovation in scientific research is recognized and counted."

ON WHY TENURE MATTERS: "As I apply to new funding agencies, I worry about how I'll be perceived in terms of my qualifications, my likelihood of being retained, and institutional support for my work."

ON THE VALUE OF MIDDLE AUTHORS: "Today's science is a team sport. We need to move beyond the current tenure model where only first and last authorship on a paper counts, and the people listed in between don't get credit in terms of recognition or advancement."

ADVICE TO YOUNG FACULTY: "Find your passion! Keep exploring and trying out options until you find the work that synergistically brings your talents and skills together in ways that excite your imagination and creativity. Your passion will inspire, motivate and sustain you through the inevitable ups and downs of any career or work environment."

3.

YDA J. SMITH, PH.D., OTR/L

Assistant Professor (Clinical), Occupational Therapy

"Achieving tenure is not a priority if it limits my ability to follow my heart and fulfill my visions of best practice in education and community work."

ON TENURE TRACK OBSTACLES: "Community-based work doesn't easily translate into the required components of the tenure process, and it leaves limited time for research, publishing and grant funding."

BIGGEST CAREER DREAM: "To demonstrate, at a national and international level, the value of occupational therapy in the field of refugee resettlement, and to create systemic change in OT education and career opportunities."

ON EXPANDING THE DEFINITION OF TENURE: "Scholarship takes many forms and is too narrowly defined by university systems. Skill, experience, dedication, creativity, critical thinking and impact should all factor in."

4.

NADIA MINICLIER COBB, M.S., PA-C

Assistant Professor (Clinical), Family and Preventive Medicine, Utah Director of Collaboration with the College of Health, Ghana

"I don't think that having tenure would add anything to my work. If anything, it could narrow and potentially stifle it."

ON MAKING TENURE MORE RELEVANT: "If there were new ways of protecting academic freedom that weren't focused primarily on publications, grants and citations, but on interdisciplinary collaboration and innovation in teaching, then I'd be interested in pursuing tenure."

ON LEARNING COMMUNITIES AS SCHOLARSHIP: "Scholarship should be expanded to include the development of 'learning communities,' where faculty and students work together across disciplines, education levels and traditional academic boundaries."

ON THE IMPACT OF GLOBAL HEALTH: "It's inspiring to be a part of a growing global wave in which the 'non-physician clinician' is being seen by agencies like the World Health Organization as a key solution to the health care shortages our world is facing."

5.

FLORY NKOY, M.D., M.S., M.P.H.

Research Associate Professor, Pediatrics; Research Director for the Division of Pediatric Inpatient Medicine

"I don't want to scramble to publish on less exciting projects just to beat the tenure clock, at the expense of developing a solid asthma care program."

ADVICE TO YOUNG FACULTY: "Don't seek recognition or success as your primary goal. Instead, be humble, teachable and persistent. Recognition and success are the natural consequence of your efforts."

ON THE ISSUE OF VOTING RIGHTS: "Even though I don't have an official 'voice' in academic affairs, I think my voice is better heard through my contributions to the University and research accomplishments."

ON QUALITY IMPROVEMENT SCHOLARSHIP AS SCIENCE: "Standard QI is not scholarship, but implementation and dissemination science, which seeks to understand the mechanism by which a new intervention is effectively translated into practice, is a growing field of research—and it should be included in the definition of scholarship."

VALUING FACULTY: REDEFINING WHAT COUNTS

After hosting 39 focus groups attended by more than 300 faculty members this past year, the Retention, Promotion, and Tenure Statements Revision Committee gained plenty of perspective and some good targets. Here are four critical themes that informed their revised guidelines.

1. Value scholarship related to all of our missions (clinical care, education and research).

2. Recognize that the hallmark of scholarship is dissemination (which extends beyond peer-reviewed journals) and impact.

3. Be inclusive and open to new forms of scholarship as they develop, including health services and implementation science, global health, technology, commercialization and innovation, sustainability, inclusion, advocacy, community engagement and quality improvement.

4. Recognize individual excellence from many clinicians and scientists in the context of team-based science, not just first authors and principal investigators. Develop new metrics to recognize vital contributions that middle authors and co-investigators often make in driving science forward. Broaden the opportunities for non-tenure-track clinical faculty to engage in and support investigation.

TENURE OR NON-TENURE: WHAT DO YOU THINK?

Under our new guidelines, the important contributions of the non-tenure-track faculty members featured here are areas of scholarship that are gaining acceptance and recognition. How is scholarship being defined at your institution?

ENRICH THE CONVERSATION

algorithmsforinnovation.org

FOR NEARLY A CENTURY, TENURE HAS BEEN VIEWED AS ONE OF THE MOST IMPORTANT MILESTONES OF AN ACADEMIC CAREER. IT GIVES SCHOLARS THE FREEDOM

to hold controversial opinions. It offers a level of job security unheard of in any other industry. And it places those who earn it at the very top of the academic food chain.

In 1915, the American Association of University Professors published a landmark statement describing three elements that comprise academic freedom: "Freedom of inquiry and research; freedom of teaching within the university or college; and freedom of extramural utterance and action." The requirements for achieving this academic freedom (now known as tenure) have evolved at many academic health centers into two specific, and much narrower, mandates: publish prolifically and amass as much external funding as possible.

In the age of YouTube and globalization, Twitter and crowdsourcing, technology commercialization and online education, today's academics aren't just publishing research papers and winning NIH grants. They're creating viral videos, inventing apps, building websites, improving quality, redesigning health systems, and promoting global health. They're also mentoring and training the next generation of researchers, educators and clinicians, who will use modern tools to push science and medicine forward.

Many academics believe that the traditional construct of tenure, which remains squarely rooted in a "publish or perish" mentality, is long overdue for change. "Our current tenure system reflects a hundred-year-old idea of academic medicine that no longer exists," says Harriet Hopf, M.D., professor of anesthesiology, associate dean for academic affairs and chair of the School of Medicine's Retention, Promotion, and Tenure (RPT) Statements Revision Committee.

> *"If we don't start recognizing and rewarding all kinds of scholarship, we're leaving talent on the table and sabotaging our future."*
>
> —HARRIET HOPF, M.D., Associate Dean for Academic Affairs, School of Medicine

CAN'T LIVE WITH IT, CAN'T LIVE WITHOUT IT

Ask people what tenure means, and there's usually a long pause. One thing they do know, however, is that they want it, especially basic scientists. "I wouldn't have come here without it," offered Trudy Oliver, Ph.D., assistant professor of oncological sciences, who joined Huntsman Cancer Institute from MIT two years ago. "Every other place I was considering was offering tenure, so to choose a place that didn't have it would have felt scary."

And therein lies the impossible problem: We can't recruit without it. "Even though we may want to get rid of tenure, we can't, because we couldn't recruit the best physicians and scientists," says John C. Carey, M.D., M.P.H., professor of pediatrics and vice chair for the department's academic affairs and a member of the RPT Statements Revision Committee. Carey believes tenure is an outmoded concept, but understands its value in academia: "It's still a badge of honor."

Once we concede that tenure is here to stay, then we can begin working on defining what it means in the 21st century. "In its most elemental form, scholarship is the dissemination of good ideas outside the academic environment," says

*The RPT Statements Revision Committee recently developed a framework to value a diverse range of faculty accomplishments. The 15-member committee, some of whom are pictured above, was selected by the School of Medicine's Academic Affairs Office to represent areas that were identified as undervalued in the current guidelines, including team science, innovation and commercialization, educational scholarship, global health and advocacy. Part of the committee's focus is to find ways to more effectively define and measure impact and to educate faculty about what work counts for review and advancement and how to claim credit for it. "Many faculty members are making important contributions that don't make it to their review file," says **Harriet Hopf, M.D.**, chair of the committee. "We need to find a better way to help people understand how to identify and communicate the great work they're doing." Instead of a free-form self-assessment tool, the committee is creating a framework that clearly outlines the types of scholarship that will be considered and offers suggestions on ways to show impact.*

Carrie L. Byington, M.D., professor of pediatrics and vice dean for academic affairs and faculty development. "Educational innovation, program development and public health advocacy can all be forms of scholarship when their impact reaches beyond the classroom or clinic," says Carey. "Dissemination is about spreading the word, and there are more than a few narrow ways to do it."

Hopf believes an evolved definition of tenure is critical to our survival. "If we don't start recognizing and rewarding all kinds of scholarship, we're leaving talent on the table and sabotaging our future." The challenge is how to establish meaningful metrics that measure excellence and maintain high standards of scholarship for new areas of study and new venues of dissemination. "The key word really should be impact," says Vivian S. Lee, M.D., Ph.D., M.B.A., senior vice president for University of Utah Health Sciences. "Has the work impacted the way in which clinical medicine is practiced or students are taught or basic biology is understood? Does the work impact the broader population of patients, scholars, educators and scientists?"

CHANGING THE CULTURE, NOT JUST THE CRITERIA

More than a decade since we last revised our guidelines, we are doing it again. This time around, we're considering the input of more than 300 faculty members from all tracks and ranks who participated in 39 formal and informal focus groups this past year. One thing is clear. Transformation won't come simply by revising promotion and tenure guidelines. It will also take significant culture change. "Many institutions have very inclusive guidelines," says Hopf. "But in practice, committees often default to the tried-and-true metric of counting publications because it's familiar and it's easy."

Success will depend on figuring out a way to create a more inclusive system to value scholarship without diminishing the significant accomplishments of those who've worked hard to earn tenure the old-fashioned way.

IMPOSSIBLE PROBLEM

No.

4

BREAK DOWN LOGISTICAL AND CULTURAL BARRIERS

CAN WE WORK BETTER IN TEAMS?

LEVERAGE *simulation* CENTERS

SHIFTING THE LANDSCAPE FROM RUGGED INDIVIDUALISM TO INTERPROFESSIONAL COLLABORATION

ENTICE, *Recognize & REWARD* FACULTY FACILITATORS

CREATE NEW VENUES —for— COLLABORATION

IMPOSSIBLE PROBLEM

*No.*4

BREAK **DOWN** LOGISTICAL **AND CULTURAL** *BARRIERS*

MAKE **TEAM TRAINING** A **REQUIREMENT**

LEVERAGE *simulation* CENTERS

ENTICE, *Recognize & REWARD* **FACULTY FACILITATORS**

CREATE NEW VENUES – *for* – **COLLABORATION**

THE BALDING, GREY-HAIRED WIG ON THE 20-SOMETHING "PATIENT" LOOKS A LITTLE PECULIAR, BUT THERE'S NO HINT

of a smirk or giggle from the students—only looks of intense concentration and concern. Somehow, within moments of entering the simulation room, this case has become real.

The medical student assigned to the role of attending physician confidently goes over discharge instructions, delivering them just as she's been taught, and then asks the patient if he has any questions. When he says no, she shakes his hand and exits the room, leaving the rest of the team to finish the discharge work. For a moment, she lingers in the hallway, seemingly unsure of what to do or where to go next. Then she walks out of view from the hidden cameras and disappears.

"Where is she going?" asks Elisabeth Carr, M.D., assistant professor (clinical) of medicine, incredulously, as she watches the whole thing unfold from the simulation control room. "Should I tell her to come back in?" asks one of the techs. "No, let her stay out there," says Carr, shaking her head. "It's all part of the learning process."

For the next half-hour, the remaining team members (a medical resident, a nursing student and a pharmacy student) discuss medication, mobility and physical therapy issues related to discharge. And then the scenario gets complicated—by design. When the team discovers that the elderly patient lives by himself, has a history of falling and has no transportation to follow-up appointments, they realize they need a consult with a physical therapist and a social worker before discharging the patient. They also realize they need the attending physician to revise the discharge plan and order the additional services, but she—believing her job is done—is nowhere to be found.

> *"One of the leading causes of death is being admitted to a U.S. hospital, and failure to communicate with members of the treatment team is the most common cause for it."*
>
> —KAREN PAISLEY, PH.D., M.S., Associate Dean for Academic Affairs, College of Health

"As a student, you're typically taught only your specific role," says Carolyn Scheese, M.S., R.N., assistant professor (clinical) and founding director of the Simulation Learning Center at the College of Nursing. Because they are trained separately in different buildings by different faculty in classes that focus almost exclusively on their profession's specific roles, students develop a tunnel-vision focus.

When they bring that myopic perspective into the complex, real-world patient environment, however, it compromises safety, quality and patient satisfaction. "One of the leading causes of death is being admitted to a U.S. hospital, and failure to communicate with members of the treatment team is the most common cause for it," says Karen Paisley, Ph.D., M.S., associate dean for academic affairs in the College of Health and one of the facilitators of team-based simulation courses.

USING SIMULATION TO BUILD A TEAM

With the patient hemorrhaging blood, the smell of vomit wafting in the air, machines beeping loudly and adrenaline running high, simulation trainings have a way of bringing out the best and worst in people. They also make the perfect training ground for students. "The beauty of the simulations is that we can layer in all kinds of complexities," says Maureen Keefe, Ph.D., R.N., professor and former dean of the College of Nursing.

During the 2012–2013 academic year, as part of a new, required interprofessional course, 873 of our medical, nursing, pharmacy, health and dentistry students participated in one of three different trainings at the Intermountain Healthcare Simulation Learning Center in the College of Nursing.

"I saw several students come into the scenario with a this-is-a-waste-of-my-time attitude," says Jen Lazzara, a doctor of nursing practice student and teaching assistant for the Interprofessional Education course. "But during the debrief, they admitted they were surprised at how much they'd learned about how different roles contributed to the care team."

Survey responses back up Lazzara's observation. More than 80 percent of the students agreed with the statement, "I learned something useful about my health care colleagues during the Interprofessional Education activity." And almost 90 percent agreed with the statement, "This Interprofessional Education activity will have a positive impact on how I interact with other disciplines when I am out in practice."

While other industries like aerospace and high tech use highly synchronized mission control teams to coordinate even the smallest actions, health care providers often fail to communicate the most essential pieces of patient information, from current medications to lab results. Teaching practitioners to work collaboratively, instead of zeroing in on their individual objectives, is one of the greatest challenges and imperatives in medicine today. The barriers, however, can seem overwhelming.

What could be so difficult? The first obstacle is getting all the decision makers to agree that interprofessional education is a priority. Once that is accomplished, there are the schedules of hundreds of students from different schools that already have packed curricula. Then there's the issue of who's going to pay for it. Training, especially in simulation centers, is expensive, and allocating costs to different schools and departments can stir up a hornet's nest of confusion. Finding faculty who practice interdisciplinary principles and who are willing to create complex scenarios and facilitate the group poses yet another vexing problem. And figuring out how these facilitators are compensated and rewarded for their work opens up larger questions about what we value and who we promote in our academic medical centers. The path of least resistance for many schools is to opt out and hope for the best for their students and their patients.

> *"It's expensive. It's time consuming. And it can seem virtually impossible to get everyone together in the same room. But at the end of the day, it's worth it."*
>
> —CAROLYN SCHEESE, M.S., R.N., Founding Director of the Simulation Learning Center

"If we wait for all the right resources to line up or for some big grant to come through, it will never happen," says Maureen Keefe, Ph.D., R.N., professor and former dean of the College of Nursing. "Instead, we have to use our pioneering, entrepreneurial spirit to make it happen."

In the spring of 2012, Keefe, the deans of the colleges of Pharmacy and Health and the School of Medicine, and the director of the Spencer S. Eccles Health Sciences Library, decided to do just that. Four months later, in time for the beginning of the school year, they had integrated three required interprofessional education courses into the curriculum for medical, nursing, pharmacy, health and dentistry students. "It's expensive. It's time consuming. And it can seem virtually impossible to get everyone together in the same room," says Scheese, who has watched hundreds of students participate in team trainings. "But at the end of the day, it's worth it." Students learn critical communication skills and begin to understand the important expertise that other disciplines bring to the table. They also learn to draw on each other's strengths and work as a team during challenging situations.

While requiring students to take team-based classes is a step in the right direction, it admittedly seems like a drop in the proverbial bucket. The ability to work in teams is critical for every aspect of health care; it's not just a course to take in school. But to get there, we'll have to challenge our most deeply held notions about how we train and practice. And we have to take our students into uncharted territory where few, if any, of our faculty have been—true team-based interpro-fessional care.

3 WAYS TO TAKE TEAM TRAINING TO THE NEXT LEVEL

Interprofessional education often occurs in classrooms or simulated settings, using high-tech mannequins or actors as "patients." While this model has its advantages, the next step is to offer team training as a clinical rotation, so students can work together in real settings with real patients. Here's how we're doing it.

1. **IN THE HOSPITAL**—Highly interdisciplinary units like our Burn Center offer medical students and residents the opportunity to work with and learn from non-medical staff, including wound care nurses, dietitians and pharmacists.

2. **IN THE COMMUNITY**—Under the guidance of faculty, students in medicine, nursing, pharmacy and health run free clinics to provide services to uninsured, underserved populations in our community.

3. **AROUND THE WORLD**—Interdisciplinary teams of faculty and students travel to countries like Ghana and Mexico to train together and explore larger social and environmental issues that impact health, from clean drinking water to mosquito control.

USING SIMULATION TO BUILD A TEAM (CONT'D)

Watching a video playback during the debriefing session provides each team member the opportunity to react to the team's performance and talk honestly and critically about it. "It's a brilliant way to learn," says Keefe. "In the real world, you don't have the luxury of stopping the action and replaying it."

Students learn critical communication skills used routinely in other high-pressure industries, like air-traffic control and the military, and identify where communication breaks down. In health care, hesitating to speak up can lead to devastating mistakes. Studies estimate the number of patients killed every day from medical mistakes in the hundreds —the equivalent of one or more planes crashing daily. In a team-based clinical environment, everyone is empowered and encouraged to express concerns. And each professional role is viewed as bringing an important contribution to overall patient care.

Importantly, through simulation trainings, students begin to recognize that there's not one right answer, one right way or one right expert. Rather it's the diversity of thought, approach and knowledge of an entire group that they'll need to navigate the complexities of human health and promote long-term healing. Knowing what to expect in your role enriches the learning experience and makes the transition to real patients much easier.

THE BURN CENTER: MODELING TEAM-BASED CLINICAL CARE

"Simulation team training is essential, but it only goes so far," says Wayne Samuelson, M.D., professor (clinical) of medicine and vice dean for education for the School of Medicine. "The more important step is getting students to work together comfortably on a real person who's really sick."

That's exactly the kind of training that students receive when they rotate through the University of Utah Hospital's Burn Center, which annually cares for more than 300 pediatric and adult acute burn patients from throughout the Intermountain West. Because of the intensity and complexity of their wounds, patients often remain on the unit for months before they're ready physically, psychologically, emotionally and logistically to return home.

The collaborative care the center provides each patient is essentially unheard of on other units. A team of physicians, behavioral health specialists, nurses, cases managers, physical therapists, dietitians and pharmacists meet daily to round on each patient (pictured below). It requires a chunk of time and a steadfast commitment from every staff member. "It's not easy, but we take the long view," says burn and critical care surgeon Amalia Cochran, M.D., associate professor of surgery. "We know that the time we spend coordinating a patient's care today will be worth its weight in gold a month from now, when we're ready to discharge that patient."

Crisis intervention specialist Kristen Quinn, L.C.M.H.C., C.C.L.S., says team rounding is invaluable to understanding a patient's worldview and personalizing their care. "It takes an entire team to explain a complex treatment plan to a patient and family members," says Quinn.

The challenge is how to extend the remarkably coordinated care in the Burn Center to other units that have less acute patients and fewer resources from which to draw. Cochran agrees that it's a difficult problem, but one worth solving. "If we viewed care from a systems perspective, ER visits would go down, patient satisfaction would go up and the cost of care could be reduced."

She also believes the system will slowly start to shift on its own. "Boomers are retiring, and Gen X, Gen Y and Millenials are naturally more collaborative and much less lone-ranger," says Cochran, who works extensively with students and residents. "They appreciate that teamwork is a better way to get things done and is the right thing to do for our patients."

GENOME ROUNDS: WORKING TOGETHER TO DISCOVER THE UNKNOWN

Nicola J. Camp, Ph.D., professor of genetic epidemiology and human genetics, opened a recent Genome Rounds by recounting the genetic rabbit hole she and her interdisciplinary team of researchers had been down for the past six months.

They were analyzing the full genomic sequences of six "relateds" with chronic lymphocytic leukemia (CLL) that belong to a family with a strong history of CLL. It was like looking for a genetic needle in a haystack, but they had identified multiple interesting coding mutations that suggested a very promising pathway.

Camp's presentation commanded the attention of a room bursting with brainpower. Biomedical informaticians, clinicians, genetic counselors, pathologists, geneticists, department chairs, students, post-docs and a host of others actively participate in the evaluation of research methodology and practices at the monthly meeting. At a certain point, her engaging talk took a slightly different tone. It turned out that because of "white noise" created by subtle annotation mismatches that were misinterpreted by the genetic analyzing software, they had been led down a mistaken path and never arrived in Wonderland. "We have nothing," she concluded.

And that's when the room went to work. Sitting in the third row was the creator of one of the world's most advanced platforms for genetic analysis, Mark Yandell, Ph.D., professor of human genetics and adjunct professor of biomedical informatics. Camp had used his tool called VAAST. While Yandell questioned her inputs, parameters and settings for clearing out the white noise of a full human genome, Camp was able to offer direct feedback to Yandell about the limits of his current algorithm for genomic discovery.

"This kind of process is vital to the success of genomic analysis," says Yandell. "There are literally 3 billion different possible answers, and no one person can think of every possible scenario. The value of seeing how our tool is being used on the front lines is immeasurable."

"That's how research works," says Camp, ready to start over with a more knowledgeable baseline. "What we're doing here has never been done before. We're truly pioneering the tuning process by which we organize and analyze this complex data. There's no how-to book to traverse the unknown towards novel findings. The best way to do that—the only way to do that—is in teams."

IMPOSSIBLE PROBLEM

No. 5

HIRE
EXPERTS
to direct
CORES

RUN CORE
FACILITIES
LIKE A BUSINESS

KEEP
COSTS DOWN
— *and*
ACCESS UP

CAN
WE LEARN
TO SHARE?

never
PLAY
FAVORITES

BRIDGING TRADITIONAL GAPS
TO FOSTER COLLABORATIVE,
OPEN-ACCESS SCIENCE

MAKE *SCIENCE* A **TEAM SPORT**

think
BEYOND
CAMPUS

IMPOSSIBLE PROBLEM

No. 5

HIRE EXPERTS *to direct* CORES

RUN CORE FACILITIES LIKE A BUSINESS

KEEP *COSTS DOWN* – *and* – **ACCESS OPEN**

never **PLAY** FAVORITES

MAKE *SCIENCE* A **TEAM SPORT**

think **BEYOND** CAMPUS

THE REJECTION NOTICE FROM THE NIH WAS CLEAR. THE INVESTIGATOR'S BID FOR A TWO-PHOTON, $500,000 MICROSCOPE WAS SIMPLY TOO RISKY. THERE WASN'T

a demonstrated need for it. And there weren't enough investigators who would benefit from it. But that didn't stop Chris Rodesch, Ph.D. He pulled together $160,000 from the University of Utah and spent the next four years building the instrument himself. His DIY plan might have worked out fine—if it weren't for the $22,000-per-year maintenance costs. "The NIH was right," says Rodesch of the grant rejection nearly 10 years ago. "It was too much of an undertaking for one person to maintain."

Today, as scientific instruments become more complex, powerful and expensive to maintain—and with the NIH forced to cut $1.55 billion from its budget for 2013—independent-minded plans like Rodesch's are even less viable. If it didn't seem like an intuitively good idea before now, economics have made sharing a basic necessity for survival. Yet figuring out how to manage core research facilities effectively—and inspiring the community to use them to their fullest potential—remains a challenge at many institutions, including ours.

The first barrier to overcome is a mind-set. The idea of sharing lab space and equipment can feel forced to investigators who've built their careers in the intensely competitive world of academic science. "Everything is set up to reward individualism," says Vivian S. Lee, M.D., Ph.D., M.B.A., senior vice president of University of Utah Health Sciences. "Tenure reviews are about you, not your team. The Nobel Prize is given to one or two people, not 20."

While a few investigators balk at the idea of shared resources, most appreciate that for a relatively small loss of autonomy and convenience, shared resources expand their discovery capabilities enormously. "Some people think we're being too controlling," says John Phillips, Ph.D., associate director of core resources for health sciences. "But the majority of faculty appreciate that we're making world-class technology cost-effective and 100 percent available to the masses."

> *"Our cores aren't run on gut instinct. They're judged by metrics of financial and temporal responsiveness."*
> —DEAN Y. LI, M.D., PH.D., Associate Vice President for Research and Chief Scientific Officer

PROVIDING OPEN ACCESS FOR ALL

Ten years later Rodesch finally has his two-photon microscope and a comprehensive maintenance contract along with five fluorescent microscopy instruments and an automated microscope for live cell imaging. His conversion from a renegade researcher building his own scientific instruments to a full-fledged believer in shared resources and large-scale collaboration is complete. He's now the director of the University's Cell Imaging Core Facility, which provides services to 66 research groups and supports the work of 73 NIH grants.

Rodesch subscribes to the foundational philosophy at the University of Utah that cores are open to everyone. While the power scientists at other academic medical centers often maintain their stronghold on the institution's resources, at Utah playing favorites is not allowed. "Not only does that hinder discovery, but since most scientific equipment in academia is publicly funded by taxpayer dollars, it's unethical to limit access to a chosen few," says Dean Y. Li, M.D., Ph.D., associate vice president for research and chief scientific officer.
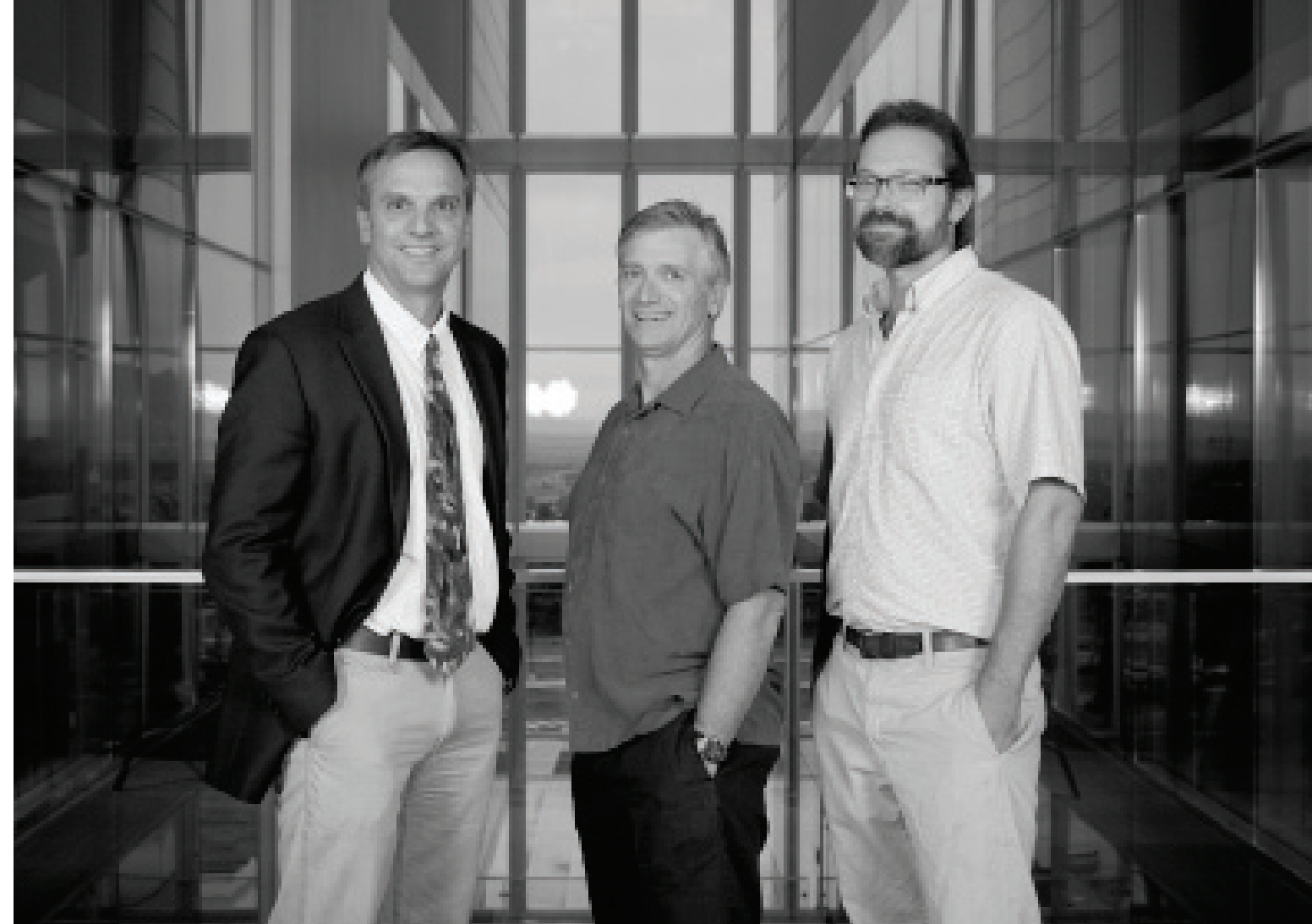
For the past year, Associate Dean for Basic and Translational Science **Andrew S. Weyrich, Ph.D.** (left), and Associate Director of the Core Resources **John Phillips, Ph.D.** (center), have been leading the evolution of our 16 health sciences cores, including the Cell Imaging core that **Chris Rodesch, Ph.D.** (right), directs. "With stronger institutional support, new opportunities for cross-disciplinary education and careful tracking of our users, we're making our cores more data-driven and academic than ever before," says Weyrich.

4.9 MILLION DOLLARS *fund*

16 OPEN-ACCESS CORE FACILITIES
supporting the research of

70 DEPARTMENTS, DIVISIONS, PROGRAMS

116 EXTERNAL ORGANIZATIONS

386 PRINCIPAL INVESTIGATORS *working on* **251** FEDERAL GRANTS

and THOUSANDS *of investigators, clinicians, fellows, post-docs, students and staff.*

Based on 2012–13 usership data for the University of Utah Health Sciences cores.

> *"What's definitely true about our cores is that they're run by experts who, rather than having a figure-it-out-yourself attitude toward new instrumentation, are readily available to train and supervise new users."*
>
> —ADAM FROST, M.D., PH.D., Assistant Professor of Biochemistry, 2013 Searle Scholar and 2013 NIH Director's New Innovator recipient

On any given day at our 16 health sciences core facilities, there may be high school students and undergrads, drug developers and venture capitalists, engineers and biologists, and investigators studying everything from cancer to diabetes to cardiology. "You're not at a disadvantage if you're a graduate student from the School of Engineering," says Rodesch. "No one is ever restricted from using our core facilities."

Our strong tradition of cores has enabled us to box above our weight, recruiting some of the best scientists and doing groundbreaking, even Nobel-prize-winning, research. We consistently hear from new recruits that the core facilities are a factor that influenced their decision to come to Utah. "There are two things that are rare here—the accessibility of the cores and the cost structure," says Eric Schmidt, Ph.D., professor of medicinal chemistry, who came to Utah from University of California, San Diego. "We also have experts running the facilities."

6 WAYS TO MANAGE SHARED RESOURCES

It takes strong and consistent institutional support to create an open and collaborative research environment. Here's how we're doing it.

1. **BUILD A STRONG OVERSIGHT COMMITTEE**—Ensure the alignment, productivity, and financial solvency of cores by forming an active umbrella committee that oversees the activities and performance of all shared resources.

2. **MAKE DATA-DRIVEN DECISIONS**—Use data and analytics to understand core users, track grants, and evaluate the performance of each facility. Require thorough documentation and justification from core directors seeking institutional funding.

3. **IMPLEMENT A CENTRAL BILLING SYSTEM**—Create a single administrative group to handle billing and financial reporting for each core.

4. **HIRE PH.D.-LEVEL CORE DIRECTORS**—Instead of hiring technicians to manage cores, hire scientists who can teach users to make the most of the facilities and connect the scientific community in new and surprising ways.

5. **CREATE ACTIVE FACULTY ADVISORY COMMITTEES**—Leverage teams of influential investigators to support the work of individual cores, assess and evaluate instrumentation needs and assist with extramural grant funding activities.

6. **HOST AN ANNUAL RETREAT**—Foster deeper interaction not just within the core, but among all of the cores, by bringing together core directors and leaders throughout the institution.

GIVING GENEROUS INSTITUTIONAL SUPPORT— BUT NO BLANK CHECKS

By purchasing scientific instruments that new recruits need and putting them into our cores, the entire research community benefits. "It's a win-win structure," says Andrew S. Weyrich, Ph.D., professor of internal medicine, who this past year took over leadership of the cores in his new role as associate dean for basic and translational sciences. Strong institutional support makes it possible to create cutting-edge cores at a mid-sized academic medical center like ours. In 2013, the University provided approximately $1.2 million toward the $4.9 million core budget, which Lee calls a "bargain" because of how efficiently the money is used.

The key to this efficiency lies in centralized financial management. Service rates for each core are set and routinely reviewed by a management accounting team. Accounts receivable are processed monthly, and then financial reports are sent to each core director. Budgets can even be reviewed in real time, so that no one is ever left in the dark about how money is being spent. At the end of each fiscal year, a faculty advisory committee reviews each budget and makes a recommendation for how much institutional support it should receive in the coming year. "Our cores aren't run on gut instinct," says Li. "They're judged by metrics of financial and temporal responsiveness."
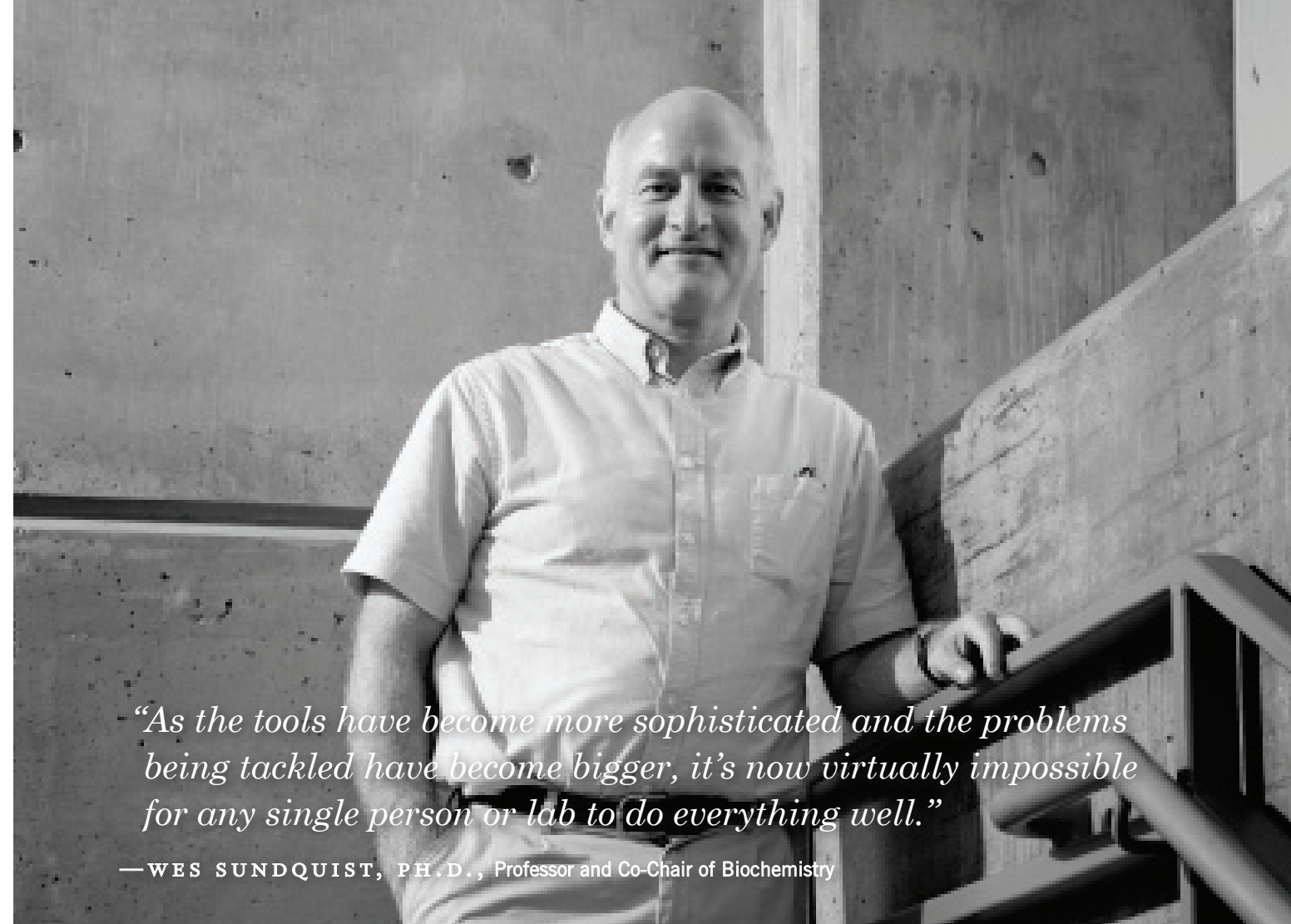
> *"As the tools have become more sophisticated and the problems being tackled have become bigger, it's now virtually impossible for any single person or lab to do everything well."*
>
> —WES SUNDQUIST, PH.D., Professor and Co-Chair of Biochemistry

THINKING BEYOND THE CAMPUS

Wes Sundquist, Ph.D., professor and co-chair of biochemistry, pushes the ideas of sharing and team science far beyond the institutional level. For the past seven years, he's been the PI on two five-year NIH P50 grants totaling $41 million to create a national center of researchers studying the structural biology of HIV.

The center, known as CHEETAH, has 16 scientific cores run by 12 different investigators at seven institutions including the University of Utah (which houses seven of the cores), Scripps Research Institute, California Institute of Technology, University of Virginia, Northwestern University, Stanford University and the University of Chicago.

As the director of the center, part of Sundquist's job is to provide members and external collaborators easy access to and expert guidance on state-of-the-art technologies that are revolutionizing the way scientists are able to study cellular structures. "Advances in electron microscopy have now made it possible, in favorable cases, to determine the position of every single atom in very complex biological assemblies such as viruses," says Sundquist. "This means we now have the tools necessary to figure out precisely how the complicated machines of the cell really work."

Beyond sharing high-tech resources, Sundquist brings together some of the country's best scientific minds to try to solve new pieces of the HIV puzzle. He's hopeful that research coming out of the center will lead to new therapeutics and ultimately effective ways to prevent HIV transmission. "We couldn't do this research as a single lab," he says. While he admits that it's much easier to collaborate with colleagues across the hall, Sundquist believes that creating well connected, global networks of researchers, brimming with diversity, is the key to next-generation scientific breakthroughs.

Yet even within this ideal team structure, Sundquist encourages researchers in his lab to explore their own ideas—not just the national team's common goals. "Never underestimate the impact that single individuals or small teams with great ideas and dedication can still have," he says. "We don't just want to be part of a pipeline. That's not science."

Learn how Sundquist's team fights HIV at the cellular level at algorithmsforinnovation.org.

In addition, this year, Weyrich, Phillips and their team created an annual report, a transparent and open document that allows anyone to review and analyze the value that each core provides to the research community. "With these tools, we've created an environment of continuous monitoring," says Weyrich. "This allows us to build on our successes, reinvest in the cores according to the value they deliver, and correct deficiencies as they arise."

"I'm crazy optimistic about the future of science. With the synergies that form in an open, collaborative environment, you're only limited by your own imagination."

—ANDREW S. WEYRICH, PH.D., Associate Dean for Basic and Translational Sciences, School of Medicine

SHARING MORE THAN JUST MICROSCOPES

Running cores efficiently is just a means to an end, which is to create a vibrant hub—the equivalent of a high-tech, scientific mosh pit—that brings investigators together and provides them with the best tools available and the training to work at the highest level. As several fields are undergoing scientific revolutions because of advances in technology, educating the community about the availability and power of the tools is key. "If you're not aware of what technology exists and what you can do with it, or if you don't have access to it, it completely constrains the kinds of questions you ask and the problems you tackle," says Mary Beckerle, Ph.D., CEO and director of Huntsman Cancer Institute, which houses six core facilities.

The same principles that guide our basic science cores also apply to our recently renewed NIH-funded Center for Clinical and Translational Science (CCTS), which comprises eight service cores. CCTS connects investigators with clinical practitioners, public health personnel, other health care institutions, patients and research participants and formally links research activities across systems.

It's this collaborative nature, and the expertise of the core directors, that has impressed Adam Frost, M.D., Ph.D., assistant professor of biochemistry, who came to Utah from Yale and University of California, San Francisco. "What's definitely true about our cores is that they're run by experts who, rather than having a figure-it-out-yourself attitude toward new instrumentation, are readily available to train and supervise new users," he says. Frost, who this year was named a Searle Scholar and received an NIH Director's New Innovator Award, uses five of the cores, but his work depends most heavily on state-of-the-art electron microscopy (EM) and computationally intensive image analysis.

Frost is excited about building a core to match the revolutionary science that's happening in his field and feels the institutional support has been "terrific." This past year, he's worked with core leadership to recruit a new director for the EM core, acquire a new instrument, and, most importantly, connect with parallel computing resources on the main campus (the Scientific Computing and Imaging Institute and the Center for High Performance Computing). "Now we have collaborations with both of those resources, which has been a real boon," says Frost.

It's that kind of continual education and interplay between cores, researchers, clinicians and institutions nationwide that Weyrich believes has the potential to transform discovery. "I'm crazy optimistic about the future of science," says Weyrich. "With the synergies that form in an open, collaborative environment, you're only limited by your own imagination."

Q&A

WINNING THE WAR ON CANCER BY REDESIGNING RESEARCH
An interview with Mary Beckerle, Ph.D., CEO and Director of Huntsman Cancer Institute

Q: *We've discovered that cancer is a crafty, unpredictable opponent, which has made winning the war against cancer much more difficult than we originally thought. While the mortality rate for other diseases, like cardiovascular, has fallen dramatically, our gains against cancer have been more modest. Do you think cancer is an impossible problem?*

A: Before 1971, we were looking for the single bullet, like a polio vaccine, that could eradicate cancer from the face of the earth. Then we learned more about cancer and discovered that it was actually many different diseases, and it seemed impossibly complex. Today, as we learn more about genetics, key pathways are emerging that allow us to target specific cancers, assess risk better and turn what was once a deadly disease into a chronic condition. Now I think everything is possible. It's an incredibly exciting time. An absolutely unprecedented time.

Q: *Since Huntsman Cancer Institute (HCI) is not a department, you've been able to create interdisciplinary teams that are organized around disease-oriented clusters. What is the advantage of that?*

A: No single individual or discipline has the capacity to solve the cancer puzzle. We can only do it with transdisciplinary teams made up of exceptionally talented and innovative individuals. So we have to make sure that individual expertise is not ossified within the walls of a single department. At HCI, we extend the talents and contributions of individuals by developing transdisciplinary teams to catalyze the highest level of achievement. We work closely with 20 departments to recruit the best team players and brightest investigators, and then generally provide half of the research startup package, as well as lab space and strong research mentoring. It's a win-win situation.

Q: *What do you think is culturally different at HCI and how does that foster high-impact, collaborative research?*

A: At HCI, we have the benefits of being in an academic setting, which provides the raw drive, creativity, individual aspiration and academic freedom, while at the same time feeling like a biotech startup, where everyone is working toward common goals. We also have a strong culture of sharing resources, which amplifies the impact of our investment. For example, the Utah Population Database, which has been overseen by HCI for many years, brings together genealogies with medical records and vital records like birth and death certificates. This remarkable database has become one of the most valuable and distinctive research resources in the country for discovery of human disease genes. Because of our genetically characterized families and the synergies that come from clinicians, scientists, and the community working together, we can do things here that can't be done anywhere else in the world. I also think there's something special about the way we look out at the landscape and see opportunities instead of constraints.

THROUGHOUT THE YEAR, WE'VE BEEN ASKING FACULTY AND STAFF:

WHAT'S YOUR

IMPOSSIBLE

PROBLEM?

TELL US ABOUT WHAT'S KEEPING YOU UP AT NIGHT AT ALGORITHMSFORINNOVATION.ORG

Meet a few of the many
DYNAMIC PEOPLE...

...who are creating our continually evolving algorithms and
TRANSFORMING THE FUTURE
of health care.

RESEARCHERS
54

INVENTORS
58

EDUCATORS
61

new recruits
64

PROVIDERS
68

LEADERS
76

patients
70

DONORS
72

WHY
Research
MATTERS

The Utah Phenotype. That's how we think of our researchers. Brilliance is in their DNA, but they are much more than just smart scientists. Fiercely independent, they're unafraid to take risks and follow a different line of thinking. Collaborative by nature, they're remarkably open to sharing expertise, data, technology and ideas.

Perhaps because of our geographic location and size, we've attracted team scientists all along. Big enough to have outstanding resources and core facilities, we're still small enough that we need to rely on one another to do our best work. Working together in a rich clinical environment ensures that the discoveries we're making— whether basic science or population-based—are directed toward improving the health of people.

So now, when funding from federal and clinical sources is increasingly tight, we're able to draw together to move science forward. Here, we feature just a few of our researchers and the impact their work is having to remind you . . . WHY RESEARCH MATTERS.

ENGINEERING SENSORS TO STUDY PELVIC ORGAN PROLAPSE

"Women almost never die in childbirth anymore. But vaginal delivery still puts women at a much greater risk for pelvic organ prolapse. We think it's worth understanding what damage is caused during childbirth and how we can mitigate disease that shows up 20 or 30 years later. We are looking at lifestyle factors like nutrition, physical activity, fitness and strength, and genetic and biomechanical factors that put women at higher risk. We're also looking qualitatively at what women are willing to do to prevent future disease."

Ingrid Nygaard, M.D., professor of obstetrics and gynecology, studies the effects that abdominal forces and physical activity can have on the pelvic floor. Her multidisciplinary research team from the School of Medicine and the Colleges of Health and Engineering has developed an intra-vaginal sensor to monitor abdominal pressure and its effects on the pelvic floor.

DISCOVERING NEW THERAPEUTICS FROM NATURAL SOURCES

"When I was a kid I loved the ocean, and I was very interested in chemistry. I wanted to know what chemicals made up life on earth. I wanted to know: Why does an orange smell like an orange? It turns out that a lot of those natural compounds wind up being really good drugs. We're looking at the way nature solves problems, especially in the marine environment, and figuring out ways to harness that knowledge to treat human diseases."

Eric Schmidt, Ph.D., professor of medicinal chemistry, uses experimental methods and interdisciplinary collaborations to discover and develop new drugs from natural products. He recently received two NIH R01 grants, one of which is to study the synthetic biology of peptides to learn engineering rules from nature. The second grant is aimed at finding new antibiotic or neuroactive compounds from marine animals.

HARNESSING BIG DATA TO IMPROVE CLINICAL PRACTICE

"As clinicians we learn very early on how to manage uncertainty in our practice. When we're unsure of something we turn to textbooks. We ask our friends. We ask our colleagues. We do curbside consultations. But you really don't know what everyone else did with a particular problem. The concept of 'Veterans Like Mine' is to tap into that collective experience, turn it into evidence, and use that evidence to inform practice."

Matthew Samore, M.D., professor of medicine and chief of the Division of Epidemiology, analyzes "Big Data," working in the interface between epidemiology and informatics. As the director of the Veterans Affairs Center of Innovation, which is called the Informatics, Decision Enhancement and Analytic Sciences Center, Samore develops tools for gathering information from millions of patient records to provide evidence for clinical practice.

FINDING SAFE TREATMENTS TO PREVENT BLINDNESS

"In premature babies, it's very difficult to study retinopathy because there's only a millimeter through which you can enter the eye to obtain tissue, creating risks of a cataract or a retinal tear that often leads to an inoperable retinal detachment. What I'm trying to do is support normal vascularization in retinopathy prematurity—or contain it within its proper compartments in macular degeneration—in a way that's safe for the patient. I'm not just trying to block blood vessel growth, I'm trying to provide physiologic blood vessel growth to bring oxygen and nutrients to tissue and keep it healthy and functional."

Mary Elizabeth Hartnett, M.D., professor of ophthalmology and visual sciences and principal investigator of the Retinal Angiogenesis Laboratory, is chair of the NIH Diseases and Pathophysiology of the Visual System Study Section at the National Eye Institute.

GATHERING EVIDENCE TO BETTER MANAGE PAIN

"We know how to manage pain, so why don't we do a better job of it? I care about patients' pain, about the symptoms they experience, and about their quality of life. Yet that kind of information isn't collected regularly in a way that allows us to advance our knowledge. We need to better integrate that into our point of care. Just like we get patients' blood pressure, we get to collect their perspectives. It really is all about developing evidence to better care for patients."

Susan L. Beck, Ph.D., professor in the College of Nursing, recently completed a nationwide hospital research study survey that evaluated patient pain management in over 20,000 patients and provided nurses with tools to enhance the patient experience. In 2012, she was recognized as a Distinguished Nurse Researcher by the Oncology Nursing Society for her lifetime contributions to the field.

EXPLORING INFLAMMATION AT THE MOLECULAR LEVEL

"The basic question I'm asking is why cells express double-stranded RNA (dsRNA). What is its true function? Why do we still encode long dsRNA in our genomes when cells associate it with a virus? I'm wondering if the reason there is an inflammatory response in many diseases is because cellular dsRNA is recognized as a virus. It's still a theory, but it's important because nobody has really investigated this. If it were true, it could change the way that we treat the inflammation associated with certain diseases."

Brenda L. Bass, Ph.D., distinguished professor of biochemistry, focuses her research on characterizing cellular double-stranded RNAs and the proteins that bind them. In 2011, she was one of 13 researchers awarded the NIH Director's Pioneer Award to investigate if double-stranded RNAs are responsible for the inflammation associated with diseases such as diabetes.

DISCOVERING NEW THERAPIES FOR NEUROLOGICAL DISORDERS

"About 12 percent of all births in the U.S. are premature infants, and about one-third of them have long-term neurologic problems (autism, epilepsies, seizure disorders) for which there is no treatment. We've developed a technique that lets us make a map of the brain and start to understand how it develops and functions, which I think will revolutionize our ability to develop treatments and therapies for the brain and the nervous system. Some of our work has already uncovered potential therapeutic avenues for kids who are born premature, which is very exciting."

Josh Bonkowsky, M.D., Ph.D., assistant professor of pediatric neurology, was one of 51 young investigators awarded the NIH Director's New Innovator Award in 2012. Bonkowsky used funding from that award to develop new techniques to create a "map" of the brain in order to discover what is—and isn't—happening in the brains of premature infants.

$230.3m

FUNDED 637 RESEARCH GRANTS
THROUGHOUT UNIVERSITY OF UTAH
HEALTH SCIENCES IN 2012

BY SOURCE

▲ **NIH:** $141.4m ▲ **Fed Government (Non-NIH):** $32.7m ▲ **Industry:** $26.2m ▲ **Other Academic Institutions:** $13.7m
▲ **Foundations & Associations:** $8.8m ▲ **Local/State Government:** $5.5m ▲ **Hospital:** $2m

BY COLLEGE

▲ **School of Medicine:** $197.9m ▲ **College of Pharmacy:** $19.9m ▲ **School of Nursing:** $3.7m
▲ **Spencer S. Eccles Health Sciences Library:** $3.4m ▲ **Other:** $3.1m ▲ **College of Health:** $2m

10 NEW STARTUPS FORMED
38 U.S. PATENTS ISSUED
53 FIRST-TIME INVENTORS
89 NEW DIAGNOSTIC TESTS DEVELOPED
107 NEW INVENTION DISCLOSURES
135 U.S. PATENT APPLICATIONS FILED

BEYOND THE
Big Idea

IDEAS, EVEN GOOD ONES, MAY BE A DIME A DOZEN. BUT TURNING THOSE IDEAS INTO SOMETHING THAT MAKES AN IMPACT TAKES GRIT, DETERMINATION AND IMAGINATION.

We believe the world needs our ideas—from video games to surgical devices—and have been focused on identifying and removing barriers along the rocky and curvy path of invention. Consistently ranked among the top universities in the country for startup formation, we're determined to make it convenient and fulfilling for our time-strapped, would-be inventors to turn an idea into a product. Hundreds of students and faculty members are involved in projects to improve lives through applied research. We asked six of our inventors—faculty and students—what motivated them to stay the course and what lessons they've learned along the way.

INNOVATIONS
IN THE HEALTH SCIENCES
AT THE UNIVERSITY
OF UTAH (2012)

IDEA

EVALUATION

RESEARCH

DESIGN

"MOTIVATIONS ARE CRITICAL. *I wanted to find a way to have the greatest impact on Alzheimer's care, and that led me to developing a mobile application and launching a company. This may seem like a distraction, something beyond my responsibilities as a physician, but it is the best way to reach the largest number of patients."*

—**Norman Foster, M.D.,** the director of the University's Center for Alzheimer's Care, Imaging and Research (CACIR) and a professor of neurology, is a co-founder of the startup Proactive Memory Services. The company is developing a mobile application that will provide guidance and support to Alzheimer's patients and their families.

PROTOTYPING

"WE CREATED AMIRSYS TO EMPOWER HEALTH CARE *providers at the point-of-care with the best possible information. We developed a publishing framework with thousands of articles and images that are stored electronically, easily searchable and available on multiple devices. The company has become a world leader in radiologic, pathologic and anatomic reference and e-products, and its success has exceeded my expectations and turned me into an accidental CEO."*

—**Ric Harnsberger, M.D.,** professor of radiology and otolaryngology, is the co-CEO of Amirsys, a medical reference company he founded with several colleagues. Amirsys was one of the first to provide health-care reference materials in a digital format that can be accessed and searched on multiple devices, and the company continues to be a world leader. Half of the world's radiologists use an Amirsys decision support or learning portal tool in their work.

"WE THINK OF OUR VIDEO GAME AS LESS OF A GAME TO PLAY *and more as a clinical tool centered around patient empowerment. Children with cancer can become deconditioned emotionally and physically. I'm a people person, and I want my research to help the whole person."*

—**Carol Bruggers, M.D.,** is a professor of pediatrics whose clinical focus is in pediatric neuro-oncology. She is working with numerous collaborators to create and commercialize an activity-promoting, interactive video game that allows children with cancer to battle their illness virtually and gain a sense of empowerment. Among the team's early successes is a publication in *Science Translational Medicine* that demonstrates the value of video games in personalized health care.

PATENTING

LICENSING

Impact

TO THE POWER OF MANY

In academic medicine, groundbreaking research in prestigious journals and lifesaving procedures in the operating room have a tendency to overshadow the quieter craft of teaching. Here, we celebrate six of our many faculty members who have made educating others a priority and highlight the exponential impact they're having on the future. In a world of countless options, we asked them to share some thoughts about why they find teaching and mentoring so rewarding.

"EVERYTHING TAKES LONGER THAN YOU THINK IT WILL. *There will be really amazing opportunities and days that are really not any fun at all, and you think it's just never going to happen. Keep showing up. If the idea is good, other, smarter people will come along and make it better. Partner with people who share your vision and values."*

—**Jodi Morstein Groot, Ph.D., APRN,** an associate professor (clinical) in the College of Nursing, specializes in working with children and teens (and their families) who have attention deficit disorder, anxiety, autism and related conditions. She created the startup company Add-it, which offers iPod software for rewarding kids for successfully managing a school schedule. When they complete tasks, they receive points that earn them time to play games, watch movies or enjoy other entertainment on the device. She has already piloted the device in local schools, secured a patent on the process and is working toward a next-generation package.

"COLLABORATION IS ESSENTIAL FOR GREAT PRODUCT DEVELOPMENT — *unless you are an expert in clinical medicine, engineering, manufacturing, business, patent law, and regulatory strategy, and you have endless time on your hands. I've also discovered there is no shortage of problems that need to be fixed, and there are multiple good ways to fix them. You need to choose your projects wisely and be open to pivoting if you encounter too much resistance or uncover something with more potential during the process."*

—**Pablo Johnson** is a medical student and recent graduate of BioInnovate, the University's new one-year graduate program in bioengineering. Johnson took a year off medical school to enroll in the program. He worked with a team of students to develop a new trocar device that allows surgeons to more easily suture the fascial defect created during laparoscopic surgery. The team won $20,000 at the University's Bench-2-Bedside competition and is talking to several companies interested in licensing the technology.

"THE VALUE OF TECHNOLOGY IF THE BOTTLE SITS ON MY SHELF IS ZERO. *It only has value if it makes it to the marketplace and ends up a product that people can use. Talk to your customers. Research for its own sake is a self-serving activity. Research in communication with users of the technology is the magic of commercialization and impact."*

—**Glenn Prestwich, Ph.D.,** presidential professor of medicinal chemistry and special presidential assistant for faculty entrepreneurism, launched and manages the Entrepreneurial Faculty Scholars group at the University and has founded numerous life-science companies. Among his inventions is a method for making cross-linked hyaluronic acid, a "wonder goo" naturally formed in rooster combs that has numerous uses ranging from repairing wounds to delivering therapeutic cells to regenerate damaged tissues.

MAIJA HOLSTI

"Undergraduate students need experiences and mentors to help them discover their passion in medicine. If there was only one thing that I would want students to learn from me, it's that learning is a long but wonderful journey that doesn't stop when you graduate. Enjoy the ride and when challenges arise, embrace them as opportunities."

—**Maija Holsti, M.D., M.P.H.,** is associate professor of pediatrics and works in the Division of Pediatric Emergency Medicine at Primary Children's Hospital. She created a new course to teach undergraduate and graduate students about clinical research by working as a research assistant on multiple pediatric studies. The popularity and success of the class led her to develop other similar courses, and this year the university created a minor degree in pediatric clinical research for undergraduates. Holsti also directs two NIH-funded summer research internships for 20 Native American students from 14 different tribal nations.

HESTER HENDERSON

"Teaching is connecting with students, sharing stories and watching them grow. It is helping them pursue a career that they will love, knowing they will make a difference in childrens' lives and ultimately make the world a better place. Contributing to that mission is rewarding to me."

—**Hester Henderson, Ph.D.,** associate professor of exercise and sport science, received a 2013 Beacon of Excellence Award for her work with the U-FIT program, an initiative she founded for children with disabilities and their siblings. She is the director of the Special Physical Education Teacher Training Program, which has expanded her outreach opportunities to all teachers wanting to know about behavior management programs for individuals with disabilities.

LYNN JORDE

"I think we're all very interested in seeing our science continue. We want to see future generations make new developments with the research that we started, and we want to be the mentors to steer them in the right direction. Part of the fun is helping people learn about what's going on in our field. Genetic research will change people's lives, so teaching students and the public about the research we're doing is important."

—**Lynn Jorde, Ph.D.,** professor and chair of Human Genetics, leads a major new research initiative, the Utah Genome Project, which plans to carry out whole-genome sequencing of approximately 2,500 members of the Utah Population Database and identify new genes that contribute to at least a dozen major human diseases. He has been honored with 12 University of Utah teaching awards and received the Award for Excellence in Education from the American Society of Human Genetics.

RICK ASH

"My graduate advisor was an excellent teacher and scientist, and because of his example, I expected that I'd always be doing both. At the University of Utah, our students are bright and engaged—and that makes teaching fun. I believe that the more our medical students know about human biology the better clinicians they can be. And the more they adopt the working attitude of a scientist, they realize that they don't know everything and are prepared to be surprised at any moment. This same skill is equally valuable for physicians."

—**Rick Ash, Ph.D.,** professor of neurobiology and anatomy, received the Distinguished Teaching Award, which honors standout mentors. Nearly 10 years ago, Ash gave up his research lab so he could focus on medical education. In addition to extensive teaching, he's helped design a new curriculum for the School of Medicine and pioneered ways to incorporate digital technology into medical education.

KARLY PIPPITT

"Teaching is important to me because it is a skill I use in every part of my career — in the classroom with students, working on research projects with teams and in the clinic with patients. I can make a small impact with the patients I care for, but in teaching students, I can have an even greater impact on patient care by helping these students become caring, compassionate physicians."

—**Karly Pippitt, M.D.,** an instructor of family and preventive medicine, is focused on finding innovative ways to improve the education of first- and second-year medical students. She helped develop a curriculum called the Longitudinal Clinical Experience, which gives students an opportunity to work in a primary care clinic during their preclinical years.
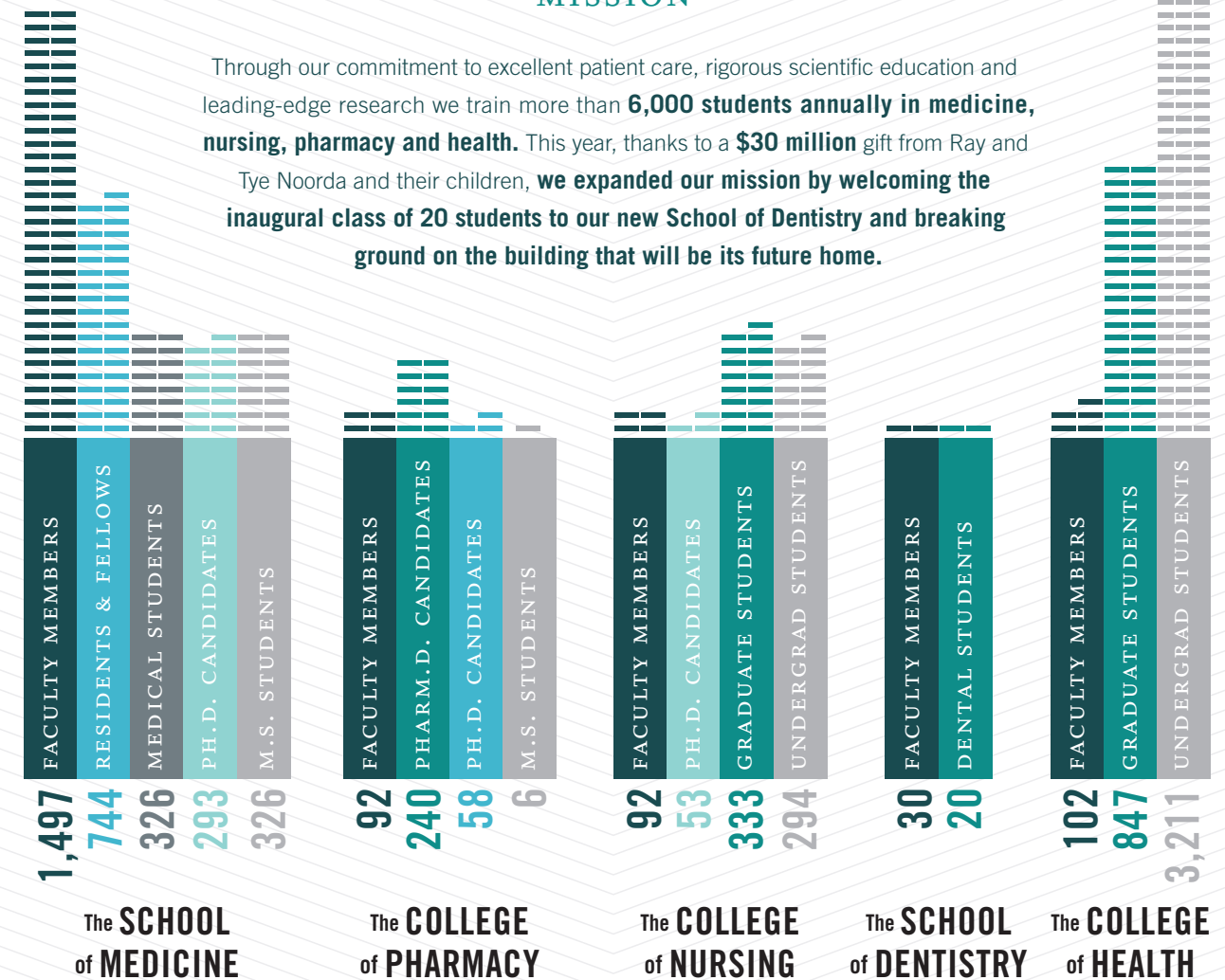
LEIGH NEUMAYER

"It's a fun job. I like coming to work every day and interacting with students and younger faculty members looking to improve both their surgical and research skills. There are lots of other professions I'd be happy working in, but this one challenges me on a daily basis. I find it equally rewarding to help a patient as I do to mentor faculty members who will be going on to treat future patients."

—**Leigh Neumayer, M.D.,** professor of surgery and co-director of the multidisciplinary team treating breast cancer at Huntsman Cancer Institute, holds a Jon and Karen Huntsman Presidential Professorship in Cancer Research. Neumayer mentors junior faculty members through the Vice President's Clinical & Translational (VPCAT) Research Scholar Program, a two-year, intensive mentored program for junior faculty members who are paired with veteran scientists to advance their research skills.

OUR EDUCATION MISSION

Through our commitment to excellent patient care, rigorous scientific education and leading-edge research we train more than **6,000 students annually in medicine, nursing, pharmacy and health.** This year, thanks to a **$30 million** gift from Ray and Tye Noorda and their children, **we expanded our mission by welcoming the inaugural class of 20 students to our new School of Dentistry and breaking ground on the building that will be its future home.**

The SCHOOL of MEDICINE
- FACULTY MEMBERS — 1,497
- RESIDENTS & FELLOWS — 744
- MEDICAL STUDENTS — 326
- PH.D. CANDIDATES — 293
- M.S. STUDENTS — 326

The COLLEGE of PHARMACY
- FACULTY MEMBERS — 92
- PHARM.D. CANDIDATES — 240
- PH.D. CANDIDATES — 58
- M.S. STUDENTS — 6

The COLLEGE of NURSING
- FACULTY MEMBERS — 92
- PH.D. CANDIDATES — 53
- GRADUATE STUDENTS — 333
- UNDERGRAD STUDENTS — 294

The SCHOOL of DENTISTRY
- FACULTY MEMBERS — 30
- DENTAL STUDENTS — 20

The COLLEGE of HEALTH
- FACULTY MEMBERS — 102
- GRADUATE STUDENTS — 847
- UNDERGRAD STUDENTS — 3,211

WHY
UtΔh?

BREATHTAKING BEAUTY, UNPARALLELED COLLABORATION, REMARKABLE
FACILITIES AND VISIONARY LEADERSHIP WERE JUST A FEW OF THE
REASONS SOME OF OUR NEWEST FACULTY GAVE US BEFORE COMING
UP WITH A DIFFERENT QUESTION: WHY NOT UTAH?

*One beautiful, late-summer evening, we invited
some of our newest faculty members to enjoy one
another's company and the spectacular views from
our campus nestled in the foothills. They are among
the 158 talented researchers and providers who joined
University of Utah Health Sciences this past year.
On the following pages, we asked them to tell you
in their own words why they made Utah home.*

*Sincere thanks to our neighbor, the spectacular Natural History
Museum of Utah, for loaning us their "patio" for the evening.*

EXCELLENCE

PATRICIA G. MORTON
PH.D., R.N.

"I was interested in the College of Nursing because of its excellence in teaching, scholarship and practice. The faculty is outstanding and many are nationally known for cutting-edge work."

The new dean of the College of Nursing joined Utah from the University of Maryland School of Nursing. She is editor of the *Journal of Professional Nursing* and is a fellow of the American Academy of Nursing.

INTEGRATION

JOHN SWEETENHAM
M.D.

"I'm so excited to be working in an institution that blends cutting-edge cancer research with an exceptional patient experience in such a seamless way."

Senior director of clinical affairs and executive medical director at Huntsman Cancer Institute, he came to Utah from UC San Diego's Nevada Cancer Institute. He is a Fellow of the American College of Physicians and The American Association for the Advancement of Science.

OPPORTUNITY

TIMOTHY BRUSSEAU JR.
PH.D., M.S.

"Utah has tremendous research and clinical opportunities and a top-ranked program that includes globally recognized researchers, clinicians and educators. And Salt Lake is one of the most naturally beautiful cities in the country."

Assistant professor of exercise and sport science, he is the director of Sport Pedagogy and the director of Physical Education Teacher Education. He came to Utah from The College at Brockport, State University of New York.

OPEN-MINDEDNESS

BEVERLY PATCHELL
R.N., M.S., C.N.S.

"I want to be able to address old problems in new ways, and it takes an atmosphere of excitement and openness to make that happen."

Assistant professor of nursing, she came to Utah from University of Oklahoma College of Nursing, where she was the project director for the American Indian Nursing Student Success Program. She was also co-director of the Center for Cultural Competence and Healthcare Excellence.

INNOVATION

JANET IWASA
PH.D.

"As a molecular animator I've had to convince others of the importance of visualization in research. That's not the case here—everyone is so supportive of innovation. There's excitement and energy humming through campus."

Research assistant professor of biochemistry, she came to the University from Harvard Medical School. She was a National Science Foundation Discovery Corps Postdoctoral Fellow and was named one of the 100 Most Creative People in Business by *Fast Company*.

BALANCE

ADAM DOUGLASS
PH.D.

"Being able to hike up an 8,000-foot mountain after work and still get home in time to cook dinner really helps me balance my professional and personal lives. For me, nothing inspires creative thinking like getting out in nature on a regular basis."

Assistant professor of neurobiology and anatomy, he joined the University of Utah after postdoctoral studies at Harvard Medical School.

ACADEMIA

PHILIPP TAUSSKY
M.D.

"Why Utah? Because it has one of the largest and best neurosurgical departments in the country, along with the most impressive fellows, residents and medical students."

Assistant professor of neurosurgery, he joined the faculty after completing a skull-base and vascular fellowship at the University of Utah and an endovascular fellowship at the Mayo Clinic.

COLLABORATION

JUAN F. GALLEGOS-OROZCO, M.D.

"I came to Utah for the collaboration in a scholarly and collegial environment."

Assistant professor of gastroenterology, he studied in both Mexico and the United States. He came to Utah from the Mayo School of Graduate Medical Education, where he was an assistant professor and received postgraduate training in internal medicine, gastroenterology and transplant hepatology.

TEAMWORK

HOLLY GURGLE
PHARM.D.

"I came to Utah for innovative and interprofessional models of primary care delivery. I love being on a collaborative team with physicians, nurses and administrators."

Clinical assistant professor of pharmacotherapy, her clinical practice site is the University of Utah's ARUP Laboratories Family Health Clinic. She came from the University of Washington.

LEADERSHIP

RENA N. D'SOUZA
D.D.S., PH.D., M.S.

"The University has unparalleled resources, amazing infrastructure, talented faculty, staff and students and visionary leadership. I came here to establish and lead a School of Dentistry that will rank among the best in the world."

Dean of the new School of Dentistry, she joined the University from the Baylor College of Dentistry, where her efforts as chairperson increased the number of faculty researcher-educators and led to the building of new interdisciplinary programs for education and research.

CORE SERVICES

CLAUDIO VILLANUEVA
PH.D.

"I came to Utah because of the collaborative environment, diversity, core services, scientific resources and outstanding faculty. We have all the amenities of a big city surrounded by natural beauty."

Assistant professor of biochemistry, he came to Utah following his postdoctoral fellowship at Howard Hughes Medical Institute, UCLA.

COMMITMENT

SAMUEL R. G. FINLAYSON
M.D., M.P.H.

"I came to Utah because of the high level of energy around transforming health care to provide greater value to patients. There is a true commitment here to making a difference for the population we serve."

Chair of the Department of Surgery, he was the Kessler Director at the Center for Surgery and Public Health at Harvard's Brigham and Women's Hospital.

4 HOSPITALS | 10 COMMUNITY CLINICS | 1,200 PHYSICIANS

1,000,000+
PATIENT VISITS

AS THE ONLY ACADEMIC MEDICAL CENTER IN THE INTERMOUNTAIN WEST, WE ARE PRIVILEGED TO CARE FOR PEOPLE WHO LIVE IN FIVE STATES AND THROUGHOUT 10 PERCENT OF THE CONTINENTAL U.S. *To do so, we have more than 1,600 committed scientists, physicians and investigators supported by 12,000 dedicated staff members* PUSHING THE LIMITS ON SCIENCE AND MEDICINE. TOGETHER, WE'RE COMMITTED TO PROVIDING AN EXCEPTIONAL EXPERIENCE FOR EVERY PATIENT WE SERVE.

TOP 10
IN QUALITY

For the past four years, University of Utah Health Care has been ranked among the top 10 academic medical centers by the University HealthSystem Consortium for delivering the highest quality of care in the country.

10%

Our referral area covers 10 percent of the continental U.S.

10 COMMUNITY CLINICS

Our clinics serve 180,000 unique patients with 420,000 patient visits per year.

University of Utah Hospital

Huntsman Cancer Institute

John A. Moran Eye Center

Primary Children's Hospital
A collaboration between University of Utah faculty and Intermountain Healthcare
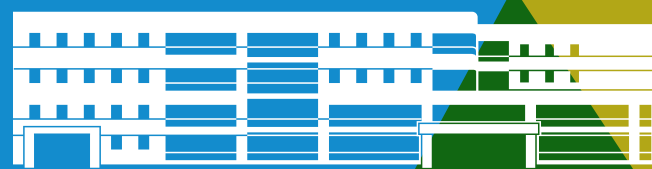
University Neuropsychiatric Institute

University Orthopaedic Center
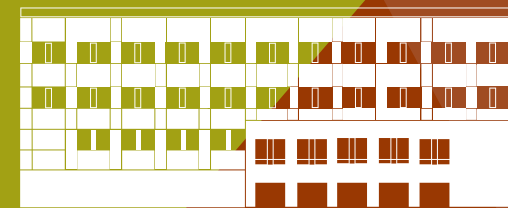
Clinical Neurosciences Center

South Jordan Health Center
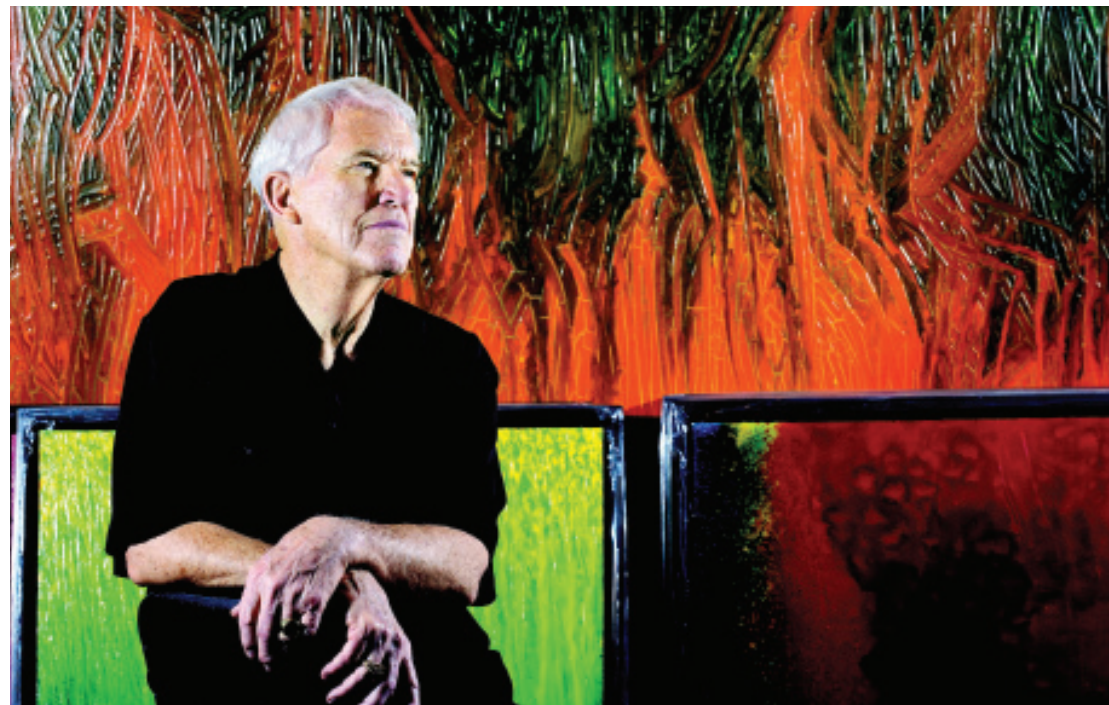
All of the questions we're asking AND ALGORITHMS WE'RE CREATING, ALL OF THE RESEARCH, TRAINING, TREATMENTS AND TECHNOLOGY WE'RE DEVELOPING ARE FUELED BY A SINGLE GOAL: DISCOVERING THE BEST WAYS TO CARE FOR PATIENTS. THESE STORIES ARE EXAMPLES OF WHY WE'RE PASSIONATE ABOUT THE WORK WE DO.

TO DISCOVER THE STORY, GO TO
healthcare.utah.edu/patient-stories

Now more than ever, WE RELY ON THE VISION AND GENEROSITY OF OUR DONORS TO ENABLE US TO FULLY REALIZE OUR MISSION. IT IS WITH THEIR SUPPORT THAT WE ARE ABLE TO CONDUCT GROUNDBREAKING RESEARCH, OFFER LIFESAVING TREATMENTS, EDUCATE THE NEXT GENERATION OF PROVIDERS AND CARE FOR OUR COMMUNITIES. *Thank you for believing that we can make a difference.*

LIFETIME GIVING
GOLD ($10 MILLION +)

A. E.* and Rosemary* Benning
H. A.* and Edna* Benning
Ian and Annette Cumming
George S.* and Dolores Doré* Eccles
Richard A. and Carol M. Fay
Mr. and Mrs. Ira A. Fulton

Jon and Karen Huntsman
Mr.* and Mrs. Larry H. Miller
John A. Moran
Ray* and Tye Noorda
L. S. "Sam"* and Aline W. Skaggs
Anonymous

CORPORATIONS AND FOUNDATIONS

The ALSAM Foundation
American Cancer Society
Associated Regional and University Pathologists
 (ARUP Laboratories)
The Church of Jesus Christ of Latter-day Saints
 Foundation
Cumming Foundation
George S. and Dolores Doré Eccles Foundation
Huntsman Cancer Foundation

Jon and Karen Huntsman Foundation
Intermountain Healthcare
Emma Eccles Jones Foundation
The Ray and Tye Noorda Foundation
Primary Children's Hospital Foundation
Primary Children's Hospital
Skaggs Institute for Research
The Larry H. Miller Group
Nora Eccles Treadwell Foundation

SILVER ($5,000,000 - $9,999,999)

Dr. Robert H.* and Dorothy Cannon* Ballard
Dr. Rodney H. and Carolyn Hansen Brady
William H. and Patricia W. Child
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*In recognition of the visionary leadership of **Edward B. Clark, M.D.** (right), Primary Children's Hospital Foundation established the Edward B. Clark M.D. Endowed Chair in Pediatrics, which was recently awarded to **Joshua D. Schiffman, M.D.** (left). As Department of Pediatrics chair, Clark has built an outstanding academic department and implemented a collaborative research paradigm, growing the department's research portfolio from $800,000 to $120 million since 1996. And as chief medical officer at Primary Children's Hospital, an Intermountain Healthcare facility staffed by University of Utah faculty, he transformed how one of the nation's top children's hospitals addresses the health of children. Schiffman is an associate professor of pediatrics and medical director of the High Risk Pediatric Cancer Clinic at the University of Utah's Huntsman Cancer Institute. He works with children and families at high risk for cancer to discover genes that may be targeted to both prevent and treat childhood cancer.*

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