

Δ gorithms for innovation

The background of the entire page is a deep red. Scattered across this background are numerous stylized hands and forearms in various colors (white, blue, yellow, grey). Each hand is pointing its index finger towards the center of the page, where the large text 'THE ALTH' is located. The hands are positioned at different angles and distances, creating a sense of many different people or entities all pointing at the same central point.

THE
ALTH

WHO'S RESPONSIBLE?

Since 2012, Algorithms for Innovation has been asking questions and searching for solutions to some of the most impossible problems facing health care.

We believe there's an unprecedented opportunity to invent a new vision for health care, and academic medicine is poised to lead the way. Algorithms for Innovation is designed to spark conversations, highlight best practices and foster collaboration to help transform the future.

Algorithms for Innovation is powered by University of Utah Health.

See more at algorithmsforinnovation.org



You may notice something has changed in this edition of Algorithms —we've changed our name from “Health Care” to “Health” to better align with who we are and what we do. We've also adopted the University of Utah's block U to highlight how we're breaking down academic siloes and working together to achieve great things.

Let's face it. America is not a picture of health. Almost two-thirds of us are obese. One in five of us still smoke. Nearly 2 million of us will be diagnosed with cancer this year. We take more than \$425 billion in prescription drugs and spend \$3.2 trillion on health care but, collectively, we still don't feel well.

Who's responsible? We could point fingers at each other all day long, but the simple truth is that health has not been our priority. We've focused on treatment rather than prevention, sick rather than health care, doing more rather than doing better. Now, change is on the horizon, opening a window of opportunity to take a more holistic approach to health and all of its social determinants. One thing is clear—we're in this together. So the question is: Can we work with one another and share responsibility to get us to a future that's better—and healthier—for everyone?



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How do we move beyond checklists to create meaningful metrics and patient-centered results? Forge authentic partnerships and hold one another accountable.

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When it comes to our health, there's no simple or straightforward answer to the question, "Who's responsible?" In *Algorithms for Innovation*, we like to start with a tough question that will help uncover clues to solve an impossible problem. Figuring out who's responsible for health is complicated. It's also key to understanding how to develop the right models of care, the right policies, the right incentives and the right partnerships. If we get this right, all else follows.

In the past, we've considered it our responsibility to focus on health care—curing disease and training the future generation of providers. Today, academic health systems are embracing a commitment that is monumentally more complex and important—taking care of the health of our patients and communities.

To do that, we will have to redefine who we are and what we do because patients don't live their lives in our offices or exam rooms. They live at home and at work and with friends and family; and they do and eat and breathe things that we have no control over. If it's true that only 10 percent of a person's overall health is affected by clinical care, 20 percent by social determinants of health, another 30 percent by genes and biology and a whopping 40 percent by individual behaviors, then we need to rethink who else we want to bring under the tent of responsibility.

Shifting our focus to health invites us to come down from the proverbial ivory tower and partner with patients and organizations

way outside of our usual thinking. And that's exciting. We may not agree with the external factors that are forcing us to change, or the direction they're taking us. Yet I believe that the opportunity to really take on health, and not just sickness, will get us much closer to what we signed up for in the first place.

In this issue of *Algorithms*, we explore some of the ways we're thinking about shifting and embracing responsibility—for defining outcomes, partnering with the community, discovering cures, preparing tomorrow's leaders and, importantly, taking care of ourselves. We hope that you'll join us in asking these questions and finding the answers.



VIVIAN S. LEE, M.D., PH.D., M.B.A.
Senior Vice President, Health Sciences
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“The opportunity to really take on health, and not just sickness, will get us much closer to what we signed up for in the first place.”



Outcomes

WHO'S RESPONSIBLE?

The path to a good outcome is hardly straightforward. Anywhere along the way, systems and behaviors can advance patients forward or set them back. Government metrics tried to ensure safe passage, but 1,700 checklist boxes later, no one is satisfied. Patients and providers are starting to take matters into their own hands and hold each other accountable.

You won't hear William Couldwell, M.D., Ph.D., utter the phrase, "It's not brain surgery," because most of the time it is. Chair of the Department of Neurosurgery, Couldwell travels the world training other neurosurgeons and spending as many as 12 hours in the operating room working against the odds of a ruptured aneurysm or teasing out tumors that tangle dangerously close to critical brain tissue.

When one of his patients wakes up from surgery and takes perhaps the most grateful breath of her life, she next wants to know "Can I still see?" "Can I hear?" "Do I recognize the person sitting at the side of my bed?" But those are not the metrics that will measure Couldwell's performance. Instead, 15 years of education and training and 30 years of experience will be measured by a cascade of hospital, government and insurance company metrics—from the routine (quick administration of antibiotics and catheter removal) to the practical (the speed with which the patient is up on her feet and sent home or to a

someone's life," says Couldwell, "but none of these metrics asks questions that would capture that."

At the same time, metrics have improved medical outcomes, cut costs and saved lives. We've needed some way to justify, quantify, measure and control what we're doing, especially in light of the Institute of Medicine's estimate that roughly 30 percent of U.S. health care spending is squandered on unnecessary, poorly delivered or wasteful care. For the most part, the federal government has taken on that responsibility, creating more than 1,700 quality and safety metrics.

The problem is that metrics are

The Proliferation of Metrics

1,700
METRICS
for Centers for Medicaid and Medicare alone

785
HOURS
average time spent per physician reporting quality data annually

\$15
BILLION
annual cost of metrics reporting

skilled nursing facility). Doctors, residents and nurses will check off hundreds of boxes pre- and post-surgery that will be used for rankings, accreditation, reimbursement and, in some cases, nothing at all.

What they won't measure, at least not yet, is what's really important: the improvement in a patient's quality of life, his ability to go back to work or her joy at being alive to see a child married or a grandchild born. "We take away the threat to a patient's life or extend

designed to simplify, but health is incredibly complex. How a person feels, ultimately, cannot be measured by adherence to processes. It's deeply personal and variable. The other problem is that, like so many patriarchal traditions in medicine, providers, systems, government and payers have all taken a we-know-best approach and left out one important voice—presumably, the very person to whom the outcome matters most—the patient.

But that's changing.



"We didn't have enough hard outcomes measures to justify what was being done."

WILLIAM COULDWELL, M.D., PH.D.
Chair of Neurosurgery



Driving Surgery with Data

America's back hurts. About 500,000 people a year undergo spinal surgery to fix bulging discs and broken vertebrae. That treatment presents a long list of options for surgeons and patients: fusion or decompression, physical therapy versus spinal injections or maybe nothing at all? Normally, a physician would look at the data to figure out the best strategy. But when the research conflicts, knowing which approach will lead to the best outcome is far from straightforward. In one year, the *New England Journal of Medicine* published two conflicting studies about how to fix a condition where one vertebra slips down over the other: fuse or decompress? Two groups of scientists disagreed.

"We didn't have enough hard outcomes measures to justify what was being done," says neurosurgery chair **William Couldwell, M.D., Ph.D.** (bottom).

Rather than simply complaining about rudimentary CMS metrics, when he was on the executive committee and serving as president of the American Association of Neurological Surgeons, Couldwell and other neurosurgeons took responsibility for coming up with better information, launching a national registry that will make it easier for specialists to determine the best techniques to get optimal outcomes for their patients. It started with just a few hospitals contributing their data, but has grown to represent more than 15,000 lumbar

surgeries and 6,000 cervical procedures.

The database has become a sandbox of sorts for neurosurgeons. **Erica Bisson, M.D., M.P.H.**, (top) associate professor of neurosurgery, compared clinical outcomes for patients undergoing two different kinds of disc herniation surgeries. Despite longer hospital stays and higher initial charges, patients whose discs were fused had just as much improvement in their pain and quality of life. Eventually, she says, this work will lead to the development of an algorithm to help deliver the right care to the right patient at the right time.

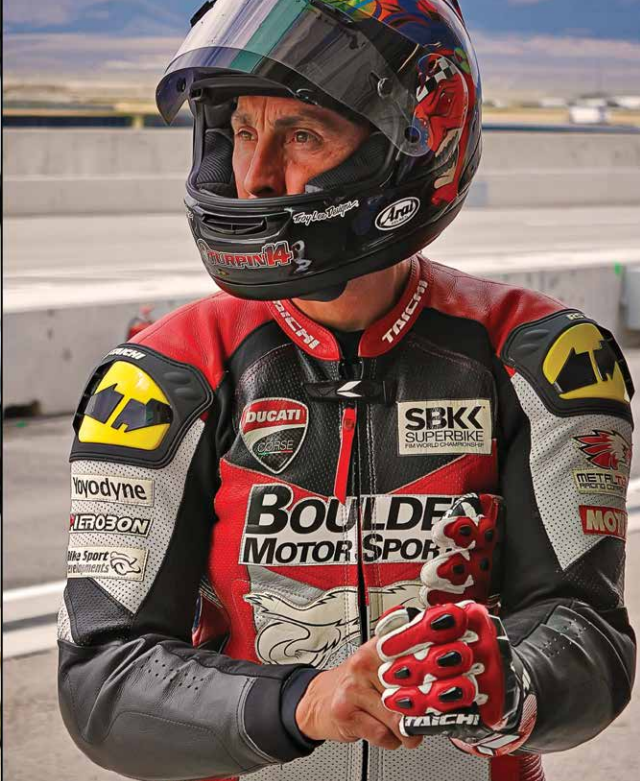
"We are able to take a patient's information—their age, amount of disability and other medical conditions—plug it into a formula and come up with their chance of returning to work and improving their quality of life," Bisson says.

INVITING THE PATIENT IN

Three years ago, Marge Torina was working in her yard, scraping a pile of leaves out from under the porch. It might have been the flip-flops. It could have been the tools, or both. But she tripped. And whatever the cause of her fall, Torina couldn't get up. She scooted across the dirt, yelling to catch the attention of a dog walker nearby who called an ambulance. She had shattered her hip and ended up with a 17-inch rod in her leg.

When she transferred to University of Utah Health's Rehabilitation Center, rather than starting with a standardized program, her therapist asked about her life and her goals for recovery. The team then created a regimen tailored for an Italian matriarch who wanted, more than

anything, to be able to cook Sunday dinner for her family. Instead of putting her on the stationary bike, the therapists took her grocery shopping with a group of patients and then put her somewhere she loved—the kitchen. She spent the next couple of hours making her signature summer pasta, a celebration of hot-weather bounty—vine-ripened tomatoes, black olives, onion, basil and "lots of cheese"—and proudly served it up to hungry staff. The next therapy session, she made pizzelles, delicate anise-flavored holiday cookies. Three years and countless Sunday dinners later, 80-year-old Torina remembers her rehabilitation with fondness. "It was fun," she says. "It was better than going down there and doing exercises. And it was a



What's the end goal? In the past, patients' thoughts on the question were secondary to the methods used by doctors, payors, systems and government to measure a successful outcome. But no more. Surgeons and therapists are starting to ask about a patient's desired outcome when creating a treatment plan.

For Italian grandmother Marge Torina, her goal was to stand in the kitchen long enough to make "summer pasta" every year for her children and grandchildren.

For superbike racer Shane Turpin, his goal was to get back on his bike, even after some doctors told him he would never walk again. "This is who I am," he says.

lot of training for when I did eventually get home."

"Patients find motivation and hope when thinking about being able to do the things that bring joy to their lives," says Occupational Therapist Christopher Noren. "So that's what we focus on. Rather than routine exercise and set programs, we try to tap into intrinsic motivation and the things that matter most to each individual."

For professional superbike racer Shane Turpin, that was getting back on his bike. The 49-year-old had taken the weekend off to ride dirt bikes with friends when he shorted a jump and landed awkwardly. He managed to save the landing but he could feel bones moving in his boots. He'd broken the tibia and fibula in both legs. His ankles were shattered.

The first doctors he saw gave him grim news: He would never walk or compete again. Three hospitals later, he ended up at U of U Health. With amputation the only other option, Turpin wanted surgery immediately. "I didn't care about the consequences, I just needed my legs."

After five operations—and two months of intense, home-based rehab involving a training bike on rollers—Turpin hit the track and set the fastest lap of the day. "I'm not 100 percent. But I'm close. I'm going faster than I ever have, and I'm almost 50."

FINDING THE SWEET SPOT

"Every day we're trying to figure out what a patient wants to do, what the provider can do for them, and if there's a match," says Charles Saltzman, M.D., chair of the Department of Orthopaedic Surgery. Consider the options for a 60-year-old patient with end-stage arthritis: the surgeon could fuse the ankle and the patient's pain would abate, but he would have a hard time walking up and down hills. Replacing the ankle would provide better function, but limit high-impact exercise. "Finding out what the patient's goals and expectations are is a critical part of being a good doctor," says Saltzman

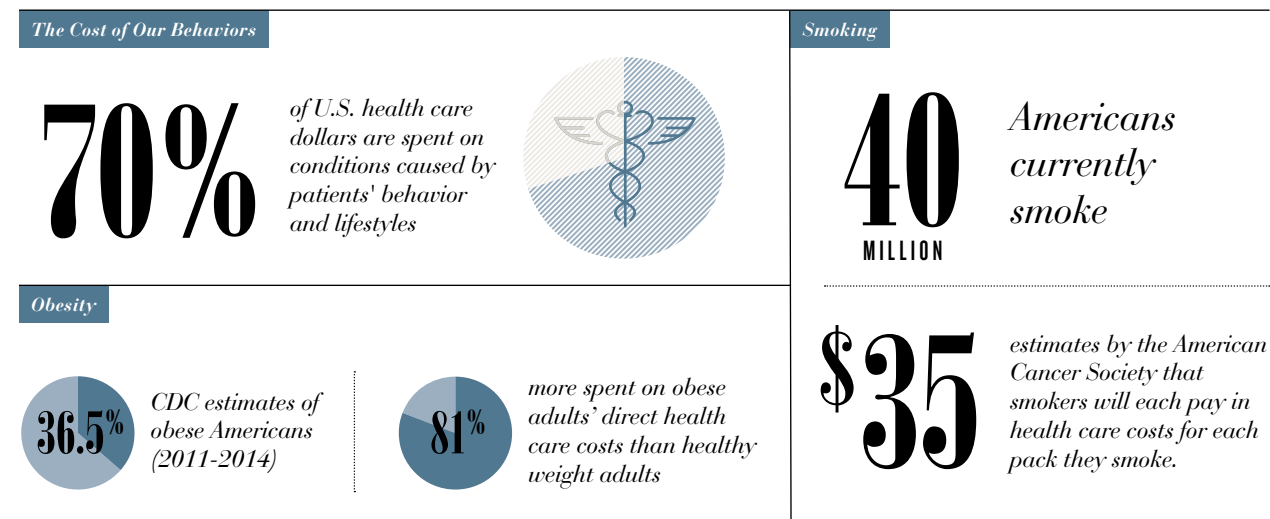
As a health care system, Saltzman admits, we haven't been very good at asking patients what they want or sorting out how well they function before or after treatment. So in 2009, he started doing just that. The Department of Orthopaedics launched an early version of the NIH's Patient-Reported Outcomes Measurement Information System (PROMIS), and then worked with a U of U Health team to create a customized, patient-friendly tool called mEVAL Personal Health Assessment. Patients can fill out an online assessment before their appointments or complete a brief computer adaptive questionnaire on an iPad when they get to the clinic. Questions range from their level of pain and social support to whether they have feelings of depression and anxiety. These patient-reported outcomes (PROs) provide physicians with critical information that can be used at the point of care, says Saltzman, especially when dealing with a patient who isn't a good communicator. They also help track progress over time and help the clinician and patient understand if that progress is appropriate based on data collected on other patients with similar problems.

Today in 30 clinic waiting rooms at U of U Health, patients are tapping on iPads before their appointments, reporting on their functional, psychological and pain status. The number of patients completing the questionnaires has doubled to nearly 13,000 per month. And by the end of 2018, PROs, including pre-visit emails and mid- and post-treatment questionnaires, will be used throughout the system. Not only will the information guide patient-physician discussions and help providers individualize treatment, it will also provide a resource for researchers to look more broadly at outcomes.

"We finally have a systematic way to listen to our patients," says Senior Vice President for Health Sciences Vivian S. Lee, M.D., Ph.D., M.B.A. "That gives us the opportunity to marry that information with our expertise to personalize their care and, ultimately, to begin measuring outcomes in terms of what is important to patients."

SHIFTING RESPONSIBILITY, JUST A LITTLE

Thomas Varghese, M.D., M.S., associate professor of thoracic surgery, makes his expectations clear from the first consultation with a lung cancer patient: Stop smoking or find another surgeon. With his Surgery Strive program, modeled after the Strong for Surgery program he helped found at the University of Washington, Varghese has his patients sign a contract of sorts, agreeing to make the lifestyle changes necessary to improve their surgery outcomes. He'll refer you to the wellness clinic to get your blood sugar in check. And he'll help you quit smoking—provide you with nicotine patches, write a prescription for Chantix or sign you up for a cessation program. But he will not operate on you if you're smoking. A simple blood test will show if you're lying.



It's not as paternalistic or heartless as it sounds. For years, doctors cajoled and urged their patients to exercise and quit smoking. But changing patient behavior is more a lifelong campaign than a pre-surgery project. "Patients are adults," says Varghese. "It's about having hard conversations and sharing in the decision-making."

Varghese knows some of his patients may sign under duress and others will look for another surgeon. But eventually, he figures, all surgeons will be holding patients accountable in the same way. He may be right. This year, the American College of Surgeons adopted the pre-surgery checklists as standard procedure. Britain's National Health Service took it a step further. In September, it announced it would block obese patients with BMIs over 30 and smokers from most surgeries—including routine hip and knee operations.

PARTNERSHIPS AND MIND SHIFTS

Of course, measuring a successful outcome for a hip replacement, a round of chemotherapy or a baby's birth is much easier than defining a good medical result for chronic conditions. "For years, we've been stuck in a plumber model of health care," says Sam Finlayson, M.D., M.P.H., chair of surgery. "Fixing the faucet when it blows generates a lot of revenue but doesn't necessarily make patients better long term. Reversing a long, slow, recurring 'leak'—like diabetes or heart failure—or preventing it in the first place, is a much more difficult thing to incentivize." Care for

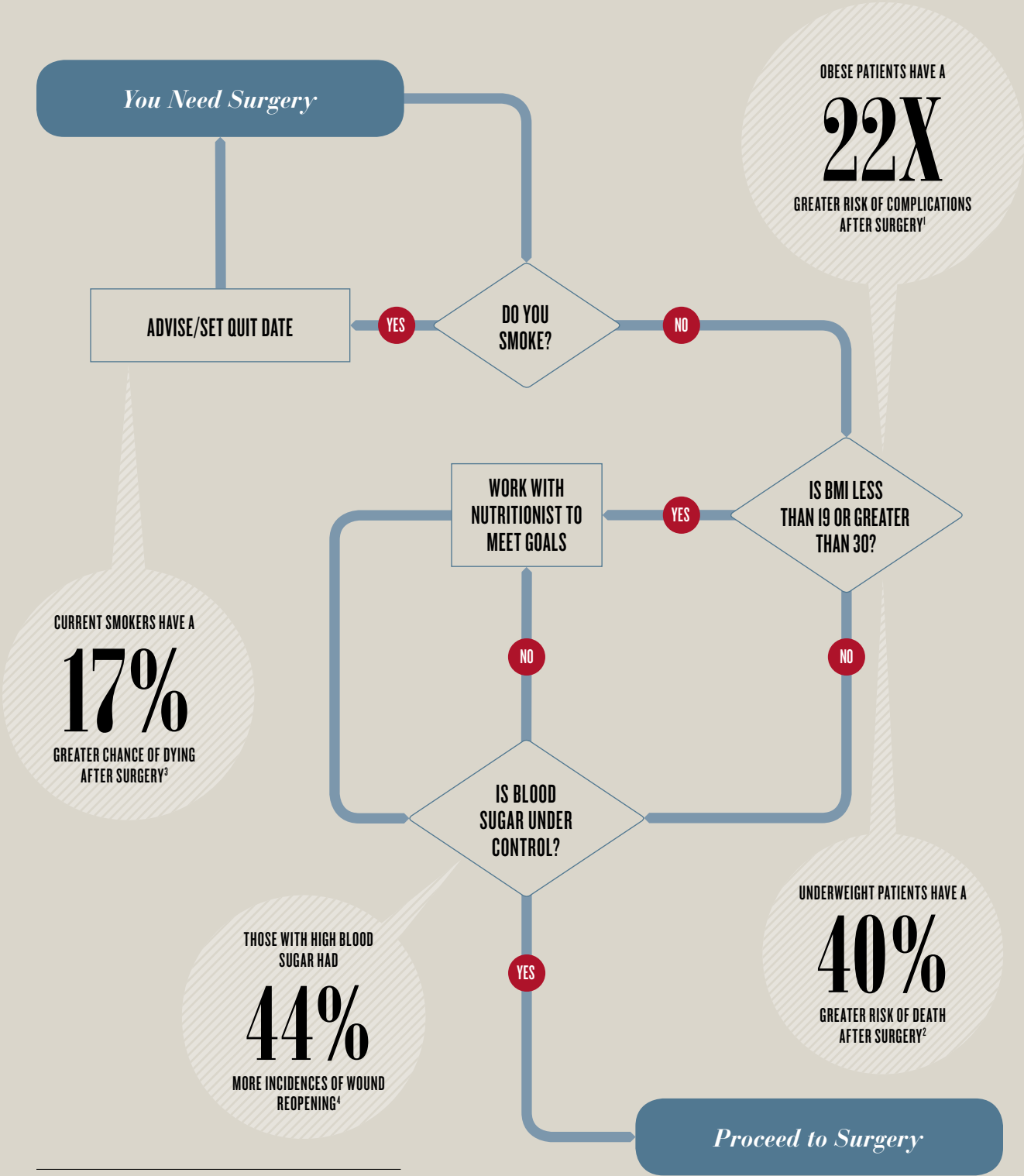
The New Patient Contract

Even as we move to team-based models of care and shared decision-making with patients, one fundamental tenet of American health care remains: at the end of the day, individual physicians still feel personally responsible for how their patients fare.

The obvious, if uncomfortable, question: What

responsibility do patients bear? Good outcomes require that patients do their part—take their medication, show up for follow-up appointments, go to rehab. Yet, according to a 2012 meta-analysis published in *Annals of Internal Medicine*, 20 to 30 percent of prescriptions are never filled, and up to 50 percent of medications aren’t taken as prescribed, resulting in 125,000 annual deaths and up to 10 percent of all hospitalizations.

So how, then, do physicians empower patients, while at the same time hold them accountable for their own health? Thoracic surgeon **Thomas Varghese, M.D., M.S.**, requires his patients to agree to a “health contract” of sorts before he will operate. Here’s how it works:



1 Research from Johns Hopkins in 2011
2 Research from NCBI in 2012
3 From Cleveland Clinic in 2013
4 From the Center for Wound Healing at Georgetown in 2013

patients with chronic conditions—many of them elderly—can be particularly fragmented with multiple specialists and no one held responsible for the overall health of the patient.

“As we begin to move away from the old fee-for-service model, providers will become heavily accountable for patients’ overall health, not just the outcome of a specific surgery or illness,” says Mark Supiano, M.D., director of the University of Utah’s Center on Aging. “Taking on that responsibility will require a reset in the way that many physicians and systems think.” It also will force systems to form new partnerships across the continuum of care. Working with an interdisciplinary team, Supiano’s created a new “medical home” designed to break down the physical and technological barriers that plague communication between hospitalists, post-acute care centers and primary care physicians.

A NEW WAY OF THINKING

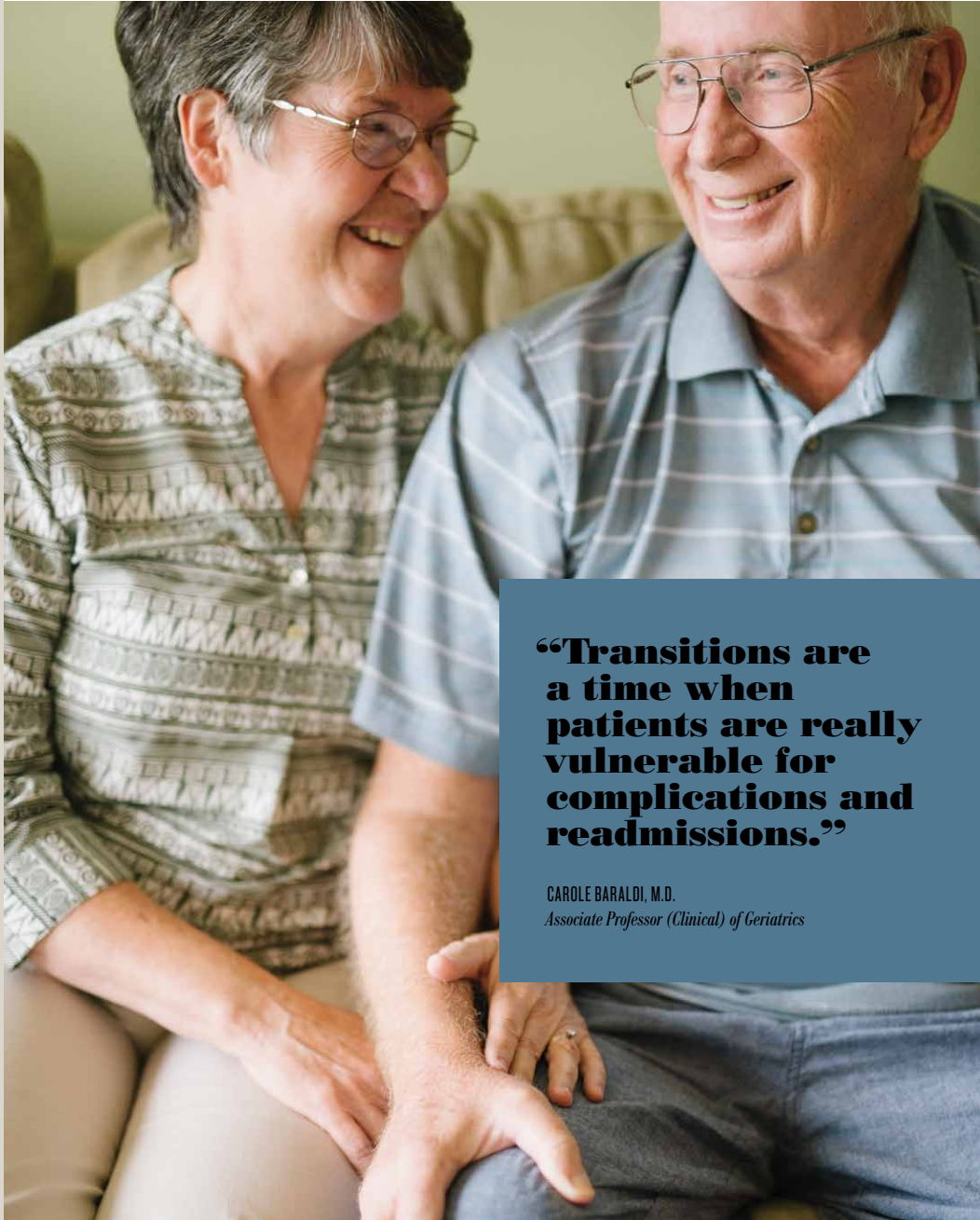
With new payment models and shifting responsibility for outcomes, we have to relearn how to talk to each other. Finlayson calls it the “dialectic” between providers and patients, a shared responsibility for the way we work together to maximize medical outcomes.

Others agree. “We tend to throw the onus on the other party, but we need to recognize that patients often don’t have the resources—intellectually, emotionally or financially—to align their lives to what their medical care team is trying to educate them to do,” says Nate Gladwell, R.N., M.H.A., director of telehealth for U of U Health. “We can prescribe, we can educate, we can diagnose all we want. But at the end of the day, health care is a partnership,” he says. “It’s going to take all of us.”



For sources and more about who’s responsible for Outcomes go to algorithmsforinnovation.org

After surgery, Keith McDonald was given a complicated discharge plan that he and his wife were preparing to do from home—130 miles away. Instead, under a new post-acute care model, the McDonalds checked into Brookdale Senior Living in Salt Lake City. “We’ve known that transitions—especially for older adults—are a time when they’re really vulnerable for complications and readmissions,” says McDonald’s doctor, Carole Baraldi, M.D., associate professor (clinical) of geriatrics. Now we’re taking responsibility for patients’ long-term care—and overall health—by partnering with these skilled nursing facilities. “Our goal is to have patients leave us healthier than when they came in.”



“Transitions are a time when patients are really vulnerable for complications and readmissions.”

CAROLE BARALDI, M.D.
Associate Professor (Clinical) of Geriatrics





Community Health

WHO'S RESPONSIBLE?

No doubt, we're starting to recognize that health is a mishmash of factors that extend way beyond our health care comfort zone. Now our challenge is how to stretch our imaginations, work together and trust one another, so we can be there for individuals and populations when and where they need us.



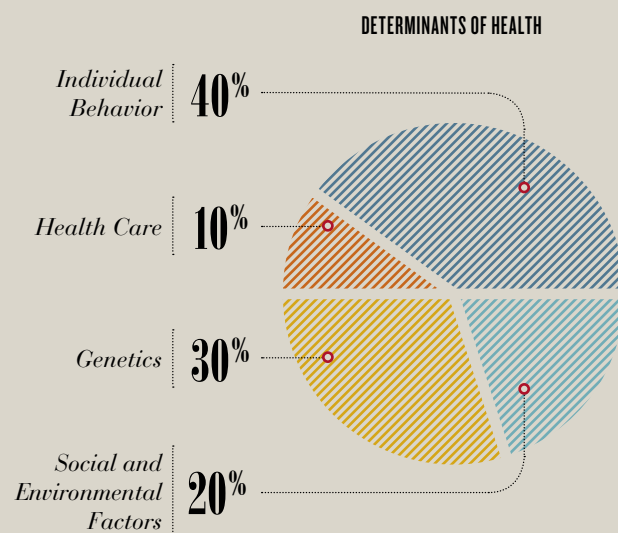
We've vaccinated billions of babies, invented penicillin, developed an artificial heart and mapped the human genome. But the most significant advancement of public health over the past 200 years was a government infrastructure project—diverting sewage and wastewater away from drinking water sources and chlorinating and filtering the water coming out of the tap. Clean water has cut overall mortality in major cities in half and infant deaths by three-fourths.

If the most important global health accomplishment ever achieved was through water pipes, where should we be focusing our efforts today? If we know that our health care delivery system influences only a small percentage of overall health, what should we be doing? Making sure our patients have clean water (think: Flint, Michigan) and good schools and fresh vegetables and convenient transportation and adequate housing and a living wage? Should the bulk of our efforts be focused on stopping smoking, conquering obesity, ending addiction, addressing mental health and tackling poverty? Truly taking care of the community

—addressing all of the social determinants of health—is perhaps the most disruptive idea that's ever been posed to our health care system. It's also the next step, especially for academic medical centers (AMCs). Unlike for-profit hospitals and health systems, which are primarily accountable to their shareholders, we are ultimately accountable to our communities. "We've got to stop thinking of ourselves as the crown jewel of the community and get back to thinking of ourselves as who we really are—a public servant," suggests Darrell Kirch, M.D., president and CEO of the Association of American Medical Colleges.

What adds up to health?

It's much more than an apple a day or a trip to the doctor's office. A person's overall health is a complex mix of whether we got grandma's genes, went to college or live in a food desert. Factor in health behaviors—what we eat, how much we exercise, whether we took up smoking—and an individual's health profile starts to become clearer. While we've been focused on caring for sick patients in our clinics, hospitals and ICUs, we've learned providers can only change about 20 percent of health behaviors.



Source: New England Journal of Medicine

What we've come to realize—and admittedly, it has taken us a while—is that health care alone cannot take care of communities. Health happens at the intersection of individuals, families, employers, pastors, teachers, philanthropists, politicians, health care providers, and countless community workers and nonprofits. But the question remains: Who's responsible for making those critical connections? Who's in charge? And who's going to pay for it? That's not how we've organized ourselves. That's not what we've trained for. And, that's not how we're getting paid.

"Is population health a business model that can stand on its own? Probably not," says Gordon Crabtree, M.B.A., interim CEO of Hospitals and Clinics. "Under any scenario, the work of population health takes a lot of time and energy from our providers and systems." But Crabtree notes academic medical centers have been doing this kind of work for years. AMCs long have supported money-losing services that are vital to their communities and provide a safety net, taking care of the uninsured, prisoners, the homeless. For University of Utah Health, that tallies up to more than \$100+ million in charity care annually. But Crabtree admits the work that we're doing already may be just the tip of the iceberg of what needs to be done. And our scope of responsibility for health may still be too narrow.

FIRST, DO NO HARM

In most cases we've done too little. In some cases, however, we've done too much. In 1986, the World Health Organization called for the limited use of morphine as a responsible way to manage cancer pain—"the right drug in the right dose at the right intervals." The drug was so effective, doctors started using morphine and other opioids to treat a variety of pains—wisdom teeth, kidney stones and knee replacements, to name a few.

Then, in the 1990s, the American Medical Association classified pain as the "fifth vital sign." Adding to the pressure to keep patients comfortable, the Centers for Medicare and Medicaid Services (CMS) included three questions about pain in its Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey starting in 2006. "Out of a compassionate call to action, opioids got applied to lots of different situations," says Scott Junkins, M.D., medical director of the Pain Management Center. "The problem was that we didn't have good research to show what the next step with these powerful drugs should be." In the absence of data, and with pharma promoting opioids' miracle powers of pain management, doctors prescribed.

We've been trying to manage the fallout ever since. Sales of prescription pain pills have skyrocketed, increasing four-fold from 1999 to 2010. But hospitals and health care systems also made money during the opiate boom. A *Wall Street Journal* review of painkiller prices at California hospitals in 2004 found prices charged for a single, \$1.35 Percocet pill ranged from \$6.50 to \$35.50.

It's the cost to society, however, that has been the steepest. The nationwide opioid epidemic results in tragically high overdose rates and related spikes in hepatitis C infections from intravenous heroin use.

Opioid addiction doesn't discriminate. It's insinuated its way into nearly every community—high and low-income, black and white, religious and agnostic, homeless youth and suburban housewives—making a mockery out of traditional stereotypes about addicts. "It's everyone," says pediatrician Karen Buchi, M.D., chair of U of U Health's opioid task force. "It's the woman sitting next to you in church and the man sleeping under the tree in the park." Utah is not immune. The state has some of the highest opioid prescription rates in the country and the fourth-highest per capita overdose rate in the nation. Six people die each week in Utah.

Dealing with drug-seeking patients is one of the top two stressors for physicians, says Susan Terry, M.D., community physician group executive medical director. "Doctors end up having a crucial conversation every 20 minutes, all day long," Terry says. It's estimated that 36 percent of all ED patients are seeking drugs. Discerning who's really in pain and who's a drug seeker is exhausting, demoralizing and risky. Getting it wrong can be catastrophic. Every opioid prescription is tracked by the state, and doctors who write scripts for known drug seekers could lose their licenses.

The solution comes down to education and support—for both patients and providers. University of Utah Community Physician Group adopted opiate prescribing guidelines in 2015 and embedded a nurse

Things that affect your health



CLEAN WATER

Chlorination has cut infant mortality by **75%** since it was introduced in 1902.



SEWER SYSTEMS

In 1900, waterborne diseases accounted for **25%** of infectious disease deaths. Filtration reduced typhoid fever deaths by **46%**.



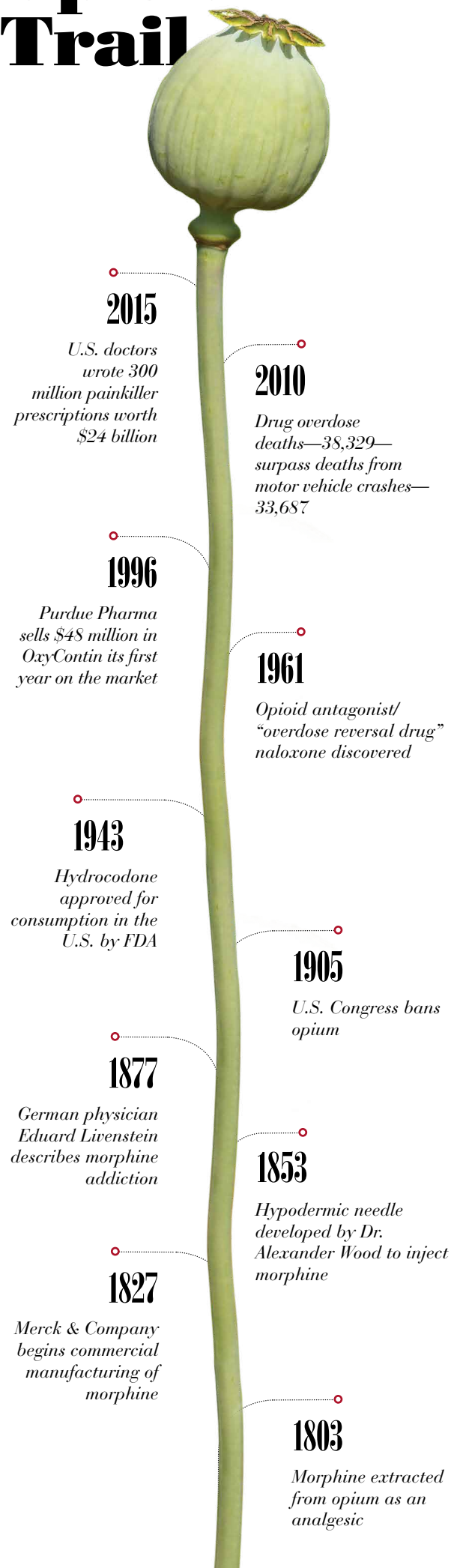
HANDWASHING

Handwashing with soap reduces diarrhea morbidity by **44%**.



WHAT IS THE CLEAN WATER OPPORTUNITY TODAY?

The Opioid Trail



practitioner to help patients manage their pain with medication and other means—mindfulness activities such as meditation, therapeutic massage and physical therapy. In the first seven months of 2016, prescriptions for the 17 opiate drugs that are internally tracked were cut in half.

An interdisciplinary model and alternative pain treatments—such as electrical spinal stimulation and dry needling—also have worked at the pain clinic Junkins manages. Over 30 years, the center has grown from one doctor with a bed and a curtain to eight treatment rooms and nine attending physicians managing 11,000 patient visits last year. “Pain is multi-faceted and we have a long way to go to address it,” says David Anisman, M.D., associate medical director of Community Physician Group. “Not every treatment for pain is appropriate for every person. We have to ask, ‘How well can you function with this level of pain?’ Having zero pain may not be an option.”

Who’s responsible for letting the opioid genie out of the bottle? It depends on whom you ask. But it will take all of us—physicians, pharmaceutical companies, nonprofits and politicians—working together to shove it back in.

FLIPPING THE TOP-DOWN APPROACH

Making tamale dough—the moist, succulent kind that falls out of its corn husk without crumbling—starts with whipping two-thirds of a cup of lard and a bit of broth. That’s how it should be done. That’s how the women in community health worker Jeannette Villalta’s wellness group did it. So when Villalta became a health coach as part of a five-year study targeted at reducing obesity among women in health disparity groups, she knew where Latinas needed to focus—food. “Food is part of the culture,” Villalta says. “We had to learn about healthy substitutes, like plain yogurt for sour cream, eggplant for lasagna noodles, olive oil for lard. It was educational—even for us as wellness coaches.”

With about one in three Americans classified as obese by the Centers for Disease Control and Prevention (CDC), the health care and business costs of being overweight are mounting. For individuals, that means higher out-of-pocket health care costs, potential lost days at work and diminishing long-term health. “This message is much stronger when coming from the members of the community, as well as nutritionists and doctors,” says Louisa Stark, Ph.D., research professor of human genetics. Studies estimate that just 20 percent of health behaviors can be changed in the clinic alone.

To reach out to health disparity groups, Sara Simonsen, Ph.D., associate professor of nursing, and Kathleen Digre, M.D., professor of neurology, asked community leaders to help design an obesity intervention study. Community Faces of Utah identified 500 underserved women in five ethnic groups—African-Americans, African immigrants, Latinas, American Indians and Pacific Islanders. After a three-month wellness training program, coaches were able to navigate cultural sensitivities around weight and exercise. For example, Pacific Islander coaches were able to gently push past long-standing cultural notions of weight being a sign of wealth and leisure time. For African

Honoring “The Eternal Kid”

For some health care providers, the opioid epidemic is personal. **Jennifer Plumb, M.D., M.P.H.**, (right) lost her younger brother Andy to an overdose in 1996—the same year OxyContin hit the market. He was 22. When friends found the earnest young man with a mischievous smile unresponsive, instead of calling an ambulance, they buried the evidence and fled. The pediatrician and her brother **Sam Plumb, M.P.A., M.P.H.**, (left) along with others, successfully lobbied the Utah Legislature

to pass “good Samaritan” protections and a law allowing public access to naloxone, the overdose reversal drug. In July 2015, the Plumb siblings founded the nonprofit Utah Naloxone, which Sam manages within the Department of Pediatrics. The nonprofit has passed out 3,200 naloxone kits at hot spots for drug activity, and to family members and loved ones of addicts. “Medicine can’t fix this alone,” says Plumb, who sits on U of U Health’s opioid task force. “Patients can’t fix this alone. Public health systems can’t fix this alone. Insurers can’t fix this alone. Politicians can’t fix this alone. Do-gooders can’t fix this alone. Really, it’s going to take an enormous change in the overall way we look at pain and providing comfort.”



“Fixing this is going to take an enormous change in the overall way we look at pain and providing comfort.”

JENNIFER PLUMB, M.D.
Assistant Professor of Pediatrics

women from Rwanda, Burundi and Congo, who wear loose, wrapped robes called “igitenge,” tight exercise wear was a stumbling block. So coaches helped incorporate West African dances into an exercise program. The coaches developed relationships with the participants that went far beyond taking their blood pressure or measuring their waistlines. And that was key, says Simonsen.

When the study wrapped up last spring, the findings were undeniable: Around 16 percent of the women were considered “sedentary” at the start of the study. After a year of coaching, that number dropped significantly. Nearly three-fourths of the women were successful with their health goals and have lost weight. And there were spillover benefits—the participants’ children and husbands started getting more exercise and eating healthier. Researchers also documented a reduction in depression among participants.

“Collaborating with communities requires a long-term relationship,” says Stark. Now that the federal grant has ended, who is going to continue that relationship? Who will train and pay the wellness coaches? Even when the data is compelling, our health system is not aligned. Villalta schedules monthly meetings where Latina women can talk about Alzheimer’s disease, or take Zumba lessons.

And the African dance group still is performing. But the truth is, says Valentine Mukundente, a wellness coach for the African American community, it will be harder to keep track of progress.

CROWDSOURCING POPULATION HEALTH

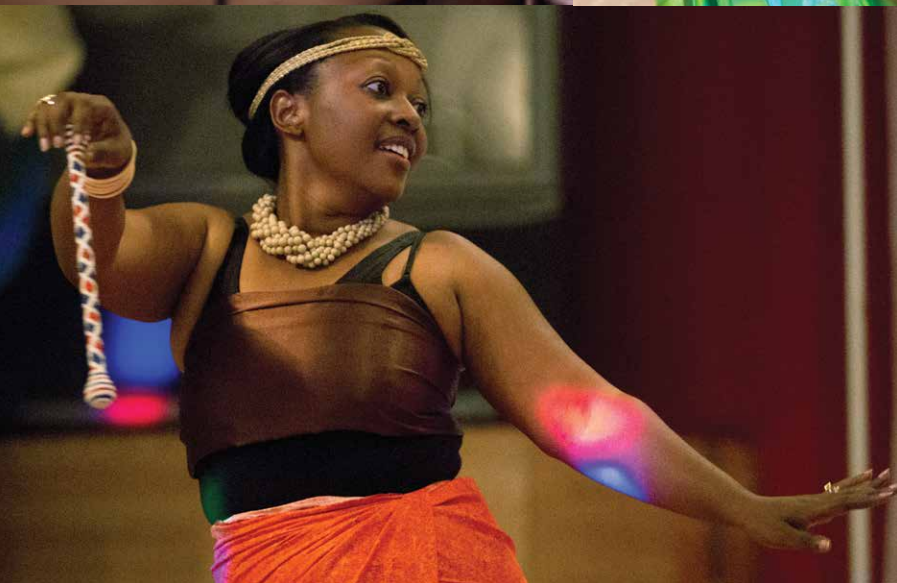
Asthma doesn’t happen in a doctor’s office. It’s triggered at school, at home, in the car and at play. So a population health solution for pediatric asthma probably won’t be found in a clinic either. Almost as soon as she was a mom, Jordan Gaddis was the mom of a kid with asthma. By the time her son Graham was one year old, he’d had two bouts with RSV. He’d been on oxygen 24 hours a day and in the hospital for days on end. She’d sneak into his room to try to slip a blood-oxygen monitor on his toe while he slept. The first years of Graham’s life are a blur of sleepless nights and rounds through the children’s hospital and pediatrician’s office.

Graham is one of an estimated 6.3 million kids across the country who have asthma, according to the CDC. For minority populations, the statistics are even more dire: Asthma rates among African-American children jumped 50 percent from 2001 to 2009, and those children are five times more likely to die from the disease than their white classmates.



Defining Community

Every woman knows: A doctor can nudge you to eat more spinach and go to aerobics till he's blue in the face. But if your girlfriend offers to come to your house and cook dinner one night, or suggests going to a Zumba class together, you'll be making that vegetarian lasagna and learning to dance. It's about community—a shared culture or language or church. No amount of formal medical training or well-meaning advice can trump the impact of a familiar wellness coach.



Graham Gaddis doesn't remember when he started having trouble breathing, but his mother, Jordan, remembers the sleepless nights and oxygen tanks and weeks in the hospital. Now, with the energetic 4-year-old's asthma under control, she hopes to participate in a research study that will help parents track the triggers of pediatric asthma.



The problem has been figuring out which trigger set off a child's asthma attack and sent a family to the emergency room. "What we're trying to do is better understand the complex role that exposure to environmental asthma triggers play in childhood asthma," says Flory Nkoy, M.D., M.S., M.P.H., associate research professor of pediatrics. "You can't control it well if you don't know what exacerbates it."

Using a \$5 million from the National Institutes of Health, Nkoy and a team of engineers, biomedical informaticists and pediatricians developed a sensor-based online tool for tracking pediatric asthma. Families will be able to monitor the indoor and outdoor environmental factors their kids are exposed to and, eventually, pinpoint which one triggered that trip to the emergency room or boost in medication.

Small enough to tuck into a kid's backpack or attach to an armband like an iPod, new high-tech sensors can track particular pollutants, distinguishing between car exhaust, pollen and the aerosol the janitor uses to clean school lockers. At the end of the day, parents can upload the data into a minute-by-minute snapshot of the kinds of things a kid has been exposed to and report any related symptoms or visits to the doctor or hospital.

"This project will make precise, personalized data available to researchers so we can see in near-real time what's happening to people," says associate professor of nursing informatics Kathy Sward, Ph.D., M.S., R.N.

"We'll finally be using the same big-data techniques that retailers collect from consumers every day, but we'll be applying them to a child's health," says Julio Facelli, Ph.D., associate director of the Utah Center for Clinical and Translational Science. The system, he says, will allow researchers "to answer questions they didn't even know they could ask."

NEXT STEPS

For now, population health innovations are outpacing payment models. Naloxone kits are not reimbursable in our current health care system. Individual asthma sensors may not be covered by a patient's insurance plan. Do we make changes anyway, simply because they're the right thing to do? Department of Surgery Chair Sam Finlayson, M.D., M.P.H., says yes. "Whether we like it or not, we're all in this together. People's health affects other people," he says. "We're all paying for health care. We all pay taxes. We're all paying health premiums. We have a societal obligation to provide high-value care. And we also have a responsibility to the larger whole to preserve our health as a community."



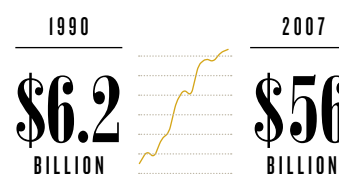
For sources and more about who's responsible for Community Health go to algorithmsforinnovation.org

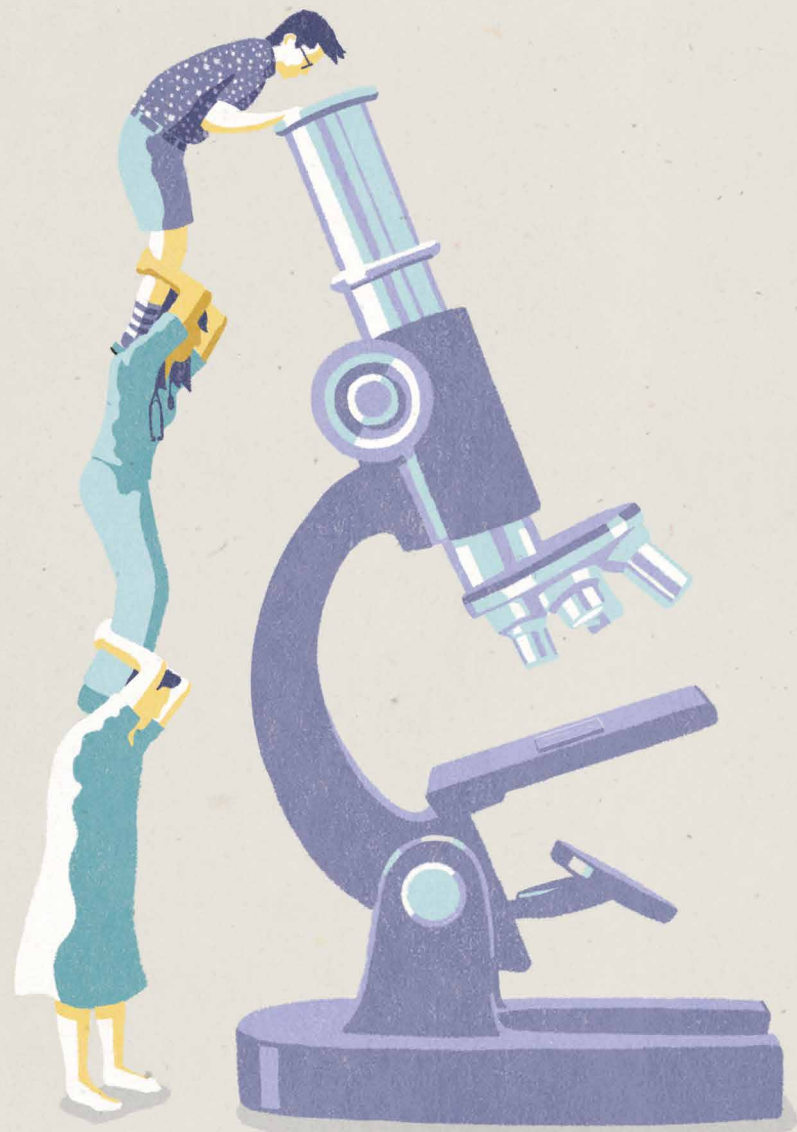
Costs of Asthma

Asthmatic kids between the ages of 5 and 17 years old missed on average

10.5 MILLION SCHOOL DAYS

Asthma costs in the U.S. grew from about





Cures

WHO'S RESPONSIBLE?

If our scientific progress to cure diseases has been underwhelming, perhaps we need to examine our expectations—not only for what's possible, but how we work together. Just as we need to balance hope and realism, we need to discover new ways for the worlds of scientists, clinicians, students and patients to collide.

Scott Summers was 14 years old when his father, an avid runner and fit 41-year-old, broke the news that he had been unexpectedly diagnosed with diabetes. Shortly after, the young teenager made his father a bold promise: He would find a cure. Summers has spent the past 34 years trying to make good on his word. But finding a cure for the disease that affects his father, along with 400 million people worldwide, has eluded him.

"I was convinced that I was smarter than everyone and my genius would save the day," says Summers, Ph.D. "Turns out there are many brilliant minds who have been putting a lot of effort in trying to understand diabetes."

Summer's ambitious, if naive, teenage promise has led to a fruitful scientific career. Among his accomplishments, he figured out a way to prevent diabetes in mice. "That's my claim to fame," says Summers. He's since started a company to find drugs that do the same in people, and he's now the chair of the Department of Nutrition and Integrative Physiology at the University of Utah College of Health. Nevertheless, progress, Summers admits, has been much slower than father or son ever imagined. "Time is running out," his father, now 75, recently told him.

"What my father doesn't understand is that it's not because of the ineptitude or lack of intellectual acumen of scientists," says Summers. While tempting to blame politicians, or the stigma of laziness associated with the disease, Summers doesn't go there. "They're just hard questions to answer," he says. "The reality is that the body is much more complicated than I realized and our understanding of it is still juvenile."

Just as Summers feels he has disappointed his father, the world of science often feels it has come up short for the general public. We were convinced that the War on Cancer would have produced a cure decades ago. We were confident that the bipartisan decision to double the NIH budget

in the late '90s would have realized cures for diabetes, heart disease and Alzheimer's. We overpromised, says Tom Parks, Ph.D., professor emeritus of neurobiology and anatomy and former University of Utah vice president for research. We created unrealistic expectations and disillusionment across all research.

"People's imagination and hope often outrun what the world can provide. When I was a kid, we were all going to have flying cars and jet packs and travel in supersonic airplanes," says Parks. "You don't want to be defeatist, but you have to be realistic." And, Summers adds, we haven't communicated well what we're doing, what the process is, and what success looks like. The reality is that most scientists will work their entire career and not contribute to a cure, says Parks. But that doesn't mean they're not contributing to our collective understanding of science.

FINDING THE LOST CHILD

Parks compares it to sending out a posse to look for a lost child. "We don't say, 'What a waste. We sent out nine people in the search party and only one found the child.'" If we're lucky as scientists, one of us will find the lost child, but most will not.

In 2010, Tom Lane, Ph.D., professor of pathology, seemed to have been the lucky one. He injected human neural stem cells into mice who were paralyzed from a condition similar to multiple sclerosis (MS), expecting them to be rejected. Two weeks later, much

For the past 34 years, Scott Summers has been searching for a cure for his father's diabetes. His father, now 75 years old, recently advised him that "time was running out." Although progress has been so slow, he remains optimistic. "I'm still fighting the good fight."

to his surprise, most of the mice were walking. The discovery renewed hope in the promise of stem cells to cure MS and other debilitating diseases. But "curing" a disease in rodents is a far cry from eradicating the disease in humans.

"There is little or no scientific evidence that these treatments actually work in humans," says Lane. "And it's quite possible that they could do harm." What's concerning for Lane and his colleagues is that the proposed REGROW Act would require the FDA to fast-track experimental stem cell interventions, even if the science hasn't concluded that they're safe or effective. Promising as it may sound to inject these neural stem cells into MS patients, it would be terribly irresponsible, says Lane. Just as troubling are the potential consequences for science. "If one person makes a false step, it kills the entire field," he says.

Being cautious, circumspect and, some would argue, pessimistic goes with being a responsible scientist, says Lane. That doesn't mean he lacks a sense of urgency. He hopes to move stem cells to clinical trials as soon as the science supports it. He works closely with clinicians to better understand the disease and often invites MS patients to tour his lab. Meeting a patient in a wheelchair reminds him that "this is a real disease that affects their lives," says Lane. And patients appreciate seeing scientists working to solve this problem every day. "Our true goal is to make a difference in our lifetime."

THE HEART OF THE MATTER

It is practically etched in scientific stone that heart failure is a one-way street that eventually dead-ends. But in 2000, world-renowned cardiothoracic surgeon Sir Magdi Yacoub, O.M., F.R.S., noticed something strange: The hearts he was transplanting weren't the same failing hearts he'd observed months earlier when he implanted an LVAD, a mechanical device as a bridge to transplant. They weren't as enlarged and they squeezed better. It seemed they had miraculously recovered. "It was like waking up a dead heart, like Lazarus; people thought it must be a scam," says Stavros Drakos, M.D., Ph.D., associate professor of internal medicine, who was training with Yacoub.

Drakos was fascinated by a fundamental question: Can you get a failing heart to recover? He made his way to Utah from his native Greece, 15 years later, to train with world-renowned cardiologist Dale Renlund, M.D., professor emeritus of internal medicine. Renlund was a driving force of the University of Utah's advanced heart failure program, which included inventing and implanting the first artificial heart in 1982. Now, Drakos works alongside a team of clinicians, scientists and trainees committed to figuring out how and why and when the heart recovers.

They found that in some patients, implanting an LVAD unburdened the damaged heart and even sparked recovery. A few do so well, they're able to have their LVAD explanted. That discovery has led to many more fascinating questions, including: What makes these patients unique? Can you predict who will recover? "Now we're trying to understand what their secret is," says Associate Vice President for Research Dean Li, M.D.,

"The reality is that the body is much more complicated than I realized, and our understanding of it is still juvenile."

SCOTT SUMMERS, PH.D.
Chair of Nutrition and Integrative Physiology

Ph.D. "The exciting thing is that, once again, patients are giving us the answers. They're leading us to the cure."

Virtually every end-stage heart failure patient in the state is now included in a longitudinal study, thanks to a partnership with Intermountain Healthcare and the Department of Veterans Affairs. Nothing is wasted, says Drakos, from actual tissue and serum that were often thrown in the trash after surgery, to clinical metrics and observations, to comments from patients about how they're feeling. "We come across patients all the time who are doing great according to our metrics but tell us they

that are much more precise and meaningful for patients, says Stehlik.

There's also no wasted time among team members. "When you walk into a basic science lab that hasn't had interactions with the clinical world, you want to cry just thinking of all of the missed opportunities and knowledge lost in translation," says Drakos. "That's what's so remarkable about this team. We're always in context. We speak the same language. And we're all working towards the same goal."

Is there hope for a cure? Will they eventually figure out how to reverse heart failure? "We're not in the business

Making Team Work

A surprising clinical observation—that the hearts of some patients in end-stage heart failure recover when you let them rest—brought together three cardiologists, a surgeon and an endocrinologist from four different countries to help solve the mystery.

Last May, the American Heart Association chose the team's proposal—from among 250—as one of eight finalists invited to present in Chicago. The night before, they were holed up in a nondescript conference room (until 2 a.m. when the manager kicked them out), figuring out how to fit years of collaboration and individual research into 30 minutes. "This is not something we just threw together for the grant," says cardiologist Stavros Drakos. "This is our life's work." The grant guidelines—which included basic, translational, clinical, population and training elements—perfectly aligned with the holistic way that the team thinks. "We're not isolating a heart with an LVAD, or a mouse with a gene cut off or a patient filling out a survey about how they feel in clinic," says cardiothoracic surgeon Craig Selzman. "We're focused on how

all of those things come together."

The next day was a perfectly timed relay race with Selzman, the grant's principal investigator finishing his last word as the clock counted down to 0:00. They won the \$3.8 million grant and became one of four groups in the new AHA-backed Strategically Focused Heart Failure Research Network. "This project is very personal," says Selzman. "We are friends and colleagues who share a common goal." Other team members agree that it's an unusual collaboration built on excellence, trust and respect. "When you work with a team like this, you feel lucky," says cardiologist Josef Stehlik. "You also feel a big responsibility to not let anyone down. I never want them to say, 'Stehlik should have tried harder.'"

Clockwise from top left: **Dean Li, M.D., Ph.D.**, associate vice president for research, cardiologist; **Craig Selzman, M.D.**, chief of cardiothoracic surgery, surgeon; **Josef Stehlik, M.D., M.P.H.**, associate professor of internal medicine, cardiologist; **Stavros Drakos, M.D., Ph.D.**, associate professor of internal medicine, cardiologist; and **Dale Abel, M.D., Ph.D.**, chair of internal medicine at the University of Iowa Carver College of Medicine, endocrinologist.

don't feel well," says Josef Stehlik, M.D., M.P.H., associate professor of internal medicine. In the past, there wasn't any way to make sense of it. "We've been so focused on survival that we haven't paid attention to what patients were telling us about their quality of life," says Stehlik. As part of a grant from the American Heart Association (see above), he's figured out a way to systematically collect patient input and feed it back into research that spans from mouse models to population health. Eventually, we'll be able to use all of this information to connect biology to quality of life to predict outcomes

of miracles," says Stehlik. "We're in the business of science and providing care to patients. If 'cure' is not a synonym for miracle, then I'm comfortable saying that is our goal."

THE POWER OF INCLUSION

If our hopes for cures have been unreasonably high, our expectations that scientists would work together have been regrettably low. Academia has historically focused on supporting and rewarding individual scientists, not teams, and building departments instead of interdisciplinary bridges. But all of that is starting to change. Funding agencies



"When you work with a team like this, you feel lucky. You also feel a big responsibility."

JOSEF STEHLIK, M.D., M.P.H.
Associate Professor of Internal Medicine





A Lifetime Commitment

In many ways, **Louis**, age 4, and his sister **Samantha**, age 13, seem like typical siblings. Louis pesters his sister and then she runs to her mom to tattletale on him. “I wish I could freeze time right now. He doesn’t know she’s different yet,” says their mother Heidi. His big sister has intractable seizures, shouts inappropriately in public and went to therapy to learn how to work her hands, legs and mouth. But her behaviors don’t register as anything unusual to the rambunctious preschool boy. “Louis will go to college and contribute to society. Sam will be under our care for the rest of her life.”

The two siblings share the same, rare disease—guanidinoacetate methyltransferase (GAMT) deficiency—caused by a combination of genetic defects. But there’s a key difference. Samantha was diagnosed just before kindergarten, by which time the disease had caused irreversible damage. Louis was diagnosed days after he was born. “I pinch myself all the time,” says Heidi. “It’s like he’s cured.”

Genetics specialist **Nicola Longo, M.D., Ph.D.**, professor of pediatrics, has spent his career caring for a long list of patients like Samantha and Louis, who are tagged with rare diseases, many still undiagnosed. GAMT, on the other hand, has a relatively simple and inexpensive treatment that Longo helped develop—a slurry of nutritional supplements that costs just pennies a day. The problem is recognizing the condition early. In the 20 years since GAMT deficiency was discovered, doctors have scribbled down just 110 diagnoses. There are no specific outward symptoms at birth, and when they emerge later, they’re frequently mistaken for autism or other conditions. “Diagnosis for a GAMT kid is 100 percent luck right now. A full life or a life of misery is currently left to chance,” says Heidi, who is now the associate director of the Association of Creatine Deficiencies.

Knowing that “a cure” for this disease—however



rare—was in reach, Longo couldn’t look the other way. Fortunately, he knew someone who could help. His long-time colleague and wife, **Marzia Pasquali, Ph.D.**, professor of pathology, is the medical director of newborn screening at University of Utah-owned ARUP Laboratories, which performs newborn testing for the state. Their goal was to design a diagnostic for GAMT that could be seamlessly integrated into the existing newborn panel at no extra cost.

What seemed to be a straightforward project became mired in the funding obstacles that often plague rare diseases. The scientists launched into the project anyway. They called in favors, found creative ways to piggyback their experiments onto others’, and worked plenty of night shifts. Running on fumes, a seed grant from the Vice President for Research at the University of Utah was the shot in the arm the couple needed.

Two years later, they celebrated. Pasquali’s screening method accurately picked out the three known GAMT deficiency samples from 10,000 archived newborn bloodspots, with no false positives. Two years after that, the test was finally added to Utah’s newborn screening panel. But their work is not stopping there. It can’t. Knowing there are women in other states pregnant with GAMT babies keeps them going.

Pasquali’s lab is now designing a universal test that easily slots into newborn panels across the country. Longo serves on the scientific medical advisory board of the Association of Creatine Deficiencies. They both take time off work to join families lobbying in Washington, D.C. “We’ve always tried to do the best we can for families, but now we’re taking it to a different level,” says Pasquali. “We have the chance to give these kids a normal life. It’s a terrible waste to do nothing.”



“If we don’t work across departments, we won’t be able to compete—period.”

MONICA VETTER, PH.D.
Chair of Neurobiology and Anatomy

are forcing the issue, requiring a translational and interdisciplinary focus on grant proposals. And academic centers are trying to redesign themselves to be accountable to these new priorities. “We owe it to the public to find ways for basic scientists and clinicians to do innovative work that is likely to move therapies for diseases forward,” says Senior Vice President for Health Sciences Vivian S. Lee, M.D., Ph.D., M.B.A.

A focus on teams doesn’t have to come at the expense of individual excellence, says Li. “Champions aren’t a team of mediocre players. They’re each great position players who come together and trust one another. Those are the teams we’re trying to form.”

Building authentic, highly functioning teams in real life is much harder than creating an interdisciplinary team on paper. The recipe calls for a certain amount of luck, serendipity and chemistry—which cannot be manufactured.

What can be crafted is an environment that increases the chances of those connections. “We need to create shared spaces so people don’t feel so isolated,” says Monica Vetter, Ph.D., chair of neurobiology and anatomy and founding chair of the Neurosciences Initiative. Vetter has met with almost every department, searching for ways to build bridges to alleviate the devastating effects of brain disorders. “If we don’t come together and work across departments, we won’t be able to compete—period,” she says.

From co-locating investigators around diseases to forming research interest groups to organizing seminars and guest lectures, she’s hoping to spark new connections. “Some of these people have never been in the same

room before,” says Vetter. In the past, pairing an electrical engineer with a biologist might have been considered a mismatch, says Vetter, but now we’re learning that even talking to someone with a completely different perspective can hatch unorthodox ideas.

With a \$10 million commitment from the institution, the Neurosciences Initiative launched a Collaborative Pilot Project that awarded 17 seed grants to interdisciplinary teams last year. One of those grants brought together investigators from ophthalmology, pharmacology and organic chemistry to pursue a new treatment for glaucoma. The trio of investigators already have a provisional patent in progress and several potential drugs in the pipeline. Now the team is “entering the Valley of Death” as they seek funding for Phase I clinical trials. “We’re excited but realistic,” says David Krizaj, Ph.D., professor of ophthalmology and visual science.

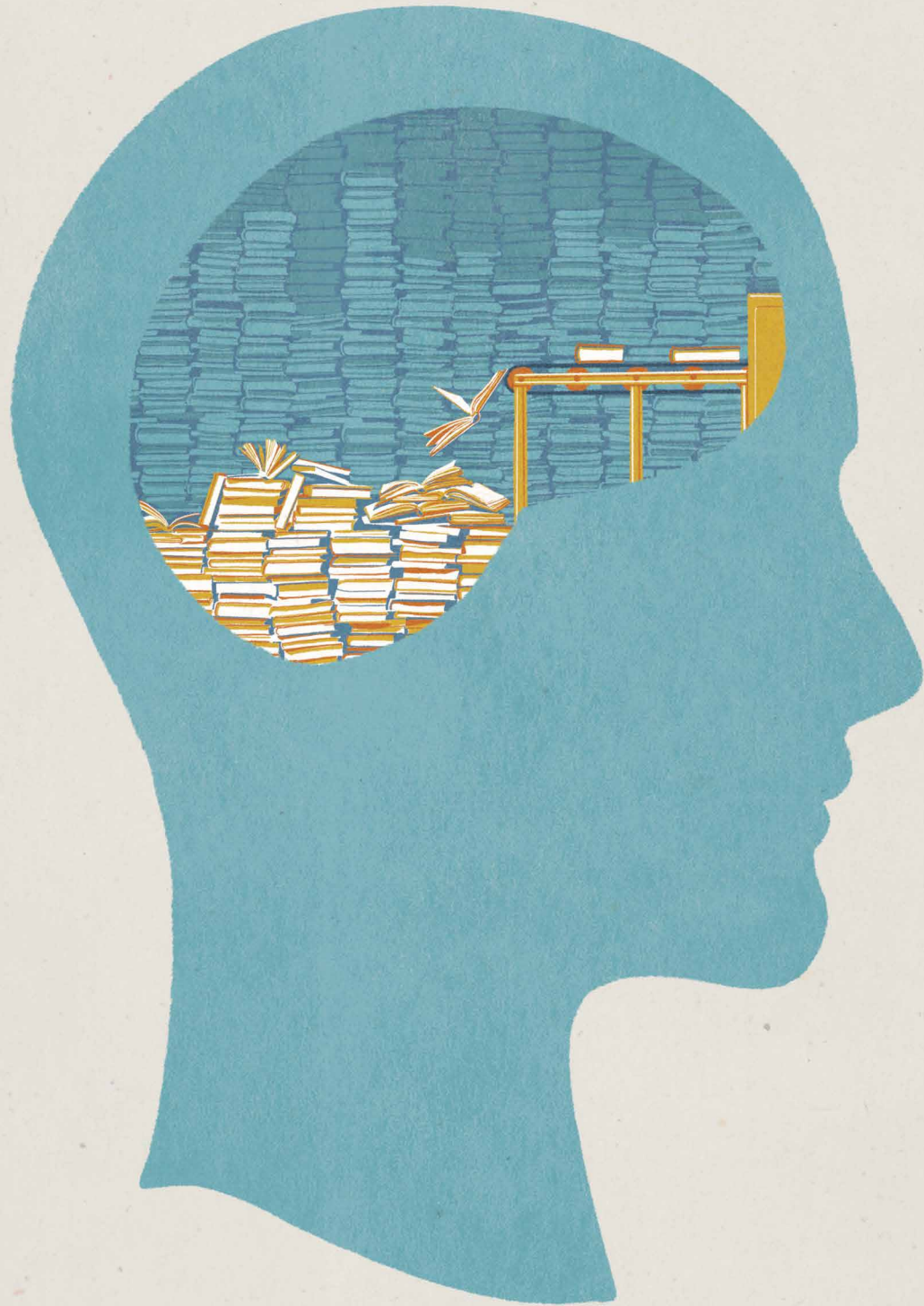
THE HOPE IN “NEVER”

The truth is that science is a low-yield endeavor. If Summers is completely honest with himself, the answer to his father’s question of when he will find a cure for diabetes, is probably “never.” But he remains optimistic. “I’m still fighting the good fight,” he says. “With all of the new tools we have, I have to believe that something great is right around the corner.” So what’s keeping him up at night? “Right now it’s excitement about the next day,” says Summers. “I don’t sleep very well because I can’t wait to get started.”



For sources and more about who’s responsible for Cures go to algorithmsforinnovation.org





Learning

WHO'S RESPONSIBLE?

With biomedical knowledge compounding every minute, there's no way for our human brains to sort through it all. New tools, innovative curriculums and even robots will only get us so far. We'll need a culture of continual learning and people to model how to embrace a brave new future.

There. He'd said it. He hadn't opened up his textbooks since the second week of medical school. It was June and quick math proved that they had stayed shut virtually the entire year. In his excitement, the new medical school graduate seemed as if he'd momentarily forgotten that every dean and chair of the School of Medicine were sitting around the tables of the first-ever educational retreat.

After the student finished his passionate educational testimonial, there were a couple audible sighs, one "what-a-shame" comment, and several "good-on-you" cheers for his courage and honesty.

But no one in the room could deny the truth: The model we've used for training medical students for the past 100 years is out of sync, not only with how this generation learns, but also how they will practice medicine. "Even as I'm learning some things, like how to do a physical exam, I think to myself, 'I know this isn't how we're going to do it after I graduate,'" says Matthew Petersen, a third-year medical student at the University of Utah School of Medicine. "Medical knowledge should come with a 'best if used by' warning label," says Sara Lamb, M.D., associate dean for curriculum. She's only half-joking. It's estimated there are 1 million articles published in PubMed annually. "The lecture we give today will likely need to be updated the next semester."

It's not only what they learn, but also how they learn. "The days of PowerPoint slides and big lectures are over," says Senior Vice President for Health Sciences Vivian S. Lee, M.D., Ph.D., M.B.A. "This is the Khan Academy generation of students." Today's future doctors are more likely to skip class and find an online video, interactive memory puzzle or question bank to prepare for the test. Schools are trying to figure out how to flip the classroom, embrace simulation, train in teams and foster lifelong learning. The Cleveland Clinic is partnering with Microsoft to teach anatomy through holographic

virtual reality. Watson, IBM's cognitive supercomputer, is in his third year of medical school, with the homework assignment of figuring out how to train doctors better. But even the fanciest new learning platforms and the most aggressive curriculum reform still will not prepare students for the onslaught of information or the team-based, precision-medicine-focused, value-driven world they'll soon be entering.

"We need to ask ourselves, given the current health care landscape, are we being accountable?" says Tony Tsai, M.B.A., School of Medicine education strategy director. Are the graduates we're producing prepared to have an optimal effect on health?

Faculty across disciplines complain that students only care about learning the material they will be tested on. They regret they don't ask questions, lack curiosity, aren't deep thinkers or high-level problem solvers. Stressed-out students respond there's no time for that. "We are so overwhelmed with mastering the basics, that going deeper into content is a luxury we can't afford," says third-year medical student Curtis Sudbury.

No doubt, students will need to take more personal responsibility for their learning. But in the real world of patient care, there will be no one to blame for not telling them what they needed to know. So what's the role we play in creating a safe environment for inquiry? Are we measuring their success in a way that shows we value curiosity and mastery over knowing and competency? Or have we designed a system that has them stuck in survival mode.

FOCUSING ON CULTURE

For Tsai, fixing education is really about culture change. "There's a lot of churning of curriculums without a lot of transformation," he says. Tackling the informal and hidden curriculums—the social structure and unspoken rules that guide how providers work with each other—may be the more urgent challenge.

"As a medical student, what we think is important is whatever our attendings tell us is important," says Petersen. If no one's talking about bundled payments, disparities and population health, or the importance of having difficult conversations about palliative care, Petersen says, there's no reason to think we should care.

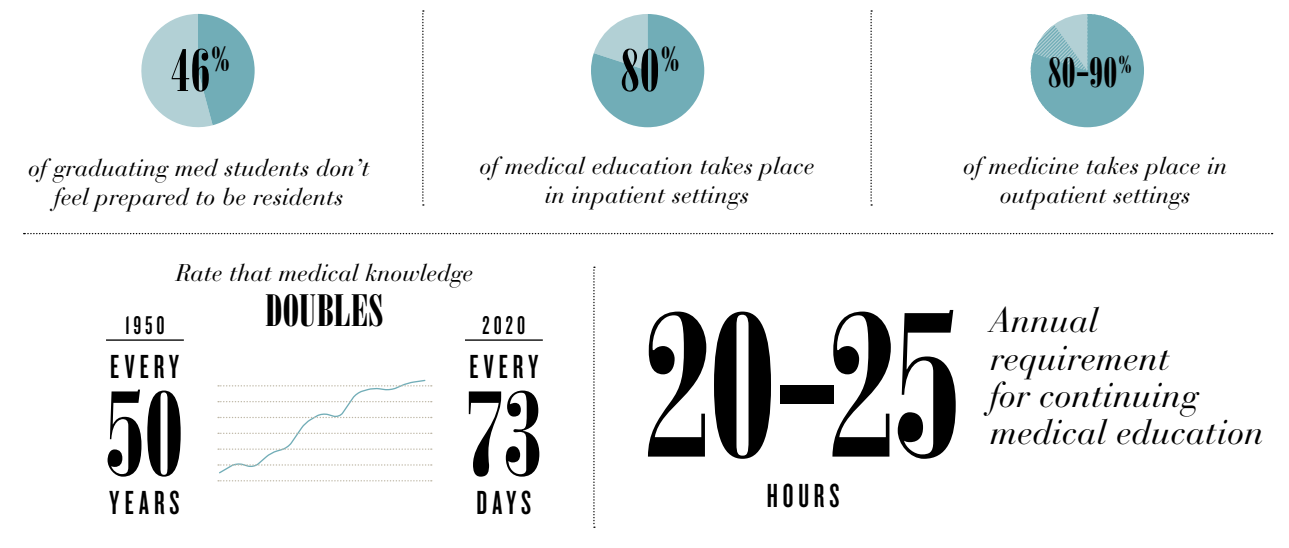
We need role models who have already embraced the future, dedicated themselves to continual learning and taken responsibility for preparing those who will follow. "If we choose to work in an academic setting, then everything we do should be about teaching and

one can summit Everest alone," says Daniels. We need to supply engaged staff with Sherpas. At University of Utah Health, those resources range from an hour-long online course in Lean training to a semester-long leadership development project. More than 1,000 staff and faculty have logged on or signed up for face-to-face training seminars. And they keep coming back. Collectively, they've developed more than 750 value projects, 180 measures of quality, more than 100 tests of service and 109 cost benchmarks.

MODELING FOR MILLENNIALS

"When I ask students, 'How many of you came into health care thinking that you were going to be part of significant change?' they all raise their hands," says Lee. "They want this transformation, even crave it. So now it's our responsibility to figure out how to tap into the true strengths of this generation." Tsai agrees. Unlike past generations, who

How We Learn



modeling, not just for the small group of students rotating through, but for every student, resident or trainee at the institution," says Lee. That kind of environment doesn't just happen organically. It requires a culture that doesn't relegate learning to students and classrooms but provides trainees, faculty and staff the opportunity and resources to learn new skills. Just as we strive to personalize care for patients, we need to personalize education—and tap into passion and curiosity.

"I've never met a provider who doesn't care about patients or want to improve the way we deliver care," says Chrissy Daniels, M.S., director of strategic initiatives. We just need to tap into that core intrinsic motivation and provide the resources and support they need to do it. "Taking on improving a huge system can feel like summiting Everest. And no

were willing to put in the time, millennials are ready to get going. But they need a cause. They want to go toward meaning, he says. And they need their role models to reassure them, to show them it's important, to give them permission.

"The number one thing is for learning to be inspiring—for students and faculty alike," says Lamb. And there's nothing more inspiring than having mentors who are passionate. So instead of focusing on curriculum design, we're celebrating people who are already there. They've taken on the responsibility to learn new skills and are helping create a system that supports that kind of learning for others. They're changing the culture.



For sources and more about who's responsible for Learning go to algorithmsforinnovation.org

“I love the fact that I don’t know everything. It’s what keeps me going.”

Janet Lindsley, Ph.D.

Associate Professor of Biochemistry

LEARNING PLATFORM: DE-EMPHASIZING ROTE MEMORIZATION

BURNING PLATFORM

Not enough emphasis on higher-level understanding. “Even though I ended up with a Ph.D. in biochemistry, I don’t think I could have clearly explained why we need to breathe.”

FUELING THE FIRE

Medical knowledge doubles every 73 days. “The focus on mastering a huge amount of content absolutely prevents passionate and curious discussions about the interface between science and medicine.”

BARRIER TO LEARNING

Rote memorization. “Clearly, you’ve got to master some content to be able to think about what questions we should be asking. But that’s just the first step.”

MISSION

Convinced powers-that-be to let med students use metabolic maps during exams instead of memorizing them. “The maps are just a launching point. It’s the ability to use them that we should really be testing.”

EMBRACING GOOGLE

“I love when a student asks a question in class and I don’t know the answer. I say, ‘I don’t have a clue. And I don’t think anyone else has a clue. Somebody who’s bored, Google it and report back.’”

PASSION

The love of the unknown. “At my core, I’m a scientist. I love the fact that I don’t know everything. It’s what keeps me going.”

“Medical students are so enthralled by technology that sometimes the power of humanism is overshadowed. It’s not as sexy.”

JOAN SHEETZ, M.D.

Anna Beck, M.D.

*Director of Supportive Oncology and Survivorship
Huntsman Cancer Institute*

LEARNING PLATFORM: UTAH CERTIFICATE OF PALLIATIVE EDUCATION

Joan Sheetz, M.D.

*Medical Director of Primary Children’s
Hospital’s Rainbow Kids Pediatric Palliative
Care Program*

MISSION

Teaching interdisciplinary teams how to provide end-of-life care. “If you’re shoulder-to-shoulder, viewing life from your patient’s perspective, you’re a true partner in their care.”

BARRIER TO LEARNING

Providers have little training and are uncomfortable having end-of-life discussions. “We love it when young doctors come back to class and say, ‘I used some of the new skills I learned with patients I saw last night.’”

PASSION

The good death. “Too many patients agree to treatments for everybody else, not because their heart is in it anymore. Then they creep off to hospice and feel like failures.”

BURNING PLATFORM

Death has long been considered a kind of medical failure, so we don’t talk about it. “Providers sometimes are afraid to talk about palliative care because they don’t want to cause someone to lose hope.”

PASSION

Teaching people how to communicate. “Surgeons operate and pathologists use microscopes and oncologists have their chemotherapy. For palliative care docs, our skill set is our conversations.”

OBSTACLE TO SUCCESS

Hierarchy. “We need to teach multiple disciplines to work as teams, rather than in silos. The input of each team member is equally valuable.”



“Does change happen because we anticipate it and are ready for it, or because we’re forced to change?”

Diane Liu, M.D.

Assistant Professor and Co-Director of Utah Pediatric Partnership to Improve Healthcare Quality

LEARNING PLATFORM: VALUE IMPROVEMENT LEADERSHIP

BURNING PLATFORM

Old health care models get in the way of providing quality care to patients.

FUELING THE FIRE

The current system can feel stressful and punitive to providers. “Fee-for-service is a very powerful engine and not at all satisfying. At my first job, I felt the tremendous tension between meeting volume mandates and preserving quality care.”

BARRIER TO LEARNING

Unnecessarily opaque, top-down health care systems.

EMBRACING TRANSPARENCY

“Never before have we had so much data about what we’re doing. Frontline staff can actually ‘touch’ and change the process now.”

MISSION

Deciding to focus her career on value initiatives. “A lot of doctors have varying perspectives about engaging in ‘value work.’ But when you have a really constructive, motivated group of human beings with a common vision, that’s when you open up the opportunity for learning.”

PASSION

Making sure nothing comes between her and her patients. “I had to tell a mother—through an interpreter who was on the phone—that her child had died. It was the ‘best’ we had in terms of communication for her specific language, but it felt like a tremendous failure. She collapsed in my arms. As a doctor, you learn how other people suffer. That’s just one of the barriers I’m trying to remove.”



“I asked Cindy, ‘Could I have you as a life coach?’ I could get a lot more done with somebody like her.”

THEOPHILUS OWAN, M.D., M.S.

Theophilus Owan, M.D., M.S.

Assistant Professor (Clinical) of Cardiovascular Medicine

Cindy Spangler, M.S.

Value Engineer and Coach

LEARNING PLATFORM: VALUE COACHING

BURNING PLATFORM

Hospitals have been primary sources of revenue, but with new payment models, providers and systems are going to be held increasingly responsible for costs incurred in the hospital.

MISSION

Standardizing clinical practices to trim lengths of stay. “If you’re able to avoid certain mistakes and document the research, you can get people to practice similarly almost all of the time.”

BUILDING A TEAM

Tackling problems from disparate perspectives leads to better results. “This give-and-take between team members is the focusing mechanism.”

PASSION

Learning through teaching. “I like to be able to make sure the people who will be practicing medicine after me are much better than I am. Teaching is learning.”

BURNING PLATFORM

The health care system could benefit from engineering. Coordinated care needs a system. “Improving patient outcomes for patients sounds abstract, but the way I look at it, it could be me, my family, my friends, my co-workers. And I want us to have the best care available.”

COACHING

“Providers have really good ideas, but they just don’t know where to start to execute them. Coaching is about breaking down the gap between what exists now and where they want to go. Sometimes that’s technical. Sometimes that’s cultural. Sometimes that’s organizational. This is the new work.”

BARRIER TO LEARNING

Time. “Everyone already has a lot on their plates. In the end, process improvement makes their lives easier, but it feels like just one more thing.”



Well-Being

WHO'S RESPONSIBLE?

Providers are tired—burned out by the emotional stresses of the job, the pressures of the EHR, patient satisfaction, endless metrics . . . the list goes on. How do we balance always wanting to do better for patients without compromising the well-being of the people delivering their care?

When it comes to delivering patient-centered care, there are few places that do it better than Huntsman Cancer Institute (HCI). For the past three years, the cancer center has ranked in the top 5 percent for patient satisfaction among all academic medical centers in the nation. Yet, while faculty and staff have been going above and beyond in caring for patients, their own well-being was taking a hit.

At a retreat HCI hosted two years ago, "people were so burned out, they couldn't even address goals we normally look at," says Nursing Director Sue Childress, R.N., M.N. A follow-up survey found widespread burnout among employees, and pharmacists showed the worst decline in several categories—including the pleasure they derive from being able to do their work well. "We've always focused on placing the patient first, which is wonderful," says Childress. "But somehow, we had created a culture that puts staff last." That needed to change.

Under the harsh neon lights of the small pharmacist's office across from the nurses' station, 28-year-old clinical pharmacist Kelly Fritz, Pharm.D., says, "Sometimes I feel like I'm much older." Her workload has more than doubled over the past four years. On an average day, she

When Your Best Is Not Enough

Kelly Fritz, Pharm.D., fell in love with pharmacy as a teenager. While shadowing family friends at a small Ohio hospital, she was fascinated watching them thoughtfully come up with pain regimes for cancer patients. "Every one of them was very individual," says Fritz. "Treating each patient was like solving a puzzle."

What Fritz didn't realize as a teenager is that unlike puzzles that fit perfectly together, the pieces of cancer patients' lives often don't. "You see them just generally declining," says Fritz, and suffering tremendously along the way. "The family wants to do everything, but we know that the best we can give in medicine is not enough."

Fritz also never imagined having awkward conversations with dying patients about the exorbitant price of medications. She recalls walking

sees more than 20 patients. She tries to exercise after work but feels too exhausted when she gets home. She worries that if she "offloads" her day onto her husband, he'll encourage her to look for another job. Instead, she finds simple comfort in the Labrador mix that she and her husband adopted from the shelter. "I don't have to tell her how my day went," says Fritz. "I just give her a hug and she licks my feet."



“Burnout is real; everyone has it—not just nurses and doctors. The hard part is that there’s no ABC solution.”

KELLY FRITZ, PHARM.D.
*Clinical Oncology Pharmacist Huntsman
Cancer Institute*

into a room as part of a five-person medical team to tell a 70-year-old woman—and nine of her 11 children—that if she wanted a chance at surviving her brain cancer, she'd need a new medication. That was the good news. Fritz was left on her own to deliver the bad news—the \$10,000-a-month price tag that the patient's insurance wouldn't cover. The patient managed to get the first treatment free and her church cobbled together enough money for a second. After that, Fritz lost touch, but she knows the story didn't end well. "Pretty soon, you become numb to it," she says.

She found comfort at a recent HCI compassion fatigue workshop where she learned she wasn't alone in feeling the need to pull away emotionally from patients or not wanting to go to work. "Burnout is real; everyone has it—not just nurses and doctors," she says. "The hard part is that there's no ABC solution; there's no, 'this is exactly what you need to do' to be able to make it better—for institutions or individuals." What keeps her going is that one person who does really well and thanks her for what she does. "That can carry me a long way."





“I always feel the need to save—and take care of—everything. That’s what we do as doctors. We sacrifice ourselves for the general good.”

KYLE JONES, M.D.
Assistant Professor of Family and Preventive Medicine

Breaking the Stigma

Kyle Jones, M.D., jokes that he has a Superman complex. “I always feel the need to save—and take care of—everything. That’s what we do as doctors,” says Jones, pointing to the glowering Superman figure on his windowsill, balled fists on his thighs, ready to do battle with any supervillain that comes his way. “We sacrifice ourselves for the general good.”

Superman complex notwithstanding, Jones is acutely aware of the fragility and vulnerability that he and many of his colleagues experience while trying to save the day. As a resident, Jones remembers watching multiple breakdowns among his fellow residents. When one wept, Jones thought to himself, “We all feel like that.”

What compounds the problem is that few providers are

Fritz and HCI are far from alone with such struggles. Burnout is rife throughout health care, reaching troubling proportions among health care providers nationwide. For a long time, provider satisfaction was ignored or relegated to the bottom of a growing and pressing list of priorities for health care systems. But now institutions are worried. “Unless we solve this problem, we’re not only going to lose some of our current providers, but we’ll disenfranchise our future workforce,” says Dan Lundergan, M.H.A., executive director of Service Lines, Specialty Clinics and Support Services. Beyond the human imperative to create a healthy workplace, there’s also a business one. Studies show that stress, burnout and depression are associated with decreased patient satisfaction, increased medical errors and higher costs.

PROVIDING FOR PROVIDERS

What’s not clear is who exactly is responsible for the physical, emotional and mental well-being of health care providers? Compounding the confusion is that there’s no one-size-fits-all solution.

At our campus alone, there are more than a dozen initiatives trying to address the issue of well-being. At HCI, Childress and her team increased staffing, opened up lunchtime exercise and yoga classes, introduced art therapy and a writer-in-residence program and got approval to buy 14 recliners that massage employees on their breaks. In October, more than 30 people from across campus gathered at a Wellness

High Cost of Burnout

1

doctor
commits
suicide

PER DAY

\$250K

to
replace
a family
physician

68%

of family
physicians would
not pick their
specialty again

willing to admit they’re suffering and even fewer seek help. Despite widespread recognition that doctors are struggling, a stigma remains among physicians who show they’re weak or vulnerable. Mental health, in particular, has long been a taboo subject. Jones decided to challenge that stigma by sharing his own battle with anxiety and depression.

He published his personal story on the American Academy of Family Physicians’ “Fresh Perspectives” blog. It was then republished on the website KevinMD. Our need to be perceived as impervious to weakness, he wrote, is getting in the way of our ability to care for our patients.

Contrary to how we’ve been trained, seeking help doesn’t mean we’re “bad physicians,” says Jones. “A big reason I’ve been open with my story is to encourage others to feel OK about admitting that they’re struggling—whether it’s mental illness or burnout.” After the blog post was published, a friend from residency came into one of Jones’ clinic rooms, shut the door and said that he finally scheduled an appointment with a psychiatrist. “Even if your story doesn’t help anyone else,” he told Jones, “it helped me.”

Strategy retreat to try to chart the way forward. In the meantime, Rick Smith, M.B.A., senior director for human resource management, started a back-up childcare and eldercare program for staff and faculty. And the cafeteria created individually packaged meals so providers don’t have to pick up fast food on the way home. Smith admits these efforts don’t get at the root of the problem. “But I think people put up with a lot more in the workplace if it is somewhere they feel supported and empowered and have resources to help them through hard times,” he says.

Other efforts target mindfulness and resilience. But Kyle Jones, M.D., assistant professor (clinical) of family and preventive medicine, cautions

Paperwork Fatigue

87%

of physicians named
paperwork and
administration as No. 1
cause of work stress

63%

of doctors believed that
EHRs made their jobs
less efficient

41%

do not believe that
EHRs actually improve
patient care

that too much focus on these areas sends the wrong message: "We're going to teach you how to deal with this crappy system or profession," he says. "The real solution requires a much broader change in the way we train and practice." Community Physician Group Executive Medical Director Susan Terry, M.D., agrees. "We need to find ways to get providers off of the hamster wheel. They're constantly running," she says. But it can't be a one-way street and, curiously, sometimes the resistance comes from the very people such changes are meant to benefit. People have to believe that things can be better, and that's one of the hardest challenges, says Terry. "Sometimes, they have a hard time seeing the possibilities."

That's especially true of older physicians, who are often perplexed by the idea of physician wellness, says Michelle Vo, M.D., assistant professor (clinical) of psychiatry. She is tasked with addressing medical students' wellness needs. "We're trying to help students feel that it's possible to be a caregiver and a wider human being, but often that's not the message they're getting from their mentors." Eventually, says Vo, we'll need to bridge that generational disconnect.

BEING ENGAGED

Getting providers to a place where they are energized by medicine's challenges requires that they are engaged and aligned with their workplaces. But nationwide, only one third of physicians report being engaged, according to a 2016 Physician Executive Council Advisory Board study. Why aren't more doctors doing system-based changes? "Because we aren't asking them to think with us, we're telling them what to do," says Chief Medical Quality Officer Robert Pendleton, M.D.

Lundergan thinks the answer may lie in asking providers themselves what change they want to see. This year, he launched the "Exceptional Provider Experience," which grew out of a remarkably successful initiative started in 2008 called the Exceptional Patient Experience (EPE). "We've been very successful at making it a great place for patients," says surgeon Blake Hamilton, M.D. "Now we need to figure out how to make it an exceptional place to work."



For sources and more about who's responsible for Well-Being go to algorithmsforinnovation.org

Pushing through Barriers

Devin Horton, M.D. (right), has always wanted to change the world. "Give me a challenge to worry about 24 hours a day and I'm happier," he says. When the first-year attending learned that sepsis was the No. 1 killer of hospitalized patients, and early analysis showed intervention could save up to 50 lives a year, he decided to take it on. "I felt engaged," Horton says. "It gave my life new meaning."

The self-described "nutty professor" found a like-minded and highly organized genius in hospitalist colleague **Kencee Graves, M.D.** (left). Their ambitious goal was to create an early warning system that would reduce inpatient mortality by 10 percent and shave \$1 million in hospital costs over six months. In August 2014, the two started working on an algorithm embedded in the electronic health record that would alert staff of the deadly infection and prompt them to intervene much earlier.

But there was resistance. Older colleagues, some of their medical heroes, thought the protocol was being imposed on them, not so much by the bright-eyed idealists, but by the quality department. It seemed like

"At the end, you've got to protect your sense of self. And no one teaches you how to do that."

KENCEE GRAVES, M.D.
Assistant Professor of Internal Medicine

just another initiative taking them away from their patients.

So instead, the pair found allies in nurses who took on the project as "their baby, their project, their thing." The IT department also enthusiastically bought in. By the end of the six-month project, soft-spoken software analyst David Roach no longer felt he was just a "cog in the wheel" but was "making a difference." For the team, the project became an engaging antidote to burnout and isolation at work.

On November 5, 2015, the sepsis protocol went live. It was released at noon and generated the first alert at 12:44 p.m. Sepsis patients' lengths of stay were cut by one-third. Early results were published in the September 2016 issue of *JAMA*. Emotional nurses and grateful patients have thanked them. One thing we know, says Graves, "No one's going to die of sepsis because we missed it."



#1 *in quality,
safety and
accountability*

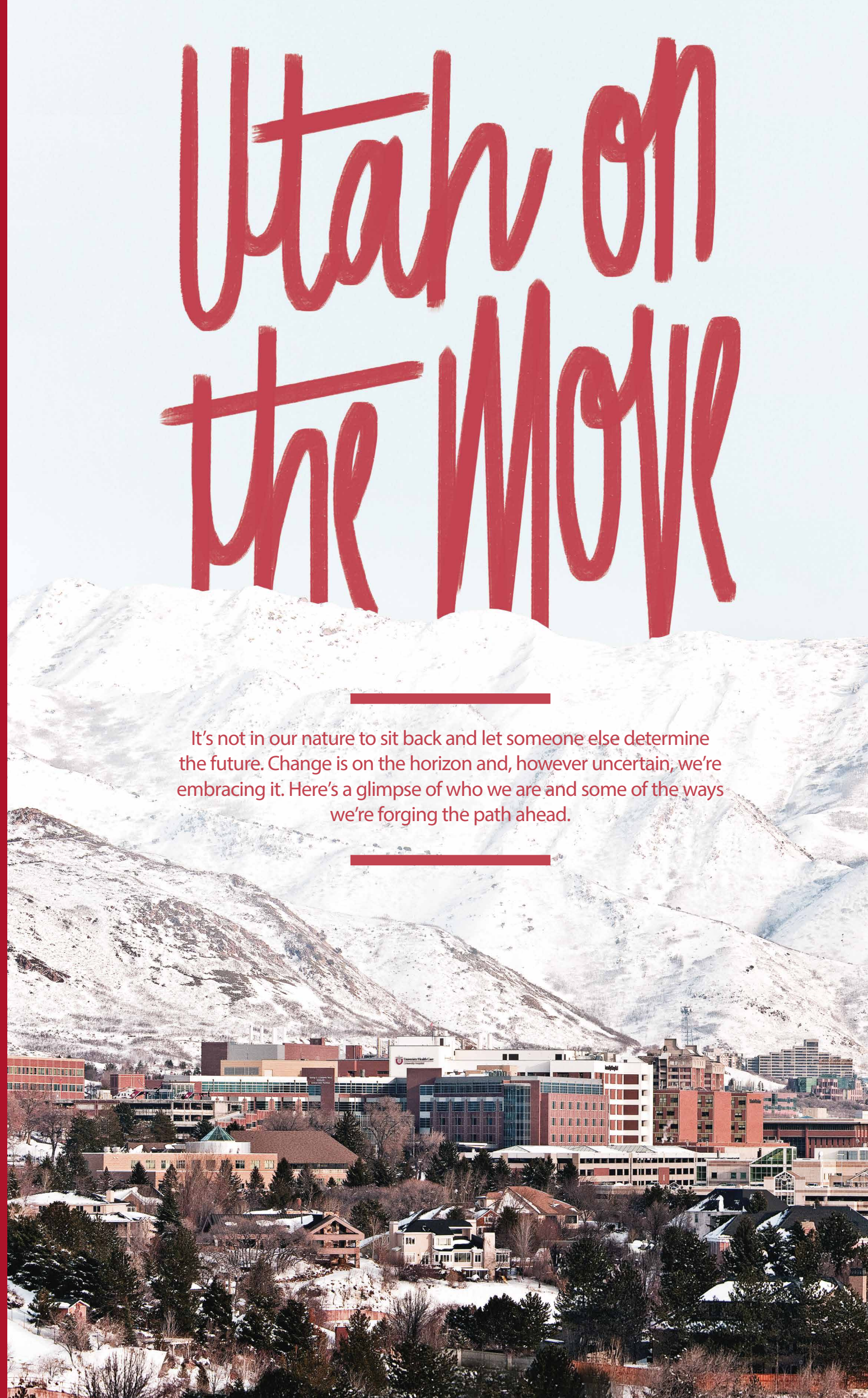
#2
NYU LANGONE
MEDICAL CENTER

#3
MAYO CLINIC
HOSPITAL

Patient-centered care is more than just a tagline for us. Improving the quality of each patient's life is at the heart of every decision we make. And that's why we're proud to announce we've been named No. 1 among all university hospitals in the nation for quality by Vizient. In fact, we've been in the top 10 for the past seven years. And we're in good company with other top medical centers, including NYU Langone Medical Center, Mayo Clinic Hospital, Cedars-Sinai, Penn State, University of Michigan and many others. But we won't be resting on our laurels. We're determined to find new and better ways to care for every life we touch.

Utah on the Move

It's not in our nature to sit back and let someone else determine the future. Change is on the horizon and, however uncertain, we're embracing it. Here's a glimpse of who we are and some of the ways we're forging the path ahead.





The trailhead for the six-mile hike to Lake Blanche is just 30 minutes from campus.



If the old real estate adage holds true, we believe we've hit the sweet spot. Tucked into the foothills of the towering Wasatch Range, the University of Utah is at the confluence of natural beauty and metropolis. Alpine meadows, granite cliffs and pristine lakes join together with the Sundance Film Festival, a vibrant arts scene and a bounty of other urban riches to inspire and energize.

Downtown Salt Lake City is a 10-minute drive from the University of Utah.

Utah on the Move

Connecting It All

Three Missions: One System

By almost every measure, we're growing. But that growth is so much more than sheer numbers. If creating economies of scale was once the end game, now it's about creating economies of connection. It's in the way we reach across worlds, institutions and disciplines to do smarter science. It's about extending our expertise to care for patients from rural America to villages in Ghana.

If we're going to approach disease differently, we need to break down traditional silos and hierarchies, invite students to contribute and create collision spaces where researchers comingle with practitioners to bring science to bear on real problems faced by real patients. So, yes, we're excited about our growth because of the impact we're making.

\$3.2B

expense
budget

50%

growth in
5 years

CLINICAL CARE

4

hospitals

12

community
clinics

10

regional part-
ners

10%

of the
continental U.S.

1.7M

patient
visits

1,391

physicians

GLOBAL HEALTH

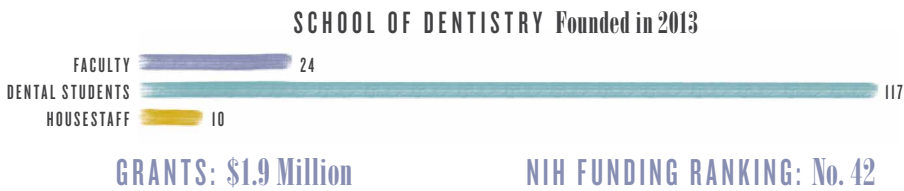
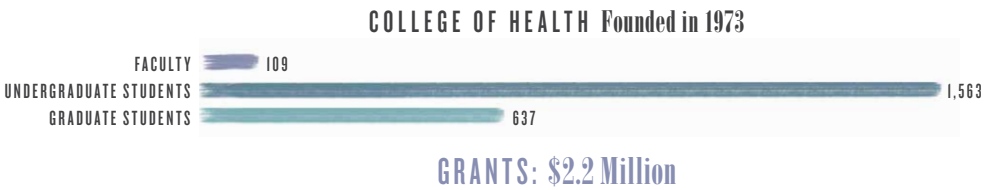
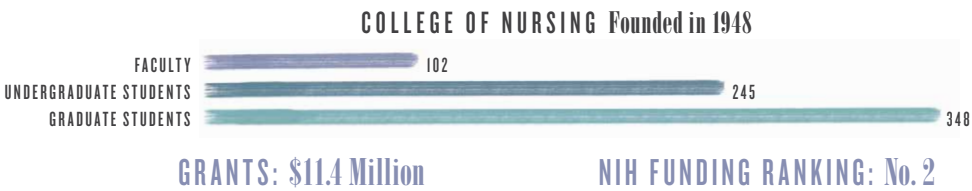
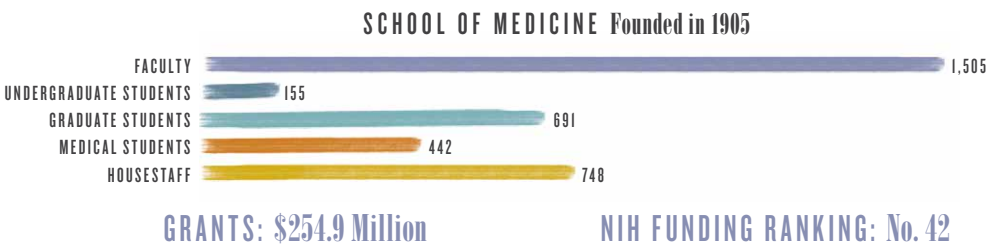
147

global health
projects in 62
countries

RESEARCH AND EDUCATION

\$200+

Million in grants from 5 Schools and Colleges
and the Spencer S. Eccles Health Sciences Library



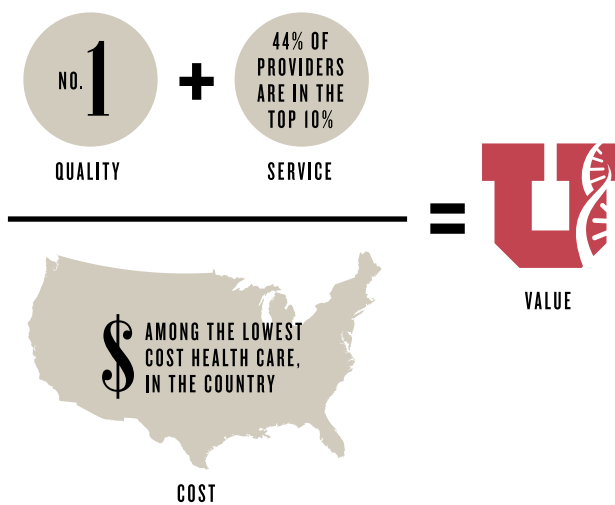
*based on 1.0 FTE equivalents

Reimagining Health Care

Creating a Value Equation

In a time of skyrocketing health care spending, we're proud that Utah offers an economic bright spot in providing some of the lowest-cost health care in the country. How is this possible? By focusing on quality, there are fewer complications and readmissions and shorter lengths of stay. In fact, University of Utah Health was ranked No. 1 for quality by Vizient and has been in the top 10 for the last seven years.

But there's one more important factor in our value equation—the patient experience. We achieve better patient outcomes because we're committed to creating a patient-centered environment and focused on improving communication, shared decision making and respect. And that's why we're thrilled that 50 percent of our providers rank in the top 10 percent for patient satisfaction. There's always room to improve but we believe we've found a model for providing the best value health care in the nation.



INVENTING SOLUTIONS TO IMPROVE CARE

A catheter that uses light to kill bacteria and prevent infections. A no-contact baby monitor to track infants' breathing remotely. A radiopaque pen to mark patients' skin during radiology scans. All these inventions and many more come from our **Center for Medical Innovation (CMI)**—a collision space where science and medicine meet engineering and entrepreneurship. We believe some of the best ideas come from empowering imaginative students—from the health sciences, the business school and the college of engineering—and partnering them with faculty to fully realize an idea. CMI offers the student Bench-2-Bedside medical device competition, a fully accredited master of bioengineering degree track

and many other formal and informal programs to foster innovation.

The Center for Medical Innovation

- 700+ students
- 100+ faculty partners
- 70 industry partners
- 127 new medical devices
- 25 medically focused video game therapies
- 32 startup companies
- 86 patents granted

STRIVING FOR TRANSPARENCY

American consumers wouldn't even dream of making a decision without first consulting reviews on Yelp, TripAdvisor or Amazon. We figured that if consumers were interested in reviews when buying a toaster oven, they'd certainly be interested in reviews when choosing a doctor. In 2012, the University of Utah became the first academic medical center in the country to post **online patient reviews** of physicians. The response was overwhelming. Our efforts to become a more transparent organization didn't stop there. We've embraced **pricing transparency**, publishing full care pricing for 100+ procedures. We've also rolled out **Open Notes** throughout our system (except psychiatry and chronic pain), giving patients access to provider

UNDERSTANDING HEALTH CARE'S COSTS

The high cost of health care is no secret. We spend \$3 trillion annually in the U.S. alone. But most health systems, providers and frontline staff are in the dark about what their actual costs really look like, or how they break down over the full cycle of a patient's care. In order to provide higher-value care, we need to better understand our costs. So we've created the **Value Driven Outcomes** tool to leverage terabytes of data in our



Value Driven Outcomes Tool

- 70 unique users per month
- 215 VDO users
- 8,000 reports generated

Going For Gold

Our Newest Partners: U.S. Olympic and Paralympic Athletes

Citius, Altius, Fortius. The motto of the Olympic Games—faster, higher and stronger—aligns perfectly with our own ambition to reach the highest levels of clinical care, medical research and education.

That's why, this year, we're thrilled to be a National Medical Center for the United States Olympic Committee's National Medical Network. We're one of only three National Medical Centers nationwide, and the only academic medical center with this prestigious designation. Through this partnership, we not only carry on Utah's rich legacy with the Olympics, we also support more than 1,000 U.S. Olympic and Paralympic athletes who come to Utah's high elevation and world-class facilities to train.

Just as Team USA embodies the ambition and potential of the human spirit, we believe this partnership will push us to be our very best.

BUILDING ON A LEGACY

As a former host city, the Salt Lake City legacy continues with...

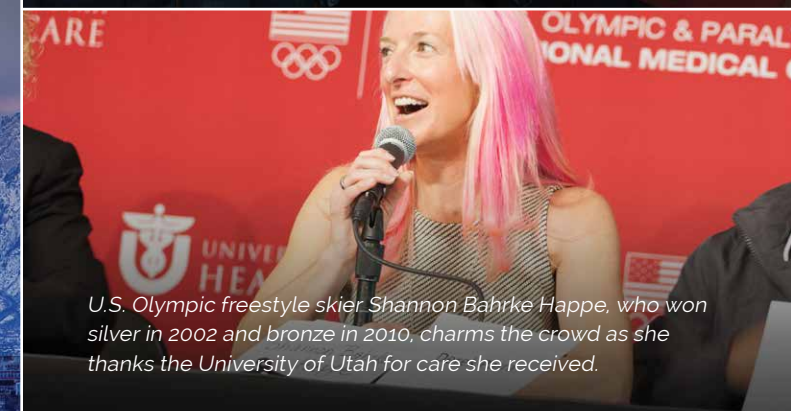
11 Olympic venues in Utah, along with **14** ski resorts

2 national governing bodies headquartered in Utah
(US Ski & Snowboard; US Speedskating)

55 of 230 U.S. athletes who competed in the 2014 Winter Games train, go to school or live in Utah.



U.S. Olympic Team members help celebrate the announcement of the University of Utah/USOC partnership in May 2016. From left to right: freestyle aerial skier Mac Bohannon, freeskier Devin Logan, Senior Vice President for Health Sciences Vivian Lee, and speedskaters Sugar Todd and Mitchell Whitmore.

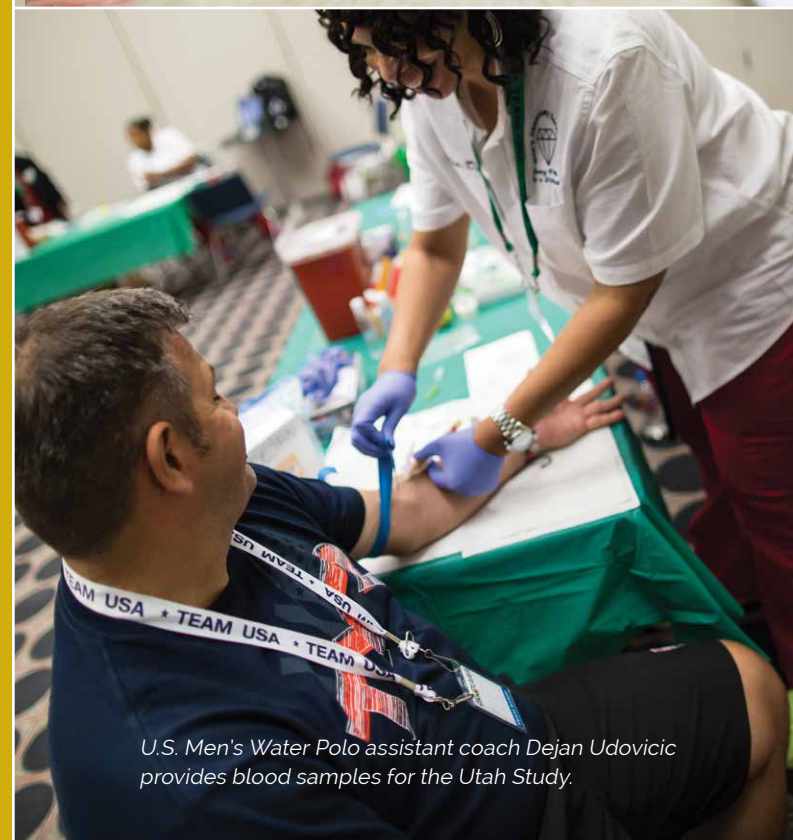
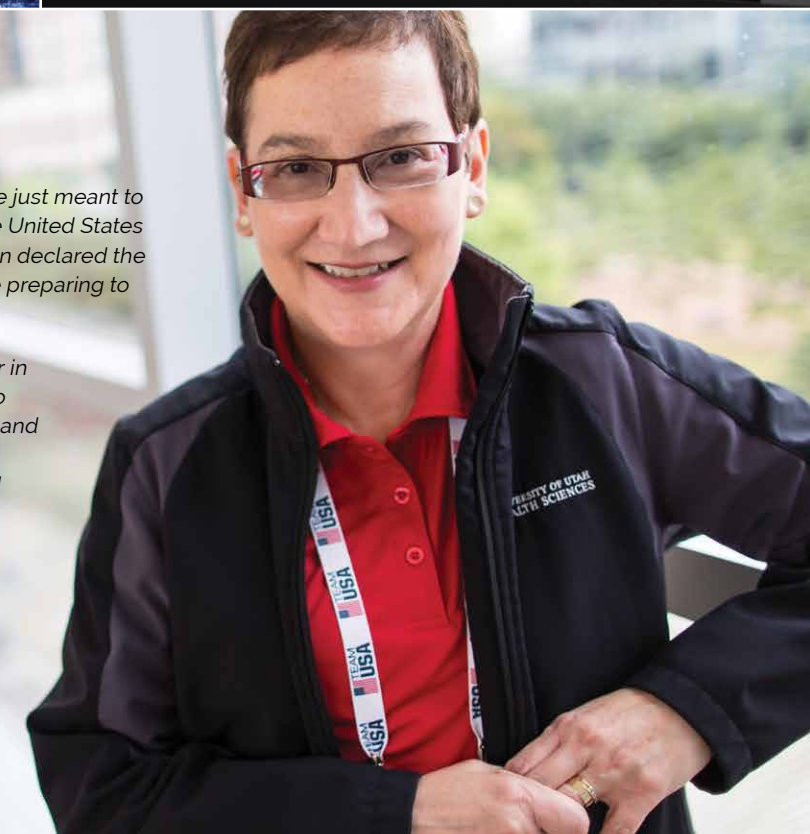


U.S. Olympic freestyle skier Shannon Bahrke Happe, who won silver in 2002 and bronze in 2010, charms the crowd as she thanks the University of Utah for care she received.

PARTNERING TO SOLVE ZIKA MYSTERIES

Call it a perfect storm or fate—we believe some partnerships are just meant to be. The ink was still drying from signing our partnership with the United States Olympic Committee (USOC) when the World Health Organization declared the Zika outbreak a Public Health Emergency—just as athletes were preparing to travel to Brazil for the Rio 2016 Olympics and Paralympics.

Serendipitously, one of our pediatricians is also a national leader in the study of Zika virus. The USOC asked Carrie Byington, M.D., to lead an advisory group to address concerns of worried athletes and help protect them from the mosquito-borne virus. Byington and team also partnered with the USOC to fast-track an NIH-funded study to monitor exposure of Team USA members. The project, called the "Utah Study", enrolled 1,000 athletes, coaches and staff members prior to the games and will follow them for the next two years to better understand the virus and its impact. "This study will allow us to answer some of the most important questions about Zika virus infection. The answers will benefit the U.S. and all countries battling the Zika epidemic," says Byington.



U.S. Men's Water Polo assistant coach Dejan Udovicic provides blood samples for the Utah Study.



Pediatric infectious diseases specialist Krow Ampofo, M.D., in Houston enrolling Olympic athletes, coaches and staff in the Zika study.



Jump-Starting Junior Faculty

We can't afford to leave talent on the table—not when we're trying to make discoveries that fundamentally change the way we understand science and practice medicine. Unfortunately, when it comes to junior faculty, academia has a long history of doing just that. And new research is showing that an academic career is becoming increasingly less attractive to freshly minted scientists. We need to continue to attract the best and the brightest and then invest in them so they can realize their potential.

At the University of Utah, some of our greatest discoveries have come from taking chances on young investigators with big ideas. Those ideas blossomed, in part, because of the collegial and generous spirit that defines the University of Utah. We're committed to continuing that Utah tradition by supporting mentorship programs linking junior faculty with the resources and people they need to propel their careers forward.

JUNIOR FACULTY RESEARCHERS

Whatever the scale—number of grants, the size of those grants, or their prestige—our junior faculty are having global impact. Here's a five-year snapshot of their imaginative and ambitious work. Think they're competitive now? There's no telling where they'll be in another five years. Like Howard Hughes Medical Investigator Jared Rutter, Ph.D., and Howard Hughes Medical Institute Faculty Scholar Jody Rosenblatt, Ph.D., they are joining the ranks of the most prestigious investigators in medicine and science.

HIGHLIGHTS

\$70+ million has come from **474** different grants given to **118** different junior faculty researchers in the last **5** years, including **34** NIH Career Development (K) Awards and **33** NIH R01 grants.

Burroughs Wellcome Fund
Nels Elde, Ph.D., Human Genetics

Damon Runyon Cancer Research Foundation
Trudy G. Oliver, Ph.D., Oncological Sciences

Doris Duke Clinical Scientist Development Award
Stavros G. Drakos, M.D., Ph.D., Cardiovascular Medicine
Adam Spivak, M.D., Internal Medicine

Howard Hughes National Science Foundation Faculty Early Career Development (CAREER) Program
June Round, Ph.D., Pathology

NIH Director's New Innovator Award
Josh Bonkowsky, M.D., Ph.D., Pediatrics
Ryan O'Connell, Ph.D., Pathology
June Round, Ph.D., Pathology

Pew Scholars Program in the Biomedical Sciences
Nels Elde, Ph.D., Human Genetics
June Round, Ph.D., Pathology

Searle Scholars Program
Adam Hughes, Ph.D., Biochemistry

Sloan Research Fellowship
Adam Douglass, Ph.D., Neurobiology and Anatomy
Megan Williams, Ph.D., Neurobiology and Anatomy

MENTORING BRIGHT SPOT

Mentoring is in the DNA of so many of our dedicated faculty. It's part of who they are and we're grateful for their generosity and talent. As a system, we're also committed to creating programs that build on that deep tradition. Designed to support clinician scientists, the Vice President's Clinical and Translational (VPCAT) Research Scholar

Program is one of our most promising efforts. The program, which started in the Department of Pediatrics and then expanded systemwide, has taught us that a little support goes a long way. To learn more about our matrix mentoring model, read the article published by Byington et al. in the April 2016 issue of *Academic Medicine*.

110 scholars **56%** women and **10%** underrepresented minorities
93% funded with extramural grants equaling **\$51+M**
95% still at the University of Utah

THE XX FACTOR

We've still got a long way to go in supporting women in science and medicine. Nationwide, only 20 percent of assistant professors in STEM and medical colleges are women. And pay inequity is alive and well: A recent study of New England researchers found that male scientists received more than 2.5 times the startup funding than

their female counterparts did. We're committed to moving in the right direction through inclusive hiring committees, mentoring programs, pay equity report cards and recognition. There's much to celebrate. Here, we highlight some of our brightest young investigators—who just happen to be women—making incredible discoveries.



1 **Charlie Hicks-Little, Ph.D., Physical Therapy and Athletic Training**

Investigating the effects of osteoarthritis of the knee and examining head trauma and brain health in student athletes.

2 **Giavonni Lewis, M.D., Surgery**

Understanding fat transformation after burn injury and its impact on skin graft survival.

3 **Lori Gawron, M.D., M.P.H., Obstetrics and Gynecology**

Leveraging informatics tools to improve pregnancy planning for high-risk women.

4 **Yelena Wu, Ph.D., Family and Preventive Medicine, Huntsman Cancer Institute**

Improving children's health through genetic risk communication and behavioral interventions.

5 **Vanessa Stevens, Ph.D., Epidemiology**

Promoting judicious use of antibiotics for the treatment of health care-associated infections.

6 **Lilliam Pinzon, D.D.S., M.S., M.P.H., Dentistry**

Finding solutions to oral health issues for vulnerable national and international populations.

7 **Karen Gibbins, M.D., Obstetrics and Gynecology**

Increasing understanding of stillbirths and preterm births by studying abnormal placental development.

8 **June Round, Ph.D., Pathology, Huntsman Cancer Institute**

Identifying new therapies to treat intestinal disease by understanding the relationship between immunity and the microbiota.

9 **Heidi Hanson, Ph.D., Public Health, Huntsman Cancer Institute**

Discovering the joint, complex familial and environmental patterns of health.

10 **Trudy G. Oliver, Ph.D., Oncological Sciences, Huntsman Cancer Institute**

Developing and using mouse models to identify new therapeutic strategies to treat lung cancer.

11 **Deanna Kepka, Ph.D., M.P.H., Nursing, Huntsman Cancer Institute**

Increasing HPV vaccination rates and addressing cancer-related health disparities in Utah and the surrounding region.

12 **Cindy Brown Matsen, M.D., Surgery, Huntsman Cancer Institute**

Using qualitative and quantitative research to help improve providers' communication with cancer patients.

To learn more about their research, go to JuniorFaculty.AlgorithmsforInnovation.org

Utah on the Move

Joining The Team

Welcoming our New Recruits

We're looking for ambitious, collaborative people who are out to change the future—people who are bold enough to question the status quo and have the courage to seek new solutions. Last year, we were lucky to find 243 of them—including many dynamic duo couples jointly recruited. They joined us from all over the world. They're smart, creative and bring the right attitude. Here we highlight just a few of the change-makers who now call Utah home.

“I came to Utah to study human disease through the powerful lens of family genetics. The fact that world-class terrain is at the front door didn’t hurt, either.”

AARON QUINLAN, PH.D.
ASSOCIATE PROFESSOR OF HUMAN GENETICS AND BIOMEDICAL INFORMATICS AND
ASSOCIATE DIRECTOR, USTAR CENTER FOR GENETIC DISCOVERY

He's investigating the biology and mutational dynamics of the human genome and the genetic basis of human diseases.
He's PI and co-PI for two NIH grants totaling more than \$4.5 million.



Department of Psychiatry Chair **Jon-Kar Zubieta, M.D., Ph.D.**, from University of Michigan; **Cardiovascular Assistant Professor (Clinical) Anna Catino, M.D.**, from Dartmouth-Hitchcock; **Associate Vice President for Development and Chief Development Officer John Baker**, from University of Southern California; **Associate Professor of Human Genetics and Biomedical Informatics and Associate Director, USTAR Center for Genetic Discovery Aaron Quinlan, Ph.D.**, from University of Virginia; **Assistant Professor of Nursing Michelle Litchman, Ph.D., A.P.R.N.**, from Wasatch Internal Medicine

(Couples across from each other, front to back) **Professor of Surgery Gary Faerber, M.D.**, from University of Michigan; **Department of Internal Medicine Chair Kathleen A. Cooney, M.D.**, from University of Michigan;
Department of Population Health Sciences Chair Angie Fagerlin, Ph.D., from University of Michigan;
Director of Education Strategy Tony Tsai, M.B.A., from University of Michigan;
Assistant Professor of Pathology Eric Snyder, M.D., Ph.D., from University of California, San Francisco;
Assistant Professor of Oncological Sciences Michelle Mendoza, Ph.D., from University of California, San Francisco





Chief Marketing Officer David Perry, M.B.A., from Bentley University; **Professor of Dermatology and Huntsman Cancer Institute Senior Director for Preclinical Translation Martin McMahon, Ph.D.**, from University of California, San Francisco; **Research Professor of Medicinal Chemistry Margo Haygood, Ph.D.**, from Oregon Health & Science University; **Department of Nutrition and Integrative Physiology Chair Scott Summers, Ph.D.**, from Baker IDI Heart and Diabetes Institute; **School of Dentistry Dean Wyatt Rory Hume, D.D.S., Ph.D.**, former Dean, UCLA School of Dentistry; Provost, Executive Vice President and COO, University of California System

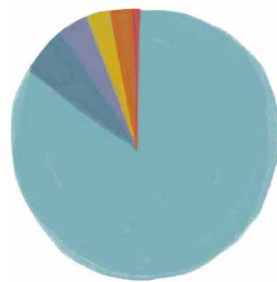
Associate Professor and Director, Nursing Informatics Heather J. Sobko, Ph.D., R.N., from University of Illinois, Chicago; **Professor of Radiology Yoshimi Anzai, M.D., M.P.H.**, from University of Washington; **Medical Director, Orthopedic Injury Clinic and Assistant Professor (Clinical) in the Department of Orthopaedics Joy English, M.D.**, from Washington University in Saint Louis; **Assistant Professor of Medicinal Chemistry Jaclyn Winter, Ph.D.**, from University of California, Los Angeles; **Assistant Professor (Clinical) of Dentistry Alberto Varela, D.D.S.**, from University of Missouri-Kansas City School of Dentistry



In 2015, we welcomed

243

new faculty recruits to our five schools and colleges.



- School of Medicine: 205
- School of Dentistry: 14
- College of Pharmacy: 9
- College of Nursing: 8
- College of Health: 6
- Eccles Health Sciences Library: 1

“The access to a great mix of basic scientists, engineers and clinician scientists who are genuinely interested in collaboration on a single campus frees us to do our best science.”

MICHELLE MENDOZA, PH.D.
ASSISTANT PROFESSOR OF ONCOLOGICAL SCIENCES

She's deciphering protein signals that control cell behavior to understand how their mutation impacts cancer patient outcomes. She holds a KOI Award from the NCI.

“I’m excited to lead a new department focused on improving the health of the population and training the next generation of researchers in this important area.”

ANGIE FAGERLIN, PH.D.
POPULATION HEALTH SCIENCES CHAIR

She's funded by significant grants from the NIH, NCI, VA and the European Union. She's also the president-elect for the Society for Medical Decision Making.

Building The Future

Thanks to our Visionary Donors

Reimagining health care is an ambitious goal and there’s one thing we know—we can’t do it alone. We’re making lasting partnerships to exceed expectations and change the future of health. We thank our donors for their vision, their generosity and their vote of confidence.

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\$74.5M total donations in fiscal year 2016**

35,000+ total number of donors

149 endowed & presidential chairs

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TRANSFORMING A CAMPUS

Three years ago, when it became clear that we needed to replace our medical school, we saw it not as a hassle but as a once-in-a-lifetime opportunity. Not just to build new buildings, but to create a campus that's a physical manifestation of our drive to advance health and transform health care.

This project, which includes an ambulatory care center, a planned

medical education and discovery building and a planned rehabilitation hospital, is the largest and most exciting building project in the recent history of the health sciences. It will take unprecedented support from our generous donors and our partners in state government. By the year 2021, we'll have a physical home that reflects our ambition and embodies our forward thinking.

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Not Sitting Still

A Strong History of Endowed Chairs

Visionary donors supporting individual faculty is a pairing that helps foster the best in research, education and clinical care. We celebrate that powerful collaboration and thank our donors by highlighting the 149 endowed and presidential endowed chairs and their talented recipients.

Endowed professorships are more than a reward or enticement for top faculty. They're a sustainable source of support for our greatest thinkers and inventors . . . an investment in our future. Originally conceived as paternalistic, ecclesiastical lecturers, endowed chairs have evolved since the practice first took hold in 15th-century England. They still reward individual genius, of course, but they also recognize leadership that nurtures and promotes collective genius. That's where Population Health Sciences Professor **Tom Greene, Ph.D., M.S.**, our newest **H. A. and Edna Benning Presidential Endowed Chair** comes in. Benning chairs—there are 12 in total—are reserved

for top medical researchers, a label that aptly describes Greene. As chair of Utah's Study Design and Biostatistics Center, Greene and his team help their peers produce high-quality, statistically sound and replicable research. "Every project he works on is greatly improved by his contributions in design, data analysis and interpretation," says Population Health Sciences chair Angie Fagerlin, Ph.D. "He has built a remarkable infrastructure for the University." At a time when cash-strapped researchers, pressured to publish in high-ranking journals or perish, are cutting corners, Greene champions thoughtful study design, says Associate Vice President for Research and Chief Scientific Officer Dean Li,

"The methods Tom Greene teaches for powering experiments in the lab and clinic are critical because they yield more credible results. His work helps all of us draw the cleanest conclusions within current constraints of people, resources and time."

DEAN Y. LI, M.D., PH.D.
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GEORGE BERNARD SHAW

“We are made wise not by the recollection of our past, but by the responsibility for our future.”

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