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We Devote Vast Resources To Intensive, One-Off Procedures, While Starving The Kind Of Steady, Intimate Care That Often Helps People More.

By [Atul Gawande](#)

By 2010, Bill Haynes had spent almost four decades under attack from the inside of his skull. He was fifty-seven years old, and he suffered from severe migraines that felt as if a drill were working behind his eyes, across his forehead, and down the back of his head and neck. They left him nauseated, causing him to vomit every half hour for up to eighteen hours. He'd spend a day and a half in bed, and then another day stumbling through sentences. The pain would gradually subside, but often not entirely. And after a few days a new attack would begin.

Haynes (I've changed his name, at his request) had his first migraine at the age of nineteen. It came on suddenly, while he was driving. He pulled over, opened the door, and threw up in someone's yard. At first, the attacks were infrequent and lasted only a few hours. But by the time he was thirty, married, and working in construction management in London, where his family was from, they were coming weekly, usually on the weekends. A few years later, he began to get the attacks at work

as well.

He saw all kinds of doctors—primary-care physicians, neurologists, psychiatrists—who told him what he already knew: he had chronic migraine headaches. And what little the doctors had to offer didn't do him much good. Headaches rank among the most common reasons for doctor visits worldwide. A small number are due to secondary causes, such as a brain tumor, cerebral aneurysm, head injury, or infection. Most are tension headaches—diffuse, muscle-related head pain with a tightening, non-pulsating quality—that generally respond to analgesics, sleep, neck exercises, and time. Migraines afflict about ten per cent of people with headaches, but a much larger percentage of those who see doctors, because migraines are difficult to control.

Migraines are typically characterized by severe, disabling, recurrent attacks of pain confined to one side of the head, pulsating in quality and aggravated by routine physical activities. They can last for hours or days. Nausea and sensitivity to light or sound are common. They can be associated with an aura—visual distortions, sensory changes, or even speech and language disturbances that herald the onset of head pain.

Although the cause of migraines remains unknown, a number of treatments have been discovered that can either reduce their occurrence or alleviate them once they occur. Haynes tried them all. His wife also took him to a dentist who fitted him with a mouth guard. After seeing an advertisement, she got him an electrical device that he applied to his face for half an hour every day. She bought him hypnotism tapes, high-dosage vitamins, magnesium tablets, and herbal treatments. He tried everything enthusiastically, and occasionally a remedy would help for a brief period, but nothing made a lasting difference.

Finally, desperate for a change, he and his wife quit their jobs, rented out their house in London, and moved to a cottage in a rural village. The attacks eased for a few months. A local doctor who had migraines

himself suggested that Haynes try the cocktail of medicines he used. That helped some, but the attacks continued. Haynes seesawed between good periods and bad. And without work he and his wife began to feel that they were vegetating.

On a trip to New York City, when he turned fifty, they decided they needed to make another big change. They sold everything and bought a bed-and-breakfast on Cape Cod. Their business thrived, but by the summer of 2010, when Haynes was in his late fifties, the headaches were, he said, “knocking me down like they never had before.” Doctors had told him that migraines diminish with age, but his stubbornly refused to do so. “During one of these attacks, I worked out that I’d spent two years in bed with a hot-water bottle around my head, and I began thinking about how to take my life,” he said. He had a new internist, though, and she recommended that he go to a Boston clinic that was dedicated to the treatment of headaches. He was willing to give it a try. But he wasn’t hopeful. How would a doctor there do anything different from all the others he’d seen?

That question interested me, too. I work at the hospital where the clinic is based. The John Graham Headache Center, as it’s called, has long had a reputation for helping people with especially difficult cases. Founded in the nineteen-fifties, it now delivers more than eight thousand consultations a year at several locations across eastern Massachusetts. Two years ago, I asked Elizabeth Loder, who’s in charge of the program, if I could join her at the clinic to see how she and her colleagues helped people whose problems had stumped so many others. I accompanied her for a day of patient visits, and that was when I met Haynes, who had been her patient for five years. I asked her whether he was the worst case she’d seen. He wasn’t even the worst case she’d seen that week, she said. She estimated that sixty per cent of the clinic’s patients suffer from daily, persistent headaches, and usually have for years.

In her examination room, with its white vinyl floor and sanitary-paper-

covered examination table against the wall, the fluorescent overhead lights were turned off to avoid triggering migraines. The sole illumination came from a low-wattage table lamp and a desktop-computer screen. Sitting across from her first patient of the day, Loder, who is fifty-eight, was attentive and unhurried, dressed in plain black slacks and a freshly pressed white doctor's coat, her auburn hair tucked into a bun. She projected both professional confidence and maternal concern. She had told me how she begins with new patients: "You ask them to tell the story of their headache and then you stay very quiet for a long time."

The patient was a reticent twenty-nine-year-old nurse who had come to see Loder about the chronic daily headaches she'd been having since she was twelve. Loder typed as the woman spoke, like a journalist taking notes. She did not interrupt or comment, except to say, "Tell me more," until the full story emerged. The nurse said that she enjoyed only three or four days a month without a throbbing headache. She'd tried a long list of medications, without success. The headaches had interfered with college, relationships, her job. She dreaded night shifts, since the headaches that came afterward were particularly awful.

Loder gave a sympathetic shake of her head, and that was enough to win the woman's confidence. The patient knew that she'd been heard by someone who understood the seriousness of her problem—a problem invisible to the naked eye, to blood tests, to biopsies, and to scans, and often not even believed by co-workers, family members, or, indeed, doctors.

She reviewed the woman's records—all the medications she'd taken, all the tests she'd undergone—and did a brief examination. Then we came to the moment I'd been waiting for, the moment when I would see what made the clinic so effective. Would Loder diagnose a condition that had never been suspected? Would she suggest a treatment I'd never heard of? Would she have some special microvascular procedure she could

perform that others couldn't?

The answer was no. This was, I later came to realize, the key fact about Loder's capabilities. But I didn't see it that day, and I was never going to see it in any single visit.

She started, disappointingly, by lowering expectations. For some ninety-five per cent of patients who see her, including this woman, the diagnosis is chronic migraines. And for chronic migraines, she explained, a complete cure was unlikely. Success meant that the headaches became less frequent and less intense, and that the patients grew more confident in handling them. Even that progress would take time. There is rarely a single, immediate remedy, she said, whether it was a drug or a change in diet or an exercise regimen. Nonetheless, she wanted her patients to trust her. Things would take a while—months, sometimes longer. Success would be incremental.

She asked the woman to keep a headache diary using a form she gave her to rate the peak level and hours of headache each day. She explained that together they would make small changes in treatments and review the diary every few months. If a regimen produced a greater than fifty-per-cent reduction in the number and severity of the headaches, they'd call that a victory.

Haynes told me that Loder gave him the same speech when he first saw her, in 2010, and he decided to stick with her. He liked how methodical she was. He kept his headache diary faithfully. They began by formulating a "rescue plan" for managing his attacks. During an attack, he often vomited pills, so she gave him a supply of non-narcotic rectal suppositories for fast-acting pain relief and an injectable medicine if they didn't work. Neither was pleasant to take, but they helped. The peak level and duration of his attacks diminished slightly. She then tried changing the medications he used for prevention. When one medicine caused side effects he couldn't tolerate, she switched to another, but that one didn't produce any reduction in headaches. He saw her every

three months, and they kept on measuring and adjusting.

The most exotic thing they tried was Botox—botulinum-toxin injections—which the F.D.A. had approved for chronic migraines in 2010. She thought he might benefit from injections along the muscles of his forehead. Haynes's insurer refused to cover the cost, however, and, at upwards of twelve hundred dollars a vial, the treatment was beyond what he could afford. So Loder took on the insurer, and after numerous calls and almost a year of delays Haynes won coverage.

After the first few rounds of injections—each treatment lasts three months and is intended to relax but not paralyze the muscles—Haynes noticed no dramatic change. He was on four medications for prevention, including the Botox, and had four escalating rescue treatments that he could resort to whenever a bad headache began to mount. Three years had passed, and progress had been minimal, but Loder was hopeful.

"I am actually quite optimistic about his long-term outlook for improvement," she wrote in her notes that spring. "I detect slow but steady progress. In particular, the extremes of headache at the upper end have come down nicely and vomiting is much less of a problem. That, in my experience, is a clear sign of regression." Haynes wasn't so sure. But after another year or so of adjustments he, too, began to notice a difference. The interval between bad attacks had lengthened to a week. Later, it stretched to a month. Then even longer.

When I met Haynes, in 2015, he'd gone more than a year without a severe migraine. "I haven't had a dreadful attack since March 13, 2014," he said, triumphantly. It had taken four years of effort. But Loder's systematic incrementalism had done what nothing else had.

I later went to visit Haynes and his wife at their lovely nine-room inn on the Cape. He was tall and lanky, with a John Cleese mustache and the kind of wary astonishment I imagine that men released after years in prison have. At sixty-two, he was savoring experiences he feared he'd

never get to have in his life.

Migraines had ruled his life for more than four decades. For the first time, he could read a book all the way through. He could take jet flights without fear of what the air pressure might do to his head. His wife couldn't say enough about the difference.

"It's almost a miracle," she said. "It has been life-changing for me. It makes me so happy that he's not ill. I feel good about my future. We can look forward together."

Recently, I checked in again, and he hadn't had another headache. Haynes doesn't like to think about what would have happened if he hadn't found the headache clinic. He wished he'd found it decades earlier. "Dr. Loder saved my life," he said.

We have a certain heroic expectation of how medicine works. Following the Second World War, penicillin and then a raft of other antibiotics cured the scourge of bacterial diseases that it had been thought only God could touch. New vaccines routed polio, diphtheria, rubella, and measles. Surgeons opened the heart, transplanted organs, and removed once inoperable tumors. Heart attacks could be stopped; cancers could be cured. A single generation experienced a **transformation** in the treatment of human illness as no generation had before. It was like discovering that water could put out fire. We built our health-care system, accordingly, to deploy firefighters. Doctors became saviors.

But the model wasn't quite right. If an illness is a fire, many of them require months or years to extinguish, or can be reduced only to a low-level smolder. The treatments may have side effects and complications that require yet more attention. Chronic illness has become commonplace, and we have been poorly prepared to deal with it. Much of what ails us requires a more patient kind of skill.

I was drawn to medicine by the aura of heroism—by the chance to

charge in and solve a dangerous problem. I loved learning how to unravel diagnostic mysteries on the general-medicine ward, and how to deliver babies in the obstetrics unit, and how to stop heart attacks in the cardiology unit. I worked in a DNA virus lab for a time and considered going into infectious diseases. But it was the operating room that really drew me in.

I remember seeing a college student with infectious mononucleosis, caused by the very virus I was studying in the lab—the Epstein-Barr virus. The infection causes the spleen to enlarge, and in rare cases it grows so big that it spontaneously ruptures, producing major internal bleeding. This is what happened to the student. He arrived in our emergency department in hemorrhagic shock. His pulse was rapid and thready. The team could barely detect a blood pressure. We rushed him to the operating room. By the time we got him on the table and under anesthesia, he was on the verge of cardiac arrest.

The resident opened the young man's belly in two moves: with a knife he made a swift, decisive slash down the middle, through the skin, from the rib cage to below his umbilicus, then with open-jawed scissors pushed upward through the linea alba—the tough fibrous tendon that runs between the abdominal muscles—as if it were wrapping paper. A pool of blood burst out of him. The resident thrust a gloved hand into the opening. The attending surgeon stood across from him, asking, in a weirdly calm, quiet voice, almost under his breath, "Have you got it?"

Pause.

"Now?"

Pause.

"You have thirty more seconds."

Suddenly, the resident had freed the spleen and lifted it to the surface. The organ was fleshy and heavy, like a sodden loaf of bread. A torrent

of blood poured out of a fissure on its surface. The attending surgeon put a clamp across its tether of blood vessels. The bleeding stopped instantly. The patient was saved.

How can anyone not love that? I knew there was a place for prevention and maintenance and incremental progress against difficult problems. But this seemed like the real work of saving lives. Surgery was a definitive intervention at a critical moment in a person's life, with a clear, calculable, frequently transformative outcome.

Fields like primary-care medicine seemed, by comparison, squishy and uncertain. How often could you really achieve victories by inveigling patients to take their medicines when less than half really do; to lose weight when only a small fraction can keep it off; to quit smoking; to deal with their alcohol problem; to show up for their annual physical, which doesn't seem to make that much difference anyway? I wanted to know I was doing work that would matter. I decided to go into surgery.

Not long ago, I was talking to Asaf Bitton, a thirty-nine-year-old internist I work with, about the contrast between his work and mine, and I made the mistake of saying that I had more opportunities to make a clear difference in people's lives. He was having none of it. Primary care, he countered, is the medical profession that has the greatest overall impact, including lower mortality and better health, not to mention lower medical costs. Asaf is a recognized expert on the delivery of primary health care around the world, and, over the next few days, he sent me evidence for his claims.

He showed me studies demonstrating that states with higher ratios of primary-care physicians have lower rates of general mortality, infant mortality, and mortality from specific conditions such as heart disease and stroke. Other studies found that people with a primary-care physician as their usual source of care had lower subsequent five-year mortality rates than others, regardless of their initial health. In the United Kingdom, where family physicians are paid to practice in

deprived areas, a ten-per-cent increase in the primary-care supply was shown to improve people's health so much that you could add ten years to everyone's life and still not match the benefit. Another study examined health-care reforms in Spain that focussed on strengthening primary care in various regions—by, for instance, building more clinics, extending their hours, and paying for home visits. After ten years, mortality fell in the areas where the reforms were made, and it fell more in those areas which received the reforms earlier. Likewise, reforms in California that provided all Medicaid recipients with primary-care physicians resulted in lower hospitalization rates. By contrast, private Medicare plans that increased co-payments for primary-care visits—and thereby reduced such visits—saw increased hospitalization rates. Further, the more complex a person's medical needs are the greater the benefit of primary care.

I finally had to submit. Primary care, it seemed, does a lot of good for people—maybe even more good, in the long run, than I will as a surgeon. But I still wondered how. What, exactly, is the primary-care physician's skill? I visited Asaf's clinic to see.

The clinic is in the Boston neighborhood of Jamaica Plain, and it has three full-time physicians, several part-timers, three physician assistants, three social workers, a nurse, a pharmacist, and a nutritionist. Together, they get some fourteen thousand patient visits a year in fifteen clinic rooms, which were going pretty much non-stop on the day I dropped by.

People came in with leg pains, arm pains, belly pains, joint pains, head pains, or just for a checkup. I met an eighty-eight-year-old man who had survived a cardiac arrest in a parking lot. I talked to a physician assistant who, in the previous few hours, had administered vaccinations, cleaned wax out of the ears of an elderly woman with hearing trouble, adjusted the medications of a man whose home blood-pressure readings were far too high, and followed up on a patient with diabetes.

The clinic had a teeming variousness. It didn't matter if patients had psoriasis or psychosis, the clinic had to have something useful to offer them. At any given moment, someone there might be suturing a laceration, lancing an abscess, aspirating a gouty joint, biopsying a suspicious skin lesion, managing a bipolar-disorder crisis, assessing a geriatric patient who had taken a fall, placing an intrauterine contraceptive device, or stabilizing a patient who'd had an asthma attack. The clinic was licensed to dispense thirty-five medicines on the premises, including steroids and epinephrine, for an anaphylactic allergic reaction; a shot of ceftriaxone, for newly diagnosed gonorrhea; a dose of doxycycline, for acute Lyme disease; or a one-gram dose of azithromycin for chlamydia, so that someone can directly observe that the patient swallows it, reducing the danger that he or she will infect someone else.

"We do the things you really don't need specialists for," a physician assistant said. And I saw what a formidably comprehensive range that could be. Asaf—Israeli-born and Minnesota-raised, which means that he's both more talkative and happier than the average Bostonian—told me about one of his favorite maneuvers. Three or four times a year, a patient comes in with disabling episodes of dizziness because of a condition called benign positional vertigo. It's caused by loose particles of calcified debris rattling around in the semicircular canal of the inner ear. Sometimes patients are barely able to stand. They are nauseated. They vomit. Just turning their head the wrong way, or rolling over in bed, can bring on a bout of dizziness. It's like the worst seasickness you can imagine.

"I have just the trick," he tells them.

First, to be sure he has the correct diagnosis, he does the Dix-Hallpike test. He has the patient sit on the examination table, turns his head forty-five degrees to one side with both hands, and then quickly lays him down flat with his head hanging off the end of the table. If Asaf's

diagnosis is right, the patient's eyes will shake for ten seconds or so, like dice in a cup.

To fix the problem, he performs what's known as the Epley maneuver. With the patient still lying with his head turned to one side and hanging off the table, Asaf rotates his head rapidly the other way until his ear is pointed toward the ceiling. He holds the patient's head still for thirty seconds. He then has him roll onto his side while turning his head downward. Thirty seconds later, he lifts the patient rapidly to a sitting position. If he's done everything right, the calcified particles are flung through the semicircular canal like marbles out a chute. In most cases, the patient feels better instantly.

"They walk out the door thinking you're a shaman," Asaf said, grinning. Everyone loves to be the hero. Asaf and his colleagues can deliver on-the-spot care for hundreds of conditions and guidance for thousands more. They run a medical general store. But, Asaf insisted, that's not really how primary-care clinicians save lives. After all, for any given situation specialists are likely to have more skill and experience, and more apt to follow the evidence of what works. Generalists have no advantage over specialists in any particular case. Yet, somehow, having a primary-care clinician as your main source of care is better for you.

Asaf tried to explain. "It's no one thing we do. It's all of it," he said. I found this unsatisfying. I pushed everyone I met at the clinic. How could seeing one of them for my—insert problem here—be better than going straight to a specialist? Invariably, the clinicians would circle around to the same conclusion.

"It's the relationship," they'd say. I began to understand only after I noticed that the doctors, the nurses, and the front-desk staff knew by name almost every patient who came through the door. Often, they had known the patient for years and would know him for years to come. In a single, isolated moment of care for, say, a man who came in with abdominal pain, Asaf looked like nothing special. But once I took in the

fact that patient and doctor really knew each other—that the man had visited three months earlier, for back pain, and six months before that, for a flu—I started to realize the significance of their familiarity.

For one thing, it made the man willing to seek medical attention for potentially serious symptoms far sooner, instead of putting it off until it was too late. There is solid evidence behind this. Studies have established that having a regular source of medical care, from a doctor who knows you, has a powerful effect on your willingness to seek care for severe symptoms. This alone appears to be a significant contributor to lower death rates.

Observing the care, I began to grasp how the commitment to seeing people over time leads primary-care clinicians to take an approach to problem-solving that is very different from that of doctors, like me, who provide mainly episodic care. One patient was a Spanish-speaking woman, younger-looking than her fifty-nine years, with a history of depression and migraines. She had developed an odd set of symptoms. For more than a month, she'd had facial swelling. Her face would puff up for a day, then go back to normal. Several days later, it would happen again. She pulled up pictures on her phone to show us: her face was swollen almost beyond recognition. There had been no pain, no itching, no rash. More recently, however, her hands and feet had started swelling as well, sometimes painfully. She had to stop wearing rings. Then the pain and numbness extended up her arms and into her chest, and that was what had prompted her to come in. She was having chest pain as she sat before us. "It feels like a cramp," she said. "My heart feels like it is coming out of my mouth. . . . The whole body feels like it's vibrating."

Doctors in other settings—say, an emergency room or an urgent-care clinic—would use a "rule out" strategy, running tests to rule out possible conditions, especially dangerous ones, as rapidly as possible. We would focus first on the chest pain—women often have less classic symptoms

of a heart attack than men do—and order an EKG, a cardiac stress test, and the like to detect coronary-artery disease. Once that was ruled out, we might give her an antihistamine and watch her for a couple of hours to see if the symptoms went away. And, when that didn't work, we would send her home and figure, Oh, well, it's probably nothing.

This was not, however, the way the woman's primary-care physician approached her condition. Dr. Katherine Rose was a young, freckle-faced physician two years out of training, with a precise and methodical air. "I'm not sure I know what's going on," she admitted to the woman.

The symptoms did not fit together in an obvious way. But, rather than proceed directly to an arsenal of tests, Rose took a different, more cautious, more empirical approach, letting the answer emerge over time. It wasn't that she did no tests—she did an electrocardiogram, to make sure the woman really wasn't in the midst of a heart attack, and ordered a couple of basic blood tests. But she didn't expect that they'd show anything meaningful. (They didn't.) Instead, she asked the patient to take allergy medicine and to return to see her in two weeks. She'd monitor her over time to see how the symptoms evolved.

Rose told me, "I think the hardest transition from residency, where we are essentially trained in inpatient medicine, to my practice as a primary-care physician was feeling comfortable with waiting. As an outpatient doctor, you don't have constant data or the security of in-house surveillance. But most of the time people will get better on their own, without intervention or extensive workup. And, if they don't get better, then usually more clues to the diagnosis will emerge, and the steps will be clearer. For me, as a relatively new primary-care physician, the biggest struggle is trusting that patients will call if they are getting worse." And they do, she said, because they know her and they know the clinic. "Being able to tolerate the anxiety that accompanies taking care of people who are sick but not dangerously ill is not a skill I was expecting to need when I decided to become a doctor, but it is one of

the ones I have worked hardest to develop.”

The woman’s symptoms disappeared after two weeks. A physician assistant figured out why: the patient had run out of naproxen, an analgesic medication she took for her migraine attacks, which in rare instances can produce soft-tissue swelling, through both allergic and nonallergic mechanisms. She would have to stay off all medications in that class. An urgent-care team wouldn’t have figured this out. Now Rose contacted the Graham Headache Center to help identify an alternative medication for the woman’s migraines.

Like the specialists at the Graham Center, the generalists at Jamaica Plain are incrementalists. They focus on the course of a person’s health over time—even through a life. All understanding is provisional and subject to continual adjustment. For Rose, taking the long view meant thinking not just about her patient’s bouts of facial swelling, or her headaches, or her depression, but about all of it—along with her living situation, her family history, her nutrition, her stress levels, and how they interrelated—and what that picture meant a doctor could do to improve her patient’s long-term health and well-being throughout her life.

Success, therefore, is not about the episodic, momentary victories, though they do play a role. It is about the longer view of incremental steps that produce sustained progress. That, such clinicians argue, is what making a difference really looks like. In fact, it is what making a difference looks like in a range of endeavors.

On Friday, December 15, 1967, at 4:55 p.m., the Silver Bridge, which spanned the Ohio River, was funnelling the usual crawl of rush-hour traffic between Gallipolis, Ohio, and Point Pleasant, West Virginia, when a shotgun-like blast rang out. It was the sound of a critical link in the bridge’s chain-suspension system giving way. In less than a minute, 1,750 feet of the 2,235-foot span collapsed, and seventy-five vehicles dropped into the river, eighty feet below. “The bridge just keeled over,

starting slowly on the Ohio side then following like a deck of cards to the West Virginia side," a witness said. Forty-six people died; dozens more were injured.

The newly established National Transportation Safety Board conducted its first major disaster investigation and reconstructed what had happened. Until then, state and federal government officials regarded such catastrophes as largely random and unavoidable. They focussed on building new bridges and highways, and employed mainly reactive strategies for problems with older ones. The investigation determined that corrosion of the four-decade-old bridge, combined with an obsolete design (it was built to handle Model T traffic, not cars and trucks several times heavier), had caused the critical fracture. Inspection could have caught the issue. But the Silver Bridge had had just one complete inspection since its opening, in 1928, and never with such concerns in mind. The collapse signalled the need for a new strategy. Although much of the United States' highway system was still relatively new, hundreds of bridges were more than forty years old and had been designed, like the Silver Bridge, for Model T traffic. Our system was entering middle age, and we didn't have a plan for it.

The federal government launched a standard inspection system and an inventory of public bridges—six hundred thousand in all. Almost half were found to be either structurally deficient or functionally obsolete, meaning that critical structural elements were either in "poor condition" or inadequate for current traffic loads. They were at a heightened risk of collapse. The good news was that investments in maintenance and improvement could extend the life of aging bridges by decades, and for a fraction of the cost of reconstruction.

Today, however, we still have almost a hundred and fifty thousand problem bridges. Sixty thousand have traffic restrictions because they aren't safe for carrying full loads. Where have we gone wrong? The pattern is the same everywhere: despite knowing how much cheaper

preservation is, we chronically raid funds intended for incremental maintenance and care, and use them to pay for new construction. It's obvious why. Construction produces immediate and visible success; maintenance doesn't. Does anyone reward politicians for a bridge that doesn't crumble?

Even with serious traffic restrictions, one in a thousand structurally deficient bridges collapses each year. Four per cent of such collapses cause loss of life. Based on the lack of public response, structural engineers have judged this to be "in a tolerable range."

They also report that bridges are in better condition than many other parts of our aging infrastructure. The tendency to avoid spending on incremental maintenance and improvements has shortened the life span of our dams, levees, roads, sewers, and water systems. This situation isn't peculiar to the United States. Governments everywhere tend to drastically undervalue incrementalism and overvalue heroism.

"Typically, breakdowns—bridge washouts, overpass collapses, dam breaches—must occur before politicians and voters react to need," one global infrastructure report observes. "Dislocation leads to rushed funding on an emergency basis with dramatically heightened costs."

None of this is entirely irrational. The only visible part of investment in incremental care is the perennial costs. There is generally little certainty about how much spending will really be needed or how effective it will be. Rescue work delivers much more certainty. There is a beginning and an end to the effort. And you know what all the money and effort is (and is not) accomplishing. We don't like to address problems until they are well upon us and unavoidable, and we don't trust solutions that promise benefits only down the road.

Incrementalists nonetheless want us to take a longer view. They want us to believe that they can recognize problems before they happen, and that, with steady, iterative effort over years, they can reduce, delay, or eliminate them. Yet incrementalists also want us to accept that they will

never be able to fully anticipate or prevent all problems. This makes for a hard sell. The incrementalists' contribution is more cryptic than the rescuers', and yet also more ambitious. They are claiming, in essence, to be able to predict and shape the future. They want us to put our money on it.

For a long time, this would have seemed as foolish as giving your money to a palmist. What will happen to a bridge—or to your body—fifty years from now? We had no more than a vague idea. But the investigation of the 1967 Silver Bridge collapse marked an advance in our ability to shift from reacting to bridge catastrophes to anticipating and averting them.

Around the same time, something similar was happening in medicine. Scientists were discovering the long-term health significance of high blood pressure, diabetes, and other conditions. We'd begun collecting the data, developing the computational capacity to decode the patterns, and discovering the treatments that could change them. Seemingly random events were becoming open to prediction and alteration. Our frame of medical consideration could widen to encompass our entire life spans.

There is a lot about the future that remains unpredictable. Nonetheless, the patterns are becoming more susceptible to empiricism—to a science of surveillance, analysis, and iterative correction. The incrementalists are overtaking the rescuers. But the transformation has itself been incremental. So we're only just starting to notice.

Our ability to use information to understand and reshape the future is accelerating in multiple ways. We have at least four kinds of information that matter to your health and well-being over time: information about the state of your internal systems (from your imaging and lab-test results, your genome sequencing); the state of your living conditions (your housing, community, economic, and environmental circumstances); the state of the care you receive (what your

practitioners have done and how well they did it, what medications and other treatments they have provided); and the state of your behaviors (your patterns of sleep, exercise, stress, eating, sexual activity, adherence to treatments). The potential of this information is so enormous it is almost scary.

Instead of once-a-year checkups, in which people are like bridges undergoing annual inspection, we will increasingly be able to use smartphones and wearables to continuously monitor our heart rhythm, breathing, sleep, and activity, registering signs of illness as well as the effectiveness and the side effects of treatments. Engineers have proposed bathtub scanners that could track your internal organs for minute changes over time. We can decode our entire genome for less than the cost of an iPad and, increasingly, tune our care to the exact makeup we were born with.

Our health-care system is not designed for this future—or, indeed, for this present. We built it at a time when such capabilities were virtually nonexistent. When illness was experienced as a random catastrophe, and medical discoveries focussed on rescue, insurance for unanticipated, episodic needs was what we needed. Hospitals and heroic interventions got the large investments; incrementalists were scanted. After all, in the nineteen-fifties and sixties, they had little to offer that made a major difference in people's lives. But the more capacity we develop to monitor the body and the brain for signs of future breakdown and to correct course along the way—to deliver "precision medicine," as the lingo goes—the greater the difference health care can make in people's lives, as well as in reducing future costs.

This potential for incremental medicine to improve and save lives, however, is dramatically at odds with our system's allocation of rewards. According to a 2016 compensation survey, the five highest-paid specialties in American medicine are orthopedics, cardiology, dermatology, gastroenterology, and radiology. Practitioners in these

fields have an average income of four hundred thousand dollars a year. All are interventionists: they make most of their income on defined, minutes- to hours-long procedures—replacing hips, excising basal-cell carcinomas, doing endoscopies, conducting and reading MRIs—and then move on. (One clear indicator: the starting income for cardiologists who perform invasive procedures is twice that of cardiologists who mainly provide preventive, longitudinal care.)

Here are the lowest-paid specialties: pediatrics, endocrinology, family medicine, H.I.V./infectious disease, allergy/immunology, internal medicine, psychiatry, and rheumatology. The average income for these practitioners is about two hundred thousand dollars a year. Almost certainly at the bottom, too, but not evaluated in the compensation survey: geriatricians, palliative-care physicians, and headache specialists. All are incrementalists—they produce value by improving people's lives over extended periods of time, typically months to years.

This hundred-per-cent difference in incomes actually understates the degree to which our policies and payment systems have given short shrift to incremental care. As an American surgeon, I have a battalion of people and millions of dollars of equipment on hand when I arrive in my operating room. Incrementalists are lucky if they can hire a nurse.

Already, we can see the cost of this misalignment. As rates of smoking fall, for instance, the biggest emerging killer is uncontrolled hypertension, which can result in stroke, heart attack, and dementia, among other conditions. Thirty per cent of Americans have high blood pressure. Although most get medical attention, only half are adequately treated. Globally, it's even worse—a billion people have hypertension, and only fourteen per cent receive adequate treatment. Good treatment for hypertension is like bridge maintenance: it requires active monitoring and incremental fixes and adjustments over time but averts costly disasters. All the same, we routinely skimp on the follow-through. We'll deploy an army of experts and a mountain of resources to

separate conjoined twins—but give Asaf Bitton enough to hire a medical aide or a computerized system to connect electronically with high-blood-pressure patients and help them live longer? Forget about it.

Recently, I called Bill Haynes's internist, Dr. Mita Gupta, the one who recognized that the John Graham Headache Center might be able help him. She had never intended to pursue a career in primary care, she said. She'd planned to go into gastroenterology—one of the highly paid specialties. But, before embarking on specialty training, she took a temporary position at a general medical clinic in order to start a family. "What it turned into really surprised me," she said. As she got to know and work with people over time, she saw the depth of the impact she could have on their lives. "Now it's been ten years, and I see the kids of patients of mine, I see people through crises, and I see some of them through to the end of their lives." Her main frustration: how little recognized her abilities are, whether by the insurers, who expect her to manage a patient with ten different health problems in a fifteen-minute visit, or by hospitals, which rarely call to notify her, let alone consult her, when a patient of hers is admitted. She could do so much more for her patients with a bit more time and better resources for tracking, planning, and communicating. Instead, she is constantly playing catch-up. "I don't know a primary-care physician who eats lunch," she said.

The difference between what's made available to me as a surgeon and what's made available to our internists or pediatricians or H.I.V. specialists is not just shortsighted—it's immoral. More than a quarter of Americans and Europeans who die before the age of seventy-five would not have died so soon if they'd received appropriate medical care for their conditions, most of which were chronic. We routinely countenance inadequate care among the most vulnerable people in our communities—including children, the elderly, and the chronically ill.

I see the stakes in my own family. My son, Walker, was born with a heart condition, and in his first days rescue medicine was what he

needed. A cardiology team deployed the arsenal that saved him: the drips that kept his circulation going, the surgery that closed the holes in his heart and gave him a new aortic arch. But incremental medicine is what he has needed ever since.

For twenty-one years, he has had the same cardiologist and nurse practitioner. They saw him through his first months, when weight gain, stimulation, and control of his blood pressure were essential. They saw him through his first decade, when all he turned out to need was someone to keep a cautious eye on how his heart did as he developed and took on sports. They saw him through his growth spurt, when the size of his aorta failed to keep up with his height, and guided us through the difficult choices about what operation he needed, when, and who should do it. Then they saw him through his thankfully smooth recovery.

When he began to struggle in middle school, a psychologist's evaluation identified deficits that, he warned us, meant that Walker would probably not have the cognitive capacity for college. But the cardiologist recognized that Walker's difficulties fit with new data showing that kids with his heart condition tend to have a particular pattern of neurological deficits in processing speed and other functions which could potentially be managed. In the ensuing years, she and his pediatrician helped bring in experts to work with him on his learning and coping skills, and school planning. He's now a junior in college, majoring in philosophy, and emerging as a writer and an artist. Rescue saved my son's life. But without incremental medicine he would never have the long and full life that he could.

In the next few months, the worry is whether Walker and others like him will be able to have health-care coverage of any kind. His heart condition makes him, essentially, uninsurable. Until he's twenty-six, he can stay on our family policy. But after that? In the work he's done in his field, he's had the status of a freelancer. Without the Affordable Care Act's protections requiring all insurers to provide coverage to people

regardless of their health history and at the same price as others their age, he'd be unable to find health insurance. Republican replacement plans threaten to weaken or drop these requirements, and leave no meaningful solution for people like him. And data indicate that twenty-seven per cent of adults under sixty-five are like him, with past health conditions that make them uninsurable without the protections.

The coming years will present us with a far larger concern, however. In this era of advancing information, it will become evident that, for everyone, life is a preexisting condition waiting to happen. We will all turn out to have—like the Silver Bridge and the growing crack in its critical steel link—a lurking heart condition or a tumor or a depression or some rare disease that needs to be managed. This is a problem for our health-care system. It doesn't put great value on care that takes time to pay off. But this is also an opportunity. We have the chance to transform the course of our lives.

Doing so will mean discovering the heroism of the incremental. That means not only continuing our work to make sure everyone has health insurance but also accelerating efforts begun under health reform to restructure the way we deliver and pay for health care. Much can be debated about how: there are, for example, many ways to reward clinicians when they work together and devise new methods for improving lives and averting costs. But the basic decision has the stark urgency of right and wrong. We can give up an antiquated set of priorities and shift our focus from rescue medicine to lifelong incremental care. Or we can leave millions of people to suffer and die from conditions that, increasingly, can be predicted and managed. This isn't a bloodless policy choice; it's a medical emergency. ?

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