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How Intermountain Trimmed Health Care Costs Through Robust Quality Improvement Efforts

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ABSTRACT **It has been estimated that full implementation of the Affordable Care Act will extend coverage to thirty-two million previously uninsured Americans. However, rapidly rising health care costs could thwart that effort. Since 1988 Intermountain Healthcare has applied to health care delivery the insights of W. Edwards Deming's process management theory, which says that the best way to reduce costs is to improve quality. Intermountain achieved such quality-based savings through measuring, understanding, and managing variation among clinicians in providing care. Intermountain created data systems and management structures that increased accountability, drove improvement, and produced savings. For example, a new delivery protocol helped reduce rates of elective induced labor, unplanned cesarean sections, and admissions to newborn intensive care units. That one protocol saves an estimated $50 million in Utah each year. If applied nationally, it would save about $3.5 billion. "Organized care" along these lines may be central to the long-term success of health reform.**

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Intermountain Healthcare is an integrated delivery system based in Utah and Idaho. Its network of twenty-three hospitals and 160 clinics provides more than half of all health care delivered in the region. Intermountain's hospitals range from critical-access facilities in rural areas to large, urban teaching hospitals. Although Intermountain has an employed physician group and a health insurance plan, the majority of its care is performed by independent, community-based physicians and is paid for by government and commercial payers.

Intermountain has been identified as a low-cost, high-quality provider.[1] It has made demonstrated improvements in clinical quality that have lowered the cost of care delivery. Those successes come from two primary factors: First, Intermountain developed an ability to measure, understand, and feed back to clinicians and clinical leadership detailed clinical variation and outcome data. Second, the system created an administrative structure that uses its robust clinical information to oversee the performance of care delivery and to drive positive change.

Shifting The Focus From Provider To Process Variation

In 1986 an Intermountain team launched an effort to measure practice variation,[2] focusing on the details of care in specific, common treatments. Over two years the team studied transurethral prostatectomy (removal of the prostate), cholecystectomy (removal of the gallbladder), total hip replacement, coronary artery bypass graft surgery, community-acquired pneumonia, and cardiac pacemaker implantation.

After all of the patients who had received the treatments under study were identified, their medical records were reviewed to quantify the severity of the primary disease; to identify and

quantify all comorbid conditions; and to identify and quantify all in-hospital complications that had occurred. The result was a detailed list of the elements that made up a treatment, each of which represented a clinical decision or action, along with related clinical outcomes. For example, the study tracked all laboratory tests; imaging examinations; drug doses; risk-adjusted nursing hours; risk-adjusted operating room minutes; and other clinical elements, such as how many grams of prostatic tissue were surgically excised during transurethral prostate surgery.

Cardiac pacemaker implantation was the treatment with the fewest elements (40), and coronary bypass surgery had the most (122). About half of the elements had associated costs. The team used Intermountain's activity-based cost accounting system to extract an accurate cost for each element that consumed hospital resources. Then it used the resulting information to conduct clinical quality, financial utilization, and hospital efficiency (or QUE) analyses. The team made several discoveries.

WHAT INTERMOUNTAIN LEARNED First, most hospital admissions for a specific treatment had similar characteristics. Even for coronary bypass surgery, more than 80 percent of the patients showed similar severity and complexity of disease on admission, had no major complications, and achieved good clinical outcomes. The team did not find a single instance in which any one physician's patients demonstrated higher levels of severity or complexity ("my patients are sicker") than the patients of other physicians in the study.

In contrast, there was massive variation in physicians' practices. Although use rates of particular treatment elements were consistent for individual physicians, they varied greatly across physicians. For instance, when the team examined individual treatment elements used for patients who were similar at hospital admission and achieved a good final outcome, it found that the highest physician-use rates were 1.6–5.6 times greater than the lowest rates. For each treatment, the hospital's cost per case, not counting payments to physicians, showed about a twofold variation.

Despite deliberately choosing some of Intermountain's highest-volume treatments and focusing on high-volume physicians, the study lacked sufficient statistical power to rank physicians accurately.[3] It did not find any physician who was consistently a high or low utilizer across all of the elements tracked. Best patient care did not reside in any one physician. Every physician had something to learn, but also something to teach.

Finally, although the study could not accurately identify which physicians were providing optimal care, Intermountain could legitimately ask why physicians' use rates were so different and what constituted best care.

PROCESS MANAGEMENT Accordingly, the findings forced Intermountain to focus on the processes of care delivery that underlie particular treatments, rather than on the clinicians who executed those processes—the "measurement for improvement" approach discussed below. As the inquiry continued, the system was eventually able to document significant declines in physician variation. Physicians led almost all of the changes themselves. Declines in variation were associated with large declines in costs, while clinical outcomes remained at their original high levels. For example, Intermountain's average internal cost for performing a total hip replacement fell from more than $12,000 in 1987 to about $8,000 per case in 1989.

The Intermountain clinical quality, financial utilization, and hospital efficiency analyses led the system to process management theory. Quality improvement is the science of process management. W. Edwards Deming, the father of quality improvement, argued that every process always produces parallel physical, cost, and service outcomes.[4] In medicine, clinical outcomes correspond to Deming's physical outcomes. Cost outcomes represent the resources expended to create the clinical outcome, and service outcomes describe the interactions between a care provider and a patient as the process takes place.

Deming carried his analysis one step further, demonstrating that most process changes that produce better physical outcomes also cause costs to fall, and that in most cases, the best way to reduce cost is to improve quality.[5] Deming's insights gave Intermountain the tools it needed to take broad advantage of the quality-cost relationship in clinical and administrative services.

Refining Variance Measurement

In 1991 an Intermountain team led by Alan Morris, the head of pulmonary intensive care medicine at Intermountain's flagship LDS Hospital, achieved a breakthrough in measuring clinical process variation. Morris and his colleagues created an evidence-based clinical practice guideline for managing the settings on mechanical ventilators used to treat a serious pulmonary illness called acute respiratory distress syndrome. They did not rely on teaching the guideline to clinicians and then asking those clinicians to remember to apply it, and to do so correctly from memory. Instead, they blended the guideline into the flow of clinical work at

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the bedside, adding it to the checklists, order sets, and clinical flow sheets—which track each patient's physiologic pulmonary information over time—that the clinicians already routinely used to deliver care, so that it became a normative default.

However, the clinicians' experience showed that the guideline was almost never perfectly appropriate for a patient. The clinicians had to adapt the guideline to each patient's particular needs. Morris's team recorded all of the adaptations as variances and reported them back to the clinical team treating the patient. The members of the care delivery team sometimes modified the guideline in response to the variances, to reflect the realities of care more accurately. In addition, clinicians often modified their practices to follow the guideline as closely as they could.

In the subcategory of patients who were most seriously ill with acute respiratory distress syndrome, applying this method reduced the rate of guideline variances from 59 percent to 6 percent within four months. Patient survival increased from 9.5 percent to 44 percent; physicians' time commitments fell by about half; and the total cost of care decreased by 25 percent.[6]

Even though the initial guideline represented an evidence-based best-care standard, the variance feedback loop led to many changes in the guideline. The initial rate of change was quite high. In its first four months of use, the team applied more than 125 changes to the guideline, which contained 840 specific recommendations regarding "best care." The guideline has been in constant use—and change—ever since, but now there are only about one or two minor changes per month.

Today at Intermountain we call this approach "shared baselines."[7] It is the main tool we use for measuring and controlling practice variation—a key part of the effective management of care delivery.

The System's Imperative For Improvement

By 1995 an Intermountain analysis showed sixty-five specific quality improvement interventions—such as Morris's guideline—that had reduced the costs of clinical care by improving patients' clinical outcomes. Intermountain had about $30 million in documented savings from those projects, representing about 2 percent of its total cost of clinical operations. These savings "bent the cost curve." They applied not just to the patients treated during the initial project, but to every such patient whom Intermountain treated afterward.

The same analysis highlighted a major shortcoming. All but three of the interventions had occurred in a single, local practice. Had we been able to extend all sixty-five interventions across the entire Intermountain system, a conservative estimate was that the savings would have totaled $100–$150 million per year, representing 6–10 percent of annual clinical costs. Faced with such compelling numbers, Intermountain's leaders demanded a strategic plan that would make clinical quality the system's core business strategy.

We called the resulting initiative "clinical integration."[8] Its aim was clinical management, or using our existing management structure to oversee the delivery of clinical care. The initiative had four components: identifying key processes; creating information systems designed for parallel clinical and financial management; revising the organization's structure so that it could use the resulting data to encourage accountability and change; and aligning financial incentives so that clinicians would not suffer financial harm for doing what was best for patients.

IDENTIFYING KEY PROCESSES Not all processes are equal in size and effect. Some are the "golden few"—the relative handful of processes that make up the bulk of the care that a clinical organization delivers. This concept lies at the heart of the Malcolm Baldrige National Quality Award[9] and the Institute of Medicine's prescription for health system reform.[10] Intermountain sought to identify this relatively small subset of key processes.

We divided Intermountain's work processes into four subgroups: clinical processes associated with specific clinical conditions (clinical programs); clinical processes that are not condition specific (clinical support services, such as pharmacy or imaging); processes related to service quality (patient perceptions of quality); and

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Clinical Processes

We found that 104 clinical processes accounted for 95 percent of all of Intermountain's care delivery.

administrative support processes. We identified and then prioritized the processes within each subgroup.

For example, we found more than 1,400 inpatient and outpatient work processes that corresponded to specific clinical conditions and thus fit in the first subgroup. We used three metrics to prioritize the processes: the number of patients affected; the health risk to patients (estimated by intensity of care, as reflected in cost per case); and internal variability measured as the coefficient of variation in intensity of care.

We found that 104 clinical processes—roughly 7 percent of the 1,400—accounted for 95 percent of all of Intermountain's care delivery. Individual clinical processes were markedly different in terms of the number of patients they served, the health risks associated with the clinical problem and its treatment, and the associated care delivery costs. For example, 11 percent of Intermountain's care delivery costs are related to pregnancy, labor, and delivery; another 10 percent are related to ischemic heart disease. Thus, our first interventions were for clinical processes in those two areas.

Our focus on key clinical processes had a major secondary impact. These processes represent the entire care continuum that patients experience, without concern for the location of the care, such as home-based, clinic-based, or inpatient care delivery. Correctly managed, they lead naturally to patient-centered care. Instead of selling clinic visits, hospitalizations, or technologies to prospective patients, a health system organized around key clinical processes finds its business model driven toward population-level health. This means shifting the focus to modifying the factors that cause disease, with the goal of avoiding future costs for care, instead of responding to health problems only after they appear.

A CLINICAL MANAGEMENT INFORMATION SYSTEM In the late 1980s and early 1990s Intermountain launched two major attempts to implement clinical management. Both failed. As it launched a third attempt in 1995, Intermountain carefully analyzed its initial efforts.

Intermountain has very extensive administrative data systems that evolved over time to manage budgets, facilities, and clinical measures imposed by external regulators. On both previous occasions, those undertaking the efforts had assumed that they could use Intermountain's existing administrative data systems to achieve clinical management. That was a fatal mistake. Intermountain's existing administrative data systems did not track 30–50 percent of the data critical to managing its clinical processes.

For example, Intermountain's guidelines recommending appropriate antibiotics to treat community-acquired pneumonia are much more specific than national measures. But detailed information about antibiotic use was not available in any of its administrative data systems.

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The difficulties experienced in Intermountain's first two attempts at clinical management were not limited to the data that were being used. A deeper problem was the way the team was thinking about data for clinical management.

The National Quality Forum's Strategic Framework Board has identified two approaches to clinical quality measurement.[11] The first, "measurement for selection," ranks the performance of care providers so that health care consumers—patients, purchasers, regulators, and referring physicians—can use the information to move toward high-value care. In theory, the ranking establishes strong incentives for care providers to improve their reported performance.

The second approach, "measurement for improvement," focuses on the processes of care delivery rather than the providers who execute them, and it generates data for front-line process management and improvement. Although measurement for improvement contains the information necessary for measurement for selection, the opposite does not hold true: In almost all circumstances, measurement for selection is not adequate to support measurement for improvement.[11]

The Intermountain team decided to focus on measurement for improvement, as noted above. It adapted measurement design methods originally developed for large, multicenter randomized controlled trials.[12] That led Intermountain to adopt a formal methodology that identifies a parsimonious set of data on guideline adherence (or variation), as well as intermediate[13] and final clinical, cost, and service outcomes built around specific clinical care processes. These data populated the new systems Intermountain created for

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clinical management.

Creating these systems required a great deal of time and resources. Therefore, Intermountain built them in size order. For example, in 1997 the team created measurement systems for care related to pregnancy, labor, and delivery and for ischemic heart disease. Once those systems were completed, there was sufficient information for the clinical and financial management of 21 percent of Intermountain's care delivery. Today we have data for the management of more than 60 of Intermountain's 104 key clinical processes, including those for major chronic diseases such as diabetes mellitus, heart failure, and depression. Those 60 clinical processes represent almost 80 percent of Intermountain's clinical activities.

The Intermountain experience might not be generalizable to all care delivery organizations. But to the extent that it is, we conclude that any organization basing its clinical measurements on inadequate internal administrative data and external regulatory requirements—rather than on intermediate and final clinical, cost, and service outcomes built around specific clinical care processes—will fail in its attempts to manage care delivery. "Measurement for selection" data reporting mandated by external regulatory agencies often competes for limited internal resources, and thus it can actively harm efforts to improve quality and reduce costs.[14,15]

IMPROVING CLINICAL CARE BY REORGANIZING ITS DELIVERY The majority of the physicians involved in executing Intermountain's key clinical processes are independent, community-based practitioners. This protected Intermountain from a classic blunder: We didn't try to control physicians' practice behavior by top-down command and control through an employment relationship.[16] Instead, we relied on solid process and outcome data, professional values that focused on patients' needs, and a shared culture of high quality.

The details of Intermountain's reorganized clinical management structure are documented elsewhere.[8] It is built around part-time physician-leaders teamed with full-time nurse administrators—clinical leadership dyads, or pairs—based within geographic regions. The clinical dyads meet monthly with the physicians and nurses who deliver care in their region. They use the clinical management information system to review data on clinical, cost, and service outcomes for each care delivery group. More important, the clinical leadership dyads from across the entire Intermountain system meet monthly as a group to identify and address improvement opportunities. They test possible solutions and disseminate successful results.

For example, in 2001 the Intermountain pregnancy, labor, and delivery leadership dyad focused on the induction of early labor as a target for improvement. They created a shared baseline that identified when elective induction is medically appropriate and deployed it across the entire Intermountain system, which performs more than 32,000 deliveries each year. When an expectant mother arrived at the hospital for an elective induction, nurses completed an electronic check sheet that summarized appropriateness criteria. If the patient met the criteria, the induction proceeded; if not, the nurses informed the attending obstetrician that they could not proceed without approval from the chair of the obstetrics department or from a perinatalogist—a specialist in high-risk pregnancies.

Elective inductions that did not meet strong indications for clinical appropriateness fell from 28 percent to less than 2 percent of all inductions. The length of time women collectively spent in labor fell by roughly thirty-one days per year. As a result, Intermountain is now able to deliver about 1,500 additional newborns each year without any additional beds or nurses.[17]

The new protocol reduced the rates of unplanned surgical delivery (cesarean section) and the attendant higher costs. Intermountain's overall rate of deliveries by cesarean section is now 21 percent, while the national rate is approaching 34 percent. The protocol also reduced admission rates to our newborn intensive care units, reducing their costs as well. We estimate that the Intermountain elective induction protocol reduces health care costs in Utah by about $50 million per year. If applied nationally, it would lower health care delivery costs by about $3.5 billion annually.

Intermountain can point to more than 100 similar successful clinical improvement initiatives introduced since 1995, in which effective clinical management, built on a foundation of sound data about clinical and financial processes, has improved clinical outcomes and

$50 million

Cost Reductions

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reduced care delivery costs.

ALIGNING FINANCIAL INCENTIVES Quality improvement is innately a preventive strategy. It achieves most of its cost savings by improving care "upstream," thereby avoiding "downstream" failures and their associated recovery costs. Most clinical savings stem from reduced hospitalizations, reduced emergency department visits, and reduced resource consumption within care delivery episodes. David Clark and coauthors provide specific examples of the cost savings that resulted from clinical improvement efforts at Intermountain.[18] Such savings extend well beyond savings from administrative improvements.

Unfortunately, health care providers today are paid for precisely those care delivery episodes that quality improvement seeks to reduce. As Intermountain teams implemented clinical management, clinical outcomes improved and costs fell. However, our payments also fell—often even further than our operating costs. For example, although improvement in Intermountain's appropriate elective induction rates saved the citizens of Utah more than $50 million per year through reduced payments, Intermountain's costs fell by only about $41 million. Intermountain thus lost more than $9 million per year in operating margins. Implementing better care required us to invest in education, work-flow redesign, and new data systems. As we improved, the resources to drive further change disappeared.

Implications For Policy, Research, And Practice

From 1993 through 2000, total health care delivery costs for the United States remained at a relatively stable 13.7 percent of gross domestic product.[19] This is the only period when the United States "bent the cost curve" for health care.

Although part of the reason for this success was the rapid growth of the US economy, the main contributor was the health maintenance organization movement, which included a payment system that put care providers at financial risk for their decisions to use health care resources. The movement eventually failed because of perceptions that it gave health care providers incentives to withhold necessary care, thus damaging quality. Even though empirical evaluations showed no worse, and sometimes slightly better, clinical outcomes,[20] health maintenance organizations were not able to overcome these perceptions. Questions about limiting patients' choice of providers also contributed to the movement's demise.

Quality improvement is innately a preventive strategy.

The Affordable Care Act of 2010 aims to extend health insurance coverage substantially, and the Congressional Budget Office has estimated the number of people who will become newly insured at thirty-two million US citizens.[21] Achieving that goal requires that growth in health care costs be brought under control.

All of the act's major initiatives to reform the care system—such as accountable care organizations and patient-centered medical homes—are intended to "bend the cost curve." They reflect sophisticated forms of provider cost sharing, an approach that differs from the health maintenance organization in three major ways.

First, in the past twenty years we have seen great improvement in the science of clinical risk adjustment and quality measurement. Well-organized care delivery groups can apply that science to generate and use robust measures that lead to effective care management. Second, the groups charged with managing the care are clinical teams at the bedside, not distant health insurance companies. The third difference between the new organizational structures proposed in the Affordable Care Act and health maintenance organizations is a major advantage for the former: When a care delivery group reduces health care costs by improving clinical outcomes, some of those savings will flow back to the clinical teams that delivered better care. This aligns financial incentives with efforts to improve clinical quality.

Taken together, these policy changes are crucial. Truly "managed care" means "organized care"—care whose hallmarks include rich clinical and financial data that inform the decisions of clinical teams at the bedside; and clinical teams that employ patient-centered care processes leading to improved population health. Researchers must partner with practitioners to evaluate and demonstrate innovative financial alignment models. A central challenge for policy makers now is to align financial incentives and drive the transition to organized care systems that can provide "the best clinical result at the lowest necessary cost."[22] ■

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NOTES

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22 This short version of Intermountain Healthcare's mission statement is used frequently in Intermountain's clinical and administrative leadership meetings.