High-Value Care Delivery
What Works, What Doesn’t

A Mayo Clinic Health Policy Center meeting in conjunction with the Arizona State University Healthcare Delivery and Policy Program

April 22 and 23, 2010 — Tempe, Ariz.
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MEETING OVERVIEW

A small group of health-care providers from diverse backgrounds — hospital systems, integrated group practices, nurse-managed health centers and independent physician groups — gathered to discuss innovative, value-based health care delivery models at work in their organizations. During the course of the meeting, participants identified common principles that facilitate value creation in a variety of settings — from high-intensity tertiary care to population-based care. Examples include:

• Identify a value proposition to encourage physicians and other providers to work together.
• Switch from a “competitor” mindset to a cooperative, patient-centered approach.
• Train team members to speak a common language.
• Standardize processes and identify a “process owner” to successfully champion change.
• Use technology to harness large amounts of data, bringing it to the bedside or clinic to serve the patient.
• Use transparent, provider-specific data to persuade independent physicians to participate in efforts to improve patient outcomes and the efficiency of care.
• Recognize that organizations must be willing to lose some staff if they cannot be supportive of safe, appropriate, high-quality care delivery.

CHALLENGES TO CREATING HIGHER-VALUE HEALTH CARE

While reviewing their case studies, participants began to pinpoint universal challenges that they faced while implementing new value-based practices. Those include:

Silos
A common organizational structure — organization by specialty — may prove to be an obstacle to value creation. Rather, clinical programs that cross specialties and partner with all types of staff who interact with the patient may significantly improve preventable complications or conditions across the health-care spectrum.

Resistance to change
Staff members at all levels may resist change. Group members noted that presenting data that supports the need for change is critical to getting buy-in and creating a sense of urgency.

Impact on budget
Many times, financial concerns cloud management’s endorsement of value-based projects. It often is necessary to demonstrate to executives that the project will help avoid expensive adverse events. Overall, group members agreed that projects generally reaped significantly greater financial rewards than anticipated and recommended looking at total cost per patient to reflect cost-structure improvements.
Lack of commonly embraced clinical best practices
Although many clinical guidelines exist, local health care providers often have not endorsed them. To overcome this issue, organizations have convened stakeholder groups to review and fine-tune best practices for specific medical problems. Most organizations can identify and emulate best practices within their own institution.

Lack of health information technology (HIT) infrastructure
Participants noted that interoperable HIT systems can be helpful if they are used to bring real-time knowledge to the point of care.

Legal barriers
The Stark Laws and the Federal Trade Commission regulate how providers interact with one another. Safe harbors must be developed to allow physicians and hospitals to work together to coordinate and integrate care for patients.

Lack of standard work processes among residents and other learners
A standard approach to work would reduce variability and the “unlearning” that frequently happens during the various stages of medical education.

CASE STUDIES
Participants discussed examples of projects underway at their organizations that were designed to generate higher-value health care by improving quality and reducing costs. Following are summaries of several projects, which are in various stages of development and analysis.
Better Outcomes with Fewer Resources

Milt Hammerly, M.D. Catholic Health Initiatives

Catholic Health Initiatives (CHI) is a national nonprofit health organization with headquarters in Denver, Colo. CHI is a faith-based system that operates in 18 states and includes 72 urban and rural hospitals (wholly owned and jointly operated); 40 long-term care, assisted- and residential-living facilities; and two community health-services organizations.

Background

CHI has taken an approach to value that aims at reaching the operational “sweet spot” between utilizing too many or too few resources to provide optimal health care to patients. Operations that are too lean result in errors of omission that lead to increases in length of stay, work injuries, staff turnover and litigation as well as decreases in quality, and patient and staff satisfaction. On the other hand, when hospitals are overstaffed, performing too many tests or providing unproven care, resources are wasted. (See Figure 1.)

CHI believes that efficiency is a by-product of using proven-care methods (evidence-based practices). Evidence-based practice (EBP) at CHI integrates the best, most current research with clinical expertise and patient, family and community values to guide health-care decisions. Multidisciplinary teams have devoted considerable time to developing EBP care bundles that include clinical guidelines, templates, algorithms, order sets and education materials for use throughout the CHI system.

<table>
<thead>
<tr>
<th>EBP Care Bundle</th>
<th>Baseline for FY 09, Q3, Q4 Outcome Numerator</th>
<th>Estimated Cost Associated with 1 event</th>
<th>Baseline Cost (Estimated Cost Associated with 1 event X Outcome Numerator for FY09, Q3, Q4 )</th>
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</thead>
<tbody>
<tr>
<td>CAUTI</td>
<td>340</td>
<td>$758</td>
<td>$257,720</td>
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<tr>
<td>CLABSI (TBD)</td>
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<td>$0</td>
</tr>
<tr>
<td>FALLS</td>
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<td>$4,233</td>
<td>$7,847,982</td>
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<td>HAI-CDI</td>
<td>299</td>
<td>$5,042</td>
<td>$1,507,558</td>
</tr>
<tr>
<td>HAI-MRSA</td>
<td>176</td>
<td>$6,400</td>
<td>$1,126,400</td>
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<tr>
<td>PUP-Acute</td>
<td>192</td>
<td>$1,878</td>
<td>$360,576</td>
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<tr>
<td>SNE</td>
<td>39</td>
<td>$62,000</td>
<td>$2,418,000</td>
</tr>
<tr>
<td>VTE (DVT &amp; PE)</td>
<td>308</td>
<td>$10,804</td>
<td>$3,327,632</td>
</tr>
<tr>
<td>Aggregate Total</td>
<td>3208</td>
<td></td>
<td>$16,845,868</td>
</tr>
</tbody>
</table>

Figure 2: Baseline incidence and costs associated with hospital-acquired conditions.

Updated 3/11/2010 @1300
A baseline incidence of hospital-acquired conditions (HACs) and associated costs was determined in FY 09 prior to implementation of the EBP care bundles. Since the implementation of the EBP care bundles, the incidence of HACs is decreasing and financial impacts will be calculated at the end of FY10.

To encourage use of the guidelines within their diverse hospitals, CHI offers hospital CEOs bonuses if they reach quality goals. The hospitals also may employ transparent “quality report cards” as a motivator for independent physicians.

**Evidence-Based Practice: Use of Blood Products**

A complete cost and reimbursement analysis suggests CHI hospitals lose money on every unit of blood they transfuse. One of CHI’s Iowa hospitals began to investigate best practices for blood-product use. After reviewing a meta-analysis on blood use in critical care medicine, the team noted that in the vast majority of studies, red blood cell transfusions are associated with increased morbidity and mortality — more hospital-acquired infections, lung injury, circulatory overload and longer length of stay. They recommended that the risks and benefits of transfusion be carefully assessed in each patient before making a decision to transfuse.

**Intervention and Outcomes**

The hospital hired consultants to analyze blood-product use and to educate physicians about the risks and benefits of transfusion. The message: Although red blood cell transfusion could save lives, it is done much too often. The consultants identified a 15 percent opportunity to reduce use of blood — particularly in orthopedic procedures — and the hospital has attained that goal through education alone (without yet implementing actual process changes). In addition to blood-use reduction, the hospital avoided many costs associated with infection and other injury from blood transfusion.

Based in part on this successful pilot, CHI is now implementing blood utilization guidelines in all of their hospitals and establishing specific targets to reduce blood use. Initial analysis shows great variability (up to a tenfold difference) in blood use from hospital to hospital. Figure 3 conveys the essential message — beyond the hemoglobin guideline, there are more than a dozen factors that contribute to the decision to transfuse — and points users to an algorithm that allows them to plug in individual patient variables to get an evidence-based answer.

**Conclusion**

Standardized, evidence-based, staff-endorsed guidelines can significantly improve care and reduce costs.
Use of Information Technology in Intensive Care Units (ICUs)

Brad Narr, M.D., Chair, Department of Anesthesiology, Mayo Clinic

Mayo Clinic is the first and largest integrated, not-for-profit group practice in the world. Doctors from every medical specialty work together to care for patients, joined by common systems and a philosophy of “the needs of the patient come first.”

Background

Information overload is a significant problem in health care, especially in intense settings. Figure 1 shows the volume of patient information that health care professionals at Mayo Clinic must scrutinize daily while caring for patients in the ICU. Researchers are redesigning the electronic environment in order to reduce cognitive load, resource utilization and human error associated with processing such large amounts of data.

Situation Summary

The first 24 hours after acute illness or injury are critical. If poor decisions are made during that time, a patient is more likely to experience complications. Such complications can prolong hospital stays and result in death or severe loss of function, necessitating long-term care. Good decision-making in the ICU is essentially about pattern recognition; small changes in a patient’s condition can form a recognizable pattern, forecasting ICU complications.

Example: Sniffers

Researchers at Mayo Clinic are using informatics, epidemiology, systems engineering and in-depth medical-record studies to create tools called “sniffers”—sophisticated computer algorithms embedded in software that detect potential patient problems and alert staff. Computer programmers create these algorithms based upon defined consensus conference diagnostic criteria for specific syndromes. The goal is to improve patient safety while reducing health-care costs.

The “sniffer” software crunches patient data that is fed continually into a “Data Mart.” (See Figure 2.) When the computer detects a problem, it sends a text message to a clinician. For example, if a patient on a ventilator is receiving too much air (based on the individualized estimation of lung size according to gender, height, type of lung injury and lung stiffness), the

<table>
<thead>
<tr>
<th>Information Overload</th>
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<tbody>
<tr>
<td>MEAN Data Points/Day</td>
</tr>
<tr>
<td>Labs</td>
</tr>
<tr>
<td>Drug Orders</td>
</tr>
<tr>
<td>Microbiology</td>
</tr>
<tr>
<td>X ray</td>
</tr>
<tr>
<td>Vitals</td>
</tr>
</tbody>
</table>

Figure 1: This figure shows the mean number of data points generated through the care of ICU patients in the Mayo electronic environment every day. This excludes documents/medical notes/nursing and ancillary health care provider reports.

Figure 2: The “sniffer” system alerts providers to potential complications.
computer texts a respiratory technician to check that patient’s ventilator setting. This helps prevent ventilator-induced lung injury.

**Example: ICU Dashboard**

Reams of data stream through Mayo’s Data Mart, and researchers are studying decision-making processes to determine which information is needed to make safe and timely decisions. Out of thousands of pieces of data, investigators have identified 30 items that caregivers use regularly to make decisions. The data’s relative importance varied according to patient demographics and condition. Combining those findings with in-depth medical records research, researchers created an information-scoring system that prioritizes information for ICU syndromes such as sepsis, coma and bleeding. The next step is to help ICU clinicians get that customized information quickly — most likely through a dashboard that will display information relevant to specific patients.

**Conclusion**

The electronic environment can be redesigned to reduce the cognitive burden, errors and costs associated with caring for critically ill patients. (See Figure 3.)

**Figure 3:** Cognitive load is measured using NASA-TLX (Task Load Index). Using novel ways to present all of the data collected on an ICU patient decreases the task load index as compared to standard displays.
Improving Care via an Interoperable Health Information Exchange

Antonio Castaneda, M.D., Board Member
Farad Choudhry, Associate Executive Director
North Texas Specialty Physicians

North Texas Specialty Physicians — known as NTSP — is an Independent Physician Association comprised of nearly 600 independent family and specialty doctors dedicated to delivering the best medical care to the residents of Tarrant, Johnson and Parker Counties in North Central Texas. Unlike some physician groups, NTSP is governed by a board comprised solely of local doctors and is managed by resident health care experts.

Background

As an Independent Physician Association, NTSP manages its members Medicare Part C risk contracts. For many years, NTSP used the coding and reimbursement information stored in a claims database to generate patient profile reports for risk adjustment purposes and so that doctors could review the efficiency of their coding. However, there was a severe lag time before the data were available. Without reliable data in hand, it was difficult to obtain optimal reimbursements, and there was significant potential for financial losses.

Situation Summary

In 2005, NTSP made the decision to invest $6 million in a health information exchange (HIE) solution. HIE allows for the electronic movement of clinical information among disparate health information systems while maintaining the integrity of the information being exchanged. The goal was to allow for real-time exchange of patient information among the NTSP physician community, resulting in faster, better, safer, more fiscally-responsible care for their Medicare Part C patients.

Process

NTSP created a wholly owned subsidiary called Sandlot, LLC. Sandlot provides HIE, a physician portal and integrated electronic medical record services to NTSP physicians, allowing them to remain independent and yet function as a virtual practice.

Today, a variety of providers use Sandlot to exchange information, including seven community hospitals, two national labs, radiology groups, two e-prescribe vendors, more than 350 electronic medical record (EMR) users on three connected systems and 1,400 professionals accessing the physician Web portal. More than 1.4 million unique patients are included in Sandlot and 53,000 patient records are updated daily. The following functions are included:

- Enter and receive patient information
- Order labs and radiology tests
- e-Prescribe
• Secure communication with other providers
• Referral management
• Interoperable exchange of information with other EMR users (physician-to-physician communication)

Outcomes
With Sandlot, physicians are able to make more accurate decisions quickly by viewing a patient’s entire medical record at once. Information is available at the point of care, improving diagnosis and treatment. The HIE allows physicians to better monitor patients with chronic, complex or co-morbid conditions. In addition, physicians have avoided redundancy and cost of repeated tests and procedures, helping them better manage care within the defined financial limits of a capitated population.

Additional Applications — Quality Improvement
NTSP is exploring additional opportunities for clinical decision support and customized reporting through the HIE. Specifically, proponents are working on a quality scorecard that individual physicians could view periodically to ensure they were meeting quality targets and to compare themselves to other colleagues. (See Figure 1.) Quality scorecards are important to NTSP because bonuses are determined by meeting appropriate benchmarks.

Because the system updates information daily, scorecards are constantly refreshed. Physicians could choose to view quality scorecard information at a variety of levels, such as drilling down to determine how they were performing with their diabetes or heart failure patients. The system also helps them identify gaps in performance. For example, if a particular patient had not yet received a necessary preventive screening test, then a triggering mechanism within the HIE system would prompt the physician to get it scheduled.

Figure 1: A sample quality scorecard for an individual physician.
Methicillin-Resistant Staphylococcus Aureus (MRSA) Surveillance in a Teaching Hospital: Quality and Cost Implications

Robert Pryor, M.D.
Scott & White Healthcare System

Scott & White Healthcare is a fully integrated health system — the largest multispecialty practice in Texas and the sixth largest group practice in the nation.

Situation Summary

Methicillin-resistant staph aureus (MRSA) is a strain of staph that’s resistant to the broad-spectrum antibiotics commonly used to treat it. MRSA can be fatal and is especially dangerous for infants, the elderly and patients with weakened immune systems. MRSA has become an increasing problem in hospitals throughout the United States, including at Scott & White Healthcare. Scott & White formed a team to determine if they could reduce hospital-based MRSA infections through a comprehensive inpatient screening program at two of their hospitals.

Barriers

In addition to convincing administration and other staff that screening was appropriate and wouldn’t “bust the budget,” proponents were concerned about getting patients to agree to be screened. This barrier was overcome through a combination of tactics, including an MRSA public awareness campaign, patient education materials and availability of Infection Control staff to answer patients’ questions. Less than one percent of patients refused the screening.

Process and Outcomes

Figure 1 (see page 12) shows Scott & White’s MRSA screening algorithm. The team determined that high test sensitivity and quick turnaround time were critical factors in successfully reducing incidence of infection. Only when all admission active surveillance was combined with a test instrument of 98 percent sensitivity and a reporting time of 15 hours or less was there capture of at least 85 percent of potential inpatient isolation days. This led to a greater than 70 percent reduction in MRSA infection, resulting in fewer patients with respiratory infections and ventilator-associated pneumonias.
Through the surveillance program, Scott & White incurred laboratory screening expenses but also earned revenue and ultimately avoided costs associated with caring for patients with MRSA infections. The tables below summarize these elements.

<table>
<thead>
<tr>
<th>Total Estimated 2009 Program Expense</th>
<th>$717,494</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Estimated 2009 Gross Revenue</td>
<td>$1,776,017</td>
</tr>
</tbody>
</table>

**Estimated Cost Avoidance: Reduction in MRSA Hospital-Acquired Infections**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fewer MRSA cases</th>
<th>Cost avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 – 2008</td>
<td>36 fewer cases</td>
<td>$916,056</td>
</tr>
<tr>
<td>2008 – 2009</td>
<td>40 fewer cases</td>
<td>$1,071,840</td>
</tr>
<tr>
<td><strong>Total cost avoidance over two years</strong></td>
<td><strong>$1,987,896</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion**

This project proved successful in preventing patients from contracting MRSA within the hospital, allowing Scott & White to avoid significant costs while modestly improving net operating income. Given these results, Scott & White plans to extend this program to all 12 of its hospitals.
Asthma Disease Management Program at Seton Asthma Center

Steve Conti, Director of Disease Management
Seton Family of Hospitals

A not-for-profit organization, the Seton Family is the leading provider of health-care services in Central Texas, serving an 11-county population of 1.8 million. The organization operates five major medical centers, two community hospitals, two rural hospitals, a mental health hospital, and several primary care health facilities for well patients and for the uninsured.

Background

Providers in central Texas had a common problem of managing health-care services for uninsured patients, who comprise about 30 percent of their total patient base. More than 10 years ago, these providers united to create a health information exchange (HIE) to monitor uninsured patients’ utilization of services, better manage care across the region and avoid duplication of effort. The providers had a common goal: improve the health status of patients (especially those with chronic diseases) and lose less money caring for the uninsured.

Today, provider groups — even competitors — enter their encounter data, diagnosis data, labs and pharmacy information into a central data repository. The goal is to reduce resources required to deliver high-value care in the region.

Situation Summary

In 2004, Seton had about of 4,000 asthma encounters a year at their four urban hospitals. About 70 percent of that group was either publically funded (primarily through Medicaid) or completely uninsured. Seton leaders believed that designing an asthma education and case-management intervention would help improve patients’ quality of life and reduce costs.

Process

Seton used the HIE to run a weekly query to identify patients who had had an emergency department (ED) visit, a hospitalization or a fourth clinic encounter for asthma in the previous 12 months. After the patients had been identified, respiratory therapists made at least three attempts to arrange a home visit. Interventions were aimed at helping patients understand the asthma disease process, taking ownership of their care, and understanding how and when to engage with the health care system. Interventions included:

- Asthma education via standard curriculum
- Asthma action plan and an individualized care plan
Outcomes

Seton was interested in driving improvement around quality-of-life measures, specifically increasing the number of days that patients were symptom-free and able to be physically active and engaged in daily activities. Figure 1 shows post-intervention results on these domains.

Figure 1: Patients had more symptom-free days and nights following a series of educational and care-coordination interventions.
Another goal was to reduce utilization of services and costs. Using the annual caseload of one respiratory therapist — 172 patients — proponents examined emergency department visits, inpatient utilization, length-of-stay and patient encounters before and after the intervention. Data show significant decreases in utilization of all of these services. (See Figure 2.)

**Value Proposition**

Higher quality-of-life measures coupled with lower costs translates into higher-value care and a win for everyone involved in this project. Below is a summary of the financial impact, again based upon one respiratory therapist’s caseload.

**Financial Benefit Using Program Effect on Patients Using Proxy Pricing Methodology**

<table>
<thead>
<tr>
<th>n=172</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total operating expenditures (reported)</td>
</tr>
<tr>
<td>(salaries+benefits+other expenses (supplies+printing etc))</td>
</tr>
<tr>
<td>Potential saving in ED visits (decrease by 40%)</td>
</tr>
<tr>
<td>total ED visits * Proxy cost per visit * estimated reduction</td>
</tr>
<tr>
<td>in ED visits post-intervention</td>
</tr>
<tr>
<td>Potential savings in IP visits (decrease by 95%)</td>
</tr>
<tr>
<td>total IP visits * Proxy cost per visit * estimated reduction</td>
</tr>
<tr>
<td>in IP visits post-intervention</td>
</tr>
<tr>
<td>Net benefit for enrolled patients using program effect on patients</td>
</tr>
<tr>
<td>with &gt;6 months in the program (Potential savings in ED+IP visits) -</td>
</tr>
<tr>
<td>Total operating expenditures</td>
</tr>
</tbody>
</table>

**Conclusion**

This program successfully demonstrates the health and financial benefits of patient education and case management for asthma. The Health Information Exchange database is a critical tool for identifying and tracking patients and evaluating disease management programs. One challenge on the horizon is preventing “management fatigue” among patients with chronic diseases.
Decreased Mortality in Level 1 Trauma Centers

L. Ray Matthews, M.D.
Director, Surgical Critical Care, Grady Health System

Grady Health System is the largest public hospital–based health system in the Southeast. Included are Grady Memorial Hospital; Children’s Healthcare of Atlanta at Hughes Spalding; Crestview Health and Rehabilitation Center; and nine neighborhood health centers.

Background

Following surgical critical care fellowship training at an integrated group practice, Dr. Matthews implemented several practice elements designed to standardize and coordinate care within the surgical ICU practice at Grady Memorial Hospital. The hypothesis was that a patient-centered, physician-led model of care would reduce mortality risk rate at the level 1 trauma center.

Methods

Researchers retrospectively examined records of 4,618 patients (Figure 1) included in the Grady trauma registry from 2000 to 2008. From 2000 to 2006, traditional methods were used in patient care:

- Decisions were made based on each physician’s preference and best judgment rather than the latest evidence
- Attending physicians saw patients within 24 hours of admission
- Patients were heavily sedated on ventilators, often developing pneumonia that caused longer ICU stays

Figure 1: Admissions to the Grady Memorial Hospital trauma ICU between 2000 and 2008.
During 2007 and 2008, an integrated model of care was incorporated into the practice. Components included:

- A multidisciplinary team approach
- Close resident supervision by attending physicians
- Patients seen by the attending physician within six hours of admission
- Standardization based upon best practices. Specific changes included:
  - Change from inverse-ratio ventilation to low TV/high PEEP strategy for patients with acute respiratory distress syndrome (ARDS)
  - Daily monitoring of PaO2/FIO2 ratio for early detection and assessment of ARDS
  - Nutritional therapy using TPN/enteral nutrition and glutamine supplement
  - Discontinue use of paralytics in intubated patients
  - Sedation “holiday” for ventilated patients

Results

The overall mortality rate declined from 9.3 percent to 5.0 percent in the intervention-exposed group, with a relative mortality risk reduction of 46.3 percent. (See Figure 2.)

![2007-2008 Mortality](image)

![% Risk of Mortality](image)

**Figure 2:** Mortality rates dropped significantly in 2007 and 2008 when a model of coordinated, integrated, evidence-based care was applied to practices in the ICU.

Conclusion

A patient-centered, physician-led model of care reduces mortality risk rate in a level 1 trauma center when compared to traditional medical practices.
Unnecessary Duplication of Genetic Tests within an Integrated Medical Center

Marc S. Williams, M.D., FAAP, FACMG, Intermountain Healthcare

Intermountain Healthcare is a nonprofit system of hospitals, surgery centers, doctors, clinics, and homecare & hospice providers that serves the medical needs of Utah and southeastern Idaho. It also has a provider-owned health plan.

Background

A 2009 Thomson Reuters report estimates that inefficient communication among providers – including lack of access to medical records when specialists intervene – leads to duplication of tests and inappropriate treatments that cost $25 billion to $50 billion annually.

Intermountain researchers took the opportunity to examine ordering patterns for two genetic tests that should be done only once during a patient’s lifetime – Factor V Leiden (FVL) and Prothrombin thrombophilia mutations (PTM). The goal was to determine if test duplication was commonplace within an integrated medical center.

Findings

Upon reviewing their data, Intermountain researchers found that 4.2 percent (n=100) of FVL tests and 3.4 percent (n=40) of PTM tests were duplicated during the study period. Because laboratory test charges vary based upon payer, study investigators estimate that between $37,000 and $130,000 was wasted on these duplicated tests. (See figure 1.)

Results

<table>
<thead>
<tr>
<th>date to query</th>
<th>fVL annual cost</th>
<th>Prothrombin annual cost</th>
<th>duplicate testing and costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>fVL</td>
<td>annual $ spent</td>
<td>PTM annual $ spent</td>
<td></td>
</tr>
<tr>
<td>6/2005 to 5/2006</td>
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<td>46</td>
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<tr>
<td>6/2006 to 5/2007</td>
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<td>30</td>
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<tr>
<td>6/2008 to 5/2009</td>
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<td>$119,692</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>10,995</td>
<td>$603,955</td>
<td>205</td>
</tr>
</tbody>
</table>


(Using Medicare Local $)

<table>
<thead>
<tr>
<th>date to query</th>
<th>fVL annual cost</th>
<th>Prothrombin annual cost</th>
<th>duplicate testing and costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>fVL</td>
<td>annual $ spent</td>
<td>PTM annual $ spent</td>
<td></td>
</tr>
<tr>
<td>6/2004 to 5/2009</td>
<td>6,171</td>
<td>$336,007</td>
<td>205</td>
</tr>
</tbody>
</table>

Figure 1: An internal analysis revealed unnecessary duplication of genetic tests within Intermountain’s practices.
Conclusion and Next Steps

Project proponents next analyzed the timing of the test orders to identify work flow issues that might contribute to the duplication. They found that a significant portion of the duplication occurred within five days of the initial test due to lack of computerized physician order entry (CPOE) in all practice settings (i.e. outpatient visits). The lack of CPOE makes it more difficult to prevent duplicate ordering going forward. Investigators also have raised the broader question of examining the clinical utility of these two genetic tests, recommending a literature review to determine if they should be ordered at all.
Nurse Practitioner Managed Health Clinics

Denise Link, Ph.D., NP, Arizona State University College of Nursing and Health Innovation

The Arizona State University College of Nursing and Health Innovation manages four nonprofit Nurse-Managed Health Clinics (NMHC). The clinics give nurses the opportunity to move to the forefront of health care, while educating ASU’s undergraduate and graduate nursing students and providing access to health care in the process.

The health clinics have an interdisciplinary staff that provides both physical and mental health services. The support that the NMHCs receive from health care officials, third-party health insurance companies, policy makers, donor agencies, the news media, and religious and community leaders is critical to the sustainability of the clinics.

Background

Nurse Managed Health Clinics (NMHCs) – where most of the care is delivered by nurse practitioners and certified nurse midwives – are not new. Historically, NMHCs managed the care of children. Over the years, these clinics have expanded their services to include primary care and care for patients with chronic conditions. Practitioners focus on meeting the majority of a patient’s needs through a sustained relationship with patients, family members and the community.

Services offered at NMHCs typically include health maintenance and promotion, chronic illness diagnosis and management, prenatal care, family planning, immunizations, mental health and community outreach. Most NMHCs are owned by universities or schools of nursing and serve as clinical sites for nursing students. Most focus on uninsured or otherwise underserved populations, usually in urban areas.

Elements of Quality and Value

NMHCs typically garner high rates of patient satisfaction. Studies also show that chronic disease management at NMHCs is particularly comprehensive, with outcomes for diseases such as hypertension, depression and asthma often exceeding national benchmarks. The centers also have proven very effective in smoking cessation assessments, and screening for breast and cervical cancer.

NMHC’s total cost per managed care member is half that of other primary care providers. The clinics deliver health care at 23 percent below the average cost and have a 21 percent reduction in hospital inpatient rates. One study (NIH: Naylor, 2004) shows NMHCs saving $4,850.00 per heart failure patient, with 38 percent savings in Medicare costs.
**Operational Model**

Because most NMHCs are university-affiliated, their staff is salaried and made up largely of university employees. NMHCs often receive some in-kind resources from the university, such as staffing, utilities, occupancy or liability coverage. Physicians are hired as contract employees in states where advanced practice nurses cannot practice as independent providers.

In terms of revenue, 35 percent comes from patient care, 41 percent from other operating income (grants, education stipends) and 24 percent from non-operating funds (donations, money from fundraisers and subsidies from the ownership organizations). Thus, 65 percent of the income stream is at risk. Long-term financial stability depends on the NMHC’s ability to get reimbursement from commercial and public insurance companies.

**Challenges/Barriers**

NMHCs are generally expected to be self-sustaining practices, but they face significant challenges in breaking even. Because NMHCs are not physician-led, it is difficult for them to be credentialed as primary care providers and receive full reimbursement from insurance companies. Other challenges include a patchwork of reimbursement mechanisms and policies, a largely uninsured patient population, and state-to-state variability in Nurse Practice Acts and other regulations.

The NMHC model could be sustainable if these barriers were reduced or eliminated by following best business practices, establishing equitable reimbursement for all primary care providers and developing advanced practice nursing-friendly policies, laws and regulations.

**Examples in Arizona**

Link reports that, for the most part, the regulatory environment in AZ is favorable toward NMHCs. Her system is called Nurse Practitioner (NP) Healthcare and consists of four clinics in varying states of financial health. Two of these NMHCs are already self-sustaining: NP Healthcare Downtown Phoenix and NP Healthcare Grace.
Vitamin D Deficiency in a Surgical Intensive Care Unit

L. Ray Matthews, M.D.
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Grady Health System is the largest public hospital–based health system in the Southeast. Included are Grady Memorial Hospital; Children’s Healthcare of Atlanta at Hughes Spalding; Crestview Health and Rehabilitation Center; and nine neighborhood health centers.

Background
Contrary to the belief that Vitamin D receptors exist only in bone and teeth, they reside in almost every cell in every tissue of the body. About 70 percent of America’s 300 million people are Vitamin D deficient, and this percentage rises in the winter months.

Vitamin D – more a steroid hormone than a vitamin – plays many roles in the human body. It controls the expression of more than 2,000 of our 30,000 genes. Many diseases are associated with vitamin D deficiency, including cancers (i.e. breast, prostate, colon, lung, renal), cardiac disease, hypertension, strokes, chronic pain, osteoporosis, rickets, muscle weakness, multiple sclerosis, dementia, influenza and depression.

Aim
To investigate the impact of Vitamin D deficiency on surgical intensive care unit (ICU) patients.

Hypothesis
Severe Vitamin D deficiency would increase length of ICU stay, treatment costs and mortality rates.

Methods
Matthews and his team studied 104 trauma and surgical ICU patients at Grady Memorial Hospital in Atlanta between August of 2009 and March of 2010. The research team used a slightly different scale than the standard to determine levels of Vitamin D deficiency: normal (>40ng/ml), mild deficiency (27-39ng/ml), moderate deficiency (14-26ng/ml), or severe deficiency (<13ng/ml). Within this context, all patients were considered Vitamin D deficient: 77 patients were classified as severely deficient, 20 as moderately deficient and 7 as mildly deficient.
Results

In this study, mildly deficient patients stayed an average of 17 days in the ICU; moderately deficient an average of 16 days; severely deficient an average of 24 days. Mildly deficient patients incurred an average cost of $29,195.43; moderately deficient an average of $33,689.26; severely deficient an average of $66,566.74. (See figure 1.) The mortality rate of severely deficient patients was 16.4 percent, and moderately deficient was 10.5 percent. No deaths occurred in the mildly deficient category. (See figure 2.)

Conclusion

Severe Vitamin D deficiency increases length of ICU stay, hospital costs and mortality. The Grady team now checks Vitamin D levels on all patients who are admitted to the ICU and administers Vitamin D supplements to those who need it.
The Marketplace Collaborative Model Applied to a Breast Clinic

William DePaso, M.D., Associate Medical Director, Center for Health Care Solutions, Virginia Mason Medical Center

Founded in 1920, Virginia Mason Medical Center is a Seattle based, multi-specialty integrated delivery system with eight suburban clinics, a 34-bed hospital and 450 employed physicians.

Background

In 2004, local employers challenged Virginia Mason (VM) to reduce their employees’ health care costs for a number of common conditions, including headache, depression and heartburn. In response, VM invited employers to participate with their health plan (Aetna) in redesigning health care to better meet employees’ needs and in restructuring dysfunctional payment methods that support the status quo. Employers accepted the invitation, and the Marketplace Collaboratives were born.

In VM’s Marketplace Collaboratives, groups of stakeholders deconstruct and reconstruct the delivery of health care based on evidence-based medicine and Toyota process improvement methods. Cost accounting is used to compare reimbursement with costs of delivering care. Collaboratives tackle medical conditions that are high cost to employers, with a focus on reducing variation in quality and access that drives much of the expense in medicine.

The goals for Collaboratives include designing a product that pays for value; analyzing both direct and indirect costs of illness; ensuring real time measurement of patient satisfaction and appointment access; and delivering the five product specifications (see box).

Breast Clinic Example

VM worked with Aetna and the City of Seattle on a Marketplace Collaborative involving breast disease. Using Toyota methods, the team reviewed the traditional course of care for a woman with a breast lump, discovering that a breast surgeon typically handled coordination of imaging and biopsy over the course of 22 days. Cost of care was about $1,400, with VM losing about $100 on every case.
The group reviewed best practices and evidence in order to design an ideal clinical pathway for this condition. The major change was adding a nurse practitioner to manage the entire process. By making this one change, staff were able to offer appointments within one day, and the nurse practitioner coordinated breast imaging and (if necessary) biopsy within three days. (See Figure 1.) VM continues to monitor and report on the five product specification domains (Figure 2) while working to refine a financial model that is fair for both the provider and the employer.

**Figure 1**: The team identified an ideal clinical pathway that reduced patient waiting time by more than 80 percent.

**Figure 2**: VM created this simple dashboard to report progress toward quality goals to members of the Collaborative.

*Source: The Center for Health Care Solutions at Virginia Mason – 2007 Annual Report*
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