



Process Improvement Through People Development™

Why Akron Children’s Hospital uses Lean Six Sigma Tools, Principles and Systems

- Enhance the voice of our patients and families
- Eliminate activities that do not add value to the patient experience, allowing for a greater focus on delivering high quality patient care
- Support our strategic growth and enhance our competitive advantage as the primary pediatric care provider in Northeast Ohio
- Empower the people who do the work to change the work

Results at Akron Children’s Hospital from January, 2009 through March, 2011.

	Since COE inception in 2009
Patient Wait Time Reduced (days)	42,870 (Days)
Staff Non-Value Added Time Reduced (hours)	24,106 (Hours)
Appointment Access Time Reduced (days)	74,608 (Days)
Snapshot Savings - Total	\$ 8,181,922
Snapshot Savings – Direct	\$ 3,545,998
Snapshot Savings – Indirect	\$ 4,635,924

Akron Children’s Hospital A3 Program

- The A3 program is an 8-week process improvement training program for non-management employees working on departmental projects.
- **Examples from the A3 Program in 2010:**
 - **Mahoning Valley Administration:** Created a skills matrix for the support staff in Administration that resulted in an initial 18% reduction in management staff

involvement in clerical work. Currently the reduction achieved is at 83% with NVAT soft savings equaling \$25,740 annually.

- **ACHP Fairlawn (hospital-associated community practice):** Reduced the time a family waited for sports and physical forms by 5.7 days or 81%. Also completed a 5S in the front desk area.
- **Mahoning Valley Radiology:** Made adjustments in the location of computers and equipment needed for testing to allow for visualization of the patient during 100% of the procedure time.
- **Laboratory/Centralized Core Lab:** Developed a central database for information related to send out lab tests. Eliminated 4,536 hours of NVAT with an improvement of 47% in the time it takes to research the method of sending out the specimen for testing resulting in a soft savings of \$97,978.

Akron Children's Hospital's Green Belt Program

- The Green Belt Program was initiated in 2008 with candidates receiving formal external training from Johns Hopkins and Seattle Children's Hospital.
- **Examples of Green Belt Projects completed in 2010:**
 - **Rehabilitation Retention Rate:** Reduction of the yearly turnover for therapist and assistants in Rehabilitation by 3 people.
 - **OR Special Orders:** Reduction of special orders in the OR by 40%

Akron Children's Hospital's Black Belt Program

- The Black Belt Program was initiated in 2010 with candidates receiving formal external training from The Ohio State University.
- Black Belt Projects completed in 2010:
 - **Locust Peds:** Through past surveys, families were satisfied with the quality of care received in Locust Pediatrics, but would like to see their overall time in the clinic reduced. The goal throughout the year was to reduce the total time that a sick patient is in the Locust Pediatrics Clinic from 70 minutes to 50 minutes. Throughout 2010, staff also worked to implement EPIC, integrate CSB children into their care, introduce new staff and provider, and worked on redesign of the area through 3P.
 - **ER Communications:** This project addresses the dissatisfaction that referring providers have when they request a call back on a patient being sent to the ED, and we fail to provide that call-back. This failure affects our brand recognition and has the potential to affect quality and growth.

Akron Children's Hospital's Kaizen Program

- Kaizen Opportunity Events are scheduled from 2 to 5 days in length. They can include administrative process changes as well as major physical changes to a work space via a 3P planning session, or by hands-on changes done during the kaizen event.
- **Examples of Kaizens completed in 2010:**
 - **IS Service Desk Kaizen:** Decreased the abandoned call rate of internal customers calling into the Information Systems Service Desk for computer assistance from 28% to 13% (June 2010 – August 2010)
 - **Financial Counseling Kaizen:** Increased the amount of patients seen face-to-face by financial counselors from 16 per week to 53 per week, resulting in a many more patients obtaining financial assistance, and a potential increase in revenue for the hospital of \$220,000.
 - **Locust Pediatrics 3P – 2 Day planning event-** Team challenged to create better flow for families, staff, and information. Created the plans for renovation to allow for better flexibility, and bringing care to the families of Locust Pediatrics. The 3P resulted in the elimination of triage rooms and laid the plans for mobile registration and discharge.

Akron Children's Hospital Blue Belt Program - Manager/leader lean training for *departmental* certification

- Managing in a Lean environment through Tools, Processes, & Systems
- Establishment of a *daily* management system to support departmental operations
 - Daily Tier Huddles – Leader – Manager – Director – Vice President
 - Daily Metric Board – Tracking key metrics linked back to the 4 big metrics of the organization linked to Quality, Research, Brand and Growth
 - Daily Root Cause at the team level taking place
 - Teaching managers how to be effective coaches
 - Engaging managers to look for quality and safety opportunities through observation
- Radiology= 1st department to become certified (started in last quarter of 2010)

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The Group Health Medical Home At Year Two: Cost Savings, Higher Patient Satisfaction, And Less Burnout For Providers

ABSTRACT As the patient-centered medical home model emerges as a key vehicle to improve the quality of health care and to control costs, the experience of Seattle-based Group Health Cooperative with its medical home pilot takes on added importance. This paper examines the effects of the medical home prototype on patients' experiences, quality, burnout of clinicians, and total costs at twenty-one to twenty-four months after implementation. The results show improvements in patients' experiences, quality, and clinician burnout through two years. Compared to other Group Health clinics, patients in the medical home experienced 29 percent fewer emergency visits and 6 percent fewer hospitalizations. We estimate total savings of \$10.3 per patient per month twenty-one months into the pilot. We offer an operational blueprint and policy recommendations for adoption in other health care settings.

The patient-centered medical home has emerged rapidly as the main policy vehicle to reinvigorate U.S. primary care. The widely endorsed 2007 joint principles of the patient-centered medical home, developed by a coalition of professional organizations, emphasize the attributes of primary care. These include access to care, long-term relationships with health care providers, and comprehensiveness and coordination of care. The principles also embrace a health professional team orientation grounded in evidence-based medicine and quality improvement. They support the use of advanced electronic health records to enable, and a payment system to reward, these activities.¹ Many demonstrations of the patient-centered medical home are under way, and preliminary evidence is starting to emerge.²⁻⁵

Despite agreement on the organizing principles for patient-centered medical homes, no consensus exists on an operational definition of the components of the model or investments required.^{6,7} These components include enhanced

staffing, key electronic health record features, and optimal methods for transformation to this new practice model.

Several questions about medical homes remain unanswered. These include how quickly the anticipated improvements emerge and how operational definitions apply to practices with different settings, patient mixes, and cultures.

Since 2006, Group Health Cooperative, a non-profit, consumer-governed, integrated health insurance and care delivery system based in Seattle, Washington, has pioneered a medical home redesign that relies on its existing electronic health record technology. The one-year evaluation of a prototype clinic redesign revealed early and broad improvements compared to control groups in patients' experiences with care, provider burnout levels, and clinical quality.² The up-front investments in redesign were recouped in the first year, largely because of fewer emergency department and urgent care visits compared to controls.

In this paper we present longer-term results—at twenty-one to twenty-four months—to track

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progress in meeting multiple objectives of improving quality, creating a sustainable work environment, and reducing costs. This analysis highlights considerations for organizations contemplating medical home transformations and for policy makers interested in facilitating the successful adoption of medical homes.

Group Health's Medical Home Prototype

Historically, Group Health has linked patients with primary care physicians working in multidisciplinary teams and supported by specialists and ancillary health care personnel.⁸ Salary-based pay has shielded physicians from the perverse, volume-driven incentives of fee-for-service medicine.

In the early 2000s, Group Health implemented a series of reforms to improve access, physician productivity, and financial performance, including “advanced access,” with ability for patients to make same-day appointments; productivity-based physician salary adjustments; and an electronic health record that lets patients securely message their providers and view portions of their record.⁹ Although successful at improving access and productivity,^{10–12} these reforms had the unintended consequences of physician burnout and relative declines in clinical quality, and they actually caused increases in use of services downstream of primary care.^{12,13} Many of the challenges faced at Group Health were similar to those faced in less structured and supported settings.

In 2006, Group Health piloted a whole-practice transformation, aligned with the medical home vision, at one Seattle-area clinic. The prototype clinic was chosen as a “proof of concept” because it was of modest size (approximately 9,200 adult patients) and had a stable workforce, strong leadership, and history of successful quality improvement.

With measures defined in advance, a two-group, quasi-experimental, before-and-after evaluation over two years was used to gauge the prototype clinic's impact on cost, quality, and experience. The intent was to spread lessons learned to other clinics. Group Health leaders recognized that investment in primary care was required to realize the medical home vision.¹⁴ They acknowledged the need to downsize primary care patient panels at the prototype clinic from the existing 2,300 patients per physician to the target of 1,800 by hiring more physicians and other clinical staff. For every 10,000 patients, the enhanced staffing model comprised 5.6 physicians, 5.6 medical assistants, 2.0 licensed practical nurses (LPNs), 1.5 physician

assistants or nurse practitioners, 1.2 registered nurses (RNs), and 1.0 clinical pharmacist. With these additional personnel, the goal was to promote stronger relationships with patients, address care needs more comprehensively, and provide time to coordinate care.

Consistent with research linking time constraints with poorer quality and satisfaction,^{15,16} standard in-person visit times increased from twenty minutes to thirty minutes, with time allocated each day for teams to plan and coordinate care. Guided by a set of design principles derived from the attributes of primary care, the Chronic Care Model, and the medical home, two workshops—involving front-line physicians and staff, patients, managers, and researchers—identified the redesign components that care teams refined and implemented during the first year.

Exhibit 1 details these components. The underlying premise is that care teams, led by primary care physicians, retain accountability for delivering primary care to patients in their practices. The expanded staffing model assumes greater care management by RNs and clinical pharmacists, as well as previsit, outreach, and follow-up activities by medical assistants and LPNs. Standard management practices were also adopted, including the use of “team huddles”—short, all-team daily planning meetings—and visual displays to identify and track issues. To encourage care activities outside in-person visits, Group Health exempted the physicians in the prototype clinic from the productivity-based salary adjustments described above.

Results: Medical Home Effects

We analyzed and described differences at the medical home prototype compared to controls for patient experience, provider burnout, quality of care, and costs at baseline, twelve months, and twenty-one to twenty-four months (Exhibits 2–5). Additional details on the methods, survey response rates, and statistical analyses are available elsewhere.² Compared with patients at nineteen other Group Health clinics in the Puget Sound area, adults enrolled at the prototype clinic were older (average age fifty-three versus fifty-one) and more likely to be female (57 percent versus 55 percent), but their burden of disease, as measured with Diagnostic Cost Groups (DxCGs),¹⁷ was similar ($p = 0.34$, which means that these results were not likely to be due to chance).

PATIENT EXPERIENCE We surveyed a random sample of 6,187 adults, ages 21–85, at the prototype clinic and two control clinics at baseline (response rate = 55 percent). We surveyed respondents again at twelve months and twenty-

EXHIBIT 1**Practice Changes At The Group Health Medical Home Prototype Clinic**

Component	Description
CARE DELIVERY CHANGES	
Virtual medicine	Secure e-mail messages and telephone encounters to enhance access and to prepare for, follow up from, or substitute for in-person visits Promotion of EHR to promote patient engagement, including lab test results review, electronic health risk appraisal, and online Rx refills Consistent use of "after visit summaries" made accessible to patients following their visits through the EHR
Chronic care management	Use of electronic registries, health maintenance reminders, best-practice alerts Use of motivational interviewing and brief negotiation skills by care team Creation of collaborative care plans to guide patient and care-team activities Promotion of self-management support resources, including group visits, behavior-change programs, and peer-led chronic illness workshops
Visit preparation	Patients contacted in advance of visits to clarify concerns and visit expectations Review record for follow-up tests, referral notes, and outside records Review quality-deficiency reports for unmet care needs Prepare the physician with education materials and other resources for visit
Patient outreach	Outreach and follow-up for all discharges and emergency or urgent care visits Quality outreach using quality-deficiency reports for unmet care needs Outreach for medication monitoring and abnormal test results New patient outreach
PRACTICE MANAGEMENT CHANGES	
Telephone call management	Redesign of telephone call intake system to bypass administrative options and connect patients directly with their care teams
Care-team huddles	Short, all-team meetings to collectively plan day, balance supply and demand, distribute tasks, and troubleshoot problems
Standard management practices	Use of visual display systems to track team performance, regular workplace rounds, root-cause analysis, and plan-do-check-act improvement cycles

SOURCE Group Health Cooperative. **NOTE** EHR is electronic health record.

four months, using seven scales from the Ambulatory Care Experiences Survey–Short Form¹⁸ and the Patient Assessment of Chronic Illness Care.¹⁹ The control clinics were chosen because of similar enrollment and leadership stability.

Among the twelve-month respondents (80 percent response rate), medical home patients reported better care experiences on six scales, after age, education, self-reported health status, and baseline status were adjusted for.² At twenty-four months, patient surveys (70 percent of baseline respondents responding) showed that most effects continued (Exhibit 2). Patients at the prototype clinic continued to report better values in three scales (coordination, access, and goal setting) and modestly improved values in two others (quality of doctor-patient interactions and patient activation and involvement), even though the precise clinical meaning of these changes is unclear.

Although the study was not large enough for us to statistically detect changes from twelve months to twenty-four months, the effects for five scales are smaller at two years. Thus, the improvements may have slightly diminished, but the prototype clinic continues to provide

better patient experiences in most aspects measured.

STAFF BURNOUT Burnout was measured with the Maslach Burnout Inventory (MBI, health services version),²⁰ a standard tool that measures aspects of workplace stress. We used an online survey sent to all staff with care responsibilities at the prototype clinic and two control clinics at baseline, twelve months, and twenty-four months. Response rates for these cross-sectional surveys were 79 percent, 83 percent, and 71 percent, respectively. Although small staff numbers ($n = 48$) and response rates make firm conclusions difficult, we found large differences that were both statistically and clinically meaningful, despite similarity at baseline.

At twenty-four months, the mean emotional exhaustion scores for the prototype clinic medical home and control staff were 12.8 and 25.0, respectively ($p < 0.01$, and therefore not likely to be due to chance), and the same scale depersonalization scores were 2.0 and 4.4, respectively ($p = 0.03$, also not likely to be due to chance). Differences in the third scale, personal accomplishment, were not statistically significant. We cannot rule out so-called Hawthorne effects—

EXHIBIT 2

Comparison Of Surveys Of Patient Experience At The Group Health Patient-Centered Medical Home Prototype And Two Control Clinics, At Baseline, Twelve Months, And Twenty-Four Months

Interval	No. of survey respondents	Ambulatory care subscales ^a					Chronic care subscales ^a	
		QI	SDM	CC	AC	HO	PA	GS
MEDICAL HOME PROTOTYPE CLINIC								
Baseline	1,232	85.4	85	80.7	86.6	91.1	77.3	69.8
12 months	1,024	86.8	86.6	83.1	87.6	91.4	81.2	74.3
24 months	888	86.6	84.1	83.9	87.1	91.5	80.1	74.4
2 CONTROL CLINICS								
Baseline	2,121	80.8	82.5	77.4	81.5	88.8	73.8	65.1
12 months	1,662	81.6	82.3	77.9	81.6	89	75.5	67.4
24 months	1,452	82.1	81.8	78.9	82	89.1	75.6	67.3
ADJUSTED DIFFERENCES								
12 month vs. baseline ^b		2.30****	2.93***	3.32****	3.71****	1.1	3.28***	3.74***
24 month vs. baseline ^b		1.63**	1.03	3.06****	2.84****	1.14	2.10**	3.96****

SOURCE Authors' analysis of survey data collected for the prototype evaluation. **NOTES** Ambulatory Care Experiences Survey (Short Form) (ACES-SF) is the measure of ambulatory care experiences. Subscales include quality of doctor-patient interactions (QI), shared decision making (SDM), coordination of care (CC), access to care (AC), and helpfulness of office staff (HO). The Patient Assessment of Chronic Illness Care (PACIC) is a patient-reported measure of chronic illness care. Subscales used in this study include patient activation and involvement (PA) and goal setting or tailoring (GS). ^aThe ACES Short Form and PACIC questions (scored on 6- and 5-point Likert scales, respectively) were totaled within the subscales and then transformed to 100-point summary scores. Missing responses were addressed by multiple imputation. ^bAdjusted mean difference and *p* value from generalized linear estimating equation regressions comparing average 12- and 24-month scores adjusting for age, educational attainment, self-reported health status at baseline, and baseline patient experience between the patient-centered medical home and control clinics. ***p* < 0.05 ****p* < 0.01 *****p* < 0.001

EXHIBIT 3

Comparison Of Quality Composite Measures For The Group Health Patient-Centered Medical Home Prototype Clinic And Nineteen Other Clinics, At Baseline, Twelve Months, And Twenty-Four Months

Period	Quality-of-care composite measure (%) ^a			
	Patient average	All or none	75% performance	50% performance
MEDICAL HOME PROTOTYPE CLINIC (n = 4,747)^b				
2006 rating	68.7	51.0	57.2	76.8
2007 rating	72.4	54.5	61.3	80.4
2008 rating	75.9	58.6	65.9	83.3
12-month difference (2006-7) ^c	3.8****	3.5****	4.1****	3.7****
24-month difference (2006-8) ^c	7.3****	7.6****	8.8****	6.5****
19 OTHER CLINICS (n = 132,330)^b				
2006 rating	64.3	44.5	51.3	72.9
2007 rating	66.8	46.2	53.9	75.4
2008 rating	70.3	50.2	58.4	78.5
12-month difference (2006-7) ^c	2.5	1.7****	2.5****	2.5****
24-month difference (2006-8) ^c	6.0	5.7****	7.1****	5.6****
Difference of changes at 12 months between clinics ^d	1.3**	1.8**	1.6**	1.2
Difference of changes at 24 months between clinics ^d	1.3**	1.9**	1.7**	1.0

SOURCE Authors' analysis of survey data collected for the prototype evaluation. ^aComposites aggregate twenty-two quality indicators from the Healthcare Effectiveness Data and Information Set (HEDIS; see the online Appendix, which can be accessed by clicking on the Appendix link in the box to the right of the article online). The "patient average" is the average of the percentage of qualifying indicators that were achieved by each patient; "all or none" is the percentage of patients achieving success on all qualifying indicators; "75 percent performance" is the percentage of patients achieving success on at least 75 percent of qualifying indicators; and "50 percent performance" is percentage of patients achieving success on at least 50 percent of qualifying indicators. ^bIncludes continuously enrolled patients (2006-2008) who qualified for at least one of the twenty-two indicators in each year. ^c*p* value from paired t-test for the average change in percentages between baseline and implementation years across patients qualifying for the measures in the clinic. ^d*p* value from two-sample t-test assuming unequal variances for the average difference in changes from baseline to implementation years between the prototype and other clinics. ***p* < 0.05 *****p* < 0.001

EXHIBIT 4
Comparison Of Adjusted Utilization (Per 1,000 Patients Per Month) At The Group Health Patient-Centered Medical Home Prototype And Nineteen Other Clinics, Over Twelve, Eighteen, And Twenty-One Months

Interval	Medical home prototype (n = 7,018)	Other clinics (n = 200,970)	Relative difference (%)	p value
PRIMARY CARE^a				
12 mo.	247 (241, 252)	256 (255, 257)	97 (94, 99)	p = 0.002
18 mo.	239 (234, 244)	254 (253, 255)	94 (92, 96)	p < 0.001
21 mo.	236 (232, 241)	251 (250, 252)	94 (92, 96)	p < 0.001
SPECIALTY CARE^a				
12 mo.	191 (186, 197)	181 (180, 182)	106 (103, 109)	p < 0.0001
18 mo.	196 (191, 201)	189 (188, 190)	104 (101, 107)	p = 0.004
21 mo.	197 (192, 202)	191 (190, 192)	103 (101, 106)	p = 0.017
EMERGENCY DEPARTMENT AND URGENT CARE^a				
12 mo.	26 (24, 27)	36 (36, 36)	71 (67, 74)	p < 0.001
18 mo.	27 (26, 28)	38 (38, 38)	71 (68, 74)	p < 0.001
21 mo.	27 (26, 29)	39 (38, 39)	71 (68, 74)	p < 0.001
INPATIENT ADMISSIONS (AMBULATORY CARE-SENSITIVE CONDITIONS ONLY)^a				
12 mo.	0.22 (0.20, 0.24)	0.26 (0.25, 0.27)	84 (78, 90)	p < 0.001
18 mo.	0.25 (0.23, 0.26)	0.28, 0.27, 0.29)	88 (82, 94)	p < 0.001
21 mo.	0.24 (0.23, 0.26)	0.28 (0.27, 0.28)	87 (81, 93)	p < 0.001
INPATIENT ADMISSIONS (ALL CAUSES)^a				
12 mo.	4.7 (4.5, 5.0)	4.8 (4.7, 4.8)	99 (94, 104)	p = 0.605
18 mo.	5.1 (4.8, 5.3)	5.3 (5.2, 5.4)	96 (91, 101)	p = 0.091
21 mo.	5.1 (4.8, 5.3)	5.4 (5.4, 5.5)	94 (89, 98)	p = 0.007

SOURCE Authors' analysis of Group Health Cooperative health care utilization data. **NOTES** Adjusted rates and rate ratios estimated from generalized linear models run using a log link; Poisson error; correcting for overdispersion; and adjusting for age, sex, and Diagnostic Cost Group (DxCg Score) at baseline (2006). 95 percent confidence intervals are in parentheses. ^aIn-person visits or admissions per 1,000 members per month by patients at Group Health facilities and with external providers and facilities.

where people change behavior merely because they are being studied—or selection biases in the samples. However, these results suggest continued reductions in burnout seen at twelve months, particularly as gauged by emotional exhaustion.

CLINICAL QUALITY To measure clinical quality, we extended our previous analysis using twenty-two indicators from the Healthcare Effectiveness Data and Information Set (HEDIS),²¹ aggregated into four composites, with the patient as the unit of analysis. Because these measures rely on administrative and clinical data available for all Group Health patients, we expanded the comparison from two control clinics to all eligible adults enrolled at nineteen other Puget Sound-area Group Health clinics. We used four composites because interpreting many individual indicators is unwieldy and different composites can lead to different conclusions.²²

Across the three measurement periods (baseline, twelve months, and twenty-four months), 4,747 study and 132,330 control patients (adults) qualified for at least one of the twenty-two indicators—including screening, chronic illness care, and medication monitoring—at the prototype clinic and other clinics.

As previously reported,² the prototype clinic performed better at baseline and showed greater improvements at twelve months, regardless of the composite chosen (Exhibit 3). Over twenty-four months, while gains at other clinics appeared to be accelerating, the improvements at the prototype clinic continued to be 20–30 percent greater in three of four composites.

USE AND COST Data on use and costs were obtained from Group Health's costing system, which allocates use and costs for all services provided at its facilities and from external claims. We compared use and costs of 7,018 continuously enrolled adults at the prototype clinic with those of 200,970 adults enrolled at other Puget Sound-area clinics. Primary care included visits to primary care physicians, physician assistants, and nurse practitioners. Specialty care included visits to all other physicians except emergency physicians, which were allocated to the emergency department.

Generalized linear models were used to adjust for baseline differences and estimate the independent effects of the medical home redesign. We estimated differences in per member per month use using Poisson regression and empirical standard errors, adjusting for overdispersion and

EXHIBIT 5

Comparison Of Adjusted Costs (Dollars Per Patient Per Month) At the Group Health Patient-Centered Medical Home Prototype And Nineteen Other Clinics Over Twelve, Eighteen, And Twenty-One Months

Interval	Prototype clinic, \$ (n = 7,018)	Other clinics, \$ (n = 200,970)	Cost difference, \$	p value
PRIMARY CARE				
12 mo.	50 (49, 51)	48 (48, 48)	1.81 (0.66, 2.96)	p = 0.002
18 mo.	50 (49, 51)	48 (48, 48)	1.72 (0.75, 2.70)	p = 0.001
21 mo.	50 (49, 51)	48 (48, 48)	1.63 (0.71, 2.55)	p = 0.001
SPECIALTY CARE				
12 mo.	93 (90, 97)	91 (90, 92)	2.34 (-1.24, 5.93)	p = 0.200
18 mo.	96 (92, 99)	92 (91, 93)	3.37 (0.11, 6.62)	p = 0.042
21 mo.	99 (95, 104)	93 (93, 94)	5.78 (1.13, 10.42)	p = 0.015
EMERGENCY DEPARTMENT AND URGENT CARE				
12 mo.	20 (19, 21)	23 (23, 24)	-3.67 (-4.71, -2.63)	p < 0.001
18 mo.	21 (20, 22)	25 (25, 25)	-3.98 (-4.91, -3.04)	p < 0.001
21 mo.	22 (21, 23)	26 (25, 26)	-4.02 (-4.92, -3.12)	p < 0.001
INPATIENT ADMISSIONS (ALL CAUSES)				
12 mo.	126 (115, 138)	136 (131, 141)	-9.59 (-20.50, 1.32)	p = 0.085
18 mo.	129 (120, 138)	143 (138, 147)	-13.94 (-21.91, -5.96)	p = 0.001
21 mo.	132 (124, 140)	146 (142, 151)	-14.18 (-21.26, -7.11)	p < 0.001
TOTAL COSTS				
12 mo.	466 (453, 480)	477 (471, 483)	-10.20 (-22.85, 2.45)	p = 0.114
18 mo.	480 (468, 491)	490 (485, 495)	-10.40 (-21.19, 0.38)	p = 0.059
21 mo.	488 (476, 500)	498 (493, 503)	-10.31 (-21.69, 1.08)	p = 0.076

SOURCE Authors' analysis of Group Health Cooperative health care costing data. **NOTES** Costs represent per patient per month nominal costs for patient care incurred at Group Health facilities and from external claims. Costs exclude those not directly related to providing health services and patient out-of-pocket costs. Costs annualized for those patients not enrolled for the entire year. Costs reported as 2005 inflation-adjusted U.S. dollars using the local Medical Price Index from the U.S. Bureau of Labor Statistics. Adjusted costs estimated from generalized linear models run using an identity link; gamma error; and adjusting for age, sex, and baseline costs (2006). 95 percent confidence intervals are in parentheses.

case-mix with age, sex, and morbidity scores.¹⁷ For costs, we estimated differences per member per month among patients at the prototype clinic and other clinics using an identity gamma model and iterative reweighted least-squares estimation, adjusting for age, sex, and baseline (2006) costs.

We analyzed changes in health care use and costs for twenty-one months because of accounting changes in Group Health's method for assigning costs for services in its integrated group practice. Thus, to ensure compatibility over time, we included data on use and costs only through twenty-one months, rather than twenty-four months.

The adjusted utilization results (Exhibit 4) reveal that differences in primary care use at twelve months persisted through twenty-one months and translated to 6 percent fewer visits. However, despite fewer in-person visits, prototype clinic patients used 80 percent more secure message threads and 5 percent more telephone encounters than other patients, which suggests greater total communication across all modalities.

Patients at the prototype clinic used specialty

care more often than controls but less so after twelve months. Differences in use of emergency department and urgent care services also persisted: Prototype-clinic patients made 29 percent fewer visits than others at twenty-one months. After accounting for case-mix, a key new finding is that all-cause inpatient admissions were 6 percent less ($p = 0.007$) over twenty-one months among patients at the prototype clinic compared to controls—a finding not apparent in a year.

As expected, the cost trends mirror the utilization findings (Exhibit 5). Primary care continued to be more expensive at the prototype clinic. It cost \$1.60 more per member per month. The greater use of specialty care cost approximately \$5.80 more per member per month. These costs were recouped, however, by fewer emergency department and urgent care visits, at a savings of \$4 per member per month, and by fewer inpatient admissions, at a savings of \$14.18 per member per month.

When costs are totaled across all types of care and adjusted for case-mix and baseline costs, we estimate a total savings of approximately \$10.30 per member per month, a result that approaches statistical significance ($p = 0.08$, meaning that

the difference could still be due to chance). Thus, while these results may have occurred by chance or from unmeasured confounding, this suggests an emerging return on investment for the prototype clinic.

Group Health had already made systemwide infrastructure investments, including the electronic health record, but substantial additional resources were nonetheless required to achieve this practice transformation. The majority of these incremental costs were personnel—recruiting and hiring additional clinical staff. Based on these additional costs and the reduction in health care costs, we can estimate return on investment associated with the prototype at twenty-one months at 1.5:1. That is, for every dollar spent to implement the medical home, Group Health received \$1.50 in return. This return on investment is based on savings in health care use achieved from personnel investments. Group Health had previously invested in various systemwide organizational and information technology (IT) improvements that facilitated the medical home; these were not included in medical home-specific return-on-investment estimates.

Lessons Learned

Group Health's experience demonstrates that primary care investments in the form of the medical home can improve patients' experiences with care, quality of care, and providers' work environment, and, at the same time, save money. The main limitations to the data presented here relate to variable response rates to our surveys and possible residual selection biases.

Based on the favorable outcomes of the prototype at one year and now up to two years, Group Health is spreading the redesign across all of its clinics. The differences in burnout are particularly notable, given that burnout among primary care physicians is associated with declines in the available workforce, which is a problem for Group Health and other organizations.

The prototype clinic was chosen as "proof of concept" because it had a stable workforce and strong leadership—attributes not consistently seen across Group Health's other practices. However, if similar investments and practice supports were made available and key redesign elements were consistently applied, leaders believe that positive results are likely. For organizations considering such transformations, Group Health's prototype experience suggests the key elements discussed below.

INVESTING IN PRIMARY CARE The medical home introduces new types of work and care expectations to primary care. Previous staffing

levels at Group Health, and probably many other organizations, were inadequate and relied on tremendous individual effort. Physicians and care teams require reasonable-size practice populations to allow physicians to know their patients better, comprehensively address their needs, and avoid burnout. Although we present our enhanced staffing ratios and mix as an example of the resources needed, we believe that staffing levels and mix should derive from the care needs of local populations.

ADAPTIVE LEADERSHIP AND PATIENT VOICES To be successful, we believe that leaders must anchor teams with a compelling vision for primary care with changes in the ways patients and physicians interact, tasks are distributed, and population-based care is deployed. In creating the vision and designing the activities, we believe that patients' desires are powerful organizing forces and that recognizing this helps ensure patient-centeredness.

In our experience, clinicians who experience high burnout and dissatisfaction are receptive to transformation, but only if leaders can clearly articulate the vision, ensure adequate resources, and let teams take charge of the process of change. Technical solutions for improving primary care, such as payment incentives, can be instrumental in shaping change, but not without strong leadership.

PAIRING LEADERSHIP WITH STRONG CHANGE MANAGEMENT Clinical staff feel understandably fatigued by the volume of changes that accompany medical home transformation.²³ Effective management is necessary to counter fatigue and resistance. Managers should assist care teams in breaking the changes into manageable parts so the teams are not overwhelmed. Careful staging can also increase the team's capacity for change as each new element is deployed. By using visual display systems, care teams can see how changes directly affect their patients and work flows. When processes are suboptimal, managers should work with teams to adjust them.

PATIENT-CENTERED ELECTRONIC RECORDS At Group Health, promoting patients' use of the shared electronic health record, including electronic communication, has been a main strategy for engaging patients, maintaining continuity, and improving access.^{9,11} Electronic health record functions used by clinicians also empower the delivery of primary care by including patient registries, care reminders, and decision-support tools to aid providers. Our experience is, however, that focused attention is needed to embed these resources carefully in medical home work flows, so that their full potential can be reached.²⁴

1.5:1

Return On Investment
For every dollar Group Health spent to implement the patient-centered medical home, it received \$1.50 in return.

Policy Implications

PRIMARY CARE FINANCING Observational evidence shows that when health systems emphasize primary care, patients achieve better health outcomes at a lower cost.²⁵ The Group Health prototype suggests that investments in primary care are likely to produce savings by reducing emergency department use and hospitalizations.

Financing reform is necessary to ensure that the benefits recouped align with the investments made. In addition to finding ways to shift downstream savings from reduced hospitalization and emergency department use upstream to primary care, other financing reform is required to support primary care infrastructures, particularly in staffing, electronic health records, and change management.

Consistent with the joint principles,¹ the Group Health demonstration confirms the importance of payment systems that value continuity of care, alternative communication forms, population management, team-based approaches, and evidence-based quality improvement.

Timing is another concern. Although the return on investment was relatively rapid at the prototype clinic, it is less clear how quickly Group Health will realize such a return in its other clinics. Ongoing evaluation and improvement efforts are obviously keys to achieving and locking in gains.

Given that community practices are positioned along the transformation spectrum, it is likely that the timing of returns will be variable. Policy makers should not expect every setting to realize the short-term savings seen at Group Health or other large systems. Savings in smaller independent practices with fewer supports may take much longer to achieve. Conversely, in some cases, existing inefficiencies and poor coordination may make gains more readily apparent.

EDUCATIONAL REFORMS Our results suggest that medical home transformation can improve job satisfaction and lessen burnout among primary care providers. Lack of satisfaction and burnout are cited by many providers as reasons for leaving the workforce or choosing other careers.^{26,27} However, successful models with enriched staffing ratios such as that used here may aggravate current shortages.

We believe that a concerted effort is needed to train more primary care physicians and other clinical staff. Training programs should also ensure that providers and clinical staff are prepared to function in their new roles. In particular, training should incorporate team perspectives,

Medical home transformation can greatly improve job satisfaction and lessen burnout among primary care providers.

use of the electronic health record, leadership and management skills, and quality improvement.

INVESTMENTS IN HEALTH IT Proposed federal standards for electronic health records are well aligned with primary care—for example, by allowing patients access to portions of their record and eventually by affording broad electronic messaging between patients and clinicians. Likewise, electronic health record functions for clinicians, such as patient reminders, can be helpful in ensuring the delivery of evidence-based care. However, installing certified electronic health records that meet proposed federal “meaningful use” criteria as called for in the 2009 stimulus legislation will not be enough. These tools must be thoughtfully integrated into primary care practice to promote transparency, communication, and coordination.

Conclusion

Group Health’s experience in a prototype clinic suggests that primary care enhancements, in the form of the medical home, hold promise for controlling costs, improving quality, and better meeting the needs of patients and care teams. We offer an operational blueprint, but success in other settings will depend on leadership, resourcing, electronic health records, change management, and aligned incentives.

Primary care transformation represents a complex system redesign that requires a policy environment that aligns payment and training to support this work. It also requires organizations in which leaders, managers, and care providers are highly engaged in achieving this change. ■

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Transforming Healthcare: Breast Cancer Care

The Gundersen Lutheran Norma J. Vinger Center for Breast Care's interdisciplinary model of caring for breast cancer

patients has the potential to save an estimated \$4.15 billion dollars in healthcare costs if it is implemented on a national scale. Gundersen Lutheran's breast care model is centralized and coordinated, meaning:

- Breast tumors are detected when they're 24% smaller
- A discovery-to-treatment timeline that's 2.5 times faster than traditional models
- A 35% reduction in total treatment cost

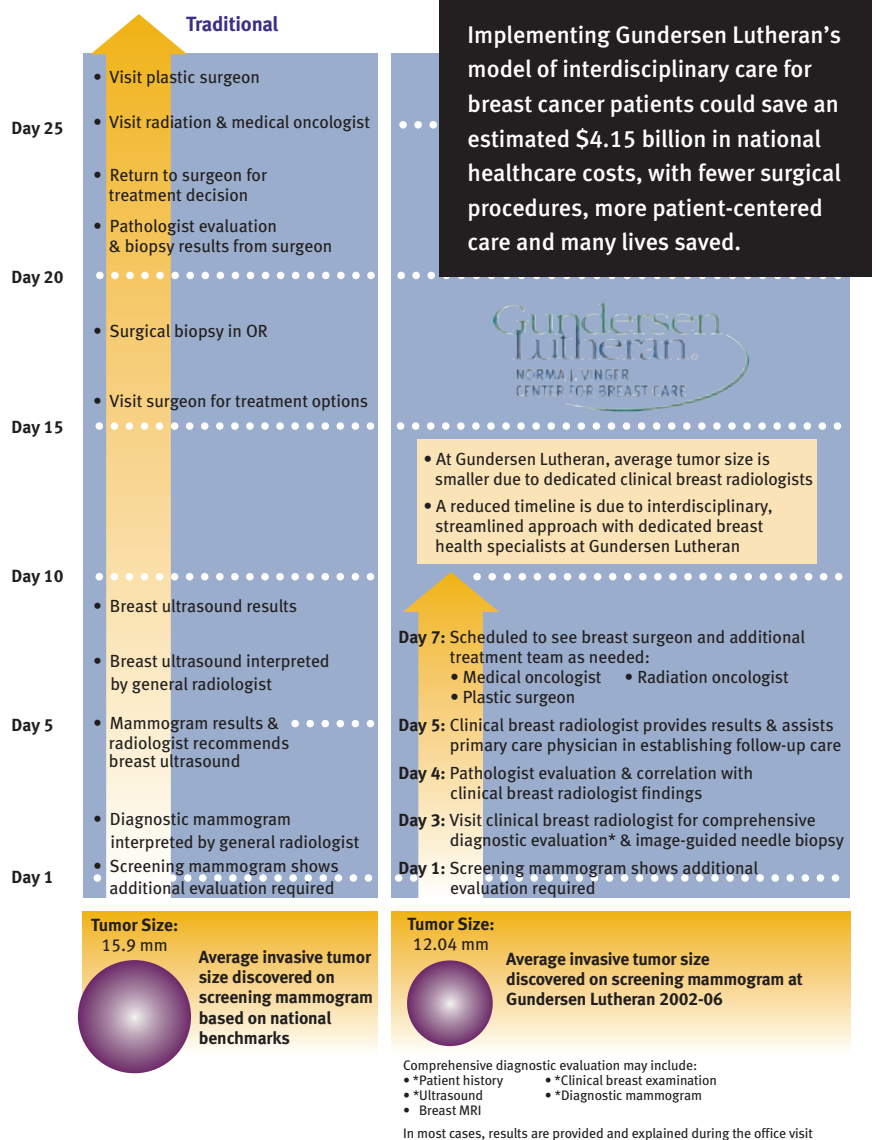
Gundersen Lutheran's unique approach to breast cancer care starts with screening mammography. All mammograms are read by a limited number of radiologists who sub-specialize in breast care, which means they have more experience detecting very small tumors and can detect lumps sooner.

When breast cancer is detected having multiple departments available to provide breast care—the traditional approach—isn't enough. Gundersen Lutheran's interdisciplinary model of care surrounds the patient with a team of specialists who use a coordinated approach that results in fast diagnosis and a streamlined pathway through treatment.

Breast care at Gundersen Lutheran is considered high quality based on more than 30 known quality indicators. In 2009, the health system became the first breast center in the nation to be named a Certified Quality Breast Center of Excellence™ by the National Quality Measures for Breast Centers™ Program, the organization's highest level of distinction.

Gundersen Lutheran's model of care can be replicated on a national scale, improving clinical outcomes while providing significant financial savings in national healthcare costs.

Breast Lump Discovery-to-Treatment Timelines



From the moment a Gundersen Lutheran radiologist detects an abnormality in a woman's screening mammogram, patients receive expedited, individualized care. With Gundersen Lutheran's interdisciplinary approach, diagnosis and treatment plans are in place within nine days, and, in most cases, much sooner. Under traditional models of patient care, breast cancer diagnosis and treatment plans are not in place until 22 days after detection, or, in most cases, much longer.

Early detection

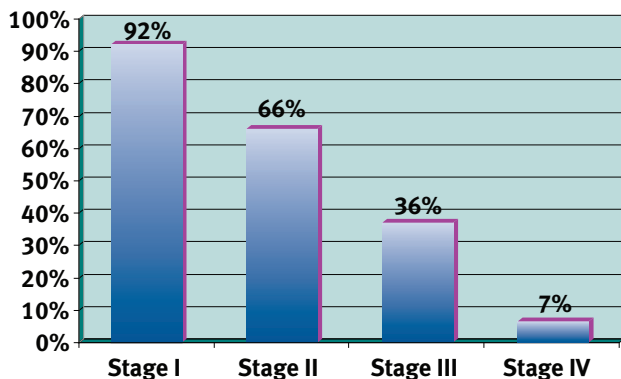
One of the keys to the success of Gundersen Lutheran's program is the early detection of breast cancer, when it's in its most treatable stage. Screening mammography is an integral part of early detection for women 40 and older because it can detect a cancerous tumor up to four years before it can be felt. When detected early and at a small size, a woman has a 92 percent chance of being alive in five years. Along with providing the best outcomes, cancer caught at an early stage lowers costs.

In 2008, the Center for Breast Care evaluated 27,167 screening mammograms and evaluated 3,990 patients with diagnostic concerns. While these numbers are good, Gundersen Lutheran is continuing its work to increase the rate of screening mammography in the communities it serves.

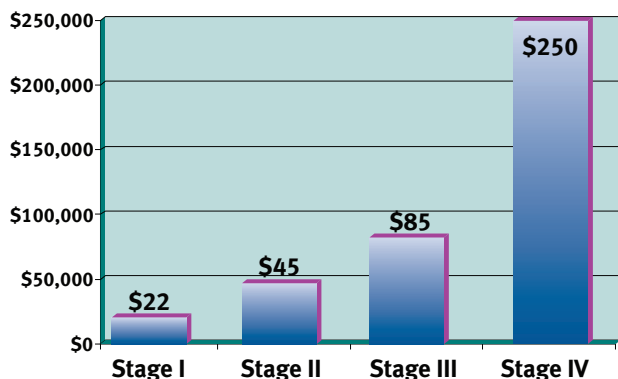
Mobile Mammography

A high number of women in Gundersen Lutheran's rural service area are still not having screening mammograms, so the health system acquired a mobile mammography unit to bring this service directly to women. The service focuses on working women who have not had a mammogram in more than five years, along with uninsured and underinsured patients. Improving access to breast cancer screening services can reduce the risk of undetected or late-stage breast cancer.

Impact of Early Detection on Five Year Survival



Impact of Early Detection on Treatment Costs



Stayin' in the Pink

Gundersen Lutheran's "Stayin' in the Pink" program spreads the message of the importance of screening mammograms. Gundersen Lutheran's Norma J. Vinger Center for Breast Care initiated the program with health system employees in 2004, and extended the program to businesses and community groups in its service area. Eligible women receive a letter to remind them of the importance of screening mammography, and those who have a mammogram are entered into quarterly prize drawings. The program has led to the discovery of many breast cancer cases in the community.

Diagnosing breast cancer

When it comes to diagnosing breast cancer sooner, the skill of the physician who interprets the mammogram is key. Gundersen Lutheran's Norma J. Vinger Center for Breast Care takes a unique approach to this process. In most organizations, mammograms are read by radiologists who interpret other types of images, like X-rays of broken bones and CT scans, at the same time they interpret mammograms. At Gundersen Lutheran, the sub-specialized breast care radiologists who read mammograms are doing only that and in a controlled environment. Gundersen Lutheran also has two fellowship-trained clinical breast radiologists on staff who specialize in breast imaging.

Gundersen Lutheran has attained every breast care-related accreditation offered by the American College of Radiology (ACR). As of March 2009, only two healthcare organizations nationwide have this distinction, and Gundersen Lutheran is one of them.

Having sub-specialized radiologists on the interdisciplinary breast team has an immediate clinical and financial impact. For example, if the radiologist spots something suspicious, more than 95% of Gundersen Lutheran patients have a less invasive clinic-based image-guided needle biopsy rather than surgery. The national average is 50%. Patients will be contacted within 24 to 48 hours with their results. Other examples include:

- 5% fewer women are asked to return for an additional evaluation after the initial screening mammogram
- 50% decrease in the number of women undergoing biopsy
- 20% increase in the positive biopsy rate
- Between 93 and 97% of screening mammogram-detected cancers are detected at Stage 0 or Stage 1 while the tumor is small and confined to the breast

Breast cancer treatment

Whenever breast cancer is diagnosed, the patient's treatment plan begins immediately, with unprecedented coordination. Weekly breast conferences at Gundersen Lutheran allow

medical and support staff from multiple specialties to work together to develop the right treatment approach for each patient. This coordinated effort means patients begin treatment in the shortest time possible and avoid the long weeks of anxious waiting that are still normal in many organizations.

Every effort is made to bring interdisciplinary care team members—including a subspecialized radiologist, pathologist, surgeon, medical oncologist, radiation oncologist, plastic surgeon, technologists, nurse navigator and social worker—to the patient, rather than having her move to various physical locations. A key team member is the nurse navigator, who ensures each member of the healthcare team receives complete, up-to-date patient information. This allows the patient to move through the healthcare system in a timely manner and have her physical and emotional care needs met efficiently.

Monitoring our outcomes

The Norma J. Vinger Center for Breast Care at Gundersen Lutheran has tracked five years of performance audit data. An interdisciplinary, point-of-care information technology tool was created to document and track more than 200 metrics that monitor patients' course of diagnosis and treatment along with outcomes data, including screening performance, positive biopsy rates, survival rates, recurrence rates, mortality rates and financial impact. Our performance far exceeds the benchmarks set by some of the nation's most revered medical centers.

Notable outcomes include:

- Average invasive tumor size of 12.04 mm discovered on screening mammogram compared to 15.9 mm national benchmark.
- Recall rate of approximately 5% compared to the 10% that is typical at many radiology facilities.
- Five year survival rate of 97 and 90% for stage 0 and stage 1 breast cancer, which is above the national benchmark.

Breast Cancer Screening, Diagnosis, Biopsy and Treatment: Cost Comparisons

If the nation shifts to a comprehensive, interdisciplinary team approach such as Gundersen Lutheran's model of care, the result will be improved clinical outcomes and a 35% reduction in national healthcare costs.

General Radiologist/ Traditional Care

*32M screening patients @ \$68 - \$2.18 billion
10% recall rate

3.2M diagnostic patients @ \$150 - \$480 million
40% recommend biopsy

1.28M have biopsy

25% Ultrasound	320K	@	\$700
25% Stereo	320K	@	\$1800
50% Surgical	640K	@	\$5000
Surgical Consult	1.28M	@	\$100

Total Biopsy \$4.13 billion
~20% Positive Biopsy Rate

**262K/yr Breast Cancer Cases
(Projected cancer detection from 32M patients)
Treatment Cost per Cancer Stage at Diagnosis

Stage Tis (DCIS)	19%	51K	@	\$15,000
Stage 1 (<14mm)	30%	63K	@	\$10,000
Stage 1 (15-20mm)	30%	63K	@	\$22,000
Stage II	14%	30K	@	\$45,000
Stage III	5%	11K	@	\$85,000
Stage IV	2%	4K	@	\$250,000

Total Treatment \$5.2 billion

Total \$12.0 billion

Clinical Breast Radiologist/ Interdisciplinary Team

*32M screening patients @ \$68 - \$2.18 billion
5% recall rate

1.6 M diagnostic patients @ \$150 - \$240 million
40% recommend biopsy

640K have biopsy

75% Ultrasound	480K	@	\$700
20% Stereo	128K	@	\$1800
5% Surgical	32K	@	\$5000
Surgical Consult	32K	@	\$100

Total Biopsy \$730 million
~40% Positive Biopsy Rate

**262K/yr Breast Cancer Cases
(Projected cancer detection from 32M patients)
Treatment Cost per Cancer Stage at Diagnosis

Stage Tis (DCIS)	19%	51K	@	\$15,000
Stage 1 (<14mm)	50%	106K	@	\$10,000
Stage 1 (15-20mm)	14%	30K	@	\$22,000
Stage II	10%	21K	@	\$45,000
Stage III	5%	11K	@	\$85,000
Stage IV	2%	4K	@	\$250,000

Total Treatment \$4.7 billion

\$7.85 billion

35% cost reduction & streamlined care

Gundersen Lutheran Health System

Headquartered in La Crosse, Wis, Gundersen Lutheran Health System provides quality health services to patients at its hospital and clinics throughout western Wisconsin, southeastern Minnesota and northeastern Iowa. Gundersen Lutheran is a major tertiary teaching hospital, providing a broad range of emergency, specialty and primary care services to its patients.

As one of the nation's largest multi-specialty group medical practices, Gundersen Lutheran is comprised of nearly 700 medical, dental and associate staff, and supported by a staff of more than 6,000. The Health System has been consistently ranked in the upper 5% of hospitals in the country.

**Gundersen Lutheran
Health System**
1900 South Avenue
La Crosse, Wisconsin 54601
Phone: (608) 775-1400
E-mail: externalaffairs@gundluth.org



Financial Analysis of Iatrogenic Harm at Henry Ford Hospital

Objective

To quantify the costs related to iatrogenic harm and support a business case for the No Harm campaign efforts at Henry Ford Health System.

Methods

Data related to all Henry Ford Hospital admissions for one year were obtained, along with total facility costs and estimated reimbursement for each case. We used published costs associated with harm events where reasonable costs existed, and calculated estimated costs for other harm events where we had patient lists for that harm item. In some cases where published cost data either did not meet our definition for the harm item or where the published estimate seemed excessive, we chose to do a local estimate.

Specifically, for harm events of glucose below 40, no pulse blue alert, medication-related ICD9 code beginning with E, coded pneumothorax, coded DVT or PE, or coded acute renal failure, we created indicator variables for each patient with a yes or no for the harm indicator. We then added an Elixhauser severity adjustment score for each patient along with the primary DRG.

Statistical Analysis

We used a statistical package to fit a model receiving an expected cost for each DRG, an expected addition of expense for each level of increase in severity score, and the difference in cost between yes and no for each harm variable.

Results

Each harm indicator was associated with a statistically significant cost increase.

Cost Results Used in Analysis

Harm Type	Cost Associated	Method/Reference or (Other estimates)
Bloodstream Infections	\$20,000	<i>Am J Infect Control. 2008;36(10):S172.e1-3 (Michigan Keystone Project \$54,000)</i>
Coded DVT/PE	\$8,761	Statistical Model on HFH 2009 Admissions (ACS NSQIP \$13,208)
Coded Medication issue	\$1,598	Statistical Model on HFH 2009 Admissions
Coded Pneumothorax	\$5,671	Statistical Model on HFH 2009 Admissions
Coded Procedural Complication ICD9 (998-999.99)	\$8,580	Statistical Model on HFH 2009 Admissions adjusted on primary procedure not DRG.
Fall	\$5,317	<i>Boswell, Ramsey, Smith and Wagers (2001)</i>
Glucose below 40	\$4,875	Statistical Model on HFH 2009 Admissions
No Pulse Blue Alert	\$5,052	Statistical Model on HFH 2009 Admissions
Pressure Ulcer	\$8,730	<i>2010 Society of Actuaries Report</i>
SSI	\$10,000	Conservative choice based on Various publications and procedures. ACS NSQIP \$20,000 – 60,000 CT surgery 20,000, Bariatric 8,000, Joint Replacement 50,000
UTI	\$8,267	Statistical Model on HFH 2009 Admissions (ACS NSQIP \$12,828)
VAP	\$11,897	<i>Crit Care Med. 2003 May;31:1582-3</i> (others ACS NSQIP \$40,000)

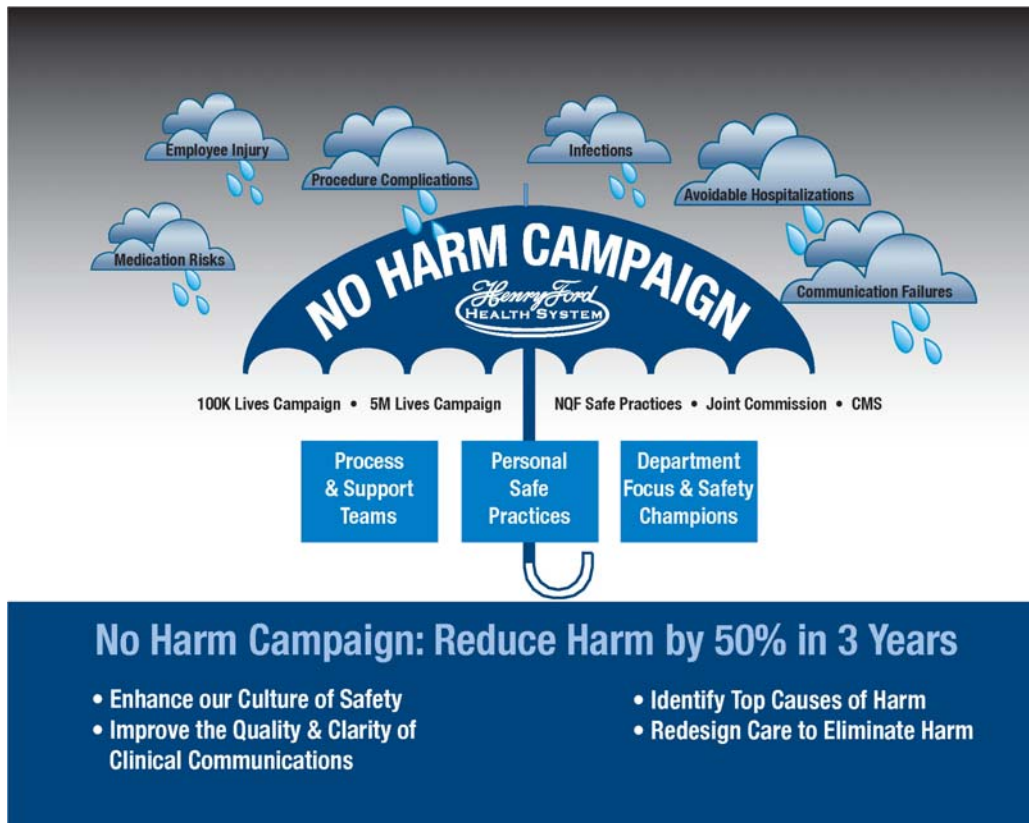
After finding these estimated costs, we applied the cost estimates to the harm events found at Henry Ford Hospital in both 2009 and 2010. The total estimated cost of harm in 2009 was \$39,910,375 or \$916 per admission. This represents 8.7% of all costs associated with treating inpatients in 2009. Through the intense efforts of the No Harm campaign in 2010, total costs were reduced to \$34,465,612, a \$4.4 million dollar improvement with a cost-savings of \$85 per patient.

Total Harm-Associated Costs 2009*

Harm Issue	Total Associated Costs
Pressure Ulcer	\$10,624,410
Procedure Comp (998-999)	\$7,670,520
UTI	\$5,662,895
Glucose below 40	\$3,846,375
Acute Renal Failure	\$2,665,680
DVT	\$2,365,470
Blue Alert	\$1,535,808
Coded Medication issue	\$1,216,078
C-difficile	\$1,176,000
Fall	\$696,527
Bloodstream Infection	\$640,000
Pneumothroax	\$340,260
SSI	\$280,000
VAP	\$190,352

*Henry Ford Hospital only.

Henry Ford Health System No Harm Campaign



Progress Report *November 1, 2010*

Background

Since the 1999 Institute of Medicine (IOM) report *To Err Is Human: Building a Safer Health System*, the focus on reducing harm has spread across health care. The IOM report used the shocking statistic that 44,000 to 98,000 deaths each year are caused by medical errors, and other studies have found alarming rates as high as 40 harm events per 100 patients admitted to a hospital. Over the past decade health care organizations across the nation have struggled with how to respond cohesively. In 2007, the Henry Ford Health System Board of Trustees identified eliminating harm from the health care experience as our highest priority. Our “No Harm Campaign” is a System-wide approach designed to coalesce various harm-reduction interventions into one key System effort.

Purpose

The highest priority of our Quality work is to become a harmless organization. To that end, we initially aimed to decrease harm events by 50% by 2010 through:

- Enhancing our culture of safety.
- Improving the quality and clarity of clinical communications.
- Identifying top causes of harm as a System and at individual points on the continuum of care.
- Redesigning care to eliminate common causes of harm.

Based on significant progress of nearly a 25% reduction in harm events system-wide from 2008-2010, the Henry Ford Health System Performance Council recently extended the “No Harm Campaign” for an additional three years to December 2013.

Scope

The broad scope of the “No Harm Campaign” uses an approach to report and study harm events, research causality, identify priorities, and change practice to eliminate all harm to patients and staff. Harm is defined as:

Any unintended physical injury resulting from or contributed to by medical care (including the absence of indicated medical treatment) that requires additional monitoring, treatment or hospitalization, or that results in death. Such injury is considered harm whether or not it is considered preventable, resulted from a medical error, or occurred within a hospital.

Objective and Measures

System Objective: Reduce harm events by 50% from March 2008 - December 2013

Although various health agencies continue to refine and propose new measures related to harm, no defined set of measures has yet been agreed upon for U.S. hospitals. In 2008 we identified a broad agenda for harm reduction for all Henry Ford Health System facilities and a unique aggregate harm score.

Measures of Harm (Appendix)

- **Infection-Related Harm:** Infection-related harm includes all common health care-acquired infections, such as with the organism *Clostridium difficile* or methicillin-resistant

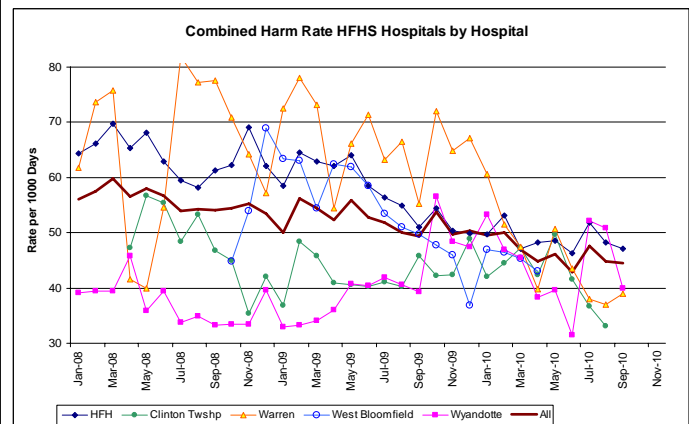
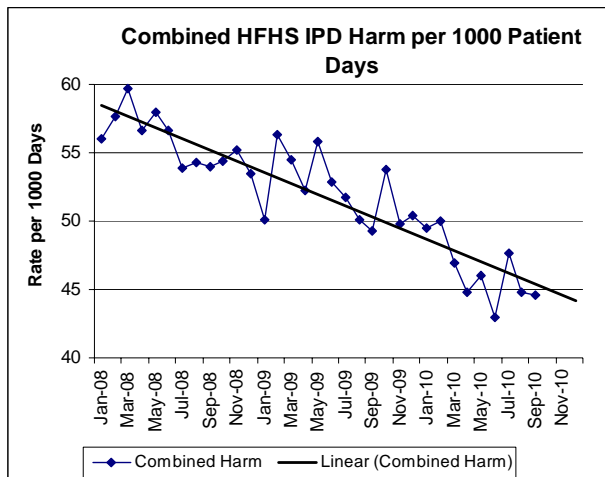
Staphylococcus aureus (MRSA); catheter-related bloodstream infections or urinary tract infections; surgical site infections; and ventilator-associated pneumonia.

- **Procedure-Related Harm:** Procedure-related harm includes all coded complications directly related to medical and surgical procedures.
- **Medication-Related Harm:** This category focuses on the types of drugs causing half of all medication-related events. These drugs include insulin, anticoagulants, and narcotics, among others. The optimal measure is the “in range” management of these risky medications.
- **Other Preventable Harm**
 - **Falls:** Patients or visitors may experience accidental falls while in the hospital. We measure all falls with injury.
 - **Pressure Ulcers:** Patients who are bedridden are at higher risk of developing pressure ulcers on the skin.
 - **Health Care Acquired Acute Renal Failure:** Radiology imaging studies using contrast material may cause kidney damage. Other causes being addressed include sepsis, dehydration, and drug-induced renal failure.
 - **Employee Injuries:** Employee injuries such as falls, needle-sticks, and back injury may occur from various environmental or work-related conditions.

System Results

Combined Inpatient Harm Rate

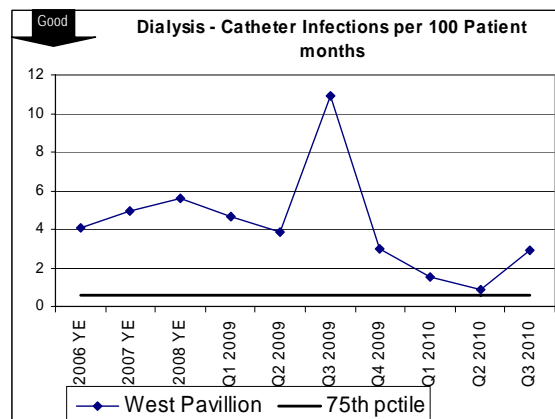
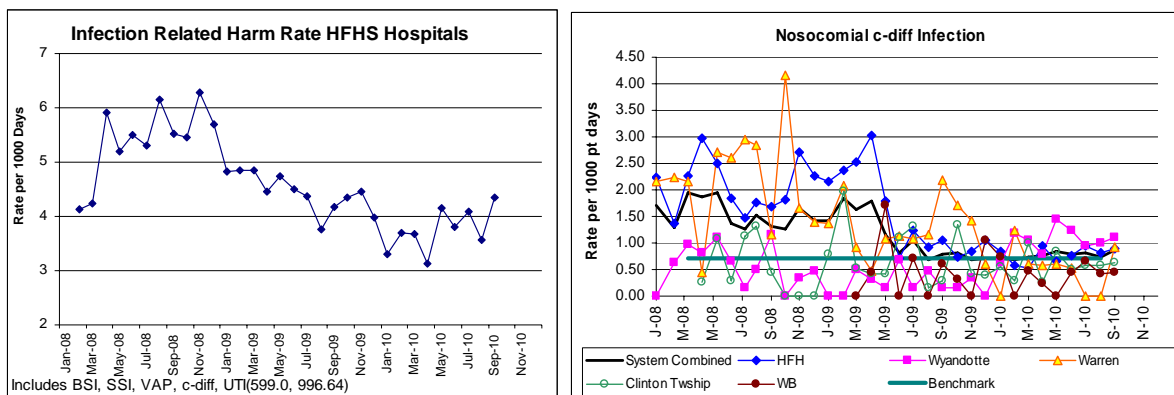
Using the identified measures of harm, Henry Ford Health System hospitals’ aggregate inpatient **harm rate has dropped almost 25%** since the start of the No Harm Campaign. We have **decreased the harm rate by 90 events/month** even while adding a new hospital and increasing the total number of patient days.



Infection-Related Harm

- **Since the start of the No Harm Campaign, infection-related harm has decreased by 29%.** In the past year, improvement was driven by a reduced rate of infection with *Clostridium difficile* (which causes colon infection). This rate for the System remains at the national benchmark of 7.0 per 10,000 patient days.

- Interventions to reduce infection-related harm have included increased hand hygiene surveillance, improved adherence to isolation precautions, and enhanced antimicrobial stewardship through use of the Theradoc computer system at Henry Ford Hospital. The pharmacy software Theradoc system has been extended to all System hospitals.
- Interventions to reduce catheter-related bloodstream infection in hemodialysis patients with tunnel catheters have included an antibiotic lock protocol. The protocol involved instilling a solution of gentamicin and trisodium citrate into the catheter lumen after each patient's dialysis session. At Henry Ford Hospital's West Pavilion Dialysis Unit, use of the antibiotic lock protocol decreased the average rate of catheter-related bloodstream infection from 9 per 100 patient months in the control period to 3 per 100 patient months. This decrease to national benchmark has been sustained throughout 2010. The antibiotic lock protocol will be spread to other dialysis units with high infection rates.
- The focus of attention in 2010 at all facilities is reducing catheter-related urinary tract infections.

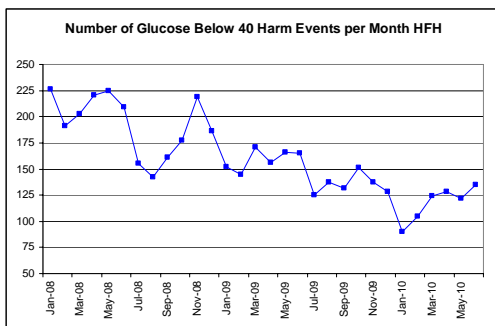


Medication-Related Harm

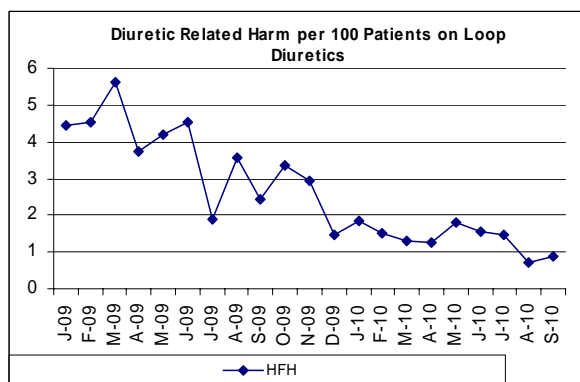
Specific categories of medications present a high risk to patients and represent a large proportion of medication-related harm. The highest risk medications include insulin to control blood glucose, narcotics to control pain, and anticoagulants to prevent blood clots. All of Henry Ford Health System's hospitals continually focus on ways to reduce harm from these high-risk drugs. The System's Corporate Pharmacy Council meets regularly to share best practices and to develop System-wide process improvements. Examples include:

- **Insulin:** The newest protocol for tight glycemic control was first piloted at Henry Ford West Bloomfield Hospital in 2009 and was spread to Henry Ford Hospital in May 2010 and to other System hospitals throughout this year. The glycemic control protocol along

with the change in the ICU drip protocol led to a 45% reduction in hypoglycemia at Henry Ford Hospital.



- **Anticoagulants:** A pilot program of anticoagulant (blood thinning) medications was started at Henry Ford Hospital in 2008. These medications, such as warfarin, require monitoring of the patient’s INR blood rate to prevent serious complications. For example, if the INR rate climbs too high, the potential for hemorrhage increases. The Henry Ford Pharmacy Department implemented the Pharmacist-Directed Anticoagulation Service (PDAS) to improve anticoagulant medication selection, dosing, monitoring, and safe transition of these patients from inpatient to outpatient care.
 - **Since implementation of PDAS at Henry Ford Hospital, the rate of INRs > 5 (risk of hemorrhage) has declined by over 80%**, suggesting improved safety in warfarin dosing.
 - Patients discharged on anticoagulant medications were 21% more likely to follow-up with the anticoagulation clinic within 5 days of discharge and to be discharged on the appropriate dose of warfarin when cared for by the PDAS team. These changes are a significant enhancement as patients transition from the inpatient to the outpatient setting. Adaptations of this model either have been implemented or are in the process of being implemented at other hospitals in the System.
 - PDAS has been identified by external organizations such as the American Society of Health-System Pharmacists and the Hospital Care Collaborative as a model for improving the safety of anticoagulation management.
 - In 2010 there continues to be a low rate of risk associated with anticoagulant medication use as a result of the Pharmacist-Directed Anticoagulation Service.
- **Diuretics:** ICD9 codes for adverse effects from diuretic medications are tracked and investigated. Improved contrast protocol and clarifications with documentation and coding have led to the improvement.

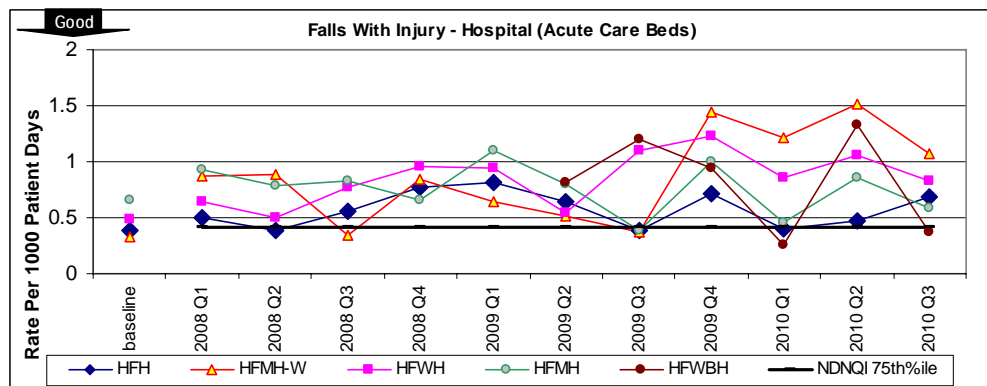


- **Narcotics:** In 2010, all System hospitals have been working to improve patient satisfaction with pain relief and implementing steps to prevent or correct over-sedation.

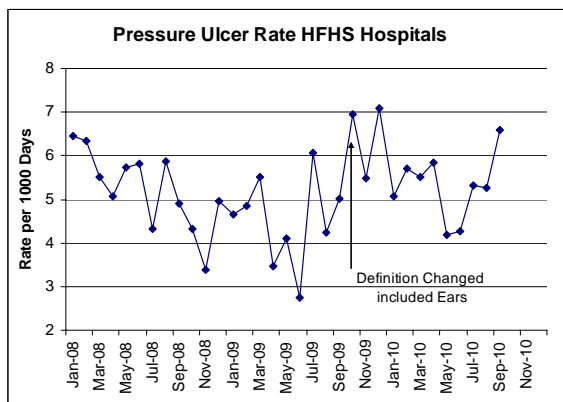
Falls and Pressure Ulcers

System hospitals have adopted an evidence-based, nurse rounding protocol designed to improve patient satisfaction and to reduce harm by preventing patient falls and hospital-acquired pressure ulcers. Nurses use a standardized checklist for each patient during the hourly rounds.

- **Patient Falls:** The incidence of falls for confused and agitated patients remains a challenge. A protocol for “no unattended toileting” was piloted, but was found to be a significant dissatisfier to patients. Because over half of patient falls are related to toileting, toilet assistance will be recommended but used only if patients accept the imposition. Beds with enclosed canopies have proven useful, and efforts are underway to increase use of these beds at all System hospitals.



- **Pressure Ulcers:** The percentage of hospital-acquired pressure ulcers peaked at the end of 2009 based on the addition of new audit criteria for assessing skin areas under medical devices and equipment. Oxygen tubing was found to cause pressure ulcers on ears, and new protection devices for the ears have been obtained for use at all System hospitals.



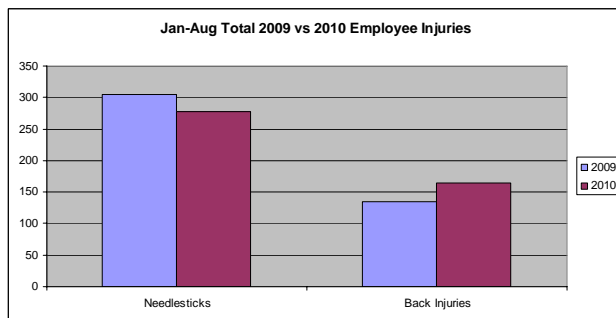
Contrast-Related Acute Renal Failure

Henry Ford Medical Group’s Department of Radiology has implemented one of the most aggressive programs nationally to protect kidney function from contrast-induced harm. The program includes avoiding unnecessary imaging studies, giving fluid to patients at risk of using

contrast material, and aggressive tracking of patients who are given contrast. This program started at Henry Ford Hospital and has been spread to other System hospitals.

Employee Injuries

Employee harm from contaminated-source needlesticks and from job-related musculoskeletal back injuries is tracked monthly. Totals year-to-date show a reduction in needlesticks from 2009 to 2010 but an increase in back injuries over the same period.



Next Steps

- **Infection-Related Harm:** Focus on reducing urinary tract infections, pneumonia, and multidrug-resistant organisms.
- **Procedure-Related Harm:** System-wide collaboration on the National Surgical Quality Improvement Project (NSQIP).
- **Medication-Related Harm:** Continue careful monitoring of high-risk medications and spread of the Pharmacy-Directed Anticoagulant Program, Theradoc pharmacy software, and process improvements to prevent or correct over-sedation with narcotics.
- **Other Preventable Harm**
 - **Falls and Pressure Ulcers:** Continue ongoing compliance with the hourly nurse rounding program.
 - **Health Care Related Acute Renal Failure:** A multidisciplinary effort including Radiology, Pharmacy, and medical management of the patient will continue, including an effort to spread the renal safety program across all System hospitals.
 - **Employee Injuries:** Collaboration with Safety Champions is ongoing to implement a culture of health and safety on the frontlines of care. We are targeting training and education on the top causes of employee-harm and best practices for personal safety.

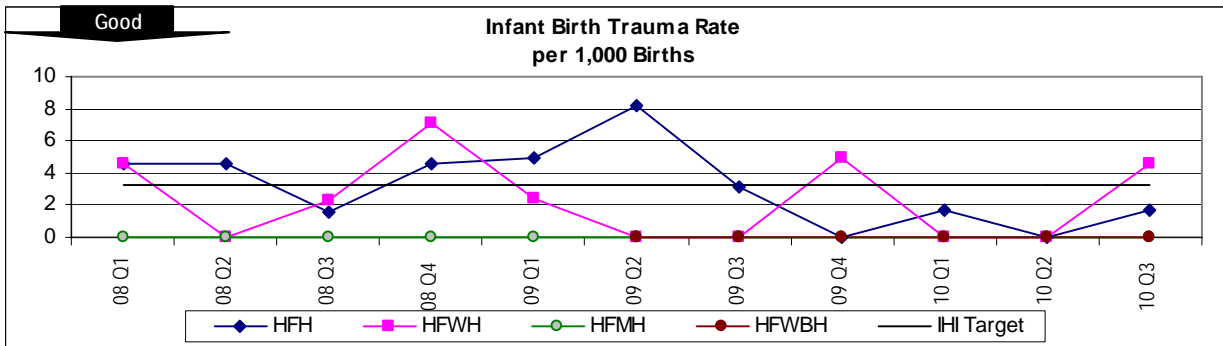
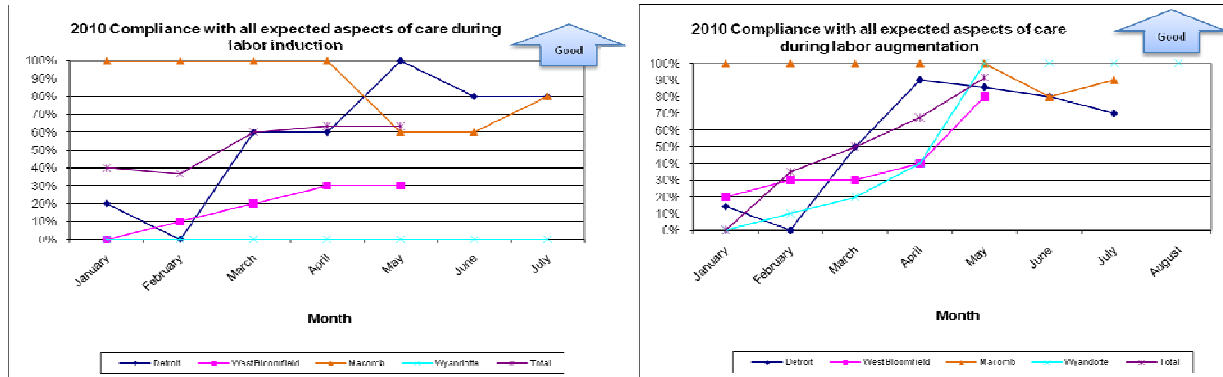
Redesigning Care Processes

1. Perinatal Care Collaborative to reduce harm to mothers and infants

We have continued with the implementation of two evidence-based bundles of care processes known to improve outcomes related to inducing or accelerating elective labor (referred to as labor induction and labor augmentation, respectively). The care bundles include:

- No induction of labor before 39 weeks of gestation
- A standardized order set for oxytocin
- Routine fetal monitoring
- Pelvic exam scoring

- Recognition and management of excessive drug-induced uterine contractions



Next Steps

To continue to enhance the culture of safety in the Labor and Delivery areas in all System hospitals, we will continue standardizing work processes and begin executive rounding. We are taking steps to engage staff and improve dialogue between providers through weekly electronic fetal monitor strip reviews. These reviews aim to provide a safe venue that encourages participants to speak up, not only during the exercise but also throughout the patient’s stay. The System Collaborative members are assessing ways to measure the “ideal delivery” which includes measures important to patients and physicians. We will continue to work with the statewide Keystone Collaborative and report the metrics required for comparative purposes.

2. Emergency Department Collaborative to improve patient safety

All of the System’s Emergency Departments have targets in place to reduce the number of patients who leave the emergency room (ER) without completing service. As of August 2010, six of the System’s nine ERs have met or exceeded these targets.

Next Steps

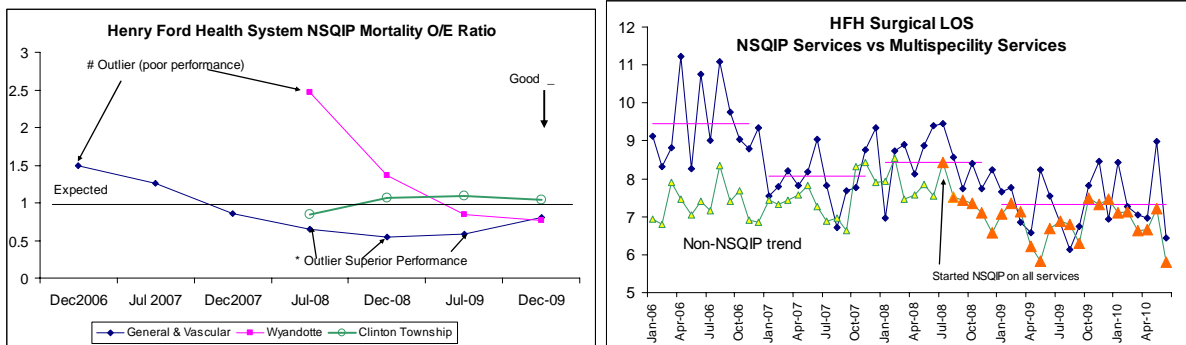
Seven of the System’s nine Emergency Departments are participating in the Michigan Hospital Association’s Keystone ER Collaborative. (The other two Emergency Departments cannot participate because of low volumes.) Four interventions in the Keystone ER Collaborative include:

- Continue to implement the Comprehensive Unit-based Safety Program. All participating Emergency Departments have completed a Culture of Safety Survey and are in the process of implementing safety interventions.

- Improve “handovers” of care during the transfer of a patient from the ER to another location in the hospital, or to an external location, to avoid miscommunication about the patient’s care.
- Improve early identification and treatment of sepsis.
- Use of LEAN methodology to improve patient flow and wait times. Site-specific projects being facilitated by the Keystone Collaborative via monthly workshops and webinars include:
 - Wyandotte (with Fairlane and CHS): Length of stay in Express Care
 - Macomb (with Warren): Time from Door to Provider in Triage
 - West Bloomfield Hospital: Time from Disposition to Admission
 - Henry Ford Hospital: Time from Door to Provider

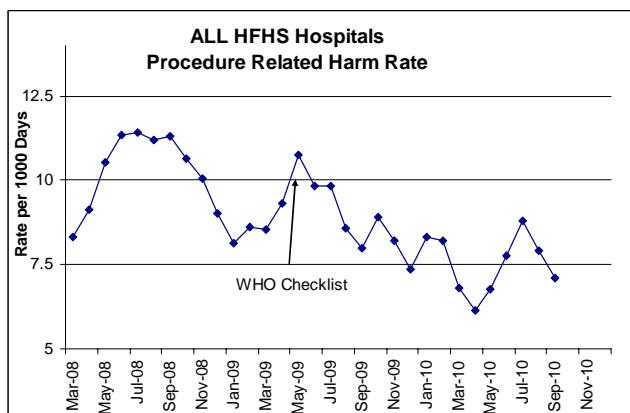
3. System NSQIP Collaborative to improve the quality of surgery

The National Surgical Quality Improvement Program (NSQIP) is an initiative undertaken across the U.S. to continually improve the quality of surgical care. Henry Ford Hospital joined NSQIP in mid 2006, and three other System hospitals joined in late 2007.



Results show that the development of a comprehensive surgical services program has led to reduced mortality and length of stay (LOS).

For all System hospitals, the combined procedure-related harm rate is based on our set of measures:



Next Steps

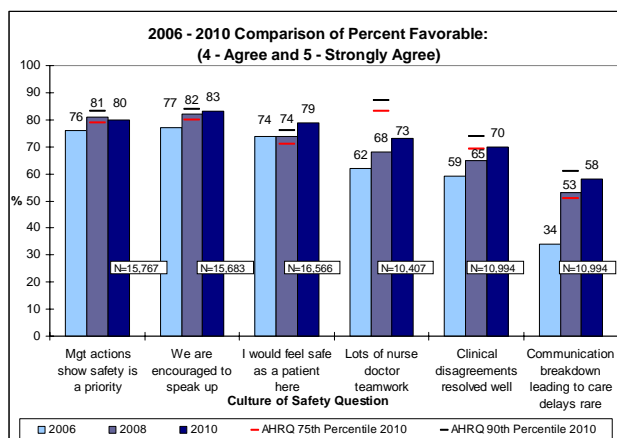
We will align the goals of the four hospitals participating in NSQIP to focus on patient flow through the hospital, data analysis, transparency, best practice sharing, and standardization of

policies and procedures as appropriate throughout our System. Improvement efforts will focus on reducing surgical site infections, blood clots, and pneumonia, as well as improving preoperative education for the patient. All System hospitals implemented the World Health Organization (WHO) checklist and debrief sessions for conscious sedation standards in 2009, and efforts to spread use of the WHO checklist to ambulatory surgery centers will continue in 2010.

Enhancing our Culture of Safety

1. Employee Survey

Employee surveys are used in health care to assess safety culture. Our surveys conducted in 2006 and 2008 showed that Henry Ford Health System exceeds the Agency for Healthcare Research and Quality (AHRQ)’s 75th percentile benchmarks for culture of safety perceptions in four of six categories. Our 2010 survey results showed that Henry Ford Health System exceeds AHRQ’s 90th percentile benchmarks for culture of safety perceptions in one question, and the 75th percentile benchmarks in five of six categories. Of note: the doctor/nurse teamwork question has shown steady improvement (the AHRQ survey includes physician participation whereas our System survey does not). The literature shows a clear gap in perceptions of teamwork between physicians and nurses with physicians typically rating team work between the two groups higher than nurses.



Next Steps

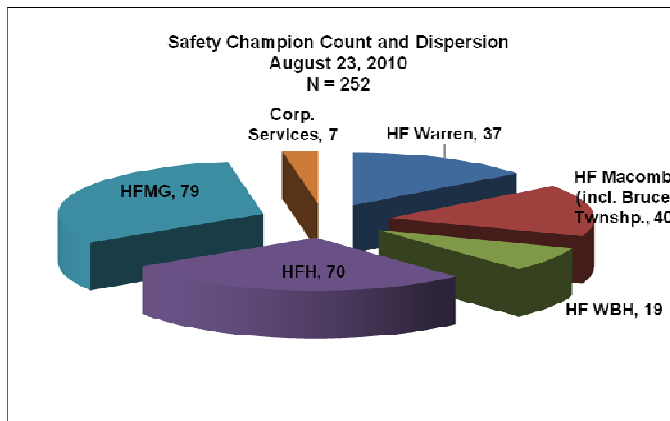
- A new course entitled “Speak Up, Speak Out: Creating Safe Environments” is being launched this fall. This training course will be paired with a “Speak Up” leadership tool kit.
- The Just Culture error management approach roll-out will be completed this fall.
- We will continue to expand and grow the Safety Champion program. A culture of safety pulse survey is planned for November to assess progress.

2. Safety Champion Program

Launched in June 2008, the Safety Champion Program provides an opportunity to give voice to the needs and concerns of our frontline employees. We recruited employees from across multiple areas of the System to be Safety Champions, and implemented System-level communication

strategies for the Safety Champion Program including a System blog, group email, a safety champion newsletter, e-learning and classroom education, and quarterly development forums. Over this past year we added monthly tool kits that Safety Champions share in their local environments to promote team communication. Safety Champions model and mentor safe practices, share information at staff meetings, and are involved in quality and safety improvement work.

As of August 2010, 252 Safety Champions have been trained and deployed throughout the System. They reinforce safety initiatives implemented throughout the System, such as for hand hygiene and the Speak Up campaign.



The 2010 Engagement Survey results showed that clinical units with Safety Champions had statistically significant improvement in culture of safety scores from 2008 results compared to clinical units without Safety Champions. Overall engagement scores were also higher for units with Safety Champions compared to units without Safety Champions.

Next Steps

Continue recruitment and education of Safety Champions and spread the program to more areas.

3. Patient Safety Training Program

The Patient Safety Training Program (Patient Safety 101) educates employees about the hazards in health care and identifies effective strategies to reduce these hazards. This web-based self-learning program includes interactive features to allow employees to share their point of view and provide feedback.

Results: To date, this e-learning program has been delivered to nearly 14,000 employees since its launch in 2008. The program has been added to new hire orientation.

Next Steps

Continue to roll out to new System employees and residents.

4. Human Factors in Patient Safety Program: The Fallacy of Perfect Human Performance

Research shows that high-reliability organizations have a preoccupation with errors: they expect error, look for error, and plan for error. The belief by employees that health care is inherently safe may negatively impact adoption of personal safe practices. A survey of Henry Ford Health System staff showed that 80% believe that health care is very safe or mostly safe. We designed

an interactive, multidisciplinary program to educate employees about human limitations and the need to adopt personal safe practices to address human error. This course uses experiential learning to impact safety attitudes, beliefs, and knowledge.

Results: A total of 791 employees and physicians have completed the multidisciplinary team training. Results of this program show increased employee engagement and commitment to employ human factors safe practices in daily work, and a decreased belief that health care is very or mostly safe.

Next Steps

Continue to roll out to System employees.

5. Speak Up Campaign

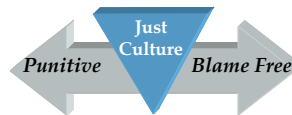
Launched in Fall 2009, the Speak Up Campaign focuses on encouraging all employees to speak up when they see or suspect harm (or the potential for harm). A conflict management course entitled “Speak Up, Speak Out” was developed to address provider-to-provider communication styles. This course was developed by the System’s Office of Clinical Quality and Safety, Human Resources, Media Resources, and the System’s Safety Champions who also served as actors in the video. This video course won first place for training and education in the 2010 AEGIS awards. The AEGIS Awards provide a forum to recognize the people and organizations responsible for developing some of the most innovative and effective video/film productions being produced today.

Results: The employee survey results from 2008 showed that 82% of our workforce felt encouraged to speak up about safety, and in 2010 this result increased to 83%.

Next Steps

Continue to roll out the Speak Up Campaign.

6. Just Culture Program and Policies



A “just culture” holds employees blameless for system process errors, yet holds them accountable for at-risk behaviors. Starting in 2009, Just Culture policies and procedures for the System were implemented and a training program for all managers was deployed.

Next Steps

Plans are in progress to complete front-line staff training in Fall 2010.

7. Team Communication Training

Miscommunication is a primary cause of health care errors. We have developed a series of educational programs aimed at improving provider-to-patient communication as well as provider-to-provider communication. Programs include obtaining informed consent from patients, use and availability of interpreter services, simulation training modules for resident education, simulation training for mock codes, human factors training, and conflict management.

Next Steps

Continue to roll out team communication programs and to develop new courses.

Spread of No Harm to Other Health Care Settings

Harm is hard to measure and track in non-hospital settings. Nevertheless, all aspects of the No Harm Campaign, especially culture change, are being spread to all System sites of care. For instance, residential facilities (e.g., our chemical dependency unit and nursing homes) participate in efforts to reduce injurious falls and pressure ulcers. Dialysis centers work to reduce infections. All facilities focus on medication safety and eliminating employee harm.

Assessment of harm risks and corrective initiatives in the outpatient arena include:

- **Medication:** Implementation of electronic prescribing, medication reconciliation, and the pharmacy-directed anticoagulant program are examples of efforts to reduce medication-related harm.
- **Procedures:** The WHO checklist and debrief sessions for conscious sedation are used in our Ambulatory Surgery centers.
- **Lost results:** Test results are automatically delivered to the ordering physician's electronic inbox, avoiding lost paper reports.
- **Falls:** The Henry Ford Medical Group has established a Falls Task Group to address patient falls in the outpatient setting.
- **Specimen errors:** The outpatient labeling initiative is underway to eliminate errors in labeling tissue specimens.
- **Acute renal failure:** Radiology's work in preventing contrast-related acute renal failure in hospitalized patients has spread to the outpatient setting; every patient with an order for contrast material receives similar prevention services.

Summary

Since the start of the No Harm Campaign in March 2008, System leaders and employees have worked to build the knowledge base and infrastructure required to implement new process improvements to eliminate harm. All System hospitals, for example, must define, measure, collect data, and analyze "harm events" in the same way before new processes can be tested, verified, refined, standardized, and spread throughout an organization for lasting change. This early critical work takes time to reach the point where all parts of the System reach *simpatico* – a tipping point – after which new process improvements and results gain momentum for faster spread and continued innovation.

Henry Ford Health System is nearing the tipping point in the No Harm Campaign: our hospitals are close to a 25% improvement in reducing harm, nearly halfway to the 50% goal, and we've seen accelerated improvement. We have decreased harm events by 90 events/month at the same time we have opened a new hospital and increased the total number of patient days. Despite these achievements, we remain committed to achieving our ultimate goal: to become a harmless organization.

Appendix: Henry Ford Health System Measures for the No Harm Campaign

Category Measures of Harm System-wide

Category	Measure
Employee	Reported employee health incident
Fall	Reported patient fall with harm
Infection	Bloodstream infection identified by infection control surveillance
Infection	C-difficile case identified by infection control surveillance
Infection	Reported issue related to infection control with severity 1, 2, or 3
Infection	Surgical site infection identified by infection control surveillance
Infection	Urinary tract infection identified by ICD9 codes (all codes used by AHRQ)
Infection	Ventilator-associated pneumonia identified by infection control surveillance
Medication	Excessive anticoagulation identified by lab value (INR >5)
Medication	Medication identified by selected ICD9 codes
Medication	Opiate reversal using Narcan
Medication	Reported issue related to medication with severity 1, 2, or 3
Medication	Glucose reading below 40 mg/dl 12 or more hours after admission
Other	Acute renal failure identified by ICD9 codes
Other	No pulse Blue Alert
Other	DVT or PE identified by ICD9 codes
Other	Other harm identified by ICD9 codes
Procedural	Procedural harm identified by ICD9 codes
Procedural	Pneumothorax identified by ICD9 codes
Procedural	Procedural complications identified by ICD9 codes (998-999)
Reported Issue	Reported issues with severity 1, 2, or 3 not reported elsewhere

Subcategory Measures System-wide

Procedural Harm

- 21 Abnormal Reaction Codes
- 13 Accidental Cutting Codes
- 6 Contamination Codes
- 11 Failure of Sterility Codes
- 13 Instrument Failure Codes
- 20 Other Miscellaneous Codes

Medication

- 189 Adverse Reaction Codes
- 63 Accidental Poisoning Codes
- 8 Other Miscellaneous Codes

Other Harm Codes

- 41 Other Non-procedural and Non-medication Codes

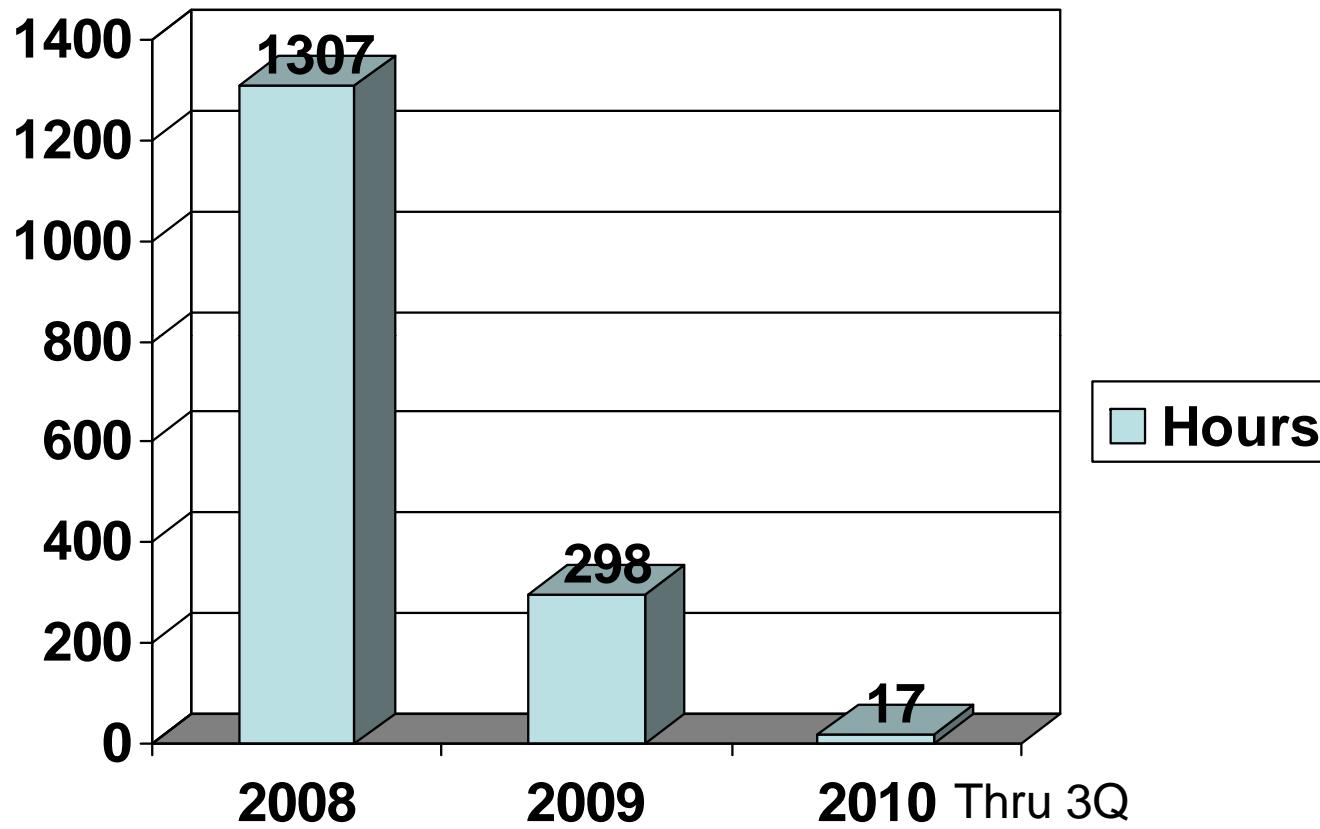
Inova Emergency Department Service Line Improvement Efforts 2009-2010

Application of Value Stream Analysis followed by
Employee Driven Kaizen (Change) in the 9 Inova
Emergency Departments throughout Northern Virginia



Quality

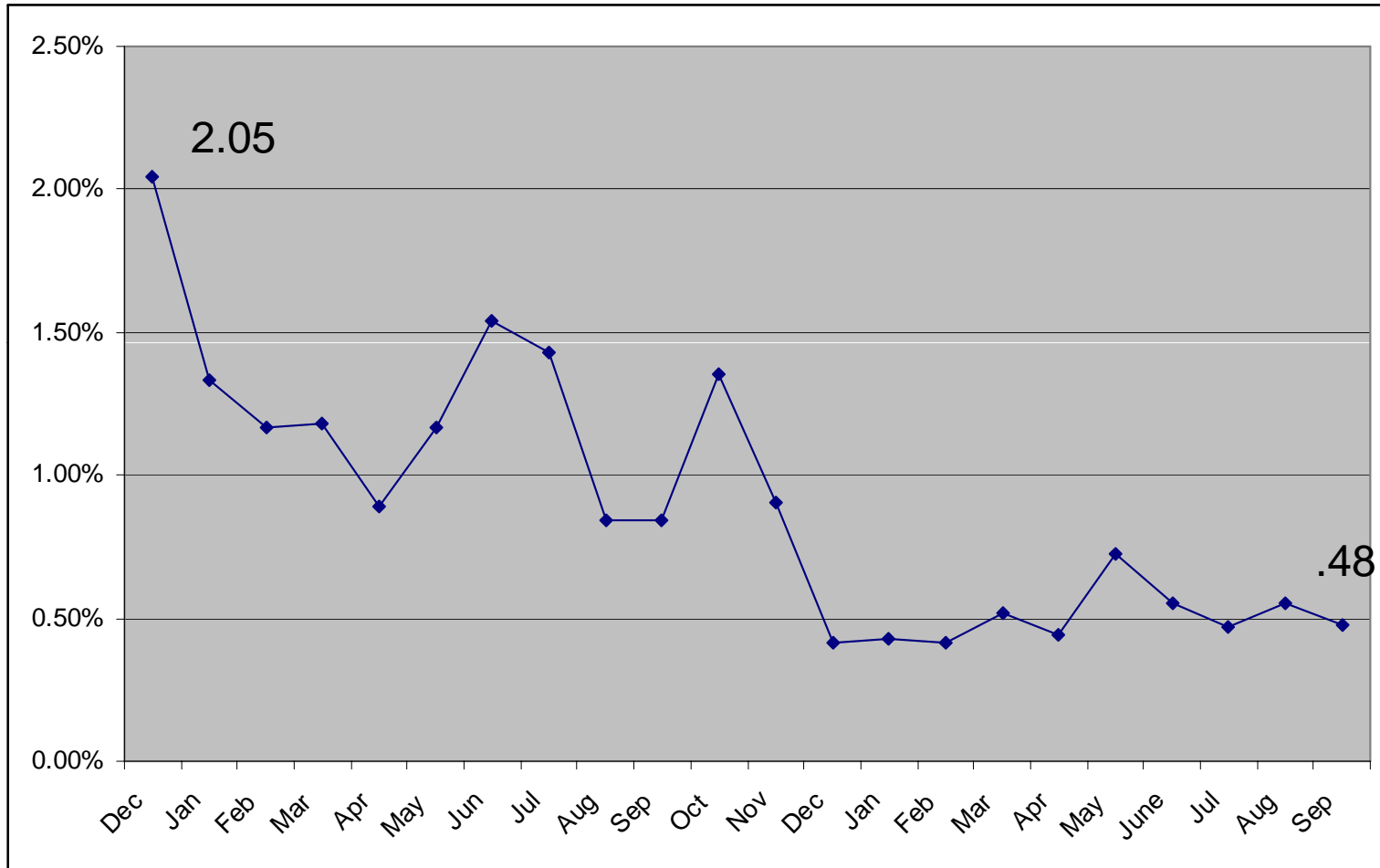
Ambulance Diversion (hours)



Goal is 0 Hours of Reroute

Quality

Left ED without being seen
LWBS (Percent)

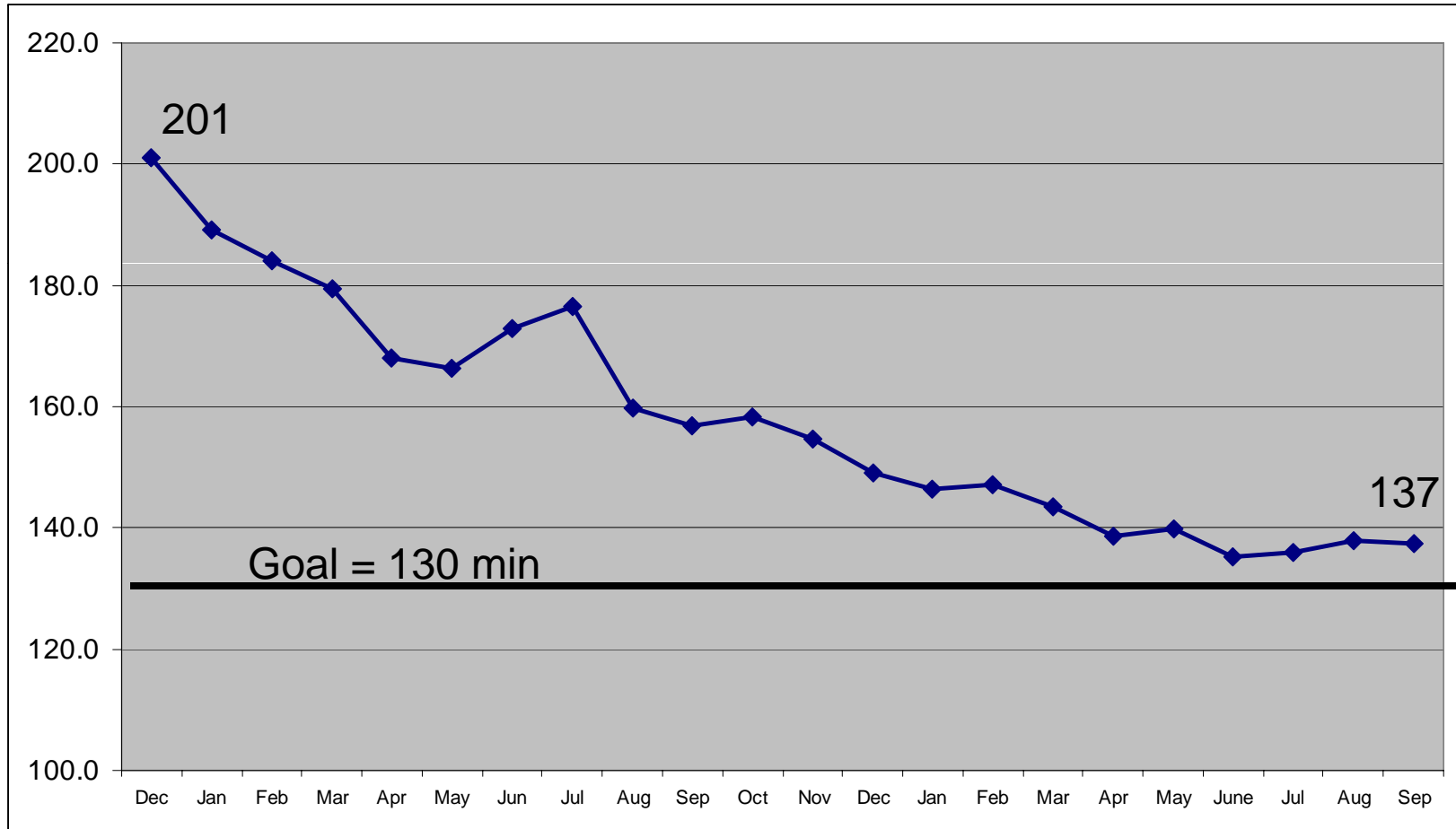


Dec 2008

Sep 2010

Cost

D/C ALOS (minutes)

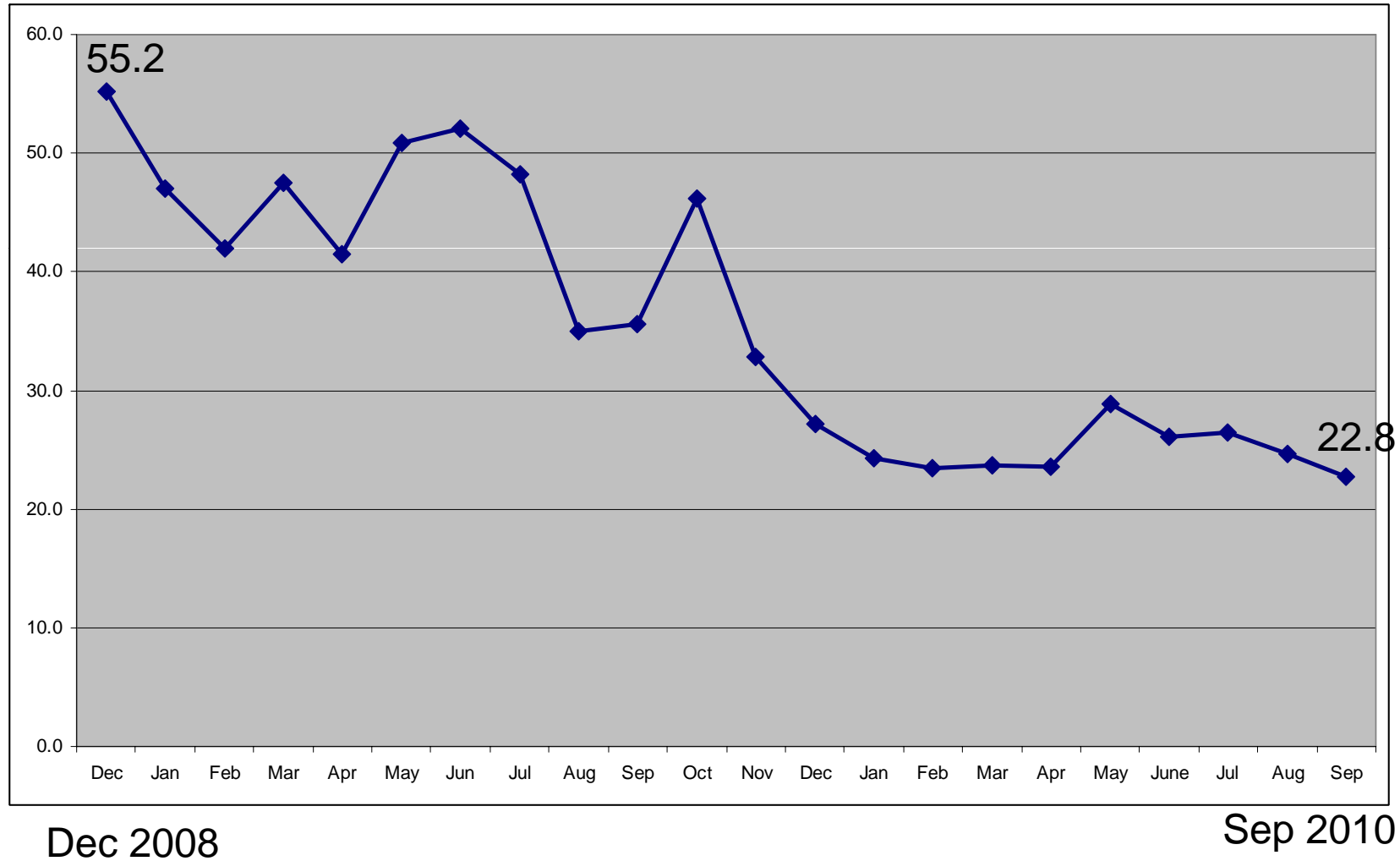


Dec 2008

Sep 2010

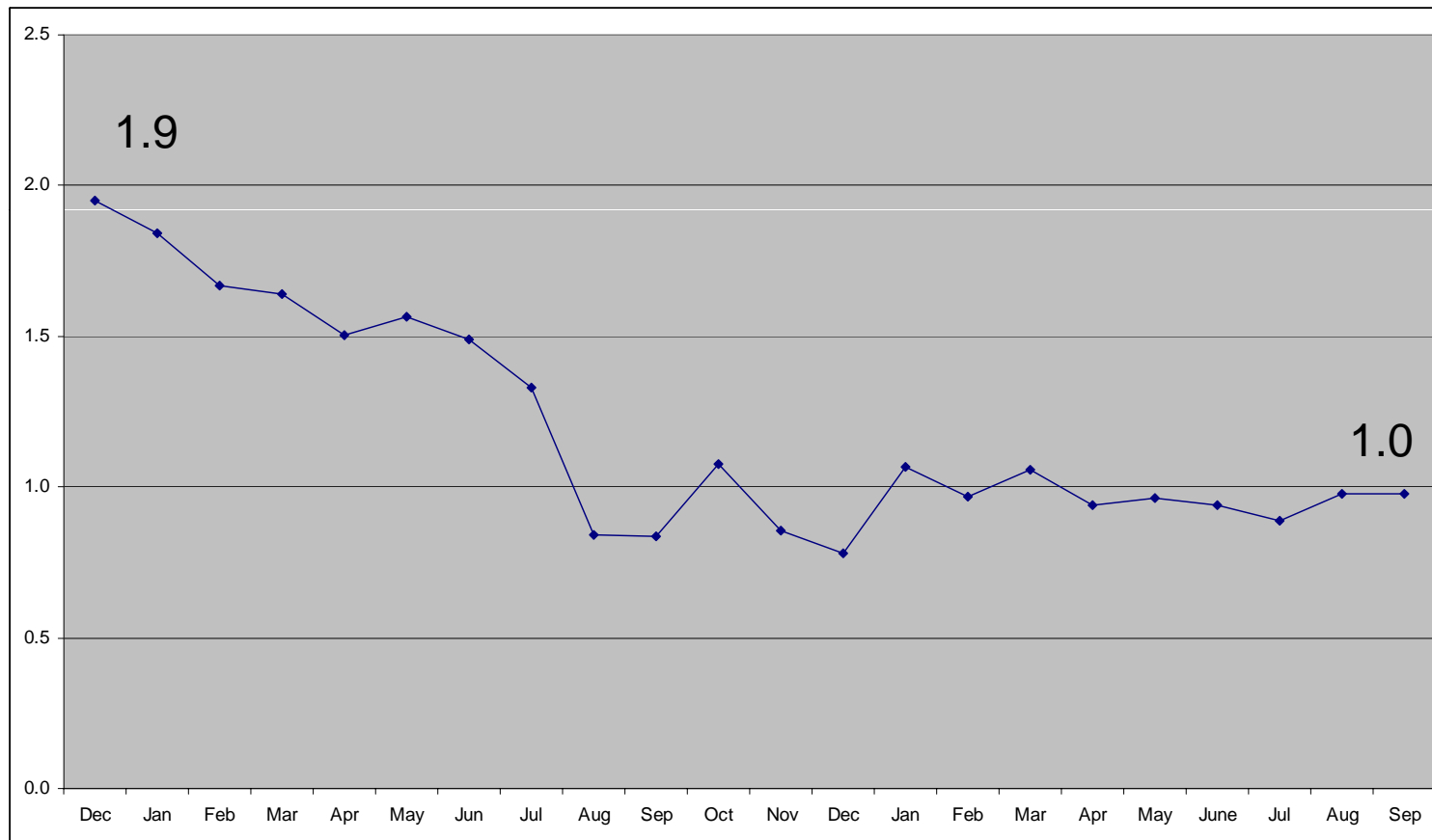
Service

Time to Doctor (avg. min)



Service

Border Hour per Admit (avg. Hours)

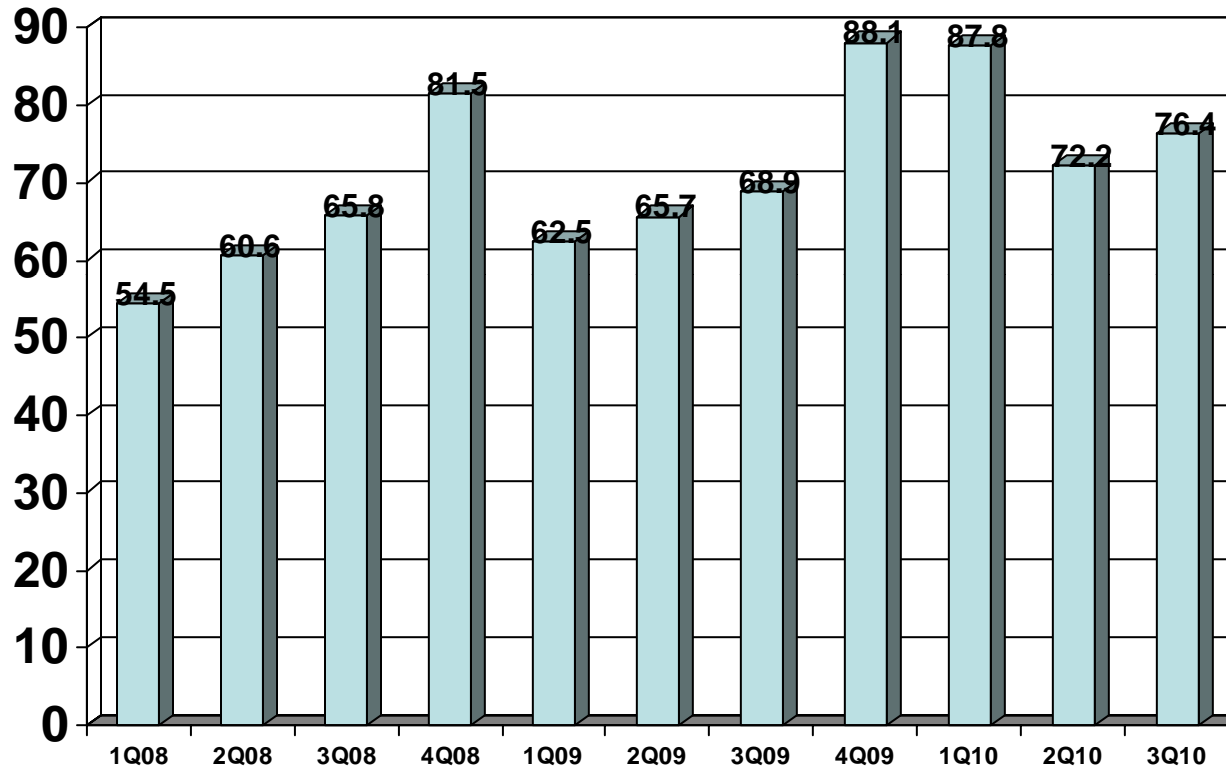


Dec 2008

Sep 2010

Service

Patient Satisfaction (Percentile)



Cost

Margin

2009

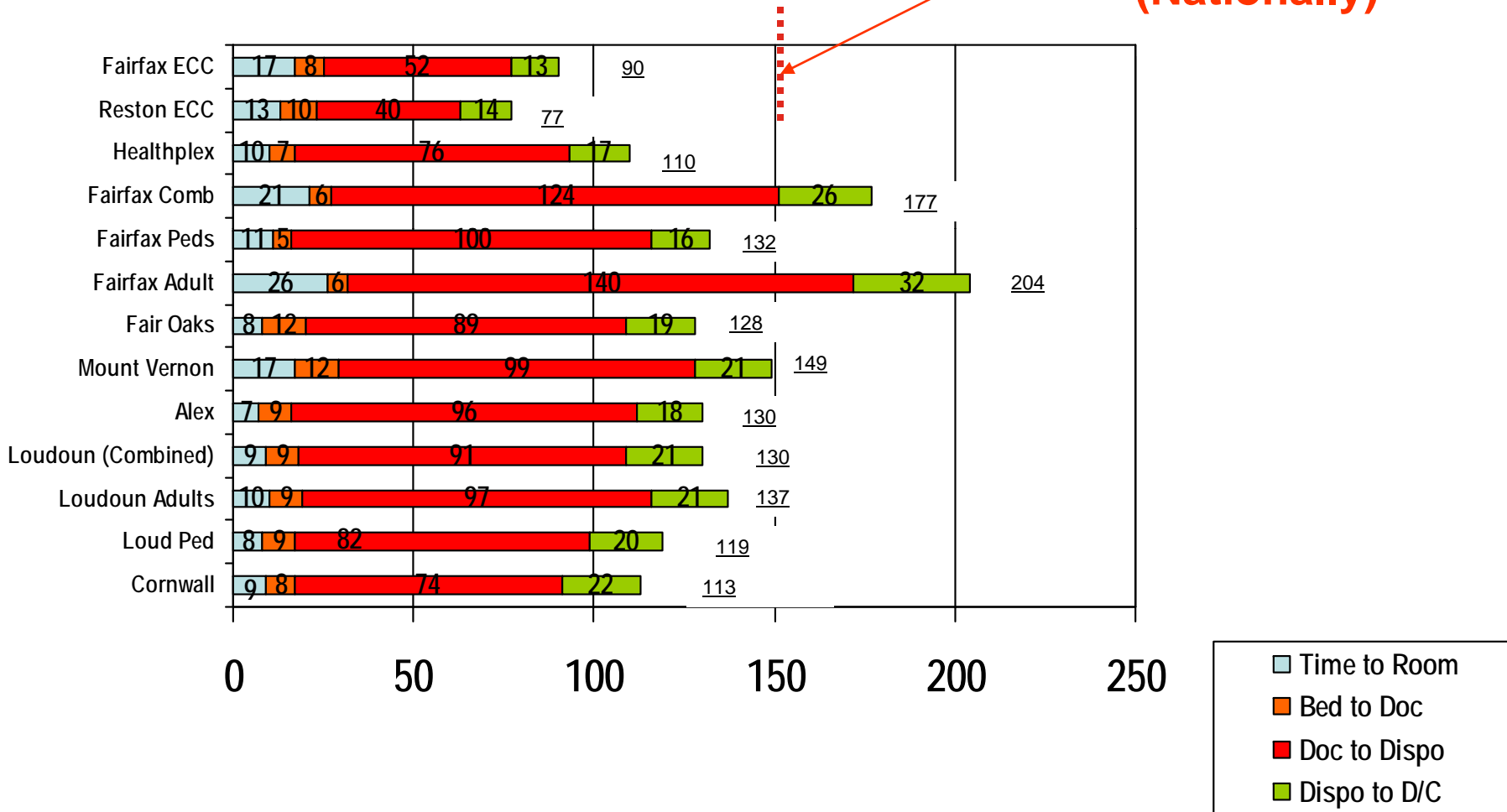
- Achieved \$10 Million in incremental Un-forecasted Operating Margin for Inova versus plan
(Additional Flu Volume was a factor)

2010

- Approaching 2009 Financial Performance on Volume basis without benefit of significant Flu Impact. Sustained Performance at Double Digit Volume Increases

Inova ED LOS D/C Patients (Sep 2010)

75th Percentile for D/C
LOS is 150 min
(Nationally)



Mercy Medical Center Laboratory:

Laboratory at Mercy Medical Center uses Lean to improve turnaround time by as much as 53%, achieves \$470,954 in annual savings plus \$70,000 in construction avoidance.

A lean implementation pilot at Mercy Medical Center identified numerous causes of waste, including an inefficient layout, repeated batching, inconsistent work practices, and poor inventory management. The team consolidated frequently used equipment and implemented process changes to address each cause of waste.

Results:

- The lab increased productivity, resulting in an annual labor savings of \$470,954.
- Canceling the lab's expansion plans allowed it to reduce space by 24% and save \$70,000 through construction avoidance.
- Test results available by 7:00 a.m. increased from 72% to 98%.

Continuous Performance Improvement (CPI)

Seattle Children's Hospital has adopted a management philosophy called continuous performance improvement (CPI) as a means to continuously improve pediatric health care delivery. Our management philosophy, CPI, is focused on applying the methods and scientific rigor of continuous improvement to our clinical, educational and research programs. We have a proven model that transforms health care by eliminating waste from our system and processes to improve service quality, clinical access, patient safety, staff engagement and financial results.

Over the last decade, the adoption of CPI by our expert caregivers has yielded tremendous results. Through CPI, physicians, nurses, residents, administrators, and hospital staff are actively engaged in a culture of continuous performance improvement. CPI allows us to evaluate and improve health care from a patient and family perspective. It has been transformative at Seattle Children's, and we believe it can transform our national health care system as well.

Key Aspects of CPI

- Focus on patient and family
- Remove barriers and burdens for staff
- Employee engagement is critical
- Facts and data drive decisions
- Technology is an enabler, not “the answer”
- This is a long-term, generational effort



Results-Over Past Three Years

- Total parenteral nutrition (TPN) medication error rates reduced by 66%
- Blood stream infections in our Intensive Care Unit declined by 50%
- Reduced patient time in hospital from 20 to 10 days in the inpatient Psychiatric Unit (can now accommodate 650 children vs. 400 a year)
- Patients remained on ventilators 20% fewer days
- Patients spent 20% fewer days in the Intensive Care Unit
- Patients see doctors sooner: appointment centralized scheduling times dropped 50%
- Fewer emergency department patients leave without being seen at peak times (achieving a 0.7% rate, compared to a 2.4% national rate)
- More patients treated without adding space
- Patient and family satisfaction and employee engagement increased

Savings

- 3.7% reduction in cost per patient and \$23M in related savings
- \$2.5M reduction in supply-related costs
- 30,000 square foot reduction in design and construction of new ambulatory services building, achieving \$20M cost avoidance
- \$180M in capital cost avoidance of not building new patient rooms

Vision

- Transform the health care system by changing the culture
- Improve safety and quality and reduce costs by eliminating waste
- Extend our model to other hospitals and health care delivery systems

Writing The New Playbook For U.S. Health Care: Lessons From Wisconsin

The U.S. government needs to reform the insurance payment system so that it rewards good medicine instead of waste.

by **John Toussaint**

ABSTRACT: U.S. taxpayers waste far too much money on health care that is merely average or worse. Some health care providers, including ThedaCare, a major Wisconsin health care company, are using the tools of lean manufacturing to eliminate millions of dollars of waste that obstructs the provision of effective medicine. ThedaCare studies care delivery processes to improve care and lower costs. Lessons from lean manufacturing and the Institute for Healthcare Improvement are lowering incidence of preterm births, improving heart attack response rates, and changing the way care is delivered in hospitals to a collaborative, team-based approach. [Health Aff (Millwood). 2009;28(5):1343-50; 10.1377/hlthaff.28.5.1343]

AT LAST HEALTH CARE IS AT THE TOP of the national political agenda, with proposed solutions including everything from universal insurance to systemwide electronic patient records. The attention is overdue. Some of the top-down solutions, however, threaten to saddle health care with more cost and waste than Americans can possibly afford.

For the past decade, my colleagues and I have been rethinking health care from the opposite direction, beginning at the patient's bedside. We have discovered parts that are broken both at the clinical level—in the haphazard nature of care, burdened by waste and inefficiency—and at the national policy level—where waste is rewarded while innovation is ignored or penalized.

At ThedaCare, a four-hospital health care system in northeastern Wisconsin, and elsewhere around the world, people are working hard to reduce waste and medical error and to improve quality using methods borrowed from lean manufacturing and the Toyota Production System. In three years ThedaCare has saved an amount equal to 5 percent of our annual revenue, while doubling our operating margin. In return for our efficiency, Medicare gives us about \$2,000 less per inpa-

.....
John Toussaint (john.toussaint@thedacare.org) is president and chief executive officer of the ThedaCare Center for Healthcare Value in Appleton, Wisconsin.

tient stay than it gives our competitors. Our inescapable conclusion is this: the U.S. system encourages inefficiency.

At this critical juncture, the government needs to do two things: reform the insurance payment system so that it rewards good medicine instead of waste, and help create transparency in medical quality measures so patients can truly have informed consent.

■ **The problem in numbers.** Most of us know the numbers. The United States spends 16 percent of its gross domestic product (GDP) on health care but, worldwide, ranks thirty-first in overall life expectancy.¹ Every year there are fifteen million instances of medical harm in this country,² including drug errors, infections, and wrong-side surgeries. Throughout the care delivery process, doctors, nurses, and technicians are hamstrung by outmoded, cobbled-together systems that encourage waste and do no favors to the most important figure in medicine: the patient. Yet this is the system that we are fighting to ensure everyone can access. Obviously, we need a new playbook.

■ **One solution.** Seven years ago ThedaCare was like other hospitals. Costs were spiraling out of control, and quality was not improving. We knew that change was necessary. ThedaCare's four hospitals—two acute care and two community facilities—and 5,300 employees make it the largest employer in northwest Wisconsin. With 20,868 patient admissions per year, we recognized that any real, systemic change would require the same concentrated attention as major surgery, every day.

We modeled our improvement plans on lean manufacturing and Toyota. In their seminal book, *The Machine That Changed the World*, based on a five-year Massachusetts Institute of Technology study on the failure of the U.S. auto industry, James Womack and colleagues laid out the core ideas of “lean”: learn to see waste in all its manifestations, eliminate it, create one-piece flow, and improve continuously.³ Above all, make sure that every action and intention is focused on the needs of the customer.

To accomplish this at ThedaCare, we introduced small cross-functional teams that gather for one week to study a process, identify problems, and propose a solution to fix the process. This is called *kaizen*, from the Japanese characters meaning “continuous improvement.” At ThedaCare, there are typically five *kaizen* projects running every week.

■ **Results and further goals.** Working in *kaizen* teams, ThedaCare employees have increased productivity 12 percent since January 2006, saving the company more than \$27 million. ThedaCare has passed those savings along to patients and insurers. With a price increase rate that is half that of our nearest competitors, our costs are consistently the lowest in the state.⁴ We have eliminated medication reconciliation errors in one pilot area, offer same-day appointments in every office and clinic, and deliver fewer preterm babies than before the *kaizen* projects.

The results have inspired bigger goals. Last year ThedaCare established the ThedaCare Center for Healthcare Value, a nonprofit group implementing public

“We have been removing 40–50 percent of wasted time and resources each time we redesign a care process.”

reporting of health care quality measures,⁵ a learning collaborative for hospitals trying to reduce waste, and a public policy reform effort to support such work.

■ **Adding up the cost.** Every health care process, from angioplasty to delivering a baby, is a series of steps that consume time and resources. A large fraction of these steps—90–95 percent—create no apparent value for the patient, largely because of poor process design and rework. ThedaCare and other lean health care sites have proved that wasteful steps can be removed and that, with rigorous attention to process design, we can create better outcomes for patients, a better experience for staff, and much lower costs.

We have been removing 40–50 percent of wasted time and resources each time we redesign a care process or value stream. In 2002, for instance, our mortality rate for coronary bypass surgery was nearly 4 percent. After several *kaizen* projects in this area, typically removing 40 percent of the waste each time, mortality dropped to 1.4 percent in 2008 and has been 0 percent through six months of 2009. A patient’s average time spent in the hospital fell from 6.3 days to 4.9, and costs for a coronary bypass declined 22 percent.

It is estimated that the United States spends \$2.4 trillion on health care, a number that grows every year by 6.2 percent.⁶ If we removed 40 percent of the waste throughout health care, we would save one trillion dollars.

■ **Lean around the world.** ThedaCare is not alone in adapting lean techniques to medicine. McLeod Health in Florence, South Carolina, for instance, has used such techniques to dramatically improve lab reporting times, cut the length of emergency department (ED) stays by an hour, and lower the error rate in sterile-surgical-instrument delivery by 50 percent.⁷ Heart attack mortality rates dropped from 22 percent to 2 percent over two years, as a result of improvements in the cardiac care system.⁸ And at Flinders Medical Centre in Adelaide, Australia, lean work techniques helped employees reduce the average time patients spent in a once-chaotic ED by 14 percent, while, overall, they were able to cut in half the number of adverse events reported to hospital insurers.⁹

How Collaborative Care Is Organized

Using a Robert Wood Johnson Foundation grant administered by the Institute for Healthcare Improvement in 2007, we assigned a core team of nurses, pharmacists, administrators, and one physician to work for six months on redesigning the care process to enable nurses to spend more time at the bedside. We documented our baseline performance, removed steps that were wasteful and unnecessary, and created a process we call Collaborative Care. Then, we remodeled a hospital wing to install this radical redesign.

In our Collaborative Care wing, a nurse, physician, and pharmacist meet with the patient and family within ninety minutes of admission to develop a care plan. Everyone is involved. In Collaborative Care, the nurse “owns the care process” and is responsible for ensuring that quality criteria are met before the patient moves to the next phase of care. The nurse remains in contact with the doctor but does not wait for instruction. Often, it is the nurse who instructs the physician about a needed step or a critical time in the patient’s care.

These are new roles for nurses and physicians, not easily accepted. An organizational development team worked for months with staff, role-playing and working through the repercussions of nurses’ giving orders to doctors before real patients arrived. Extensive interviews after the pilot site had been operational for several months confirmed that even skeptical doctors reported that the nurses in Collaborative Care were better informed, better at thinking on their feet, and more helpful to the doctors overall than other nurses were.

Instead of a hierarchy and “heroic” firefighting, there are now daily huddles and reviews of standard work. Using PDSA (plan, do, study, act) cycles, a problem is identified, a plan is created to address it, and a new process of care is implemented. The process is measured or studied, and changes are made if it doesn’t achieve the desired results.

Changes To Specific Care Processes

■ **Improved heart attack care.** Transforming care delivery for patients with acute myocardial infarction (AMI) offers an example of lean work at ThedaCare. “Door-to-balloon” time—the minutes between a heart attack patient’s entering a hospital and receiving a life-saving angioplasty—is recognized as a critical window. Seven years ago, when the American College of Cardiology (ACC) said that door-to-balloon should be 120 minutes, ThedaCare hit that mark 70 percent of the time.

In studying the process, we found that like most hospitals, we did not have a clear, standardized response to heart attacks. So *kaizen* teams examined the standard operating procedures. They created value-stream maps—recording every step and aspect of work, no matter how small—and studied our every move in response to heart attacks. In a condition where minutes make the difference between life and death, the *kaizen* team found a lot of delays.

For instance, after an ED doctor diagnosed a heart attack in progress, she would phone a cardiologist to come to the ED, reexamine the patient, and make an independent diagnosis before calling in the catheter team and booking a room for surgery. In lean philosophy, rework and waiting are waste. To eliminate the waste, we had to change the process. This meant convincing reluctant cardiologists that ED physicians could accurately diagnose heart attack. Despite concerns that catheter teams would be called unnecessarily, the cardiologists agreed to try the new way. In the past two years, there have been only two false-alarm diagnoses out of nearly 2,000 heart attack patients.

Meanwhile, ThedaCare's average door-to-balloon time is now thirty-seven minutes. We hit the new ACC guideline of ninety minutes 100 percent of the time. The standard work to evaluate and care for a suspected heart attack is posted in every room in the ED.

■ **Better newborn delivery.** Eliminating unnecessary steps in a process improves productivity, quality, and patient flow. To achieve this, *kaizen* teams focus on the patient, asking what the patient needs and what she is willing to pay for. Everything else is defined as waste.

Patients' input is also critical to providing lean care. After a new mother complained about care during her baby's delivery, we asked her to share her experience by becoming a member of a *kaizen* team studying neonatal care. We studied the neonatal care value stream—every step in delivering a baby, from the mother's admission to getting the new baby home—and identified 140 steps. Of these, only 5 percent were of value, at least in the opinion of the new mother. She would pay for medicine delivered to her baby, for instance, because she recognized the nurse's expertise with injections, but she would not pay for the nurse to go retrieve drugs from the nurses' station. Locked and stocked medicine cabinets installed in each room gave nurses an extra ten to thirty minutes per delivery that could be spent at the bedside.

After reviewing data for the neonatal value stream, the team realized that a surprising 35 percent of babies at ThedaCare facilities were delivered before the normal gestation time of thirty-nine weeks. Nationally, that number is 12.7 percent.¹⁰ Why was the premature birth rate at ThedaCare nearly triple the national average? The team found that many delivery inductions were scheduled early, at times convenient to doctor or mother, without taking into account that babies are not supposed to be delivered that early.

Staff and doctors created a series of protocols that included the criteria of thirty-nine weeks' gestation before the patient could be admitted for induction.¹¹ Unblinded physician performance on induction was posted in the unit so that all doctors were aware of each other's performance. That led to 100 percent compliance within a month.¹²

Premature babies receiving expensive level II or III intensive care at ThedaCare remain in the neonatal intensive care unit an average of sixteen days instead of thirty. Babies are well enough to go home almost two weeks earlier because a team of people, looking to improve the process, saw the data and said, We can do better.

Changing Physician Culture

The sea change required for true teamwork in health care begins with medical education. In a process that is still based on outmoded apprenticeship systems, young doctors are trained by individual specialists, who pass along their idiosyncrasies. Practitioners, trained to be autocratic in their decision making, tend to be more loyal to their specialty than to the team with whom they work every day. The

scientific method and careful systems of analysis may be used in research but are not often seen where medicine meets the patient. A lean system requires, however, creating standardized work to deliver repeatable, consistent performance.

In addition, health care suffers from a culture of “shame and blame.” Searching out the errant person instead of studying the process and identifying a root cause leads to low error reporting and unwillingness to be candid.¹³ Changing any of this is not easy. ThedaCare considered the existing culture and opted for systemwide transformation instead of incremental progress.

Team Results

Since Collaborative Care began with a pilot unit in 2007, we have cared for 2,400 people and recorded dramatic improvement in patient satisfaction, quality performance, and medication reconciliation (Exhibit 1). The cost of care in a Collaborative Care ward is 30 percent less than in a traditional ward. These data convinced ThedaCare board members to convert all hospital beds to Collaborative Care. This decision was projected to improve the buildings’ net present value by

EXHIBIT 1
Results Achieved In ThedaCare’s Redesigned Inpatient Collaborative Care Unit

Measure	Pre-Collaborative Care	End of 2007	July 2008	Compared to non-Collaborative Care units
Defect-free admission medication reconciliation	1.05 defects per chart	0.01 defects per chart (99 percent decline from 2006)	0 defects	0.87 defects per chart, August 2007 through July 2008
Quality bundle compliance	38 percent pneumonia (2005 baseline); no baseline for CHF	100 percent pneumonia (163 percent increase over 2005); 92.5 percent CHF (two patients failed bundle during the year)	100 percent pneumonia; 85 percent CHF (3 patients failed)	84.67 percent pneumonia (all-or-none bundle score); 85.22 percent CHF (all-or-none bundle score)
Patient satisfaction	68 percent rated as top box	90 percent rated as top box (34 percent increase over 2006)	91.4 percent rated as top box	Not available
Length-of-stay (days) ^a	3.71	2.96 (20 percent decline from 2006)	3.14	4.05
Case-mix index ^{a,b}	1.08	1.12	1.10	1.15
Average cost per case ^{a,c}	\$5,669, fully loaded	\$4,467, fully loaded (21 percent decline from 2006)	\$4,911, fully loaded	\$7,273, fully loaded

SOURCE: ThedaCare.

NOTES: CHF is congestive heart failure. Fully loaded means that all direct and indirect costs of care are included in the total cost.

^a Financial indicators represent a subset of the patients, to demonstrate the impact of the delivery model. Excluded from both baseline and pilot were the following: observation patients, intensive care unit (ICU) patients, and those with lengths-of-stay greater than fifteen days. Pilot numbers included admissions from the emergency department (ED) to the unit or direct admissions to the unit. 2006 is updated baseline.

^b Used top sixteen diagnosis-related groups that match across Coordinated Care and non-Coordinated Care.

^c Using Medicare ratio of costs to charges.

“On average, Medicare pays \$2,000 less per patient in Collaborative Care than in a traditional medical wing.”

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63 percent, or more than \$25 million.

Continuous improvement requires the cooperation of the entire team and can only be accomplished in an atmosphere of trust.¹⁴ Even though reducing waste often reveals the need for lower staffing levels, ThedaCare is committed to never laying off an employee because of conversion to continuous improvement. Redeploying personnel has not always been easy, but the Human Resources department, working in an area about to be improved, often finds people ready and willing to move to a new opportunity within the company.

Downside To Better Efficiency

Will the solution make us bankrupt? We have reduced the length of hospital stay by nearly a day, taken down cost per case by \$2,362, and increased quality (Exhibit 1).

■ **Medicare physician payment.** Although we know from surveys and interviews that patients prefer to spend less time in the hospital, there is a downside to our more efficient system. On average, Medicare pays \$2,000 less per patient in Collaborative Care than in a traditional medical wing. Less efficient competitors with worse quality metrics will still get \$2,000 more from the federal system for their health care. Lacking an accurate, widely used system of quality reporting in medicine, patients are none the wiser. Medicare can spur improvement among U.S. hospitals and doctors by carefully restructuring payment to focus on high-quality health care.

■ **Information technology.** Although we agree that universal electronic health records are necessary, we do have a caution. In 1995 ThedaCare became one of the first companies to begin digitizing health records; over the past fifteen years, we have put the project on hold a number of times because we found that we were digitizing wasteful processes, capturing records that were often unusable in any real sense.

Immediate Needs

The changes we have described involve a fundamental shift in the way people think about and deliver care. It is not just about saving money or doing less with more. This is about returning to the core scientific principles of modern medicine.

We begin with a hypothesis that performance could be better. Then we change the process, measure it, study its effect, and incorporate it into daily work. Before we can convince other health care organizations to join us in radically improving performance, however, there must be some incentive. If we prove that lean health care will put more money in a hospital's pocket, only to have Medicare take it out

of another pocket, we will not enlist many converts. Similarly, if a national insurance plan continues Medicare's rules, paying more money for inefficient health care, we will get a lot more inefficient care. Quality will only thrive when quality is demanded.

There is much more than money at stake. We must find a way to reward and encourage more efficient, better-quality health care, and that's what we will get.

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The author acknowledges Emily Adams for her tireless work in preparing this paper.

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Collaborative Care Outcomes through 2010

Measure	Pre-Collaborative Care (2006)	End of 2007	End of 2008	2009	2010	Compares to non-Collaborative Care units thru 2009
Defect-Free Admission Medication Reconciliation	1.05 defects per chart	0.01 defects per chart	0 defects	0 defects	0 defects	1.25 defects per chart without RPh
Patient Satisfaction (number of patients rating care 5 out of 5)	68%	87%	90%	86%	95%	Not captured for other units.
Length of Stay* (In days)	3.51	2.92	3.09	3.05	2.91	3.5
30-day re-admission rate	No data	No data	13.98%	13.7%	12.9%	15.2% (2009) 14.7% * (2010)
Average Cost Per Case* (using Medicare RCC) and restated in current dollars	\$6512	\$5024	\$6326	\$5781	\$5781	\$7775

* This is all medical surgical unit re-admissions from a comparable non-collaborative care unit in the same hospital

•Financial Indicators represent a subset of the patients to demonstrate impact of the delivery model. Excluded from both baseline and pilot are: observation patients, ICU patients, and LOS >15 days. Pilot numbers includes: Admits from ED to Unit, or direct admits to unit. 2006 is updated baseline.

•Case mix was not significantly different between collaborative care and non-collaborative care

•From: "Writing the new playbook for health care: lessons from Wisconsin," 2009, *Health Affairs*, 28, p.1348

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Michigan Quality System Projects FY10 Selected Results

Results from a selection of Michigan Quality System (MQS) projects active in FY10. Includes centrally-supported and area work. Some of these projects were initiated or implemented in a prior year, but results were not available for reporting earlier.

See A3s for active MQS projects at <http://www.med.umich.edu/mqs/projects/index.htm>.

Project:	Results:
<ul style="list-style-type: none"> • M-ACE Appointment, Credentialing, and Enrollment Goal: Streamline the process of onboarding physicians, across: <ol style="list-style-type: none"> 1) Appointment by Office of Faculty Affairs 2) Credentialing by Office of Clinical Affairs /Medical Staff Services 3) Enrollment by Provider Enrollment 	<ul style="list-style-type: none"> • 43-day reduction over the past year in the time to enroll faculty in Medicare after ECCA approval (from 52 days to 9 days) • \$1.5 million in physician services could be billed that otherwise would not have been billable.
<ul style="list-style-type: none"> • Audiology/Otology Team Goals: 'Free up' unused appointment slots, and unused coordinated 'block' appointment slots in Taubman; reduce new patient lead time to 2 weeks or less. Means: Analysis of schedules; implementation of a 7-day advance auto-release function for AA-MD appointment slots; coordination of audiology blocks to MD appointment slots 	<ul style="list-style-type: none"> • 4 visit per week increase in activity • \$33,280 increase in revenue billed in the first 3 months after implementation
<ul style="list-style-type: none"> • Blood Utilization Goal: Identify and implement interventions leading to: appropriate use of blood products; improved patient outcomes; and reduction of waste and delays in the dispensing and administration processes. Means: Implemented a guideline, with associated Carelink controls; rolled out mandatory education for residents through M-Learning; revamped the Transfusion Committee to proactively review data, specific cases and areas monthly. 	<ul style="list-style-type: none"> • Utilization of expensive RBCs has been reduced, with incremental decreases continuing over the last 6 months. • \$0.2 million reduction in monthly blood product cost (from \$1.3M/month to \$1.1M/month) achieved through efforts of Blood Bank, Transfusion Medicine and Transfusion Committee.
<ul style="list-style-type: none"> • Cardiac Surgery LOS Project Goal: Address a 2-day increase in LOS for STC patients occurring after the June 2007 opening of the CVC Means: Use of a pathway; standardizing vent wean and handoff processes; making key process steps visible; implementing multi-unit charge RN management tools for tracking, managing change 	<ul style="list-style-type: none"> • 2 day reduction in LOS for uncomplicated patients • Improved 6-hour vent wean rate from 26% to $\geq 45\%$ for uncomplicated patients • Implemented, standardized OR-to-ICU handoff process is being replicated by other services, and piloted with OR-to-PACU handoffs
<ul style="list-style-type: none"> • Clinical Research Billing Goal: Define and implement efficient processes and standard work for clinical research budgeting, billing and enrollment Means: New future state includes: standard operating procedures; "hard stop" for completed billing calendar prior to patient enrollment; central repository in eResearch; billing calendar education program and support resources for study teams to improve FTQ 	<ul style="list-style-type: none"> • 80% reduction in wait time (from 164 days to 31 days) • 22% reduction in process time (from 15 hours to 11.6 hours)

Appendix A-1

<ul style="list-style-type: none"> • ED Arrival Process Goal: Create an effective and efficient arrival process that expedites the patient to the exam room in a prompt, safe and professional manner 	<ul style="list-style-type: none"> • Over 30 minute per patient decrease in time spent in waiting room (average for adult patients in Nov 09 compared to baseline)
<ul style="list-style-type: none"> • Emergent MRI Process Goal: Decrease lead time from order until start of scan Means: Redesigned future state; improved communication among ED, MRI Scan Areas and Reading Rooms; standardized the process 	<ul style="list-style-type: none"> • 4 hour decrease (from 7 hours to 3 hours) in time from requisition to scan started
<ul style="list-style-type: none"> • Everyday Bed Management Goal: Improve the efficiency of everyday bed delivery - <i>Right Bed, Right Time, Right Condition</i> 	<ul style="list-style-type: none"> • Increased FTQ from baseline of 5% to 72% at most recent measurement (March 2010)
<ul style="list-style-type: none"> • FGP Professional Fee Billing: Payment Posting LIT Pilot Goals: <ul style="list-style-type: none"> - Improve and sustain unit's value metrics - Improve Lean Culture Survey Score - Track # of Lean Solutions implemented and documented - Sustain Lean in Daily Work infrastructure - Plan for lateral spread 	<ul style="list-style-type: none"> • 34% improvement in payments posted within 3 days of receipt • 51% improvement in culture survey scores • 33 lean solutions worked (more underway) • 3 leader standard work audits completed • 2 areas identified as 'next in line': Patient Business Services & Document Control Center
<ul style="list-style-type: none"> • Interventional Radiology Start and Turn Around Time Goal: 100% of CVC and UH cases will start by scheduled first case start time (7:30 or 8:30 a.m., depending on day) Means: Visual management: visual metrics boards and tracking implemented; workflow tool created, to be piloted 5/1/10, will make accountability, work-up delays visible to the team. 	<ul style="list-style-type: none"> • On-time starts showing steady improvement (from 13% at baseline in July 2007 to 58% in January, 2010)
<ul style="list-style-type: none"> • Livonia Surgery Center PACU Redesign Goal: Improve patient flow, workflow and workstations to support "flawless" care, and free up nurses' time for patient education. 	<ul style="list-style-type: none"> • Improved productivity: redesign of space and flows allowed adding GI patient population into same space with same staffing.
<ul style="list-style-type: none"> • Mott OR Projects (multiple "A3" projects, "A4" suggestions and educational activities – results may not be directly attributable to a specific project) Goals/Targets: <ul style="list-style-type: none"> - Improve first case start times with target of 80% "on time" - Decrease PACU holds - Improve employee engagement 	<ul style="list-style-type: none"> • 12% below budget on cost/case (through Jan) • 80% first case start time maintained since June 2009 (baseline was 35% in July 2006) • 77% decrease in average daily PACU hold time • >80 'A4' improvement suggestions submitted by frontline staff
<ul style="list-style-type: none"> • Musculoskeletal Health Goal: Reduce the lead time (initial contact to comprehensive treatment plan) for patients requiring multiple UMHS specialties Means: Weekly MSK Arthritis Cooperative Clinic established with Orthopaedics, PM&R and Rheumatology. 	<ul style="list-style-type: none"> • Opportunity for 6-week reduction off of total lead time [small sample result]
<ul style="list-style-type: none"> • Neurosurgery Lean Project Goal: Increase Neurosurgery patient activity; improve patient flow Means: Multidisciplinary rounds, evening rounds, earlier identification and planning for patients' discharge 	<ul style="list-style-type: none"> • 0.6 day reduction in Neurosurgery LOS (from 5.59 days baseline to 5.0 Feb2010 YTD)

Appendix A-1

<ul style="list-style-type: none"> • Patient Relations – Timely Resolution of Grievances Goal: Close 80% of all grievances within 10 business days 	<ul style="list-style-type: none"> • 80% target met by Nov 09
<ul style="list-style-type: none"> • Pediatrics Family Centered Care Rounding Goals: Improve rounding process by including participation from key stakeholders, and improving information flow 	<ul style="list-style-type: none"> • 100% of parents surveyed felt welcome to participate in rounds; 86% responded that their questions were answer by the team [Pilot Measurement Results]
<ul style="list-style-type: none"> • Radiation Oncology – Sustaining & Continuous Improvement 	<ul style="list-style-type: none"> • Multiple teams (3-D Planning & Treatment; Bone & Brain Metastases, Charge Capture, 1-3 Treatment Process, IMRT Process) have continued to meet regularly and make incremental improvements over several years.
<ul style="list-style-type: none"> • Sentinel and Serious Adverse Events Time to Complete Process Goal: Streamline the process of SE and SAE Means: Regular ‘weekly reviews’ huddle to pre-plan reviews; use of A3s for problem solving 	<ul style="list-style-type: none"> • 70 day reduction in time to complete RCA for sentinel and serious adverse events (from Avg 107 days baseline to Avg 37 days) • Reduced time to complete action plans (from 14-902 days at baseline to 0-289 days)
<ul style="list-style-type: none"> • “Tedious Payment” Transfer process Goal: Streamline the process for transferring patient invoices: reduce the number of manual steps and errors Means: Creating a shorter, streamlined process 	<ul style="list-style-type: none"> • 80% reduction in # of steps in process (from 20 to 4).
<ul style="list-style-type: none"> • UH Oto Surgery Project Goal: Create an efficient standardized patient and work flow process from dressing end of one patient to induction end of the next patient 	<ul style="list-style-type: none"> • 12 minute reduction in average turnover (from 41 minutes at baseline to 29 minutes) • Potential revenue opportunity = \$300,000/year • Increased staff satisfaction scores
<ul style="list-style-type: none"> • Vascular Surgery Discharge Project Goal (High Level): Improve patient throughput Target: Discharge 1 patient by 12 p.m. and 2 patients by 3 p.m each day; meet these targets 80% of time Means: Visible discharge planning team board, daily goal tracking calendar, trending system to monitor key metrics and root causes of delay 	<ul style="list-style-type: none"> • >2 hour reduction in avg. discharge time of day for all SVA patients, improving throughput • 68% success rate meeting discharge targets, and performance on target metrics continues to improve • Sustain/continuous improvement plan in place
<ul style="list-style-type: none"> • Weekend Services – Acute Physical Therapy Means: Create and implement new standard work process, and implement across UH 	<ul style="list-style-type: none"> • 21% improvement in % of therapist’s time spent providing care at the patient’s bedside • 72% improvement in response time (order to note completed in less than 24 hours) • 9.4% increase in RVU per FTE (from First Quarter FY09 to First Quarter FY10)
<ul style="list-style-type: none"> • Weekend Services - Acute Occupational Therapy Means: Create and implement new standard work process, and implement across UH 	<ul style="list-style-type: none"> • 18% improvement in % of time therapists spent providing care at the patient’s bedside • 60% improvement in response time (order to note completed in less than 24 hours) • 11% increase in RVU per FTE (from first Quarter of FY09 to First Quarter of FY10)
<ul style="list-style-type: none"> • Weekend Service – Echo Goal: Complete adult inpatient surface ECHOs within 24 hours of order throughout the week. Means: Implementation of new coverage model and a “visual” value metric; “order leveling”; and eliminating weekend carryover 	<ul style="list-style-type: none"> • 74% of Fridays with no carryover for period March-Nov09 (compared to 25% at baseline) • 79% of orders “in by 10” completed same day in Nov09 (compared to 58% at baseline) • 32% of orders in by 4 p.m. completed same day in Nov09 (compared to 21% at baseline)