

Performance Improvement

Kaiser Permanente's Performance Improvement System, Part 2: Developing a Value Framework

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In the first article in this four-part series, we described how in 2008, in recognition of variations in quality, service, safety, and efficiency, Kaiser Permanente started implementing a nationwide performance improvement (PI) system, with the plan to expand the system in phases across its eight regions and medical centers in a three-year period.¹ The goal was to transform care delivery by engaging the entire workforce and providing uniform quality measurement, increasing PI skills in staff at all levels, developing organizational capabilities, and providing support for making improvements in medical centers and across regions. New ways of supporting PI included developing a national Improvement Institute; training medical center-level improvement advisors (IAs); and engaging mentors to support implementation and develop local experts to help multidisciplinary, cross-departmental frontline teams to redesign care processes.*

In this article, we describe our evaluation of intermediate results in 22 medical centers in the first and second groups of sites implementing the system. Implementation in the first group began in January 2008, and implementation in the second group was completed in September 2009. The results we report here were obtained between January 2008 and September 2009.

Value Framework

To evaluate the PI system, we adapted Kirkpatrick's scale, which assesses trainees' abilities to apply new skills.² We used the first two levels of evaluation to assess participants' satisfaction with training and the extent of their perceived knowledge acquisition. We used the third level to evaluate the participants' appli-

* Three organizations cooperate to provide all needed care for members: the Kaiser Foundation Health Plan, Inc.; Kaiser Foundation Hospitals, overseeing 36 medical centers nationwide; and regional Permanente Medical Groups that include nearly 15,000 physicians representing all medical and surgical specialties. Medical centers consist of hospitals providing a full array of inpatient services, continuum of care, and multispecialty ambulatory care clinics. Some regions do not provide inpatient services.

Article-at-a-Glance

Background: In 2008, Kaiser Permanente began phased implementation of a nationwide performance improvement (PI) system. The aim was to improve performance by providing consistent, highly meaningful performance measurement, increase PI skills in staff at all levels, develop organizational capabilities, and provide support for making improvements in medical centers and across regions.

Evaluating the PI System: The intermediate results of the PI system were assessed in the 22 medical centers in four of the eight Kaiser Permanente regions. Implementation for 3 of these medical centers occurred in January 2008 through November 2008, with implementation for the remaining 19 medical centers occurring from September 2008 through September 2009.

Findings: The 22 medical centers that were evaluated achieved a 61% improvement in selected capabilities, and improvement advisors (IAs) successfully completed 84% of initial PI projects. For each dollar invested, estimates suggested an average return on investment of \$2.36.

Lessons Learned: Critical factors include adequate dedicated time for PI activities by staff with necessary expertise, expert support to operations, alignment of projects with regional and national strategic priorities, and close working relationships between PI staff and operational management. Involving finance leaders in improvement planning, prioritization, and oversight is important. These elements can be adapted to smaller systems and single hospitals.

Conclusions: The initial evaluation of the Kaiser Permanente PI system indicated that (1) IAs successfully led projects in conjunction with frontline teams, (2) organizational capabilities increased, and (3) the investment in PI infrastructure and staff was sound. Expansion throughout the entire Kaiser Permanente system is under way.

cation of knowledge to the PI projects. However, it was the fourth and final level of evaluation—the degree to which targeted outcomes result—which we used to develop the value framework. For this level, we extended assessment from the participant to the project level. However, our value framework also assesses whether the projects cumulatively result in system-level measurable outcomes and financial results and whether medical centers increase their high-performing capabilities. Finally, the value framework addresses the estimated system-level economic value of training and supporting infrastructures for sustainable PI.

Value is generated from quality, service, and cost in the following relationship^{3,4}:

$$\text{Value} = \frac{\text{Quality} + \text{Service}}{\text{Cost}}$$

The *quality* component of value for the Kaiser Permanente PI system includes the ability of medical centers to achieve goals for individual PI projects and sequenced series (“portfolios”) of projects, increase organizational capabilities, and sustain both accomplishments over time. Through sustained improvement, the quality component of the value framework translates into quality, safety, service, and efficiency as experienced by patients and monitored in the “Big Q” Data dashboard (which displays a vital few high-level measures to represent system-level performance¹).

The *service* component of value, which will be addressed in a later article, includes (1) individual participants’ satisfaction with the Improvement Institute and related training programs and (2) medical center leadership’s and IAs’ satisfaction with dedicated expert improvement or “mentor” support for performance improvement.

The *cost* component includes overall expenses of the training program, dedicated mentor and improvement advisor staffing and implementation, and the estimated financial value of PI projects.

Evaluating the Kaiser Permanente Performance Improvement System

Assessing the impact of complex, multicomponent interventions in health care such as the Kaiser Permanente PI system is best achieved by a mix of approaches that reflect the local context, rather than through randomized controlled trials.^{5–8} Consequently, we used qualitative and quantitative approaches that included time-series and program evaluation methods to assess the quality and cost components of the value framework for the PI system.

SIX CAPABILITIES OF HIGH-PERFORMING HEALTH CARE ORGANIZATIONS

We previously described an external benchmarking process that enabled us to identify six capabilities of high-performing health care organizations,¹ as follows:

1. *Leadership Priority Setting*, in which leaders identify key improvement opportunities and prioritize them to align with broader strategic goals

2. *Systems Approach to Improvement*, in which organizational processes are mapped across functions and departments

3. *Measurement Capability*, in which outcomes and process data are displayed as current, time-trended information

4. *Learning Organization*, as reflected in the spread of effective practices

5. *Improvement Capability*, in which sustained improvement is effected through oversight, an infrastructure of expertise, and an identified training methodology

6. *Culture*, through which senior leaders and frontline teams alike actively engage in continually improving care

We developed a self-assessment tool that senior leaders could use to track changes in organizational capabilities over time. To validate the tool, we compared organizational self-assessments by medical center leaders with independent observations by mentors in a sample of sites in the first implementation group. Mentors at each site received detailed training on scoring evidence of capabilities and worked with medical center leaders to periodically score their facilities on these capabilities, using a scale of zero to five. (A score of five indicates that the capability is embedded into the fundamental fabric of the organization and is highly likely to be sustainable, and a score of zero reflects a lack of evidence for the capability.)

We asked an average of eight senior leaders at each of the 22 medical centers to use the self-assessment to identify areas of improvement and create plans to address them. Although self-assessment is subject to validity threats such as inflation and recall bias, it is relatively low-cost and is arguably a proven approach to performance measurement used by many organizations, including participants in the Baldrige Performance Excellence Program.^{9,10}

PI PROJECTS

We assessed the percentage of PI projects that IAs “successfully completed,” which we defined as achieving initial goals. Because many IAs had other organizational responsibilities, we also examined the relationship between the percentage of IA time that was devoted to PI projects and the rate of successful completion. We categorized project goals by whether they were

directed at improving quality, service, safety, or efficiency. Finally, we compiled narrative reports of projects to better understand relationships between local context, mechanisms, and outcomes.

COSTS AND SAVINGS

We calculated the costs pertaining to the design and implementation of the Improvement Institute training, mentors, and IAs for the 22 medical centers and all 51 PI projects completed by March 2009. We also included the financial impact for 11 of these projects. Medical center-level project costs and savings were rolled up and included in the systemwide estimated financial impact.

To identify medical center-level project costs and savings, we developed a planning and evaluation tool that incorporates specific cost data derived from cost-accounting databases for operational and finance leaders to use in estimating the financial impact of individual projects. The tool helps to delineate the potential “dark green” dollar and “light green” dollar impacts of improvement.¹¹ Dark green dollars reflect actual impact on the budget, balance sheet, cash flow, or working capital. Examples include medical, surgical, and pharmacy supplies; variable unit staffing costs (including overtime); and other services such as environmental services, pharmacists, pharmacy technicians, laboratory assistants, and the like that can be stepped down as a result of volume reduction.¹² Light green dollars cannot be tracked to the bottom line and accrue from reallocating resources to PI projects, avoiding costs, or enhancing capacity (examples include department management/administration, hospital administrative overhead, utilities, and incremental support service and staffing reductions that do not reduce overall hours worked).¹² Whether light green dollar savings can be removed from the cost structure depends on the magnitude of change or reduced utilization and/or whether additional capacity is reallocated to alternative uses. Figure 1 (page 555, also available in online article) provides an example for the estimation of the financial impact of a PI project.

Table 1 (page 557) lists the steps we used to calculate costs—in terms of equipment, personnel, and project support—of improvement projects. Table 2 (page 557) lists the steps we used to calculate the projects’ financial effects—in terms of utilization, materials, and capacity. The tool was originally used at the close of projects to assess their financial impact. However, as use of the tool increased, IAs and medical center leaders also began applying it in the planning stage to prioritize multiple PI projects. It constituted one element of a prioritization matrix (Appendix 1, available in online article)

that also included potential impact on quality and service, degree of alignment with regional and national strategic goals, and difficulty of implementation.

Findings

SIX CAPABILITIES OF HIGH-PERFORMING HEALTH CARE ORGANIZATIONS

In December 2009, the 11 medical centers that implemented the PI system in 2008 self-reported an average score of 2.9 (on a five-point scale) on six capabilities of high-performing health care systems, an increase of 61% over their initial average score of 1.8 (Figure 2, page 556). The target score for 2009 was 3.0.

PI PROJECTS

The 54 IAs attending the Improvement Institute between February 2008 and March 2009 completed 51 PI projects at the 22 medical centers at which they worked. All IAs who devoted at least 0.75 FTE completed at least one project (Table 3, page 557). As shown in Table 3, the project completion rate for all IAs was 84%. Notably, the 11 IAs who devoted less than 0.2 FTE to PI efforts completed just over half (55%) of the projects they initiated. All completed projects met their initial goals. The completed projects focused on efficiency (45%), service (23%), quality (17%), and safety (15%). Project scope was constrained to what could be accomplished within 90–120 days to avoid “scope creep” and overburdening frontline staff;¹³ sequencing of serial projects and grouping projects into improvement portfolios to address broader needs resulted in greater impact than what could be achieved through single projects.

Examples of Projects. Completed PI projects at medical centers include a portfolio of projects related to communication, service-level agreements, and reporting and feedback systems to improve patient transfers and discharges. For example, an IA at one medical center worked in conjunction with unit-based teams (unit-level multidisciplinary teams convened by labor leadership and management as part of the Kaiser Permanente Labor Management Partnership¹) to reduce transfer time from the emergency department (ED) to medical/surgical floors through a series of sequenced projects. These teams created a system to notify inpatient units immediately of admission orders and developed a standardized admission information tool and service-level agreements regarding the time required to perform radiology, laboratory, and diagnostic services in the ED. Assigning beds more accurately also reduced long transfer times. To expedite transfers between the ICU and medical/surgical floors, the PI team created a “transfer ready” flag in the

Sample Estimation of the Financial Impact of a Performance Improvement Project

Performance Improvement Project Financial Worksheet Summary				
Project Title: Medical Center Throughput Optimization (for a 200-bed hospital)				
Project Initiation Date: October 2008		Targeted Completion Date:	Process Owner:	
Team Members:	Help Chain	Project Scope		
Improvement Advisor:	Sponsor:	SCOPE: Reduction in LOS for frequent clinical conditions to evidence based practices (e.g. CHF, PNA)		
Project Team Member Names				Champion:
				Champion:
		Mentor:		
Financial Benefits of Project:				
Net Projected Hard Financial Benefit of Project:		\$3,050,000		
Net Projected Soft Financial Benefit of Project:		\$3,416,000		
Combined Total Financial Benefit of Project		\$6,466,000		
		Difference Between Baseline & New State		
		Baseline	New State	
A. Hard Financial Benefit (Realized Revenue/Reduced Cost)				
1. New revenue stream		\$0	\$0	
2. Existing revenue stream increase		\$0	\$0	
3. Material reduction, e.g. reduction in costs for inventory/material		\$0	\$0	
4. Utilization impact, e.g. reduced LOS leading to fewer staffed beds and/or staffing hours		(\$5,100,000)	(\$3,525,000)	
5. FTE Capacity Change, e.g. Reduction in OT, staff not linked to LOS		\$0	\$0	
6. Reduced Outside Medical Costs (KP patients seen by KP providers or facilities)		(\$65,000,000)	(\$63,000,000)	
Total Projected Hard Financial Benefit of Project		(\$70,100,000)	\$3,575,000	
B. Hard Financial Revenue Decrease/Cost Increase				
1. Reduced revenue (co-pay revenue reduction)		\$0	(\$525,000)	
2. Cost increase (please specify)			\$0	
Total Projected Hard Financial Costs of Project		\$0	(\$525,000)	
Net Projected Hard Financial Benefit of Project			\$3,050,000	
C. Soft Financial Benefit (Incremental)				
1. Cost Avoidance (Incremental Increase in efficiency but no cost reduced/revenue realized)		\$0	\$0	
2. Utilization impact (reduced LOS but no cost removed from system)		(\$11,053,000)	(\$7,637,000)	
Total Projected Financial Benefit of Project		(\$11,053,000)	\$3,416,000	
D. Soft Financial Costs				
1. Cost increase (Please Specify)		\$0	\$0	
		\$0	\$0	

Figure 1. A sample estimation of the financial impact of a performance improvement project is shown. The far left column depicts typical “dark green” (Hard Financial Benefit) and “light green” (Soft Financial Benefit) dollar impacts (color version available in online article).

electronic health record and stopped using a separate lift team for transfers. ICU beds became available more quickly when the environmental services staff communicated directly with the ICU staff regarding bed readiness rather than relaying messages through a supervisor. The improvement team also designed a system to monitor performance on the goal of transfer within one hour of notification that a patient was ready. To improve discharge home from medical/surgical floors, the IA and unit-based teams began including patients in discharge planning and created standard discharge criteria. They initiated unit bed huddles, designed a system to monitor performance on the goal of discharge within two hours of written order, and coordinated care management with skilled nursing facilities.

As a result of these projects, overtime decreased by an average of 36 hours per month, and length of stay (LOS) on a medical/surgical unit decreased by 19 days per month. The annual projected impact was a savings of more than \$800,000, includ-

ing avoided costs of caring for Kaiser Permanente members at non-Kaiser Permanente facilities. Reduced bed days translated into dark green dollars of avoided costs.

Projects at other medical centers included reducing all-cause, 30-day readmissions of patients with heart failure through improved case finding, follow-up, and medication reconciliation; eliminating retained foreign objects in surgery by standardizing intraoperative procedures; and reducing overrides of electronic medication and armband safety scans through provider education and feedback, refined monitoring, and resolving scanner- and medication-related problems. Appendix 2 (available in online article) provides a case study of the improvement projects at one medical center.

COSTS

All 51 of the completed projects achieved their quality, safety, service, and efficiency goals; the total investment in the first

Eleven Medical Centers' Self-Assessment of Six Capabilities in 2008 and 2009

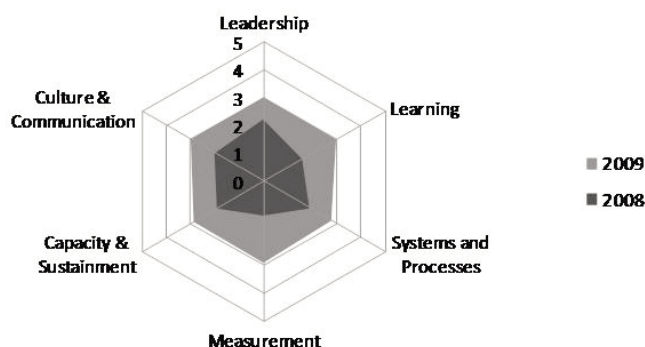


Figure 2. In December 2009, the 11 medical centers that implemented the PI system in 2008 self-reported an average score of 2.9 (on a five-point scale) on six capabilities of high-performing health care systems. Although growth occurred in all six capabilities, the greatest growth occurred in measurement and learning, while the greatest need for further improvement was found for systems and capacity and sustainment.

and second groups of sites totaled approximately \$7 million, including all start-up and directly applicable consulting costs, as well as all project costs. The combined financial impact for the 11 projects (at 7 of the medical centers and one outpatient region) which were sufficiently large or “mature” to allow the calculation of financial impact was \$23 million, with an average investment (across all 22 medical centers) of \$318,500 and an average net return on investment (ROI) of \$753,100—an average of approximately 0.4% of each medical center’s operating budget. For the 8 medical sites that obtained results, savings ranged from 0.01% to 1.4% of the operating budget. For every dollar invested in staff, development, and implementation support for the 22 medical centers, Kaiser Permanente realized a net return of \$2.36. Table 4 (page 558) lists the strategies, results, and financial impact for 4 of the 11 improvement projects.

Discussion

Intermediate results from medical centers in the first and second phases of implementing the Kaiser Permanente PI system provided evidence that this approach was successful and should be expanded. IAs successfully completed 81% of the projects addressing efficiency, service, quality, and safety. The estimated financial impact of the 11 projects for which costs and financial effects could be reliably determined was a net ROI of \$2.36 per dollar. Senior leaders’ self-assessments suggested improvement—and a need for further improvement—among the six capabilities of high-performing organizations.

ROI

To the best of our knowledge, the evaluation represented in this article is the first report on a multicomponent PI system to include an estimated ROI. Whether quality improvement (QI) activities yield an ROI remains a pressing question. Evidence and methodologies are inconsistent. For example, innovations to increase the use of effective diabetes care in very similar integrated health care delivery systems have been documented to generate cost savings in one case¹⁴ but not the other.¹⁵ Investigators who conducted a comparative case study of a federal chronic disease management QI program in community health centers found disparate impacts on costs and revenues and concluded that the impact of PI programs may be difficult to quantify because leaders weigh multiple diverse financial and nonfinancial outcomes.¹⁶

Key factors in a robust business case for PI include a short time horizon within which economic benefits occur and accrual of benefits to the entity investing in PI.^{17,18} Interventions that decrease unit cost or increase capacity are also typically associated with a strong business case.¹⁹ All three of these factors operate in our model of estimated ROI.

Our estimates included significant savings from reduced average LOS, a measure that other studies have also used.^{20,21} Yet, it has been argued that LOS does not reflect a conversion of light green dollars (potential savings) into dark green dollars (realized savings).²² This criticism rests on assumptions about the fixed and variable costs of a bed day of care, with labor as solely a fixed cost. However, although minimum staffing levels represent a direct fixed cost, additional labor and overtime are direct variable costs.²³ Total direct variable labor costs in our analysis were approximately \$600 per day, and dark green dollar savings from reduced LOS were reflected in financial performance in terms of budgeted labor expenses through reduced overtime and variable staffing. In addition, as noted above, increasing throughput allows Kaiser Permanente medical centers to avoid the use of outside services to meet excess demand.

The alternative to using decreased LOS to estimate ROI would be to identify control populations for each condition in which the average LOS decreased and compare actual costs.²⁴ However, this was not feasible. The PI system was implemented regionwide, so no other medical centers in the same region were available as controls. In addition, we were unable to use facilities in other regions as controls because the cost structure varies substantially across regions. To ensure that costs were not shifted to other delivery settings, readmission and use of extended care services were monitored.

Table 1. Calculating Costs for Performance Improvement Projects*

Identify “dark green” dollar and “light green” dollar project costs. Dark green dollar costs affect the current budget, balance sheet, cash flow, or working capital. Light green dollar costs are indirect and include reallocation of existing staff and resources to project activities.

Dark Green Dollar Costs	1. Identify all dark green dollar costs (e.g., technology, supplies, additional FTE); quantify cost per month for each; sum over 12 months.
Light Green Dollar Costs	To calculate project support costs: 1. Identify FTE for project support team members by month. 2. Multiply FTE per team member by monthly FTE cost (annual salary divided by 12). 3. For each month, enter the sum of FTE costs for all project team members. 4. Sum all costs for project support over 12 months.

* FTE, full-time equivalent.

Table 2. Calculating Financial Effects of Performance Improvement Projects*

Identify “dark green” dollar and “light green” dollar effects. Dark green dollar effects have an impact on the budget, balance sheet, cash flow, or working capital. Light green dollar effects include cost avoidance or capacity enhancement. For each identified change, we used the following steps to calculate its financial effect.

Dark Green Dollar and Light Green Dollar Utilization Effects	1. Identify baseline utilization in units (e.g., events, days, procedures) per month; sum over 12 months; multiply by unit cost. 2. Identify projected or actual new utilization in units per month; sum over 12 months; multiply by unit cost. 3. Subtract projected or actual new costs from baseline costs.
Dark Green Dollar and Light Green Dollar Materials Effects	1. Identify baseline utilization in units per month; sum over 12 months; multiply by unit cost. 2. Identify projected or actual new utilization in units per month; sum over 12 months; multiply by unit cost. 3. Subtract projected or actual new costs from baseline costs.
Dark Green Dollar and Light Green Dollar FTE Capacity Effects	1. Identify baseline costs per desired unit of time of personnel performing identified process step, based on wage rate or annual salary and benefit percentage. 2. Identify baseline annual time required for each personnel type for process step. 3. Multiply #2 by #1. 4. Repeat steps 1–3 for all baseline process steps and personnel (e.g., phoning patients with test results, proficiency testing). 5. Sum #3 and #4. 6. Repeat steps 1–5 for projected or actual new capacity needed for improved process. 7. Subtract projected or actual new costs from baseline costs.
Roll Up Results	1. Sum all dark green dollar effects. 2. Sum all light green dollar effects.

* FTE, full-time equivalent.

SIX CAPABILITIES OF HIGH-PERFORMING HEALTH CARE ORGANIZATIONS

Comparing our results in terms of increased organizational capabilities with published reports proved challenging. Although evidence exists as to the importance of the capabilities we targeted, we were unable to identify published reports of systemwide initiatives to simultaneously improve them.^{25,26} To address the issue of bias in self-assessment of organizational capabilities, we are arranging for mentors to conduct site visits (starting in January 2011) across the Kaiser Permanente system to provide objective assessments of these capabilities. In addition, in an effort to assess external competitiveness, we

Table 3. Impact of Dedicated Improvement Advisor (IA) Time on Project Completion Rates*

FTE	Number of IAs	Projects		Completion Rate
		Incomplete	Complete	
< 0.2	11	5	6	55%
0.2	13	2	10	83%
0.5	6	2	5	71%
0.75	4	0	4	100%
1.0	20	0	24	100%
	54	9	49	84% (average)

* FTE, full-time equivalent.

Table 4. Examples of Performance Improvement Projects and Their Strategies, Results, and Financial Impact*

Improvement Project	Strategies	Results (annualized)	Financial Impact
Decrease hospital-acquired pressure ulcer (HAPU) rates in at-risk patients	<ul style="list-style-type: none"> ■ Established turning teams and criteria ■ Created visual clock to remind staff to turn patients ■ Implemented O₂ devices with special padding ■ Developed documentation in complex wound flow-sheet segment of EMR ■ Established auditing process to sustain results 	Reduced HAPU rate by 55%; avoided an estimated 124 HAPUs	\$1,219,000
Reduce average incidental overtime (< 1 hour) by 50%	<ul style="list-style-type: none"> ■ Linked assignments from on-coming and off-going nurses to reduce report time ■ Removed infrequently used narcotics to decrease narcotic count time ■ Created assignment standards and etiquette to reduce time and enhance transitions 	193 saved hours	\$22,000
Reduce all-cause 30-day heart failure readmissions	<ul style="list-style-type: none"> ■ Coordinated concurrent medication reconciliation by home health RN, PharmD, and patient in the patient's home ■ Improved identification of heart failure inpatients ■ Increased reliability of home health visit within 48 hours of discharge ■ Increased reliability of outpatient heart failure clinic follow-up one week after discharge ■ Implemented readmission diagnostic tool to identify system gaps 	Reduced readmission rate from 15.7% to 9%, saving 1,810 patient days	\$2,394,000
Increase mobility for orthopedic hip and knee patients on a med/surg telemetry unit	<ul style="list-style-type: none"> ■ Educated total hip and knee patients on the Patient Mobility Path ■ Enacted process for Foley catheter removal no later than 8:00 A.M. ■ Enacted process for physical therapy appointment time on patient's care board by 8:30 A.M. ■ Improved team communication of patient mobility status via the NKE (Nurse Knowledge Exchange) handoff and Activity Communication Tool 	Achieved mobility criteria earlier, decreasing length of stay for targeted patients from 3.5 to 2.8 days	\$290,000

* EMR, electronic medical record; RN, registered nurse; PharmD, doctor of pharmacy.

encourage high-performing medical centers to apply for national quality awards.

An evaluation of the first phase of implementation conducted in 2008 by the Kaiser Permanente Institute for Health Research (Denver) showed that personnel at all levels of five care delivery sites—from frontline staff to medical center leaders to national executives—supported the PI system. Frontline physicians and staff believe that they are best positioned to make local, immediate performance improvements. Managers enjoy being coaches and mentors rather than telling employees what to do. Leaders saw the vesting of responsibility for identifying solutions with frontline workers as appropriate.

COMPLETED IA PROJECTS

IAs had a remarkably successful track record with initial projects, which reflected in part the support that the mentors

provided in terms of the identification of improvement priorities and the monitoring of improvement efforts during and after implementation, as well as focus on rapid learning at the front line of care. By frequently tracking operational metrics, such as transfer and discharge times and LOS, IAs and unit-based staff could quickly identify effective strategies and discard or refine ineffective ones. In another whole-system QI effort, a similar approach of flexible experimentation and learning was crucial to achieving an array of successful outcomes and optimizing the use of resources.⁸

LIMITATIONS

Limitations to our findings include the difficulty of attributing changes to interventions in complex adaptive systems without the rigor of a randomized controlled trial. In addition, the 11 completed projects for which we were able to determine the

financial impact represent only approximately 20% of the 51 completed projects.

In the case study provided (Appendix 2), multiple PI projects were under way at the medical centers, and we tracked the effects of portfolios of projects which focused on improving the quality and effectiveness of care in treating a specific clinical condition rather than individual projects. Therefore, we could not quantify the financial impact at the departmental or unit level. In addition, once projects were under way, frontline teams tracked utilization and quality metrics, not financial performance, to identify the need to adjust tactics. However, finance leaders were integrally involved in validating the financial impacts of completed projects and served on improvement oversight committees at medical centers.

Although sustainability of improvement is one of our goals, the one-year time period for our evaluation after implementation is not sufficient for assessment of the projects' sustained impact. With the implementation of federal health care reform, in which, for example, persons are to be covered under health insurance exchanges and payments for inpatient and postacute care are to be bundled, the next two years are particularly important to maintain and extend the impact of the PI system. Medical center, regional, and national leaders continue to monitor Big Q metrics, which now include the 22 core measures that are considered "accountability measures."²⁷ Frontline staff, IAs, and improvement oversight committees continue to monitor operational process and outcome indicators specific to frontline improvement efforts to ensure that process improvements are sustained. For example, for the Kaiser Permanente Walnut Creek Medical Center's project on improving hospital day rates (Appendix 2), process and outcome indicators include the percent of discharges scheduled and occurring on time and the patient day rate and average LOS.

We plan on further developing the value framework, including the service component of value (*see* Value Framework, page 552), in the context of more comprehensive and long-term evaluation strategies, which must include more rigorous measures of the six organizational capabilities to complement organizational self-assessment.

In addition, we will assess staff engagement in PI activities, staff retention, and continuing improvement in organizational performance as measured by the core Big Q metrics and other whole system measures.²⁸ In the immediate future, we will focus on standardizing indicators using KP HealthConnect™, our electronic health record, as a source of outcomes data and a mechanism for feedback so that we can continue to monitor the pace of improvement.

LESSONS LEARNED

Dedicating adequate time for staff to develop the necessary expertise in PI is critical. Staff were trained in rapid-cycle improvement so they could take ownership of and engage in PI projects. In addition, IAs—which all health care organizations, no matter how large or small, can develop—play a critical role in facilitating PI projects.

Predicting the financial impact of PI projects (Figure 1) helped leaders prioritize multiple improvement projects—and can be adapted to other settings. The financial impact tool formed just one part of a decision matrix with which all proposed improvement opportunities were reviewed. By including other weighted criteria, such as business strategy and regulatory compliance (Appendix 1), medical center leaders developed consistent criteria for prioritizing opportunities. The involvement of the chief financial officer in calculating the financial impact of full-scale implementation and prioritizing improvement projects can reveal fiscal consequences that may not be immediately apparent to operational leaders. For example, one project focusing on turnover of operating rooms in a day-surgery unit initially revealed no dark green dollar savings. The finance executive investigated further and found that some patients were unnecessarily identified as requiring inpatient admission, which led to inaccurately high predicted staffing needs. Refining the identification of day-surgery patients requiring admission affected direct variable labor costs in the hospital.

The continuing involvement of financial executives in planning and oversight of projects aligns all senior leaders behind PI and helps ensure that portfolios of projects remain aligned with higher-level strategic priorities. In our case, those were regional and national priorities, but the same principle applies to a single organization or a consortium. Aligning PI activities with higher-level strategic priorities is fundamental for a sound business strategy.

Accountability for managing a population and properly deploying resources across the continuum of care allows for realizing dark green dollar financial impacts more directly than in fee-for-service systems, where, for example, revenues may decrease if supplies or diagnostics are unused because of the markup on goods and services.²² In an integrated delivery system such as ours, reducing inappropriate overuse of care by treating patients in the most appropriate setting reduces the overall cost of care. In addition, when reduced LOS allows our patients to be cared for internally, dark green dollars are realized through reduced costs for outside services.

Conclusion

The value framework for the Kaiser Permanente PI system is intended to provide a comprehensive view of the value of investing in developing improvement capacity in operations and its impact on overall medical center performance. Stand-alone hospitals and clinics can employ a similar approach and tools.

This initial evaluation of the Kaiser Permanente PI system indicated that IAs were successfully leading projects in conjunction with cross-departmental frontline teams, that organizational capabilities were improving, and the investment in PI infrastructure and staff was a sound one. Since September 2009, the end point of the evaluation period reported here, our PI system has expanded to include 600 IAs in all 36 medical centers in all eight regions, more than 2,000 operations managers, and more than 20,000 frontline staff. As the PI system expands, our goal is to realize an average net return corresponding to 1% of medical center operating budgets. ■

Online-Only Content

See the online version of this article for

Appendix 1. Performance Improvement Project Prioritization Matrix

Appendix 2. Northern California Region and Kaiser Permanente Walnut Creek Medical Center

Figure 1. Sample Estimation of the Financial Impact of a Performance Improvement Project

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Appendix 1. Performance Improvement Project Prioritization Matrix

Click the link to view this file as an Excel spreadsheet:
http://www.jcrlnc.com/common/documents/schilling_matrix.xls

LEAN SIX SIGMA PROJECT PRIORITIZATION/ SELECTION MATRIX

Rank	Project Name/ Description	Champion/ Process Owner	Results				Feasibility			Risk			Total	Effort	
			Financial	Customer Satisfaction	Business Strategy	Regulatory / Compliance	Resources and Time	Performance Trending	Content Expertise	Clarity	Complexity	Probability of Success		Effort	Number and Skills required for external resources
			8	10	5	5	2	7	3	4	4	3			
			Hard Dollar Savings Annually	Will this project improve customer satisfaction?	Is this project critical to the business strategy?	Is this project regulatory? Does it address compliance issues?	Are the necessary resources and time available?	Is the process getting worse or staying the same?	Do we have the necessary expertise internally?	Is the project well defined and scoped appropriately?	What is the relative complexity of this project?	What is the probability of success?		1 = 0-3 mth 2 = 3-6 mth 3 = 6-9 mth 4 = 9-1 yr	
			1 = \$100k 2 = \$300k 3 = \$500k	0 = no 1 = low 2 = moderate 3 = strong	0 = no 1 = low 2 = moderate 3 = strong	0 = no 1 = low 2 = moderate 3 = strong	0 = no 1 = low 2 = moderate 3 = yes	0 = improving 1 = staying same 2 = worsening 3 = worsening fast	0 = no 1 = low 2 = moderate 3 = strong	0 = no 1 = low 2 = moderate 3 = simple	0 = high complexity 1 = moderate complexity 2 = low complexity 3 = simple	0 = none 1 = low 2 = moderate 3 = strong			
4	IP Practice Office Encounters Process Design	New Process/No Process Owner Assigned Yet	1	3	3	1	3	1	3	3	3	3	197	1	NA
7	Hospital Acquired Pressure Ulcers Improvement	HCU Department Administrator	3	3	3	3	1	1	3	0	0	1	153	1	NA
2	Process Improvement	Environmental Services Director	3	1	3	1	3	1	3	3	3	3	226	1	NA
3	Acute Myocardial Infarction Improvement	Quality Performance Improvement Director	1	3	3	3	3	1	3	3	3	3	221	1	NA
5	Community Acquired Pneumonia Improvement	Quality Performance Improvement Director	1	3	3	3	3	1	3	3	3	3	183	1	NA
1	MR Turn Around Time Improvement	OR Department Administrator	3	3	3	1	3	1	3	3	3	3	321	1	NA
6	ED Patient Satisfaction ASQ #30	ED Department Administrator	1	3	3	1	1	1	3	0	1	1	181	1	NA

Appendix 2. Northern California Region and Kaiser Permanente Walnut Creek Medical Center

In 2008, Kaiser Permanente Northern California (KPNC) leaders defined a vision and strategies to achieve “world-class hospital” status. They monitor performance improvement (PI) at the regional level through a scorecard that measures progress toward achieving that vision, which is being achieved by building deep PI capacity at all levels of KPNC: at the front line of care, within medical centers, and at the regional level.

The scorecard includes four goals: quality leadership, exceptional care experiences, efficient and patient-centered care processes, and a highly skilled and motivated workforce. Drivers for each goal result in achievement when they are optimally engaged; drivers are broken down into focal areas. For instance, under the goal of exceptional care experiences, drivers include responsive communication, patient comfort, and well-sequenced care; under the driver of well-sequenced care, focal areas include patient flow and throughput and scheduling of inpatient stays.

Each of the 21 KPNC inpatient medical centers regularly updates an operating plan, identifying strategic priorities that are measured by the scorecard. Senior executives at each medical center examine their facility’s unique improvement opportunities and prioritize PI resources, allocating improvement advisor (IA) time and investing in training as needed.

Performance Improvement Project: Increase Bed Capacity and Shorten Transfer Times

In 2008, Kaiser Permanente Walnut Creek Medical Center (WCMC) leadership recognized an opportunity to improve hospital day rates to increase available bed capacity and shorten transfer times from the emergency department (ED) to inpatient units. The medical center IA helped them design a portfolio of improvements addressing the drivers of well-sequenced care and timely, appropriate discharges. Starting in the fourth quarter of 2008, WCMC implemented multiple improvements focusing on improving average length of stay (LOS) for patients with targeted procedures and conditions.

Improvements. For patients with total joint (knee and hip) replacement, nursing and physical therapy streamlined communications and referral processes. Pre-operative classes for patients with total joint

replacements were redesigned, and the pain scale, a central tool for pain management, was refreshed.

For patients with pneumonia, congestive heart failure (CHF), and stroke, nursing staff implemented checklists for care pathways, established thresholds for urine output (CHF) and ambulation (pneumonia), and worked with physicians to create standards for enabling patients to make the transition from intravenous to oral antibiotics (pneumonia) and to create time lines for imaging studies (stroke). Nursing staff and the IA also created new standards and processes to increase patient mobility.

Each patient’s expected LOS was noted on the chart within 24 hours of admission. WCMC also began multidisciplinary rounding for patients at risk of an LOS longer than five days. A weekly multidisciplinary team meeting was started for patients with extended LOS, attended by representatives from palliative care, home care (hospice and home health), physical therapy, skilled nursing, hospital utilization and resource management, and administration.

A hospital-based specialist (HBS) physician developed a customizable template to document the plan of care in the electronic health record, and patient care coordinators’ (PCCs’) work assignments were revised. They were paired with HBS physicians instead of being assigned to units, and HBS/PCC pairs began huddling twice a day. All PCCs began using a new patient discharge scheduling system.

Results. Between 2008 and 2009, the number of hospital days per 1,000 members at WCMC decreased by 9%. The average LOS decreased by 15%, average LOS for total joint replacements decreased by 18%, and average LOS for pneumonia decreased by 13%. The total estimated financial impact of these improvements is a savings of \$1.1 million (Table, below). During the same period, quality and service indicators remained the same or improved.

The sustainability of improvements is measured through process and outcome indicators. Process metrics include the percentages of patients with a clear plan of care, out of bed for meals, and ambulating, as well as the percent of discharges scheduled and occurring on time. Outcome measures include the patient day rate and average LOS.

Table. Example of Estimated Financial Impact of Performance Improvement*

Target condition	Baseline ALOS	Target LOS	Hospital Days Saved	Net Savings (\$M)
Total joint replacements	4.6	3.0	1,019 [†]	\$0.4
Pneumonia	4.8	4.0	330 [‡]	\$0.1
Congestive heart failure	5.8	4.0	718 [§]	\$0.3
Stroke	5.2	3.0	561 [§]	\$0.2
Total	—	—	2,628	\$1.1

* ALOS, average length of stay; LOS, length of stay.

[†] Implementation period: October 2008–September 2009.

[‡] Implementation period: October 2009–September 2010.

[§] Implementation period: November 2009–October 2010.

Figure 1. Sample Estimation of the Financial Impact of a Performance Improvement Project

Performance Improvement Project Financial Worksheet Summary			
Project Title: Medical Center Throughput Optimization (for a 200-bed hospital)			
Project Initiation Date: October 2008		Targeted Completion Date:	
Team Members:		Process Owner:	
Improvement Advisor:		Project Scope	
Project Team Member Names		SCOPE: Reduction in LOS for frequent clinical conditions to evidence based practices (eg. CHF, PNA)	
Help Chain			
Sponsor:			
Champion:			
Champion:			
Mentor:			
Financial Benefits of Project:			
Net Projected Hard Financial Benefit of Project:		\$3,050,000	
Net Projected Soft Financial Benefit of Project:		\$3,416,000	
Combined Total Financial Benefit of Project		\$6,466,000	
	Baseline	New State	Difference Between Baseline & New State
A. Hard Financial Benefit (Realized Revenue/Reduced Cost)			
1. New revenue stream	\$0	\$0	\$0
2. Existing revenue stream increase	\$0	\$0	\$0
3. Material reduction, e.g. reduction in costs for inventory/material	\$0	\$0	\$0
4. Utilization Impact, e.g. reduced LOS leading to fewer staffed beds and/or staffing hours	(\$5,100,000)	(\$3,525,000)	\$1,575,000
5. FTE Capacity Change, e.g. Reduction in OT, staff not linked to LOS	\$0	\$0	\$0
6. Reduced Outside Medical Costs (KP patients seen by KP providers or facilities)	(\$85,000,000)	(\$83,000,000)	\$2,000,000
Total Projected Hard Financial Benefit of Project	(\$70,100,000)	(\$66,525,000)	\$3,575,000
B. Hard Financial Revenue Decrease/Cost Increase			
1. Reduced revenue (co-pay revenue reduction)	\$0	(\$525,000)	(\$525,000)
2. Cost Increase (please specify)			\$0
Total Projected Hard Financial Costs of Project	\$0	(\$525,000)	(\$525,000)
Net Projected Hard Financial Benefit of Project			\$3,050,000
C. Soft Financial Benefit (Incremental)			
1. Cost Avoidance (incremental increase in efficiency but no cost reduced/revenue realized)	\$0	\$0	\$0
2. Utilization Impact (reduced LOS but no cost removed from system)	(\$11,053,000)	(\$7,637,000)	\$3,416,000
Total Projected Financial Benefit of Project	(\$11,053,000)	(\$7,637,000)	\$3,416,000
D. Soft Financial Costs			
1. Cost Increase (Please Specify)	\$0	\$0	\$0
	\$0	\$0	\$0

Figure 1. A sample estimation of the financial impact of a performance improvement project is shown. The far left column depicts typical “dark green” (Hard Financial Benefit) and “light green” (Soft Financial Benefit) dollar impacts.