

# Establishing a Portfolio of Quality-Improvement Projects in Pediatric Surgery through Advanced Improvement Leadership Systems

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Perm J 2013 Fall;17(4):41-46

<http://dx.doi.org/10.7812/TPP/13-035>

## Abstract

Formal quality-improvement (QI) projects require that participants are educated in QI methods to provide them with the *capability* to carry out successful, meaningful work. However, orchestrating a portfolio of projects that addresses the strategic mission of the institution requires an extension of basic QI training to provide the division or business unit with the capacity to successfully develop and manage the portfolio. Advanced Improvement Leadership Systems is a program to help units create a meaningful portfolio. This program, used by the Division of Pediatric General and Thoracic Surgery at Cincinnati Children's Hospital Medical Center, helped establish a portfolio of targeted QI projects designed to achieve outstanding outcomes at competitive costs in multiple clinical areas aligned with the institution's strategic goals (improve disease-based outcomes, patient safety, flow, and patient and family experience). These objectives are addressed in an institutional strategic plan built around 5 core areas: Safety, Productivity, Care Coordination and Outcomes, Patient and Family Experience, and Value. By combining the portfolio of QI projects with improvements in the divisional infrastructure, effective improvement efforts were realized throughout the division. In the 9 months following the program, divisional capability resulted in a 16.5% increase (5.7% to 22.2%) of formally trained staff working on 10 QI teams. Concurrently, a leadership team, designed to coordinate projects, remove barriers, and provide technical support, provided the capacity to pursue this ongoing effort. The Advanced Improvement Leadership Systems program increased the Division's efficiency and effectiveness in pursuing the QI mission that is integral at our hospital.

## Introduction

The Institute of Medicine reports from the late 1990s and early 2000s document the substantial problems with quality in the US health care system. In those studies, medical errors resulted in the deaths of an estimated 44,000 to 98,000 people each year.<sup>1,2</sup> This realization led health care systems to reevaluate how care is provided and to seek processes for improving patient safety. For the last decade, Cincinnati Children's Hospital Medical Center (CCHMC) focused its efforts on transforming the organizational culture from a traditional approach, in which errors are expected and accepted as inevitable and care is based on practitioner preference, to one in which the focus is on learning from errors and care is driven by evidence and outcomes. The ultimate goal is to achieve

an organization where safety and quality improvement (QI) become an integral part of the way medicine is practiced rather than periodic initiatives responding to sub-optimal care. CCHMC invested resources to develop the appropriate educational training for faculty, nursing leaders, and administrators who would undertake the QI work. As an academic medical center, CCHMC has a strategy for building improvement capability that focuses on advancing the scholarship of health care improvement through rigorous methods and QI research.<sup>3</sup>

Two broad concepts emerged from this strategy regarding an organization's ability to successfully achieve sustained improvement results. The concept of *capability* refers to the presence of "knowledgeable and skilled

human resources to lead the design of improvement initiatives to achieve measurable results, execute (ie, develop, test, measure, and implement changes) the improvement efforts, and sustain the results."<sup>4</sup> The concept of *capacity* is defined as "organizational resources that enable it to initiate and sustain a transformation effort."<sup>4</sup> Previous publications describe the educational training courses at CCHMC that are necessary to build the proper *capability* required for successful transformation.<sup>4,5</sup>

As trained QI leaders proliferated across the organization, it became apparent that there was also a need for a guiding structure for leaders of the academic divisions to coordinate and manage a QI portfolio of work. These leaders held the responsibility of directing work to meet the strategic goals of improving disease-based outcomes and transforming care systems across the organization. Across CCHMC, many divisional leaders had undergone extensive training in improvement science, yet it was clear that many divisions lacked the necessary *capacity* to achieve the results required by the organization's strategic initiatives. To address this deficit, CCHMC created an educational program called Advanced Improvement Leadership Systems (AILS). This course helps divisional leaders in the institution address the institutional objectives to achieve outstanding outcomes at a competitive cost, manage a portfolio of projects to achieve goals in multiple strategic areas and to deliver on the CCHMC strategic plan goals through effective alignment.<sup>4</sup> AILS is a six-month training and development program for Division Directors responsible for developing and aligning their divisional goals with

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the organization's overall strategic goals to improve disease-based outcomes, patient safety, and patient flow.<sup>4</sup> This article describes our work using the AILS model to establish a coordinated portfolio of successful QI projects in the Division of Pediatric General and Thoracic Surgery.

## Methods

The AILS model consists of a series of five educational half-day sessions that are outlined below.<sup>4</sup> QI leadership teams consisting of four to ten people participate in the process. The Division of Pediatric General and Thoracic Surgery QI Leadership Team includes the Division Director, the nurse practitioner (NP) team leader, the Business Director, a QI consultant, and a lead decision support analyst. Each of the five sessions focused on an educational theme with deliverables for each team due before and after each session. The session themes were as follows (Figure 1):

1. Assessing the current state (divisional readiness, existing projects)
2. Safety and productivity (identify key safety processes)
3. Care coordination and outcomes (understand the chronic care model)

4. Patient and family experience/managing your system of work (portfolio, dashboard)

5. Execution of system's goals (report on work completed and plan for execution).

At each of the five learning sessions, a combination of didactic material presentations and individual group work is completed.

The Division of Pediatric General and Thoracic Surgery is a large division with 7 subspecialties (bariatric, colorectal, fetal, general surgery, hemangiomas/vascular malformations, transplantation, and trauma), each with different needs and different populations. There are 21 surgeon faculty members and 21 NPs. At the onset of the AILS course, 5.7% of faculty and NPs had received formal QI methodology training.

Given the diversity of the conditions and patient populations treated in the Division, the decision was made to select a single disease treated by most Division members and to address multiple aspects of the disease management (a so-called vertical process) and a non-disease-specific process affecting all diseases treated in the Division (a so-called horizontal process). Appendicitis management was

selected as the vertical process on the basis of the frequency of the diagnosis (500 to 600 patients per year) and the availability of literature suggesting clinical best practice. A treatment guideline was developed for perforated appendicitis and agreed on by the faculty, with primary objectives of reducing the number of patients treated with interval appendectomy and reducing the number of patients discharged on an antibiotic regimen. Data gathered included adherence to the guideline and a balancing measure of readmissions because of abscess within 30 days of treatment.

The horizontal process selected addresses communication of the care plan with the family, a known correlate to have an impact on patient and family satisfaction. Through extensive analysis of patient and staff satisfaction survey data, a common theme was noted regarding basic communication of the care plan to the various members of the care team and, equally important, to the patient and family. To address this opportunity, the process of morning rounding by the care team was studied. Baseline data were obtained, followed by sequential tests of change designed to result in a clear care plan communicated to the entire team for each patient on the service at the end of rounds each morning. A second effort was undertaken to facilitate the transfer of the care plan to the bedside caregivers and the patient and family. Nurses and family members were integrally involved in the testing and implementation of the redesigned process. The approach of selecting a vertical and horizontal problem was designed to engage the majority of faculty, surgical fellows, and NPs in the work and increase their exposure to the QI process and methodology. Subsequently, additional targeted education efforts are now in place to ensure appropriate capability for strategic faculty and staff training on the basis of prioritized improvement initiatives.

Through this process, 6 NPs participated in the Rapid Cycle Improvement Collaborative educational program; and 2 surgeons and 1 nurse manager participated in the Intermediate Improvement Science Series course. Rapid Cycle Improvement Collaborative is a project-focused education process in which a small team learns

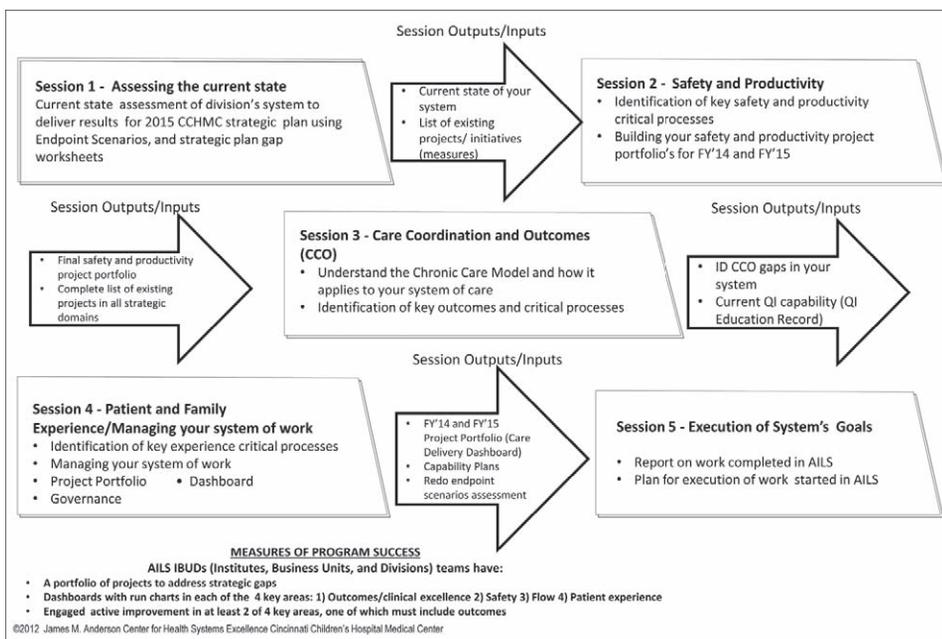


Figure 1. Roadmap of Advanced Improvement Leadership Systems.

AILS = Advanced Improvement Leadership Systems; CCHMC = Cincinnati Children's Hospital Medical Center; FY = fiscal year; ID = identify; QI = quality improvement.

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improvement science methods and works to solve a specific problem in a 120-day learning collaborative. The Intermediate Improvement Science Series is a more comprehensive 6-month leadership course that teaches participants leadership skills and offers extensive training in improvement science methods. Our Rapid Cycle Improvement Collaborative teams worked on appendicitis care and patient and family satisfaction, while our 3 Intermediate Improvement Science Series teams completed QI projects specific to the Colorectal Center.

The process of increasing the capability of the Division presents challenges both to the institution, to provide training, and to the clinicians, to invest a substantial time commitment to complete the training. The Rapid Cycle Improvement Collaborative and Intermediate Improvement Science Series courses are heavily supported with coaches, lecturers, and consultants representing a substantial investment by the institution in the QI effort. Similarly, the clinicians involved in each project are supported during their work, but care is taken not to overstretch the clinical care resources required to provide for the clinical volume. In addition, “initiative fatigue” is a potential barrier that also limits the speed at which training and overall improvement work can occur.

**Results**

Through participation in the AILS program, the Division of Pediatric General and Thoracic Surgery used its multidisciplinary QI leadership team to effectively manage a portfolio of projects that align and deliver on the CCHMC’s 2015 strategic plan. Figure 2 (available in color at: [www.thepermanentejournal.org/files/Fall2013/Timeline.pdf](http://www.thepermanentejournal.org/files/Fall2013/Timeline.pdf)) illustrates the body of ongoing improvement work in the Division. Each arrow represents an individual project, which is color-coordinated to correspond with the surgical subspecialty program identified at the bottom of the figure. Each project is aligned with one of the five CCHMC’s care delivery domains that form the core of the institution’s strategic plan—Safety, Productivity, Care Processes and Outcomes, Patient and Family Experience, and Value—which are indicated in a circle on the left side of each arrow. The QI leadership team (meeting weekly after

completion of the AILS program) operates in a way that integrates improvement, transparently shares data, reports on QI team status, and delivers care for surgical patients at the population level.

The Division of Pediatric General and Thoracic Surgery’s strategic goals for Fiscal Year 2013 were operationally set around delivering both the best clinical outcomes and the best value for patients undergoing surgical services care. For the clinically oriented outcome work, the key measures were percentage of patients receiving evidence-based care for patients with perforated appendicitis, cost of care for perforated appendicitis, patient and family satisfaction, percentage of patients in the Bowel Management Program who successfully achieved fecal continence, and percentage of reliable remote follow-up with patients in this program. Figure 3 (available at: [www.thepermanentejournal.org/files/Fall2013/Dashboard.pdf](http://www.thepermanentejournal.org/files/Fall2013/Dashboard.pdf)) shows the Care Delivery System Dashboard that helps the Division of Pediatric General and Thoracic Surgery use data to drive its

decision making. Our organization’s value initiative, aligning strongly with both organizational priorities and the Institute for Healthcare Improvement priorities,<sup>6</sup> aims to reduce the cost of providing surgical services. The following results of the active QI teams demonstrate the high-level accomplishments obtained in the first nine months after conclusion of the AILS program.

**Results of Active Improvement Teams**  
**Appendicitis Evidence-Based Care Guideline**

The team increased the percentage of patients treated with an evidence-based guideline for treatment of perforated appendicitis from 5% to 88%.

**Patient and Family Experience Rounds Redesign**

The team increased the percentage of NPs, nurses, and families that reported a consistent care plan (at least 4 of the 5 equally weighted elements) each morning for general surgery patients on 2 surgical inpatient units from 50% to 90%. The care

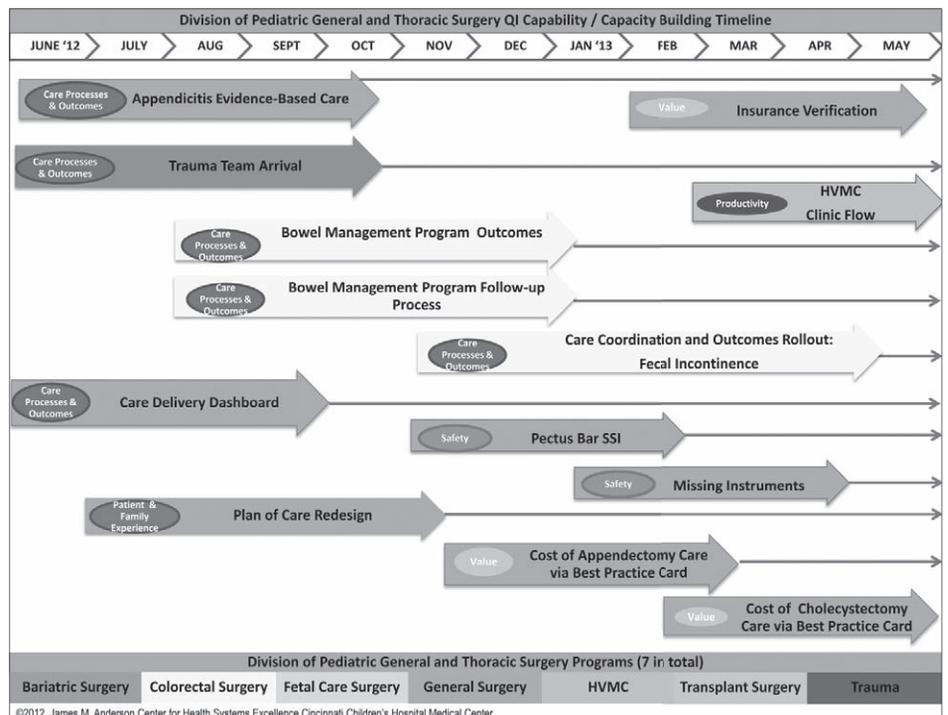


Figure 2. Division of Pediatric General and Thoracic Surgery Quality Improvement Capability and Capacity Building Timeline.  
 HVMC = Hemangioma and Vascular Malformation Center; Pectus Bar SSI = surgical site infection after pectus excavatum correction; QI = quality improvement.  
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plan elements were as follows: 1) changes to medications or antibiotics; 2) tests (ie, laboratory tests, x-rays) or procedures (ie, operating room, drain placement); 3) starting, stopping, continuing, or changing intravenous fluids; 4) diet or nutrition plan; and 5) predicted date of discharge.

**Anorectal Malformation Outcomes**

The team increased the percentage of patients in the Bowel Management Program (first-time program participants only) who successfully achieved fecal continence by the end of the 4-week program from 36% to 85%.

**Anorectal Malformation Follow-up Process**

The team increased the reliability of remote contact and collection of outcomes data for patients in the Bowel Management Program from 50% to 96%.

**Division Quality Improvement Capability**

In the 9 months following the AILS formal curriculum, Division capability achieved a 16.5% increase—from 5.7% to 22.2%—of formally trained staff (physicians, registered nurses, NPs, and business

directors) working on 10 improvement teams actively engaged in successful QI work. This rapid growth in capability required substantial financial commitment on the part of the Division and time commitment on the part of the clinicians.

**Discussion**

During the past ten years, the Division of Pediatric General and Thoracic Surgery, along with the entire institution, accumulated a number of Division members trained in improvement science methods. Although this provided some

 <b>Care Delivery System Dashboard</b> Division of Pediatric General and Thoracic Surgery FY2013 (Q2)										
Measures	Measure Type	Priority <sup>1</sup>	Project Leader	FY2011	FY2012	Current	FY2013 Goal	Reporting Frequency <sup>2</sup>	Desired Direction	
Patient and Employee Safety	Number of serious safety events	SD	MO	MD	0	0	0	0	YTD	↓
	Surgical Site Infection Rate - Class I / II operative procedures	SD	IP	MD	0.33%	0.45%	0.37%	0.5%	YTD	↓
	Number of OSHA Employee Injuries	SD	MO	Business Dir.	N/A	2	1	2	YTD	↓
	Number of OSHA Employee Injuries that resulted in lost time/time away from work	SD	MO	Business Dir.	N/A	0	0	0	YTD	↓
	Percent of surgical consents with no safety errors	SD	MO	MD	N/A	99.9%	99.0%	99%	YTD	↑
	Percent of surgical consents with no administrative errors	D	MO	MD	N/A	99.8%	92.0%	99%	YTD	↑
	Percent of unplanned returns to the OR within 30 days of a surgical procedure.	SD	MO	MD	0.41%	0.45%	0.26%	0.5%	Q	↓
Percent of unplanned returns to the Emergency Dept or Urgent Care within 30 days of a surgical procedure	SD	MO	MD	2.1%	2.0%	0.83%	2%	Q	↓	
Productivity	Productivity: wRVUs per clinical FTE	SD	IP	Business Dir.	8,817	10,067	9,417	10,319	YTD	↑
	OR Utilization: % of Block Time Utilized - Base Campus	SD	IP	Business Dir.	73.0%	74.0%	88.3%	75%	Q	↑
	OR Utilization: % of Block Time Utilized - Liberty Campus (FY13 goal is 10% improvement over FY12)	SD	IP	Business Dir.	27.1%	32.9%	48.1%	37%	Q	↑
	% Utilization of exam room space*	SD	MO	Business Dir.	N/A	N/A	53.0%	70-85%	Q	↑
	Access: Days until 3rd next available appointment	SD	MO	Business Dir.	TBD	TBD	4	≤10 days	Q	↓
	Percent of clinics that start on time*	SD	MO	Business Dir.	N/A	N/A	51.2%	70%	Q	↑
Outcomes and Clinical Excellence	SZD2 % available appointments filled	D	IP	Business Dir.	78.3%	92.6%	82.6%	75%	Q	↑
	% of patients with perforated appendicitis treated with Evidence based guideline (composite: timing / antibiotic usage)	D	AI	MD/QIC	N/A	N/A	84.4%	90%	YTD	↑
	% of General Surgery chronic conditions (11 total) being actively improved on (inside/outside QI courses)	D	AI	MD/QIC	N/A	18%	55%	55%	YTD	↑
	# of General Surgery programs (7 total) participating in active quality improvement (inside/outside QI courses)	D	AI	MD/QIC	N/A	3	4	5	YTD	↑
Patient & Family Experience	# of General Surgery Quality Improvement conference submissions	D	AI	MD/QIC	N/A	N/A	1	1	YTD	↑
	Overall Satisfaction: Percent of survey respondents giving CCHMC a rating of 0-6 on overall satisfaction	SD	AI	Business Dir.	0.4%	1.6%	0.0%	2%	Q	↓
	Overall Satisfaction: Percent of survey respondents giving CCHMC a rating of 10 on overall satisfaction	SD	MO	MD	78.1%	76.4%	79.7%	70%	Q	↑
Value	Number of Negative Unsolicited Concerns	SD	MO	MD	N/A	N/A	16	50	YTD	↓
	Average supply cost per case for laparoscopic appendectomy procedure	D	AI	Business Dir.	TBD	TBD	\$200	≤\$991.74	YTD	↓
Academics and Research	Average supply cost per case for laparoscopic cholecystectomy procedure	D	FW	Business Dir.	TBD	TBD	TBD	TBD	YTD	↓
	Number of Peer-Reviewed Publications	D	MO	Research Mng.	47	48	19	50	YTD	↑
	Number of Lead Author Peer-Reviewed Publications	D	MO	Research Mng.	31	28	12	25	YTD	↑
	Number of active grants	D	MO	Research Mng.	25	28	22	10	SA	↑
	Total annual grant dollars (direct)	D	MO	Research Mng.	\$1,900,021	\$2,459,193	\$1,366,972	\$1,995,361	SA	↑
	Total NIH grant dollars (direct)	D	MO	Research Mng.	\$1,702,678	\$2,194,397	\$1,225,106	\$1,994,694	SA	↑
	Research funding per square foot	D	MO	Research Mng.	N/A	\$301.06	TBD	\$225	Y	↑
	Number of Grant Submissions that obtained funding	D	FW	Research Mng.	TBD	TBD	TBD	TBD	Y	↑
	Number of Grant Submissions that did not obtain funding	D	FW	Research Mng.	TBD	TBD	TBD	TBD	Y	TBD
	Total annual grant dollars (institutionally funded)	D	FW	Research Mng.	TBD	TBD	TBD	TBD	Y	TBD
1 AI - Active improvement; MO - Monitor; FW - Future work; IP - Improvement Priority 2 Reporting frequency: quarterly (Q), semi-annual (SA), yearly (Y) SD - Strategic Domain Measure; D - Division Specific Measure								At Goal		
								≥75% of Goal		
								Below Goal		
<b>The Mission: Achieve the Best Outcomes, Experience, and Value</b>										

Figure 3. Care delivery system dashboard, Fiscal Year 2013, Quarter 2.

AI = active improvement; CCHMC = Cincinnati Children's Hospital Medical Center; D = Division-specific measure; Dir = director; exam = examination; FTE = full-time employee; FY = Fiscal Year; FW = future work; IP = improvement priority; MD = physician; Mng = manager; MO = monitor; N/A = not available; NIH = National Institutes of Health; OSHA = Occupational Safety and Health Administration; OR = operating room; Q = quarterly; QI = quality improvement; QIC = quality improvement consultant; RVUs = relative value units; SA = semiannual; SD = strategic domain measure; SZD2 = same day consult / same day surgery; TBD = to be determined; wRVUs = work relative value unit; Y = yearly; YTD = year to date; # = number; ↑ = increase; ↓ = decrease.

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capability—knowledgeable and skilled human resources able to lead the design of improvement initiatives to achieve measurable results—the Division lacked sufficient *improvement capacity*—organizational resources that enable sustaining a transformative effort.<sup>3</sup> Completing the AILS program demonstrated to divisional leadership that it lacked sufficient *improvement capacity* across the micro-system, mesosystem, and macrosystem levels.<sup>7-9</sup> Before participating in AILS, the Division of Pediatric General and Thoracic Surgery lacked both the organization and infrastructure to change the culture and behavior across the entire Division to one in which QI efforts are aligned with institutional goals and are prioritized for completion. Creation of the infrastructure, at the leadership level, in the Division allows for both oversight and accountability to accomplish strategic goals. The AILS program resulted in divisional success with both improvement *capability* and *capacity*.

The AILS process produced a clear roadmap demonstrating the Surgery Division's needs, both skilled resources and

proper infrastructure, to create a micro-system environment where QI initiatives achieve measurable results. Whereas the Division of Pediatric General and Thoracic Surgery lacked sufficient support resources to initiate its QI knowledge and skills before the AILS program, completing this process enabled the Division to focus on proper development of QI leaders, effective and efficient utilization of resources, and maximization of human resources to help ensure success. Before the AILS program, few improvement projects were initiated, fewer were completed, and virtually none entered the sustain phase of an adopted improvement. In many cases, limited projects were initiated by clinicians without the time or support to see the projects to completion. The addition of a QI consultant to the Division along with project prioritization, and the leadership management and oversight precipitated by the AILS process, dramatically increased the throughput and sustainability of the work. The structure allows busy clinicians to focus on their clinical work while still directing strategic QI work.

CCHMC uses an institutionally developed system-level key driver diagram (Figure 4) to aid QI efforts by ensuring that all projects are aligned to strategic goals. Aim statements for specific projects under way replace the list of interventions on a conventional key driver diagram (Figure 4). In this way, systematic segmentation of strategic goals permits development of a portfolio of aligned projects to improve quality. Ultimately, the Division of Pediatric General and Thoracic Surgery developed the following infrastructure components to frame its QI through the output of AILS:<sup>3</sup>

- Build improvement capability beyond acquisition of knowledge and skills, moving toward action-oriented improvement that achieves critical results and accelerates transformation
- Identify key safety, productivity, patient and family experience, outcomes, and critical clinical processes to improve child health as a multidisciplinary leadership team
- Manage a system of work with a strong governance structure, transparent data

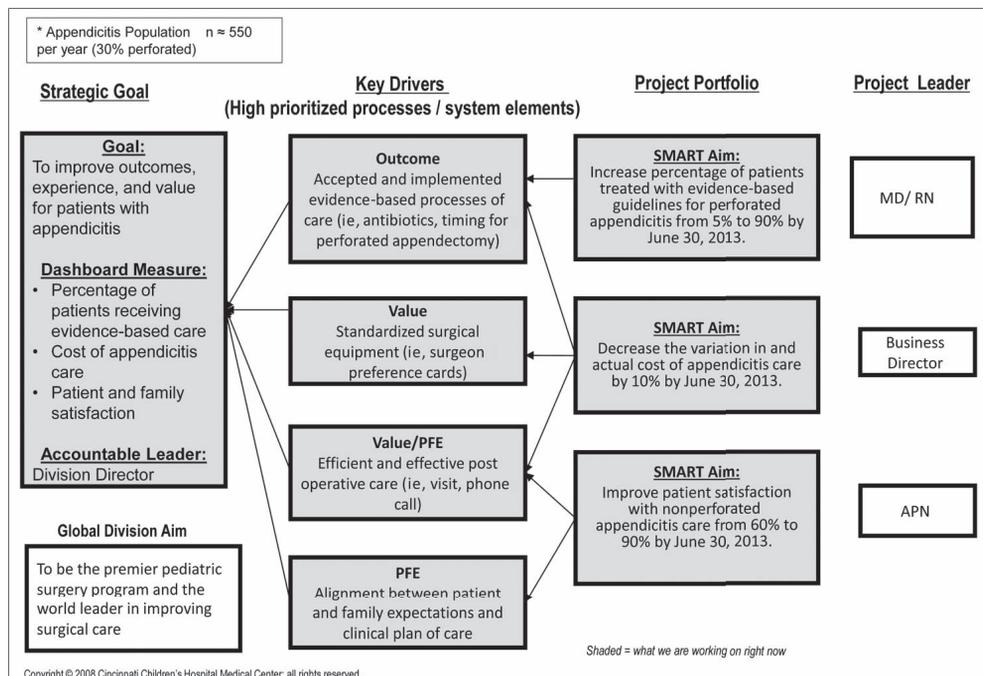


Figure 4. Care processes and outcomes for system-level key driver diagram for Fiscal Year 2013.

APN = advanced practice nurse; MD = physician; PFE = patient and family experience; RN = registered nurse; ≈ = approximately; shaded boxes = what we are working on currently.

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driving decisions, and a comprehensive map of the Surgery Division's QI project portfolio to plan and execute its QI work.

### Conclusion

AALS enabled the Division of Pediatric General and Thoracic Surgery to create a multidisciplinary QI leadership team to accelerate managing a portfolio of projects that align and deliver on the medical center's strategic plan. Moreover, after the AALS program, the leadership team now conducts operations in a way that integrates improvement to advance child health as a multidisciplinary team effort. Additionally, following AALS, the Division of Pediatric General and Thoracic Surgery mapped out QI capability planning across seven subspecialty programs with quarterly and yearly goals for Fiscal Year 2013 and beyond, launched five Rapid Cycle Improvement Collaborative teams, and trained three students in the Intermediate Improvement Science Series program. Figure 3 displays the Division of Pediatric General and Thoracic Surgery care delivery system dashboard, which has been critical to achieving a more integrated approach to maintaining and aligning the Surgery Division's QI projects to advance organizational strategic initiatives.<sup>3</sup> The AALS program helped clarify the Division of Pediatric

**The structure allows busy clinicians to focus on their clinical work while still directing strategic QI work.**

General and Thoracic Surgery's QI aims, boundaries, and core processes across domains of safety, productivity, outcomes and clinical excellence, patient and family experience, and value.<sup>3</sup> Figure 4 is an example of a high-level diagram outlining the incorporation of the core objectives into the appendicitis improvement work.

The AALS program highlighted the need for a multidisciplinary leadership team that works together to overcome challenges and barriers in achieving QI goals by executing work in a coordinated, intentional manner. The Division of Pediatric General and Thoracic Surgery now possesses the necessary components—proper infrastructure, clear governance, and coordination—to achieve and to sustain results. ❖

### Disclosure Statement

*The author(s) have no conflicts of interest to disclose.*

### Acknowledgments

*Special thanks to John Gaskey, MHA, who participated in the Advanced Improvement Leadership Systems training, to Alicia Vincent, who has contributed greatly to building capability and capacity for improvement in our Division, and to Uma Kotagal, MBBS, MSc, and Geraldine Kaminski, MS, DA, who developed and taught the Advanced Improvement Leadership Systems process and supported and mentored us in this important work.*

*Kathleen Loudon, ELS, of Loudon Health Communications provided editorial assistance.*

### References

1. Institute of Medicine: Committee on Quality of Health Care in America. Kohn LT, Corrigan JM, Donaldson MS, editors. *To err is human: building a safer health system*. Washington, DC: National Academy Press; 2000.
2. Institute of Medicine: Committee on Quality of Health Care in America. *Crossing the quality chasm—a new health system for the 21st century*. Washington, DC: National Academy Press; 2001.
3. Margolis P, Provost LP, Schoettker PJ, Britto MT. Quality improvement, clinical research, and quality improvement research—opportunities for integration. *Pediatr Clin North Am* 2009 Aug;58(4):831-41. DOI: <http://dx.doi.org/10.1016/j.pcl.2009.05.008>
4. Kaminski GM, Schoettker PJ, Alessandrini EA, Luzader C, Kotagal U. A comprehensive model to build improvement capability in a pediatric academic medical center. *Acad Pediatr* 2013. [Forthcoming]. DOI: <http://dx.doi.org/10.1016/j.acap.2013.02.007>
5. Langley GJ, Nolan KM, Nolan TW, Norman CL, Provost LP. *The improvement guide: a practical approach to enhancing organizational performance*. 2nd ed. San Francisco, CA: Jossey-Bass Publishers; 2009.
6. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Aff (Millwood)* 2008 May-Jun;27(3):759-69. DOI: <http://dx.doi.org/10.1377/hlthaff.27.3.759>
7. Batalden PB, Nelson EC, Mohr JJ, et al. Microsystems in health care: part 5. How leaders are leading. *Jt Comm J Qual Saf* 2003 Jun;29(6):297-308.
8. Godfrey MM, Nelson EC, Wasson JH, Mohr JJ, Batalden PB. Microsystems in health care: part 3. Planning patient-centered services. *Jt Comm J Qual Saf* 2003 Apr;29(4):159-70.
9. Nelson EC, Godfrey MM, Batalden PB, et al. Clinical microsystems, part 1. The building blocks of health systems. *Jt Comm J Qual Patient Saf* 2008 Jul;34(7):367-78.

## Modeling the Way

A leader who models the way is one who shares beliefs about leading; breaks projects into steps; sets personal example; talks about guiding values; follows through on promises; and sets clear goals and plans.

— *The Leadership Challenge*, James M Kouzes and Barry Z Posner