



Program for Supporting Front Line Improvement Projects in an Academic Radiology Department

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Background and Purpose

The amount of time and effort required to effect durable quality improvement (QI) differs according to the size and complexity of the problem, ranging from small problems that can be solved within days to large problems requiring multi-disciplinary QI teams working several months or longer.

After developing and implementing a program for large team-based projects, as well as a program for addressing routine problems encountered on a daily basis, leaders in the department of radiology recognized the need to also support small-to-medium-sized improvement initiatives.

The purpose of this program was to support the execution of small-to-medium sized improvement projects led by front-line staff in an academic radiology department.

Material and Methods

A program dedicated to supporting smaller QI projects led by front-line staff and leaders was established in the radiology department of a large academic medical center. The program was given the title of “52in52,” referring to the goal of completing 52 projects in 52 weeks of the year, for an average of one project per week for the department.

All staff members in the department who wished to address an issue were encouraged to submit a project to the program at any time. Projects needed to be large enough that the underlying problems could not be solved within a few days, but small enough to be able to be accomplished by a single front-line staff member or leader within 4-8 weeks, while also continuing full-time in their regular jobs.

Participants were assigned a QI coach and taught to use the institution's A3 QI methodology, including documentation of the current state, establishment of a performance measure and a target, identification of root causes, development of experiment and improvement plans, implementation of the improvements, and creating a plan for sustaining improvement.

Participants were given a limited amount of protected time to work on their projects. Participants and department leaders attended weekly 30-minute check-in meetings to update the group and received feedback and support from department leaders (**Fig. 1**).

Outcomes of the projects were calculated in terms of estimated financial impact. Costs of the program were essentially only in the form of personnel time. An anonymous survey was administered at the end of the first year, assessing agreement with statements regarding how well the program accomplished its objectives.

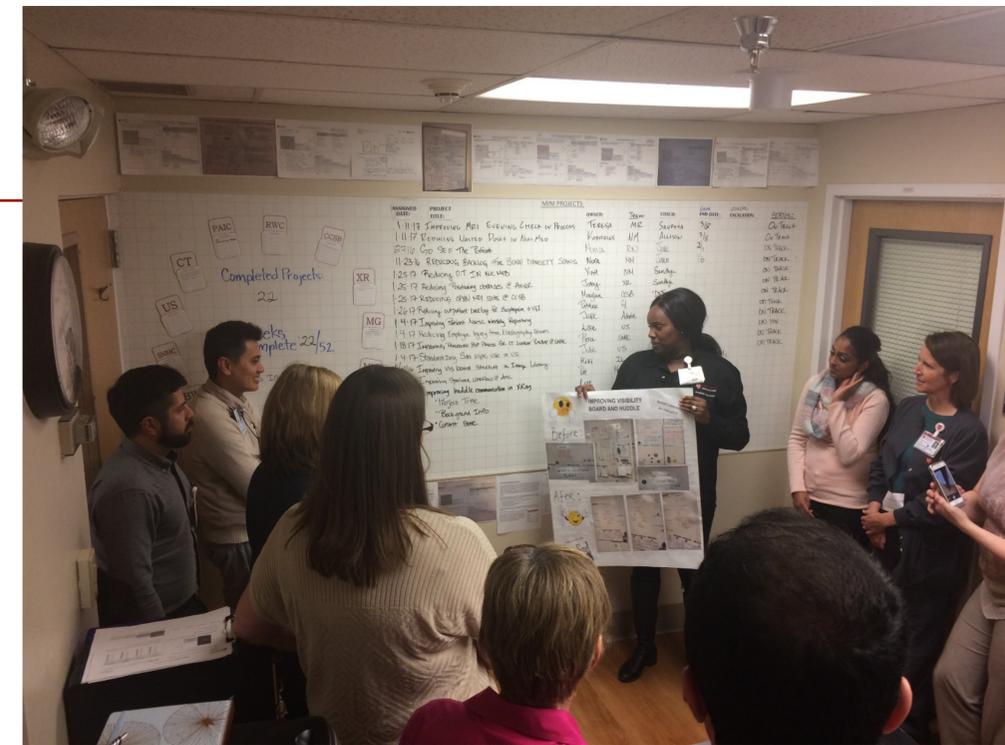


Figure 1. 30-minute weekly check-in meeting.

Results

102 projects were completed—54 projects in the first year and 48 projects in the second year (**appendix**). Participants included 44 front line staff members, 7 supervisors, 17 managers, and 3 radiologists or radiology trainees, for a total of 76 participants. 8, 4, 3, 1, and 1 individuals completed two, three, four, five, and seven projects in the program, respectively. 9 projects were completed by two participants. All participants were drawn from the department of radiology.

The project type mix for the first year included 13 quality improvement projects, 13 patient satisfaction projects, 6 staff engagement projects, 14 efficiency improvement projects, and 8 regulatory compliance and readiness projects. Estimated annualized outcomes for the first year included approximately 3,100 labor hours saved, \$315,000 in supply cost savings, \$11.4M in potential increased revenues, 8-point increase in top-box patient experience scores at one clinic, and reduction in 60 near-miss safety events.

The project type mix for the second year included 12 quality improvement projects, 9 patient satisfaction projects, 8 staff engagement projects, 13 efficiency improvement projects, and 6 regulatory compliance and readiness projects. Estimated annualized outcomes for the second year included 1,400 labor hours saved, \$30.8M in potential increased revenues, and 2-point increase in top-box patient satisfaction survey scores at a different clinic than that of the first year.

Projects required a mean of approximately 6.8 weeks to complete, with approximately two hours per week of protected participant time, for a mean of approximately 13.6 participant person-hours per project. Total participant time was estimated to be equivalent to approximately 0.35 full-time equivalent (FTE) positions per year. Program support was estimated to require approximately 0.1 FTE of time of the performance improvement manager to direct the program and approximately 0.1 FTE of time of each performance improvement project manager, for approximately 0.4 FTE to support the program. Therefore, the amount of total effort was equivalent to approximately 0.75 FTE, representing approximately 0.17% of all personnel time in the department.

Results (cont'd)

Results of the participant survey administered at the end of the first year are shown in **Table 1**. As shown in the table, the program was generally viewed favorably by the participants. Sample open-ended participant comments are included in **Table 2**.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)	Mean	n
Positives							
Improves my knowledge and confidence to solve problems	1	0	3	4	13	4.3	21
Provides support for those who want to do improvement	1	0	2	3	15	4.5	21
Increases my ability to contribute meaningful work for my direct team	1	0	2	4	14	4.4	21
Increases my ability to contribute meaningful work for the entire department	1	1	2	2	15	4.4	21
Shows the importance of my role in the department	1	0	4	7	9	4.1	21
Motivates me to do more improvement type work	1	0	3	6	11	4.2	21
Acknowledges the work I contribute to the department	1	0	2	4	13	4.4	20
Helps me in my personal growth and learning	1	0	0	6	13	4.5	20
Negatives							
Projects take too much time	5	2	5	6	2	2.9	20
The weekly check-ins are not helpful	7	7	3	2	1	2.2	20
The coaches are not a supportive as needed	16	3	1	0	0	1.3	20

Table 1. Results of participant survey administered at the end of the first year.

Results (cont'd)

	Comment	Role
<u>Positive Comments</u>		
	"I really loved that this issue I was having in the department was taken very seriously. I also felt that we were able to come together as team and get things much more organized. These projects help make us more efficient as a group, and help us to provide better care for our patients."	Medical Assistant
	"A game-changer program. It has empowered our staff, and has motivated all of us to think of improvement projects. While it's true these are projects we can all do outside of the program, having the assistance of the Quality coach and the questions and feedback we receive on during the Wednesday meeting has been critical to the success of these projects."	Manager
	"By allowing the projects to be smaller and faster, [the program] takes away the separation of improvement projects as a 'big deal.' It makes them more approachable and everyday. It gives structure and support to front line staff to work on projects that are important to them, then gives that staff visibility with leadership so that the staff feels that they are being acknowledged and leadership knows that good work is being done on the front lines. I think it is important that staff feel like part of something larger and these projects help them feel like they are making a difference."	Supervisor
<u>Opportunities for Improvement</u>		
	"It was difficult to find time to work on this project while running a scanner. I probably spent 5+ hours a week at home working on this."	Technologist
	"The weekly check-ins were helpful, but it was very difficult to leave while I had patients on my scanner and no one to cover for me."	Nurse
	"I think a clearer definition of what is the appropriate scope of a 52in52 project, as well as more coaching time at the very onset of the project to help create the boundaries for time/scope for the participants. We found that many of our projects were too large after spending weeks on them. Defining that early on would be very helpful."	Supervisor

Table 2. Sample comments of program participants from the anonymous survey, including role of participant.

Discussion

Based on the number of projects completed, financial and other impacts on the department, and participants' survey responses, we consider the program to have achieved its objectives. We identified six primary drivers that we considered key to the success of the program.

1. Selection of projects by front-line personnel

Allowing front-line personnel to choose the projects they worked on helped ensure that the projects were meaningful to the participants. Most problems addressed through the program represented either issues that had been a source of frustration to the respective staff member or opportunities for improvement that the staff member noticed and wanted to carry out.

2. Dedicated coaching support and sponsorship

QI methods are not intuitive to most individuals without dedicated training, and the best training includes experience with successfully completing an improvement project. The coaches who supported the front-line personnel were experienced specialists in improvement methodology.

3. Front line leadership commitment

Direct supervisor and manager support helped ensure projects' and participants' success. The sponsor role included encouraging, mentoring, providing resources, and helping the staff member navigate organizational challenges. In other words, responsibility for the projects' success fell not only to the individual staff member conducting the project, but also to the sponsor supporting the project.

4. Instruction in a structured problem-solving method

Participation included direct instruction on the institution's approach to problem-solving. The use of a common method helped enable peers as well as managers and supervisors who had received training in the same improvement methods to better support the participants' efforts.

Discussion (cont'd) and Conclusion

5. Forum for regular follow-up with leadership engagement

Weekly report-outs provided a forum for participants to present progress and receive advice and help from department leaders. They allowed participants' work to be regularly spotlighted and participants to receive input as the project progressed, without department leaders being excessively directive in their oversight.

6. Forum for participants to present to their peers

The same weekly report allowed participants to share progress with and learn from their peers, who were also working on similar projects. We found that peers tended to be effective teachers, but often less threatening, as they modeled effective techniques, provided encouragement and support, asked provocative questions, and offered helpful ideas.

Limitations included: (1) the program focused primarily on hospital staff rather than faculty and trainees, (2) the program allowed staff to develop solutions that may not necessarily have been optimal, (3) no formal assessment was performed to follow up after projects had been completed to ensure that the results were sustained, (4) outcomes estimates were admittedly imprecise, (5) personnel time was not precisely tracked, (6) causality between interventions and outcomes in financial, quality, and safety were not established, (7), the participant survey was only administered at the end of the first year, and (8) the program was felt by some participants to be too time-consuming.

The program has continued to time of the writing of this article, though with modifications. For example, we have found it difficult to sustain a completion of 52 projects per year on an ongoing basis.

Conclusion

We found the 52in52 program to be successful in providing a platform for simultaneously solving a large number of organizational problems while also providing a positive experience to front-line personnel. The return on the time and effort was found to be worth the investment. We also found that the program effectively filled the niche between large organizational problems that require the effort of multi-disciplinary teams and small problems that can be solved through daily management and improvement efforts.

Appendix: QI Projects Completed in Year 1

Project Title	Role	Category	Description
Improving use of key words for key times	Manager	PS	Improved communication with patients and overall Press Ganey scores
Reducing wait times for coronary patients at PAIC	Staff	PS	Improved percentage of patients arriving on time for appointment from 50% to 95%
Improving notification process for stroke code	Manager	EI	Reduced the notification failure rate for stroke codes from 20% to 0%
MRI linen maintenance	Supervisor	EI	Improved management of linen and garbage in the MRI scanner rooms
Improving patient satisfaction with wait times	Supervisor	PS	Improved communication with patients at BWC
Improving specimen radiograph workflow in MG	Staff	EI	Reduced time technologists spend finding accession numbers for biopsy specimens
Improving communication among supervisors	Supervisor	EI	Improved supervisor collaboration through structured, frequent check-ins
Decreasing mis-marked images	Supervisor	QI	Reduced the number of mismarked radiograph images by 50%
Increasing availability of ordering MD information	Manager	QI	Increased number of orders that list the attending
Improving nurse-MD communication	Staff	QI	Improved secure communication for colonoscopy procedures at RCC
Standardizing iPhone workflow at NHC	Supervisor	EI	Standard work put in place for emergent intra-department communication at outpatient facility
Reducing misdirected calls to IL	Staff	EI	Reduced the number of misdirected calls with improved phone tree and triage process
Improving ED-CT personnel communication	Staff	EI	Improved communication between ED and CT for scanner usage when trauma and stroke codes are called
Improving regulatory documentation in MG	Staff	RC	Created central location for accreditation and registration documents
Inventory of radiation producing equipment	Manager	RC	Compiled list of all X-ray producing equipment with physicist for compliance and reporting
Improving pediatric CT reconstructions	Staff	QI	Improved CT image quality for pediatric PET-CT patients in NM without increasing CT dose
Improving cardiac imaging scheduling	Manager	PS	Reduced wait time for cardiac MR appointments from 32 days to 3 days
Increasing par levels of Q-Sight supplies	Staff	EI	Updated barcodes for par level supplies resulting in 99% of supplies being appropriately stocked
Improving active daily management in IL	Staff	SE	Standardized huddle board and created huddle agenda for IL
Investigating backlog for bone density scans	Staff	PS	Discovered that backlog was not a patient dissatisfier for routine bone density exams
Improving visibility board and huddle in NM	Staff	SE	Standardized huddle board and created huddle agenda for NM
Improving nurse engagement and communication	Manager	SE	Increased number of nursing staff attending daily huddle from average of 3 to 11 attendees
Increasing slot utilization in CT at PAIC	Manager	PS	Increased the number of CT exams daily from 31 to 34 exams
Reducing bulk pertechnetate costs: Phase 1	Staff	QI	Found \$48k annual cost savings for pertechnetate radioisotope
Standardizing Sani-Wipe use in US	Staff	QI	Standardized wipes used in US across all sites resulting in cost savings of \$5K annually
Improving patient access report	Manager	QI	Decreased time for QI team to create patient access report from 2 hours to 5 minutes weekly

Project Title	Role	Category	Description
Improving MRI evening check in process	Manager	PS	Standard check-in process for patients arriving after hours
Improving lumbar puncture prep process at NHC	Staff	PS	Reduced CT lumbar puncture procedure time by 30 minutes, equivalent to 130 hours annually
Improving x-ray throughput at Hoover Clinic	Manager	EI	Found that demand exceeded capacity at times; obtained portable machine to assist
Reducing open MRI slots at SBC	Supervisor	PS	Increased MRI utilization at outpatient site from 20% to 70%
Reducing overtime hours in NM	Staff	EI	Reduced amount of overtime/flex hours in NM with better patient management
Reducing outpatient fluoroscopy backlog	Staff	PS	Backlog for esophagram and upper GI exams decreased from 18 days to 4 days
Improving pre-imaging prep: "Go see the patient"	Staff	PS	Improved communication between nurses and patients who arrive for coronary CT exams
Improving huddle attendance in X-ray	Staff	SE	Created standard process for communicating with employees unable to attend daily huddle
Increasing availability of wide bore MRI	Manager	PS	Updated scheduling template for wide-bore MRI to reduce backlog
Reducing sodium bicarbonate waste	Staff	QI	Eliminated the use of sodium bicarbonate with physician approval; cost savings of \$2.2K annually
Reducing MRI missed appointment rate	Supervisor	PS	Reduced missed appointments in MRI from 17% to 13%
Reducing wasted doses in NM	Staff	QI	Reduced wasted doses in NM from 1.45 per week to 0.66 per week by reducing no-show patient visits
Reducing old CDs in IL	Manager	EI	Standard work created for disposing of old CDs in IL
Reducing bulk pertechnetate costs: Phase 2	Staff	QI	Found additional \$153k annual cost savings for pertechnetate radioisotope
MAA cost reduction	Staff	QI	Updated protocols to reduce small partical orders by 50%; \$95k annual cost savings
Billing updates	Staff	EI	Updated exam billing information; estimated \$2M corrected billing charges (annual)
Improving NM protocol management	Staff	RC	Created dosing per protocol, standardized protocol approval process, centralized protocols
Reducing supplies left out overnight in MG	Staff	QI	5S project completed in all exam rooms; standard work for end of day checklist created
Improving employee engagement in MRI	Staff	SE	Implemented 12-hour shifts to improve employee satisfaction between inpatient and outpatient sites
Improving survey readiness awareness and tools	Staff	RC	Creation of monthly education plan for regulatory survey readiness across all locations
Standardizing crash cart competency	Staff	RC	Created hands-on crash cart training program for nurses and technologists
Reducing missed lunch breaks in X-ray	Staff	SE	Reduced average missed meal breaks in X-ray from 24 per week to 12 per week
Improving stereotactic room turnaround efficiency	Staff	EI	Decreased turnaround time between procedures by 10 minutes; 43 hours per year saved
Improving accuracy and consistency of NPSG audits	Staff	RC	Increased NPSG site surveys submitted from 2 to 12 per month at 12 locations
Improving begin-exam workflow in Epic Radiant	Manager	QI	Created standard process for employees to begin and end exams in Epic
Improving outside image upload at Los Gatos Clinic	Staff	EI	Increased uploads completed by non-technologist staff from 0% to 83%

PS=patient satisfaction, EI=efficiency improvement, QI=quality improvement, RC=regulatory compliance, SE=staff engagement, PAIC=Palo Alto Imaging Center, BWC=Blake Wilbur Clinic, RCC=Redwood City Clinic, NHC=Neuroscience Health Center, SBC=South Bay Clinic, NM=nuclear medicine, US=ultrasound, MG=mammography, IL=image library, NPSG=National Patient Safety Goals

Appendix: QI Projects Completed in Year 2

Project Title	Role	Category	Description
Improving radiopharmaceutical delivery workflow	Manager	RC	Created process for security to escort vendors into department during off hours
Improving emergency response at Emeryville Clinic	Manager	PS	Streamlined process for emergency response at new outpatient center
Improving BWC huddle and visibility board	Manager	SE	Standardized visibility board and created huddle agenda for an outpatient clinic
HR file organization, storage, and auditing	Staff	RC	Created central location for human resources information, including staff licenses
Reducing scheduling workload for technologists	Staff	SE	Created standard work for urgent NM studies
Improving emergency medication kits	Staff	RC	Created standard work for replenishment of reaction and crash cart medications after code
Improving safety workflow	Manager	QI	Refined the categories of reported safety events for more streamlined reporting process
Optimizing MRI scheduling templates	Manager	SE	Improved communication of MRI blocked appointment times between ordering providers
Reducing late-patient arrivals at BWC MRI	Supervisor	PS	Decreased the percentage of BWC MRI patients arriving late from 35% to 26%
Reducing missed breaks in MG	Manager	SE	Decreased missed meal breaks in MG from 2.9 per week to 1.2 per week
Improving radiology-OR communication	R/F	RC	Formal process created to notify radiologist of foreign object radiographs during procedure
Live interpreter workflow at NHC	Staff	PS	Created process for interpreter services request for fMRI procedures at outpatient sites
Improving report discrepancy notification	R/F	RC	Developed method of feedback to radiology trainees for report discrepancies
Improving MD-staff information sharing	Manager	QI	Sharepoint site created for better communication between hospital staff and physicians
Improving X-ray coordination at outpatient sites	Staff	QI	Created list of X-ray studies able to be performed at NHC and Hoover Clinic
Increasing CT and MRI slot utilization at NHC	Supervisor	EI	Increased number of CT and MRI exams performed daily by 1.84 and 2.2, respectively
Improving late patient arrival process for MRI	Supervisor	QI	Created new workflow to accommodate MRI patients who arrive late
Increasing CT slot utilization at NHC	Supervisor	EI	Increased the number of CT exams by 7.3 exams per day by adjusting staffing model and open hours
US training for fellows	R/F	SE	Created in-service for radiology fellows to connect with sonographers for hands-on education
Foley catheter removal workflow for CT cystograms	Staff	SE	Reduced patient office visits by adding catheter management question to order form
Daily task list for outpatient clinics	Staff	SE	Standardized list of responsibilities for MRI float staff across all outpatient sites
Improving patient education regarding medications	Staff	PS	Updated information in online patient portal for medications commonly used in radiology
Workflow for pain injections at NHC	Staff	PS	Reduced procedure time from 40 to 18 minutes; increased capacity from 6 to 12 procedures per day
Improving appointments and website links	Manager	PS	Updated links in online patient portal to better display imaging appointment information
Improving radiopharmaceutical delivery workflow	Manager	RC	Created process for security to escort vendors into department during off hours
Improving emergency response at Emeryville Clinic	Manager	PS	Streamlined process for emergency response at new outpatient center

Project Title	Role	Category	Description
Improving daily Scheduling Services reporting	Manager	QI	Automated daily report for ease of daily review, saving 2 hours per week in report generation time
Emergency preparedness for outpatient sites	Staff	EI	Created ongoing training and support for emergency situations at outpatient facilities
Improving patient perception of privacy at NHC	Staff	PS	Increased patient privacy-related Press Ganey scores by 2.4 points
Improving appointment confirmation letter	Manager	PS	New appointment letter created to include policies on late arrivals, no-shows, supervision of minors
Improving outpatient exam schedule visibility	Staff	QI	Create a more organized view of GI schedule and appointment usage for physicians and staff
Improving temperature monitoring workflow	Manager	RC	Standard work agreed upon for all imaging to record temperature monitoring
Improving information for new budget system	Manager	QI	New budget tool guidelines created and shared with all managers
Improving process for outpatient CD burning	Manager	EI	Established standard work for after-hours CD requests at outpatient sites
Improving nursing involvement in pain injections	Staff	EI	Standard workflow created for pain injections between nurses, physicians, and medical assistants
Improving patient education for procedures at NHC	Staff	PS	Updated information for pain injections in online patient portal to decrease patient anxiety
Improving ED trauma sheet tracking	Staff	QI	Collaborated with ED to properly capture and track trauma cases
Improving remote participation in QI program	Staff	QI	Established way to virtually participate in project check-ins
Improving PET/CT exam completion process	Staff	EI	Improved the completion of exams in EPIC from 50% to 75% turnaround in 30 minutes
Improving MSK MRI protocolling process	Manager	EI	Created standard work to allow technologists to protocol MSK studies
Improving IT issue escalation process	Staff	QI	Standard work created for escalating urgent IT issues
Creating a lead development training program	Manager	SE	Created platform for lead technologists to discuss techniques and standard practices
Reducing steps for outside film intake process	Manager	EI	Reduced the number of steps physicians had to take to upload images from 6 steps to 3 steps
Improving daily radiology administration huddle	Manager	QI	Improved daily huddle to reflect updated priorities and escalations to administrative team
Decreasing scheduling time for CT	Supervisor	EI	Created new technologist work schedule for CT; saved approximately 5 hours per week
Decreasing scheduling time for MRI	Staff	EI	Created new technologist work schedule for MRI; saved approximately 8 hours per week
Improving protocol guidelines	Staff	EI	Created "gold standard" image library for each protocol for sonographer reference
Improving NM exam paperwork workflow	Staff	QI	Reduced the amount of paperwork required for NM exam completion at outpatient Clinic
MRI access at SBC on weekends	Supervisor	EI	Opened weekend times for MRI at NHC
Improving portable US workflow	Staff	EI	Created workflow for sending portable US images from patient floors; decreased send time by 40%
Improving daily Scheduling Services reporting	Manager	QI	Automated daily report for ease of daily review, saving 2 hours per week in report generation time
Emergency preparedness for outpatient sites	Staff	EI	Created ongoing training and support for emergency situations at outpatient facilities

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