Health Services Research

Resident-Driven Holistic Lean Daily Management System to Enhance Care Experience at a Safety Net Hospital

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OBJECTIVE To describe the use of Lean in urology at Zuckerberg San Francisco General, a community safety-net and trauma hospital that serves as a major teaching site for the University of California San Francisco.

METHODS We examined our process improvement activities from 2016 to 2018. Our Lean Daily Management System (DMS) includes a 15-minute team huddle ("urology Lean work") of service residents, faculty, clinic and operating room nursing staff, and anesthesia liaisons. Our DMS also includes a 5-minute preoperative huddle. Besides team-building, urology Lean work surfaces logistics, safety or equipment improvement ideas, and ensures progress and completion of initiated projects.

RESULTS Over a 2-year period we developed and completed 67 projects. Projects impacted the outpatient setting (57%), followed by the operating room (22%), the Urology service (12%), and inpatient setting (9%). We completed projects in the following domains: safety (26%), quality (22%), care experience (21%), workforce care and development (13%), equity (11%), and financial stewardship (7%). Urology Lean work reduced new patient clinic access time (119-21 days) and Bacillus Calmette-Guérin in clinic treatment time (180-105 minutes). The average proportion of urology on-time surgeries was better than the overall surgery on-time surgeries (71% v 61%).

CONCLUSION Urology Lean work successfully applied DMS in a service specific yet holistic approach. Urology Lean work improved resident engagement in quality and safety endeavors and served as a DMS model throughout perioperative and clinic areas. UROLOGY 00: 1–8, 2020. © 2020 Elsevier Inc.

Zuckerberg San Francisco General (ZSFG) is a community safety-net and trauma hospital that serves as a major teaching site for the University of California, San Francisco. In order to provide the highest quality of care, ZSFG has created "True North Goals." These goals focus on equity, safety, quality, care experience, workforce care and development, and financial stewardship.[1] Departments strive to achieve excellence in these areas and are provided flexibility in how they work towards fulfilling this shared vision. The Department of Urology has been achieving the True North metrics via the implementation of a resident driven Lean Daily Management System (DMS) that is facilitated by a faculty member and nurse practitioner.

The Lean system is modeled on the Toyota Production System and has continued to evolve since it began in 1948.[2] This system operates through core principles to help eliminate waste, *muda* in Japanese.[3] Womack and Jones outline the 5 stages of lean which include value, value stream, flow, pull, and perfection.[3] Value is defined by the consumer and the value stream is the most efficient way to bring the product to the consumer by identifying what steps increase and decrease value.[3] The flow stage moves from traditional processes to maximize product development allowing the consumer to pull, or access, the product.[3] Lastly, the perfection stage consists of continuing to improve on the prior stages.[3] Lean DMS is not a new concept, but is one that has gained popularity due to its success in multiple industries.[4-7] In healthcare, introduction of lean concepts has led to improved efficiency, cost reduction, patient satisfaction, and quality improvement as well as reduced mortality.[8-10] A systematic literature review, however, concluded that current available literature cannot demonstrate either improved health outcome nor patient and staff satisfaction through DMS interventions.[11]

Conflict of Interest: *Kim Barnas is the CEO of Catalysis, a non-profit organization for healthcare transformation. Although Catalysis has been working in a consultant role with Zuckerberg San Francisco General Hospital, the entire work described in this manuscript was developed and conducted without any direct influence of Kim Barnas or Catalysis.*

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Our objective herein is to provide a descriptive overview of our application of the Lean process within our urology department and in our health care system with emphasis on new patient clinic access time in pediatric urology, Bacillus Calmette-Guérin (BCG) treatment time for bladder cancer, and urology Operating-Room (OR) on-time starts. Our secondary purpose is to assess the effectiveness of urology Lean work, a 15-minute weekly huddle which evaluates logistic, quality, safety, and equipment concerns.

METHODS

ZSFG Urology Lean Work Process

Our urology team performs a 15-minute weekly urology Lean work conference which serves to surface logistic, quality, safety, and equipment concerns. We also generate new ideas and measure progress with existing stakeholders. Urology trainees, which includes 3 residents that rotate every 3-4 months, faculty, operating room and clinic charge nurses, and an anesthesia attending all actively participate in urology Lean work. Urology trainees are encouraged to suggest quality improvement projects during team huddles and work in partnership with the Chief of Urology at ZSFG and stakeholders to achieve them. Residents work on these projects in-between clinical duties and on their half day of administrative duty time every Friday. This includes a visual management system which tracks the metrics for our ongoing and completed projects. Having a visible physical manifestation of our process and progress is essential to keep the team on target to meet established metrics and develop new metrics. On OR days, we also conduct a 5-minute team preoperative briefing to review cases, anesthetic approach, positioning, and equipment needs. This team briefing was borne from an improvement idea, which originated at urology Lean work and has been immediately adopted by the perioperative team as a quality and safety tool.

Tools

Once an area of improvement is identified during our huddle, residents are empowered to explore the idea using the A3 problem solving tool. A3 stems from an international industrial norm classification of a paper sizes.[12] In this context, however, the A3 is a problem-solving tool that progresses in a natural pattern including information on the identification of the background of the problem and current conditions. The target/goals are then identified. A gap analysis is then performed to identify what the barriers are to moving from the current to desired conditions. Proposed countermeasures and plan are then formulated to achieve such goals. Lastly, close follow-up occurs throughout the process to ensure proper adjustments are made (Fig. 1).[12]

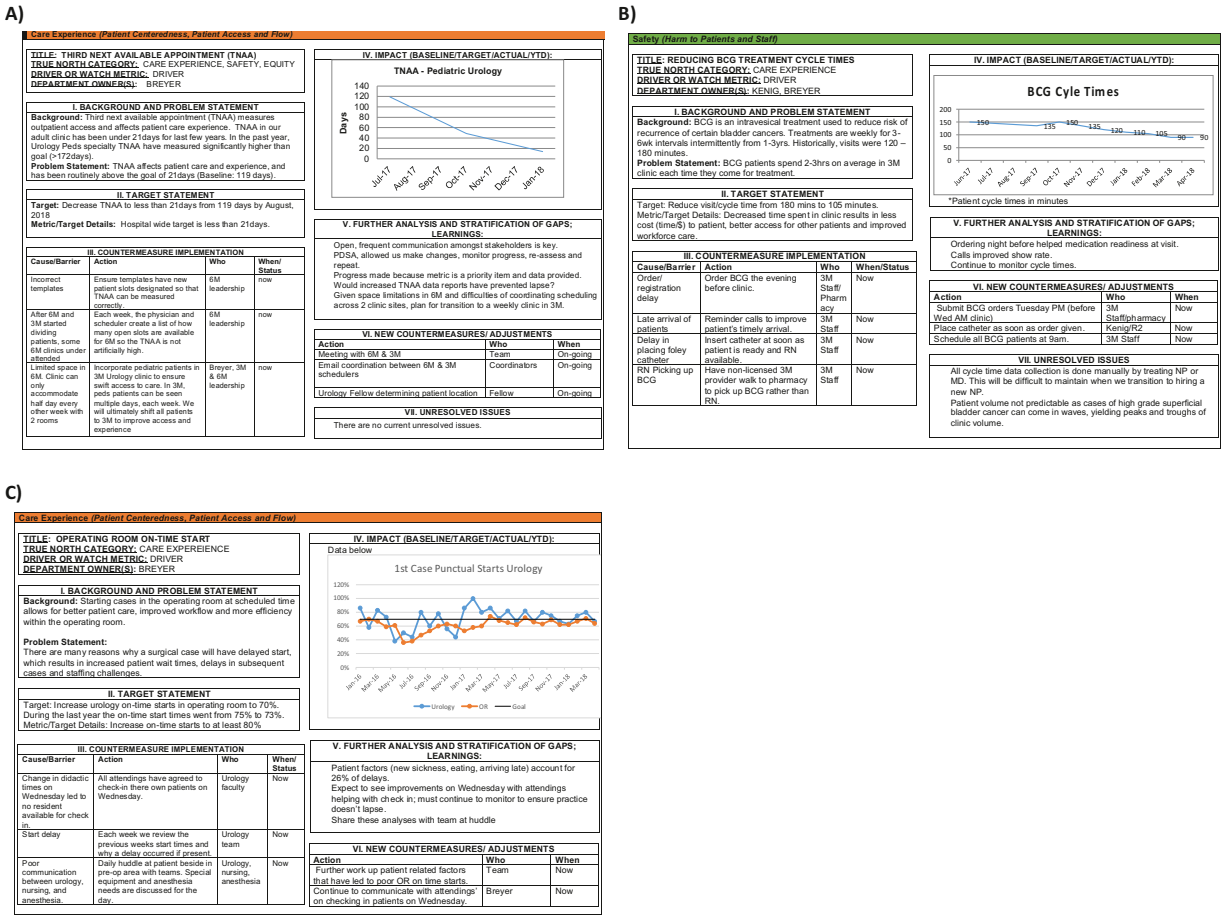

Figure 1. A3 model for (**A**) Third next available appointment in the pediatric urology clinic, (**B**) BCG treatment time and (**C**) OR on-time starts demonstrating the key sections of an A3 model and an example of how it is filled and used as a living document to guide and analyze a quality improvement project. (Color version available online.)

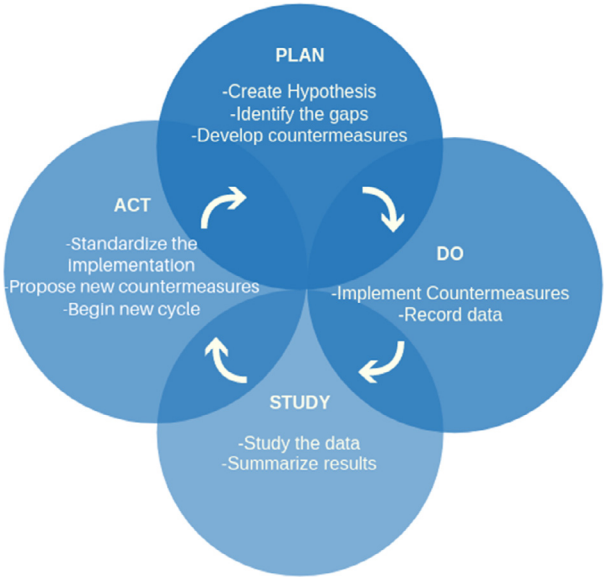

Figure 2. Model PDSA cycle used by the urology team to continuously evaluate outcomes. (Color version available online.)

Strongly mimicking a scientific abstract, the A3 tool is especially appealing to academic medicine and fosters inclusion of physicians into the DMS. The countermeasures consist of interventions implemented to close gaps and improve current practice.[12] Stakeholders track their progress and continue to evaluate their outcomes using Plan, Do, Study and Act (PDSA) cycles (Fig. 2), which are the cornerstone to iterative quality improvement.[13] Anchored in the scientific method, PDSA cycles give users structure to plan a hypothesis, do an experiment, study its results, and act on the conclusions.[13]

We also employed the use of the fishbone diagram, which is another tool for root cause analysis. Fishbone diagrams are a cause and effect diagram or Ishiwaka diagram that are ideally used at the beginning of a project to provide a framework to identify major cause categories that result in the effect being studied.[14] At the start of a project, a detailed problem statement is outlined that is put at the head of the fishbone diagram.[14] From there, major cause categories are drawn as branches off the diagram.[14] Within each category, stakeholders identify contributors towards adverse effects by continuing to ask why the problem exists. This fishbone diagram has been adopted for use in root cause analysis and is a vital part of the lean system (Fig. 3).[14] Many of our improvement ideas are "Just Do its." These are problems that have known solution that are easy to enact.

Data Collection

We examined our lean activities at ZSFG from July 2016 to October 2018. All completed and proposed projects were noted. Detailed baseline data was collected for new patient clinic access time in our pediatric urology department, BCG treatment time and OR on time starts during the 2016-2017 year. All data was prospectively collected and tracked for 12 months. Following the collection of the baseline data, implementation of the countermeasures ensued. For clinic access time, retrospective review occurred quarterly. Additionally, for BCG treatment time and OR on-time starts, retrospective review occurred on a monthly basis.

Statistical Analysis

All data was analyzed using Microsoft Excel (Redmond, Washington). We used descriptive statistics to summarize the percentage of projects in each True North Goal category in addition to the settings for the projects.

RESULTS

Over a 2-year period 67 projects were developed by the team to improve safety, quality, care experience, workforce care and development, equity, and financial stewardship in the Urology department. Most projects were in multiple True North categories. Projects most often impacted the outpatient setting (57%), followed by the OR (22%), the overall service (12%) and inpatient (9%). In accordance with ZSFG's True North Goals, most projects related to safety (26%), quality (22%), care experience (21%), workforce care and development (13%), equity (11%), and financial stewardship (7%) (Table 1).

New Patient Clinic Access Time

Our A3 model has provided the framework for evaluating clinic access time (Fig. 1). We chose to improve clinic access time in response to a directive by the local health network payer to improve new patient visit wait times to under 30 days. The

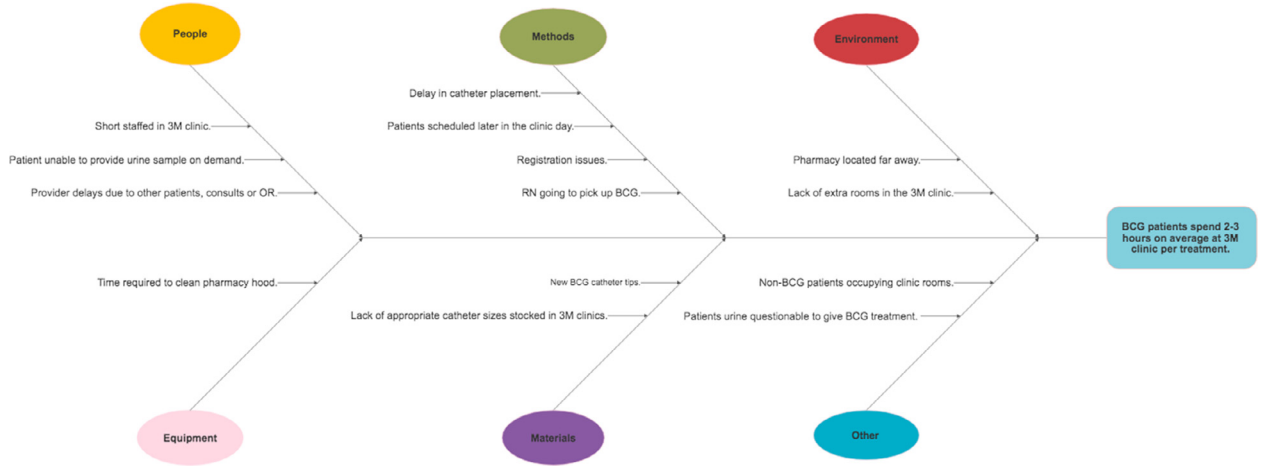

Figure 3. Fishbone analysis of prolonged BCG treatment time. (Color version available online.)

Table 1. Total number of projects enacted throughout the study period (2016-2018) categorized by True North Goal and Impact setting

Year	Project	True North Goal	Impact
2016	Oral peri-op antibiotic for endoscopy surgeries	Care experience, financial stewardship	OR
2016	Antibiotic in cysto* clinic	Care experience	Clinic
2016	Outside call-in access	Safety	Overall service
2016	Cysto cart obtained	Care experience, workforce care & development	Clinic
2016	Daily huddle-> communication	Safety, quality, financial stewardship	OR
2016	Cysto staffing/supplies	Safety, quality, financial stewardship	Clinic
2016	IV Gentamycin for prostate biopsies	Quality, safety	Clinic
2017	New cystoscopes	Safety, quality, care experience	Clinic
2017	Service laptop for rounds	Workforce care & development	Inpatient
2017	SIS* Uro team access	Workforce care & development	OR
2017	Bimix* in clinic	Care experience	Clinic
2017	Revised postprocedure cystoscopy instructions	Care experience, quality, safety	Clinic
2017	Cath tip syringes on floor	Safety, quality, care experience	Inpatient
2017	Genetic tests prostate cancer	Quality, equity	Clinic
2017	Surgery form created	Safety, quality, workforce care & development	Clinic/OR
2017	Cunningham clamp in clinic	Care experience	Clinic
2017	Translator phone in the procedure clinic	Care experience, equity, safety, quality	Clinic
2017	Postprocedure cystoscopy and TRUS* forms translated to Cantonese and Spanish	Care experience, equity, safety, quality	Clinic
2017	Catheters stocked in procedure clinic	Workforce care & development, quality, equity	Clinic
2017	Pre-op labs	Safety, quality, care experience	OR
2017	Cysto flow labeling	Safety	Clinic
2017	Coordinating Pediatric anesthesia	Equity, safety, quality	OR
2017	Type and screen in clinic	Safety, care experience	OR
2017	Consent for blood in clinic	Safety, care experience	OR
2017	Arranging sildenafil	Care experience, quality, equity	Clinic
2017	Obtain PTNS* for clinic patients	Care experience, equity, safety, quality	Clinic
2017	Cysto clinic template for bladder findings	Workforce care & development, quality, safety	Clinic
2017	Flexible botox needle	Care experience, quality	Clinic
2017	Restocking cysto clinic qMonth	Workforce care & development, quality	Clinic
2017	Printer in cysto	Workforce care & development, quality	Clinic
2018	Peds Uro TNAA*	Care experience safety, equity	Clinic
2018	BCG* ECW* Template	Workforce care & development, safety	Clinic
2018	Cath Tips on Floor	Safety, quality, care experience	Inpatient
2018	BCG Cycle Time	Safety, quality, care experience	Clinic
2018	PTNS obtained/trained/implemented	Equity, workforce care & development, safety	Clinic
2018	Viagra-UCSF Discount at other pharmacies	Care experience, quality, equity	Clinic
2018	PTNS ECW Template	Workforce care & development, safety	Clinic
2018	Viagra access at other Walgreens UC Discount	Care experience, quality, equity	Clinic
2018	BCG cycle time tracking-> improvement	Care experience, safety	Clinic
2018	Priapism order set	Safety, workforce care & development, quality	Overall service
2018	Jelly Beans* to Zero	Safety, quality, care experience	Overall service
2018	Urine cytology/Path Dept review	Care experience, quality, equity	Overall service
2018	Vasectomy kit	Care experience, workforce care & development, safety	Clinic
2018	BCG tracking form	Safety, financial stewardship	Clinic
2018	Cysto clinic printing	Workforce care & Development, quality	Clinic
2018	Cold cup forceps for Olympus lens	Financial stewardship, safety	OR
2018	Entereg for radical cystectomy ERAS	Equity, quality, care experience, financial stewardship	Inpatient
2018	New leg drapes	Financial stewardship, safety	OR
2018	White board for Flow/PVR* in clinic	Workforce care & development, care experience	Clinic
2018	Mitomycin forms	Workforce care & development, safety	OR
2018	Cysto instructions done in other languages	Care experience, quality, equity	Clinic
2018	Pedi DVIU* scope ordered	Care experience, quality, equity, safety	OR
2018	Stent registry	Safety	Overall service
2018	PTNS timers	Care experience, workforce care & development	Clinic
2018	Confirming TRUS Abx appropriate	Safety, financial stewardship	Clinic
2018	Flexible stents replaced for now	Safety	OR
2018	TRUS probe replaced	Safety	Clinic
2018	BCG Instructions-Pt Safety	Safety, equity	Clinic

Continued

Table 1. Continued

Year	Project	True North Goal	Impact
2018	Gentamycin/Mitomycin on floor	Quality, care experience, workforce care & development	Inpatient
2018	Entereg approved	Equity, quality, care experience, financial stewardship	Inpatient
2018	Male pelvic PT* set up with 2 SF* providers	Care experience, quality, equity	Overall service
2018	UDP* Tracing in chart (to med records)	Workforce care & development, safety	Overall service
2018	Surgeon preference cards	Safety, quality, workforce care & development, financial stewardship	OR
2018	Rx labels on outside of BCG bags	Safety	Clinic
2018	URS* spreadsheet	Safety	OR
2018	Stent registry migrated to excel	Safety	Overall service
2018	Prostate measurement in cysto clinic	Care experience, quality, financial stewardship	Clinic

* BCG, bacillus calmette-guerin; Bimix, intracavernous anti-erectile dysfunction medication; Cysto, cystoscopy; DVIU, direct vision internal urethrotomy; ECW, eClinicalWorks; Jelly Beans, central system for results in ECW; PTNS, posterior tibial nerve stimulation; PT, physical therapy; PVR, post void residual; SF, San Francisco; SIS, system for booking OR cases; TNAA, third next available appointment; TRUS, transrectal ultrasound; UDP, urodynamics; URS, ureteroscopy.

baseline time for our third next available appointment during the 2016-2017 year based on the 347 patients seen in the pediatric urology department was 119 days, which is markedly higher than that of our adult urology population at less than 21 days. Our target was to decrease new patient appointment time from 119 to less than 30 days within a 12-month period. Barriers to achieving the target were identified using the A3 model. The top contributors to achieving our target were incorrect templates, misappropriate designation of pediatric clinic slots, and missed opportunities for flexibility in scheduling. Identifying these 3 barriers has resulted in the following countermeasures: (1) Ensuring templates are adjusted so that clinic access time can be measured accurately, (2) Enhancing communication between clinics 3M and 6M related to how to open appointments so the next available appointments are efficiently utilized, and (3) Incorporating pediatric patients into available slots during adult clinics. Following the 12-month implementation of urology Lean work, time to our third next available appointment in our pediatric clinics has improved from 119 days to 21 days.

Bacillus Calmette-Guérin Treatment Time

At baseline, BCG treatment time was approximately 180 minutes for the 50 patients seen in our clinic. In order to evaluate causes of prolonged BCG treatments, we used a fishbone analysis (Fig. 3). We identified major categories which may contribute to delay including: people, methods, environment, equipment, and materials. The biggest contributor towards prolonged treatment were order delays of the BCG treatment, which sometimes resulted in prolonging the time to pick up of BCG from pharmacy. Patients who were scheduled in the afternoon were attended to by substantially less staff. Another contributor was the timing of catheter placement by our nursing team after an order was placed. For work flow, we identified that having a nurse pick up the BCG is a deviation from more important tasks. In light of this analysis, the following corrections were made: 1. Ordering the BCG the day before clinic, 2. Scheduling BCG patients early in the day, 3. Prompt insertion of catheter as soon as the provider places the order and having nonlicensed staff pick up the BCG treatment from pharmacy. Our goal for BCG treatment times following 12 months of intervention was BCG treatment time of ≤105 minutes. The implementation of these countermeasures has reduced the BCG treatment time from 180 minutes to 105 minutes.

OR On-Time Start

We chose to study OR start time based on institutional directives to improve OR efficiency. Barriers to on-time starts in our urology OR included poor communication between the urologist, nursing staff, and anesthesia. Implemented countermeasures included daily huddles in the pre-op area on OR days; special equipment and anesthesia needs were discussed at this designated time. Furthermore, all attending physicians have agreed to complete the check-in process for their patients on Wednesdays to avoid delays given resident physicians have didactics on Wednesday mornings. The 12-month goal following the implementation of the countermeasures was to maintain >70% OR on-time starts. The urology on-time OR average start-time following our initial PDSA cycle was better than the overall OR mean (71% v 61%, respectively). Common barriers identified to on-time starts through our initial PDSA cycle included: patient related factors (25.93%), anesthesia (17.59%), housekeeping (17.54%) and surgeons (12.9%). On average, successful first case OR on-time starts was 80% on Mondays and Thursdays. On Wednesdays however, only 55% of first case OR on-time starts were successful. Postintervention, cystolithopaxy and urethroplasty had the highest successful OR on-time starts at 90% each. Conversely, cystoscopy, prostatectomy, percutaneous nephrolithotomy, and nephrectomy had the lowest percentage of successful first case OR on-time starts at approximately 57%.

DISCUSSION

Through the use of the urology Lean work model, our residents were able to create and execute quality improvement projects. While specific projects varied in scope and topic, the process to implement change was repeatedly successful. For problems with clear solutions, we used a "Just do it" framework. For more complex problems, the A3 process was employed. We successfully implemented 67 projects from 2016 to 2018. The commitment of all our stakeholders, particularly our residents, as well as facilitation and dedicated, consistent guidance by the departmental chief has been the driving force behind our Department's success.[15]

The implementation of Lean has been shown to be successful in improving outcomes throughout healthcare.[8-10]

Similar to the positive impact of Lean in our department, many others reports have also shown significant positive results. The application of Lean has been valued by the Veterans Affairs healthcare system so much so that that they have begun applying Lean methodology throughout their system at 10 select pilot sites.[16] This initial phase includes identifying a clinical and nonclinical value stream to focus on with 3 rounds of subsequent evaluations at 6 month intervals. At the Department level, Dickson et al implemented Lean in their emergency department (ED) to limit medical errors and improve the quality of care. Through the implementation of Lean, they were able to see both short and long term improvements with decreased average length of stay and improved patient satisfaction during a time when hospitals admissions were increasing.[17] At our institution, Lean has been used to improve length of stay and rates of patients leaving prior to evaluation in the ED. Mercer et al recognized the importance of timely care in the ED and through an iterative process including value stream mapping, and root cause analysis, the following countermeasures were applied: creation of a fast track for low acuity patients, standardized processes discussed in daily huddles amongst stakeholders, dissemination of real time metrics, and maintainence of team consistency and engagement. This resulted in a 25% decrease in length of stay from 190 minutes to <150 minutes and decreased the rate of patients without being seen from 8% to 4%.[18]

The implementation of Lean at ZSFG is a noteworthy example of Lean implementation, especially given that it is a resident driven activity through the guidance of a faculty member. Kiger and Bertagnoli outlined their resident quality improvement curriculum and found that residents perceived this curriculum positively, improved their fund of knowledge in quality improvement work and completed 4 projects in their first 2 years following the implementation of this curriculum in 2015.[19] Multiple studies looking at orthopedic, neurosurgery, and vascular surgery residents have demonstrated success in quality improvement initiatives and education.[20-22] Residents overall felt that there was significant value added to their education and future careers by taking part in quality improvement projects.[20-22] Residents additionally demonstrated a statistically significant improvement in their ability to organize and lead quality improvement projects following their introduction and training.[20,21] Similarly, at our institution, residents have continued to champion quality improvement projects with shareholders using the aid of DMS tools.

We worked to improve patient access to pediatric urology clinic and patient experience with BCG administration. Similar to the work done in our clinics, Skeldon et al was able to demonstrate improvements in their academic urology-oncology outpatient clinics in 2014.[23] Using the lean methodologies, they aimed to decrease clinic length of stay, clinic wait time, and increase physician face time with patients. This process started with including all clinic staff. In 90 days they were able to decrease clinic length of stay from 46 to 41 minutes, wait time from 26 to 5 minutes and increased physician face time from 7.5 to 10.6 minutes.[23] Similarly, in our pediatric urology clinics and outpatient adult urology clinics, we were able to decrease our new patient clinic access times from 119 to 21 days and BCG treatment time from 180 to 105 minutes. Additionally, Casey et al evaluated the use of Lean management principles in an ambulatory clinic thoroughly outlined the use and implementation of Lean principles to minimize waste and improve overall quality.[24] This was done by identifying nonessential activities for physicians and running them in parallel with the essential activities. Identifying the capacity of their resources, they were able to identify physicians as the bottleneck in clinic. Additional principles implemented included implementing steps with the least variability before those that are more variable. In clinic, this manifested by scheduling follow-up visits and procedures before new patients and cancer diagnosis appointments.[24]

During our study period, our proportion of OR on-time surgery starts was better than the overall OR on-time surgery starts. Prior studies also demonstrated a statistically significant increase in OR on-time starts following the implementation of the lean model.[25,26] The intervention in a study by Coffey et al focused on patient arrival, operative team communication, and multidisciplinary debrief.[25] Our intervention although similar did not include interventions towards patient related factors. Their patient interventions included ensuring all patients arrived at 4:30 a.m. regardless of scheduled surgery time, improved patient registration and scheduling, designated patient parking, and greeters who met patients at the hospital entrance and oriented them to the OR check in process.[25] Following their interventions, they improved their proportion of OR on-time starts to 73% from 23.5%. Their most common reasons for delays included surgeon delays (35.9%), equipment issues (21.5%), anesthesia delays (17.2%), and patient related factors (11.4%).[25] This is notably different from our study which demonstrated the leading causes of delayed OR on-time starts were primarily patient related factors, anesthesia, room turnover, followed by surgeon delays. The success of the Lean methodology comes from the leadership, communication, culture and education in the lean model.[27] Given the multiple components in the success of OR on-time starts, the lack of universal Lean education in these groups can jeopardize overall success. Continued work with our colleagues and implementing interventions towards patient related factors are ways we can continue to improve in providing quality and timely care.

This manuscript must be considered within the context of its limitations. This is primarily a descriptive study. While a formal qualitative approach was not used to generate ideas and projects discussed herein may not be generalizable, the process is largely generalizable. Additionally, the BCG and OR on-time start data was recorded by different staff members and there is a possibility of recording errors.

CONCLUSION

Residents were successful in applying Lean in a safety-net hospital. Though this study provides a look at the implementation of Lean methodology at only 1 hospital, the process used to generate our interventions are generalizable even if specific projects are not.

Improved communication within our team and across service lines resulted in measureable improvement in wait-times among 67 other projects. Lean provides a universal structure that can be an effective tool to improve resident engagement in quality and safety endeavors.

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EDITORIAL COMMENT

Postgraduate training in urology has evolved from the "see one, do one, teach one" mantra of yore to an environment in which curiosity, collegiality, and creativity are prized. Rather than simply subscribing to dogma, current urology residents are challenged to think innovatively about ways to achieve desired clinical, educational, and academic goals. Quality improvement (QI) projects, in which sustainable, system-wide processes are formally evaluated and streamline to foster improvements in health care delivery and outcomes, is 1 example of this.[1] The Accreditation Council on Graduate Medical Education mandates resident participation in QI initiatives,[2] but does not specify the scope of activity or the expected deliverables from these QI projects. While there are certainly large, multicenter formal collaborations aimed at improving quality for a population of patients, most notably the Michigan Urological Surgery Improvement Collaborative, the importance of local action should not be underestimated.[3,4] Safety net hospitals, like Zuckerberg San Francisco General Hospital, provide health care to

patients with Medicaid or without medical insurance[5]; identifying actionable ways to diminish barriers to the care of underprivileged patients helps those most at-risk to gain access to and remain engaged in the health care system.

This manuscript shows that residents can be not only "involved" in QI projects, but can be the key drivers of successful evaluation of processes, implementation of change, and assessment of results. In fact, in academic medical centers, residents are so intimately involved in the front-line care of patients that they are arguably experts at identifying opportunities to improve clinician and patient experience. This manuscript shows resident commitment at all levels of QI: the creativity of the residents in identifying QI opportunities, the integration of QI work into all aspects of the workday (so that it is—appropriately—the norm, rather than "extra" work), the respect for the "boots on the ground" perspective offered by residents, and the regard for the limited time of all members of the health care team (huddles are 5-15 minutes and resident QI work is primarily undertaken during Friday administrative time). Perhaps most striking is the sheer number of resident-driven QI projects that have been undertaken and completed: 67 projects in 2 years, or, amortized, 1 project every 10.9 days. By all accounts, this is a phenomenal amount of change that has been effected by simply leveraging the knowledge, skills, and time of learners in an organized, systematic framework that promotes efficiency, minimizes waste, and promotes introspection. Above all, I am impressed with the authors' use of QI tenets to create a durable QI program; perhaps instead of "Urology Lean Work," they should call it "Meta-QI."

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