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Applying Lean Design Principles to a Gastrointestinal Endoscopy Program for Uninsured Patients Improves Health Care Utilization

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Roadmap to the FUTURE of PRACTICE

There is an emerging national consensus to increase colon and rectal cancer (CRC) screening rates to 80% by 2018. For us, as a nation (and GI specialty) to move from our current 60% to 80% we have to enhance screening among patient populations that are challenged to access our medical system. Those who are underinsured or uninsured pose a special challenge. In this month's Practice Management column, gastroenterologists in Houston, Texas describe the impact of lean management strategies to enhance colon and rectal cancer screening among low-income patients in the Harris Health System. Readers are encouraged to refer to a previous article, which focused on similar patients in Connecticut (Lagarde SP. No one left behind: the road to 80% by 2018. Clin Gastroenterol Hepatol *2014;12:1212–1215).*

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Efficient health care delivery, particularly to uninsured and underinsured patients, is challenging. Limitations include financial constraints, poor communication within complex health care systems, and lack of patient empowerment.[1] Overcoming these obstacles requires considerable multidisciplinary effort. Frequently, poorly integrated decisions are made in ways that lead to a low-functioning system.

To create a more efficient health care system, principles of lean management have been applied to the process of redesigning health care delivery.[2] Lean principles originated in the automobile industry and encourage a design of systems with increased value and reduced waste.[3] The application of lean principles involves reiterative analysis of current practices, providing innovations to increase value, remove waste, and implement new processes. Lean management has been used successfully at a few US health care centers—most notably Virginia Mason Institute in Seattle, Washington (http://www.virginiamasoninstitute.org/about).

Lean management strategies have been applied to emergency room management,[4] direct open-access upper-endoscopy clinics,[5] and global health system redesigns.[6] Little is known about the use of lean principles to improve colorectal cancer (CRC) screening for underserved populations. We describe the process of a lean management–based group and antecedent changes in the system that relate to CRC screening.

The Harris Health System provides care to the 1.2 million uninsured and underinsured residents of Harris County, Texas.[7] The annual incidence of CRC in this population does not differ from national levels. However, CRC-related mortality is significantly higher than the national average because CRCs are diagnosed at later stages.[8] This can be attributed to CRC screening of less than 33% of at-risk individuals. Of patients with positive results from fecal immunochemical tests, 25% to 30% do not complete the screening process or undergo the recommended colonoscopy.

There are several reasons that patients do not undergo recommended colonoscopies, including long wait times for appointments, poor communication with their physicians, and lack of education or health literacy.[9] Most facilities perform large volumes of procedures, but have inefficiencies such as underscheduling of available procedure slots, understaffing of key positions, and miscommunication of appointment schedules to patients. To

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Abbreviations used in this paper: **CPHQ, certified professional in health care quality; CRC, colorectal cancer; NP, nurse practitioner.**

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identify and overcome some of these system limitations, we undertook an endoscopy program redesign project, led by personnel with specific training in lean management.

Implementing a Lean-Principle Redesign

A certified professional in health care quality (CPHQ) with substantial background in lean-process design (Lean Six Sigma Black Belt) directed the group. She, along with the gastroenterologists within the system, first identified representatives from services involved in any aspect of the endoscopy process. These services included physicians (gastroenterologists, anesthesiologists, primary care physicians, oncologists), nurses, hospital administrators, financial staff, and information technologists. As the process progressed, additional members were added by the CPHQ as needs were identified. Once the group was assembled, a charter was drafted by the assembled group that outlined current limitations, the purpose of the project, team members, and proposed methods and outcomes. The charter was approved by the hospital administrative board and a 2-hour meeting was scheduled for each week.

The fundamental first step in applying lean principles to process redesign is identifying current limitations in outcomes. In our system, these included long wait times for procedures, patient drop out, underuse of endoscopy time and space, high no-show rates, and low satisfaction scores from patients. These features all contributed to subpar clinical productivity.

We captured baseline measures of wait times, no-show and cancellation rates, endoscopy unit utilization, daily procedural volume, and patient satisfaction scores. We then created a map of our current process, and modified it to overcome current limitations. This exercise is known as value stream analysis, whereby any wasteful step is eliminated and replaced with a value-added step. We created a process map of the current state of delivering endoscopic care, beginning at the point of initial patient referral and ending when the procedure was complete. This map was created with attention to every possible step, to provide multiple targets for improvement (eg, preprocedure planning, endoscopic performance, and follow-up care). Each step in the process map then was evaluated to identify waste—inefficiencies of time or resources, bottlenecks, and sources of patient dissatisfaction. Wasteful steps were flagged, and suggestions for improvement were noted. Over the course of several weeks, the entire process was evaluated in this manner and a new, ideal, future-state map was created (Supplementary Figure 1). This new map included new or redefined processes and personnel, and incorporated consolidated processes and information technologies.

Implementation of Value-Added Practices

Once the future-state map was created, the group estimated the impact on outcome measures. These included reductions in wait times, increased volumes of procedures, reductions in no-shows, and improved patient satisfaction scores. We created a list of interventions, in priority of importance, and presented it to the senior administrative board for approval (Supplementary Table 1). Some of the key interventions are as follows.

Financial Eligibility

We identified the process of determining whether an individual patient qualified for care in the Harris Health System as a limitation. Often, patients were attending primary care visits, and receiving subsequent referrals for endoscopy, without confirmation of their eligibility for care. The proposed improvements to this process included expansion of eligibility office staff and creation of a telephone hotline to guide patients through the process.

Referral Entry

Although the Harris Health System has adopted an electronic medical record, there was no uniform detailed referral request form to be used by referring providers. As a result, referral nurses spent variable and often considerable amounts of time determining whether patients required endoscopies, office visits, or both. To overcome this obstacle, a new referral order form or template was developed, to allow providers the option of ordering open-access colonoscopies for patients who met certain prespecified criteria. These referrals are forwarded directly to an endoscopy scheduler, and a procedure appointment is made. This bypassed several time-consuming steps.

Endoscopy Nurse Practitioner

The flow of patients through the endoscopy process was divided among various providers in multiple geographic locations. Furthermore, the distinct locations of the gastroenterology clinic and laboratory made integration difficult. To overcome these limitations, we created a new position for an endoscopy nurse