

Applying Lean Six Sigma to improve medication management

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Abstract

Purpose – A significant proportion of veterans use dual care or health care services within and outside the Veterans Health Administration (VHA). In this study conducted at a VHA medical center in the USA, the authors used Lean Six Sigma principles to develop recommendations to eliminate wasteful processes and implement a more efficient and effective process to manage medications for dual care veteran patients. The purpose of this study is to: assess compliance with the VHA's dual care policy; collect data and describe the current process for co-management of dual care veterans' medications; and draft recommendations to improve the current process for dual care medications co-management.

Design/methodology/approach – Input was obtained from the VHA patient care team members to draw a process map to describe the current process for filling a non-VHA prescription at a VHA facility. Data were collected through surveys and direct observation to measure the current process and to develop recommendations to redesign and improve the process.

Findings – A key bottleneck in the process that was identified was the receipt of the non-VHA medical record which resulted in delays in filling prescriptions. The recommendations of this project focus on the four domains of: documentation of dual care; veteran education; process redesign; and outreach to community providers.

Research limitations/implications – This case study describes the application of Lean Six Sigma principles in one urban Veterans Affairs Medical Center (VAMC) in the Mid-Western USA to solve a specific organizational quality problem. Therefore, the findings may not be generalizable to other organizations.

Practical implications – The Lean Six Sigma general principles applied in this project to develop recommendations to improve medication management for dual care veterans are applicable to any process improvement or redesign project and has valuable lessons for other VAMCs seeking to improve care for their dual care veteran patients.

Originality/value – The findings of this project will be of value to VA providers and policy makers and health care managers who plan to apply Lean Six Sigma techniques in their organizations to improve the quality of care for their patients.

Keywords Lean thinking, Quality management, Continuous quality improvement

Paper type Case study

Introduction

Lean/Six Sigma in healthcare

Lean principles owe their origin to the Japanese car maker Toyota. They include tools that focus on eliminating waste from manufacturing processes and adding value for the customer. Some Lean tools, such as process and value stream maps, show promise in healthcare. They can eliminate inefficiencies and waste in workflow processes; improve patient scheduling processes; and patient satisfaction with care (Dickson *et al.*, 2009;

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Wojtys *et al.*, 2009). Six Sigma was developed by Motorola in the 1980s and focusses on reducing errors and variability in the production process using data and statistical methods. Six Sigma uses the define, measure, analyze, improve, control (DMAIC) approach to problem-solving and has been used in healthcare patient safety and quality improvement (QI) (Taner *et al.*, 2007). Lean Six Sigma thinking combines Lean with Six Sigma's data driven analytical tools to provide a unique approach to organizational problem solving and QI (Koning *et al.*, 2006; Antony *et al.*, 2003; Van den Heuvel *et al.*, 2006). Lean Six Sigma emphasizes their complementary benefits: combining the pragmatic and value-centered Lean thinking with the data-driven Six Sigma (Arnheiter and Maleyeff, 2005; Kumar *et al.*, 2008). In a recent literature review on Six Sigma in healthcare, Liberatore (2013) found Six Sigma applications in several inpatient care areas including admission, discharge, medication administration, operating room, cardiac and intensive care. About 38 percent of the applications focussed on process time and most were in hospitals, with less than 10 percent in the ambulatory care setting. In this study, we used Lean Six Sigma techniques to address an organizational quality issue in one Mid-Western United States Veterans Affairs Medical Center (VAMC).

Project background

Many US veterans, particularly rural veterans, are dual users or use healthcare services within and outside the Veterans Health Administration (VHA). Receiving care from VHA and non-VHA systems can lead to uncoordinated care and poorer health outcomes. In this project, we used Lean Six Sigma principles to develop recommendations to improve the current systems and processes for medication co-management for dual care veterans. Our QI project aims were to: assess compliance with the veteran affairs' (VA) dual care policy; collect data and describe the current system/processes for co-managing dual care veterans' medications; and draft recommendations to improve the current system/processes for dual care medications co-management. The key outcomes that the QI project was expected to achieve were to: reduce clinic waiting time for veterans in the VA clinic with necessary, urgent non-VA prescriptions; reduce the time taken to fill non-VA prescriptions; reduce veterans' clinic visits for unnecessary/non-urgent non-VA prescriptions; improve veterans satisfaction with dual care medication co-management; improve provider satisfaction (VA and non-VHA providers) regarding dual care medication co-management; and improve compliance with the VA's dual care policy.

The quality problem

In 2010-2011, a mail-in survey of non-VHA physicians practicing in Nebraska and telephone interviews with a random sample of veterans residing in rural Nebraska were conducted to examine the quality of dual care provided to veterans (Nayar *et al.*, 2013a, b). The findings suggested that the system for medication co-management for dual care veterans required improvements to provide coordinated high-quality care. The Mid West Mountain Veterans Engineering Resource Center (MWM VERC) funded a QI project to develop recommendations to facilitate medication co-management for dual care veterans. The project site was an urban VAMC primary care clinic in the US Mid-West region. The team obtained the primary care clinic managing physician's permission to conduct the project.

Approach

This study was classified by VHA managers as a QI or non-research project, hence VA IRB approval was not required. The project team collected data to assess compliance

with the VA's dual care policy and to describe the current system/processes for dual care medications co-management at the project site. Data were collected from multiple sources including: surveying care team members; site visit to the VAMC and a focus group with VHA patient care team members; direct observation and data collection on waiting and process times for filling non-VHA prescriptions.

Define

The first step in the Six Sigma process is to define the problem, project goals and customer requirements. The project team conducted a site visit to the VAMC in March 2012 and met patient care team members. The meeting's purpose was to brief the care team about the project and to map the current process for filling a non-VHA prescription. Process maps are used in Lean manufacturing to depict a process diagrammatically. The current state process map (Figure 1) represents how the process currently operates that leads to identifying opportunities for process optimization and improvement.

Measure

The next DMAIC process step is to measure process performance. Prior to the site visit the team also collected data from the care team regarding the process for filling a non-VHA prescription (script) and for dual care documentation. The care team survey findings indicated that the dual care non-VHA provider documentation is inconsistent, and when done is not readily accessible to the VHA provider. The reasons cited by the care team for inconsistent documentation and inaccessible information are "(in) consistent location in the computerized patient record system (CPRS)" that everyone can access readily and an absent written policy on documentation. If a non-VHA prescription is changed by the VA provider then it was noted that the non-VHA provider is not automatically informed. It is the veteran's responsibility to inform the non-VHA provider and the patient has to fill out paperwork to have the records sent to the non-VHA provider. The common reasons cited by the care team for changing prescriptions written by a non-VHA provider included: drug not in VA formulary; drug-drug interactions; and dosage changes. The changes made to a non-VHA prescription are documented in the non-VA medication section in the CPRS. The project team also collected data using direct observations in the clinic over four weeks to measure process performance.

Findings

The key findings from directly observing the non-VHA prescription filling process highlight delays and inefficiencies in the current system to fill a non-VHA prescription. Most scripts that were tracked during the direct observations conducted by the project team were non-urgent (i.e. not required to be filled the same day). In most cases when the veteran was informed that the script was non urgent, s/he decided to go home and not wait. The median wait time (between walk in and being seen by a VA pharmacist) for walk in non-VHA scripts was 11 minutes. The median time for pharmacist review and script dispensation was 15.2 minutes. The median time for physician review and rewriting the script was 17.48 minutes. The median time for dispensing the script (after physician review) was 16 minutes. The median process time (total time between walk in and script being filled) for a non-VHA script to be filled was one and a half hours. The team also collected data from veterans to examine their satisfaction with the filling a non-VHA prescription process and found that the mean veterans' satisfaction score was 4.58 (good to excellent) on a Likert scale from 1 to 5 (1 = poor; 5 = excellent).

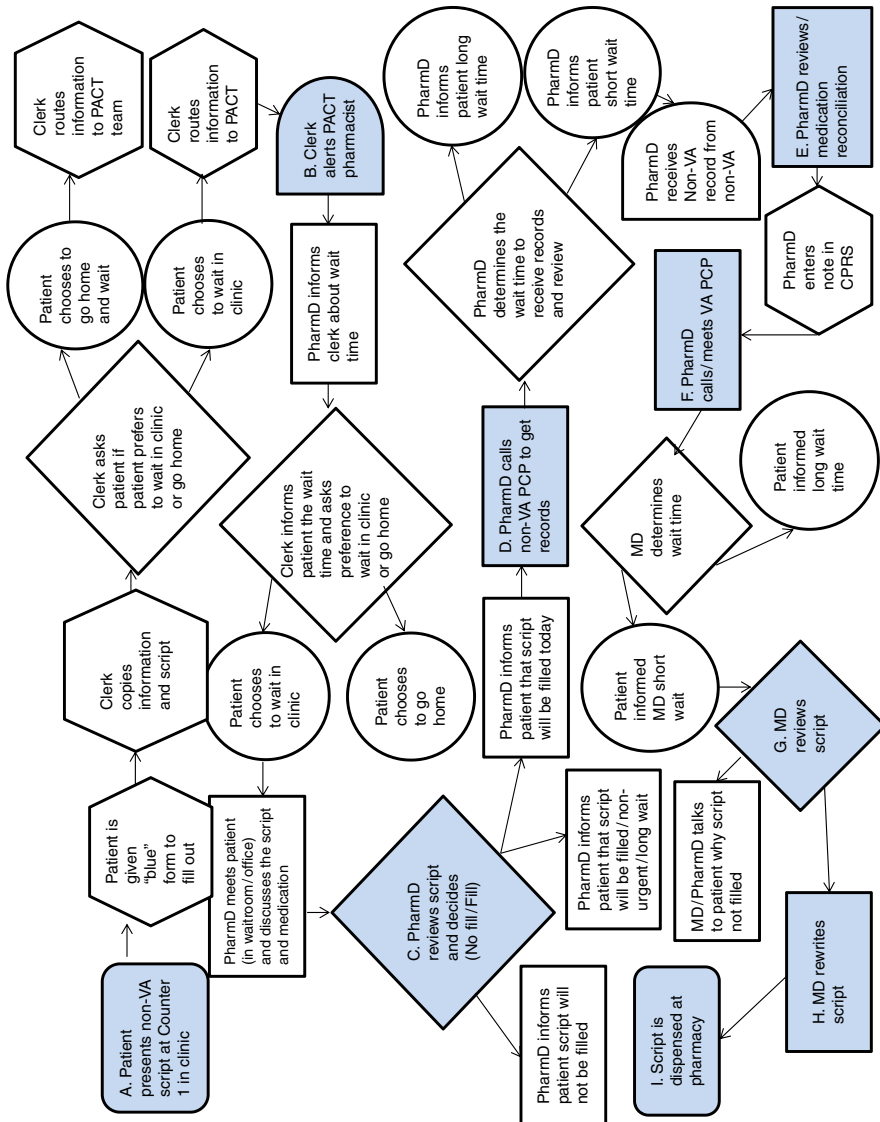


Figure 1.
Current state process
map: outpatient
walk-in with non-VA
prescription

Analyze

The next step was to analyze the process to determine root causes of variations and poor performance. The team identified a key bottleneck in the process: receiving patient records from the non-VHA provider in a timely fashion. This often delayed scripts being filled on the same day. Additionally, the team conducted key informant interviews with non-VHA providers regarding medication management for dual care veterans. The non-VHA physicians interviewed expressed difficulty accessing the VHA formulary, obtaining veterans' medication history and updated medication lists. They also expressed concerns that they were not informed when the VHA provider changes a prescription.

Improve

To improve process performance, by addressing and eliminating the root causes identified, the following recommendations were designed to improve the current system/processes for dual care medications co-management. Recommendations focus on four domains: documenting dual care; veteran education; process redesign and outreach to community providers.

Documenting dual care

Currently, there is no formalized system for documenting non-VHA provider information. The team recommended that veterans are asked on intake whether they receive care from a non-VHA provider and if they do receive care outside the VA then the non-VHA providers' information be documented in the CPRS in a specific location, such as the cover sheet. This will ensure consistent documentation and also have the information readily accessible and ensure compliance with VHA Directive 2009-038, which requires that non-VA providers are listed in the patient's EHR. A prompt in the CPRS to ask for the dual care information was identified by the care team as helpful in facilitating this documentation, in addition to a written policy and staff education.

Outreach to community providers

If a veteran reports receiving care from a non-VHA provider then the non-VHA service providing care should be contacted to deliver the patients history and medication list, which should be updated in the patient's medical record. The VHA Directive 2009-038 recommends that a letter be faxed to community providers who look after dual care veterans, for every veteran who reports seeing a non-VHA provider. This will address and eliminate the bottleneck identified in the process for filling a non-VHA prescription and also facilitate co-managing dual care veterans' medications and improve care coordination by updating the patients' records and providing non-VHA providers with the VHA formulary information. We also recommend that an updated medication list be faxed to the non-VHA provider when the veteran fills a non-VHA script at the VA.

Veteran's education

Veterans need to be taught their dual care medication responsibilities. If a veteran presents with a non-VHA prescription then a blue education sheet is handed out. However, it is advisable to provide the dual care veteran with this information on initial intake and dual care documentation, rather than when the veteran presents with a non-VHA prescription. This reduces the clinic visits for unnecessary/non-urgent prescriptions.

Knowing what scripts the VHA will or will not fill will avoid the veteran making unnecessary trips to the VAMC and also reduce waiting time for filling non-VHA scripts, thereby improving process efficiency.

Lean Six Sigma
to improve
medication
management

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Process redesign

Implementing VHA Directive 2009-038 reduces the process time for filling non-VA scripts, because veteran EMRs will already be updated and this will reduce the time spent by VHA staff, including pharmacists, to contact the non-VHA provider to get this information before a non-VHA prescription is filled. Providing educational information to dual care veterans also eliminates unnecessary prescriptions and improves system efficiency, resulting in a more effective and efficient process for filling necessary non-VHA scripts by removing inefficiencies and bottlenecks in the process. Applying Lean methods, the team created the future state process map (Figure 2) that would reduce the script filling process time.

Control

The final step in the DMAIC process is to control the improved process and future process performance. Key recommendations, therefore, were communicated to the VAMC leaders:

- (1) every veteran seen at the VA clinic should be asked by the clerk on intake for dual care information and the non-VA provider information should be consistently documented in a specific location in the CPRS (such as the cover sheet);
- (2) every veteran who reports receiving care outside the VHA should handed an education sheet that outlines his/her responsibilities;
- (3) for every veteran patient who reports seeing a non-VHA provider, a request to send the veteran's non-VHA records should be faxed to the non-VHA service and this should be updated in the veteran's VHA medical records (CPRS); and
- (4) for every veteran who fills a non-VHA prescription at the VAMC, an updated medication list should be faxed to the prescribing non VA provider.

Conclusions and practical implications

Our findings will be valuable to VA providers and policy makers who seek to improve the service quality provided to dual care veterans and to healthcare managers who plan to apply Lean Six Sigma techniques in their organizations to improve service quality. The Lean Six Sigma general principles applied in this project to develop recommendations to improve medication management for dual care veterans are applicable to any process improvement or redesign project. Our project, therefore, has valuable lessons for other VAMCs seeking to improve care for their dual care veteran patients.

Limitations

This case study applies Lean Six Sigma principles in only one urban VMAC in the Mid-Western USA to solve a specific organizational quality problem. Therefore, the findings may not be generalizable to other organizations.

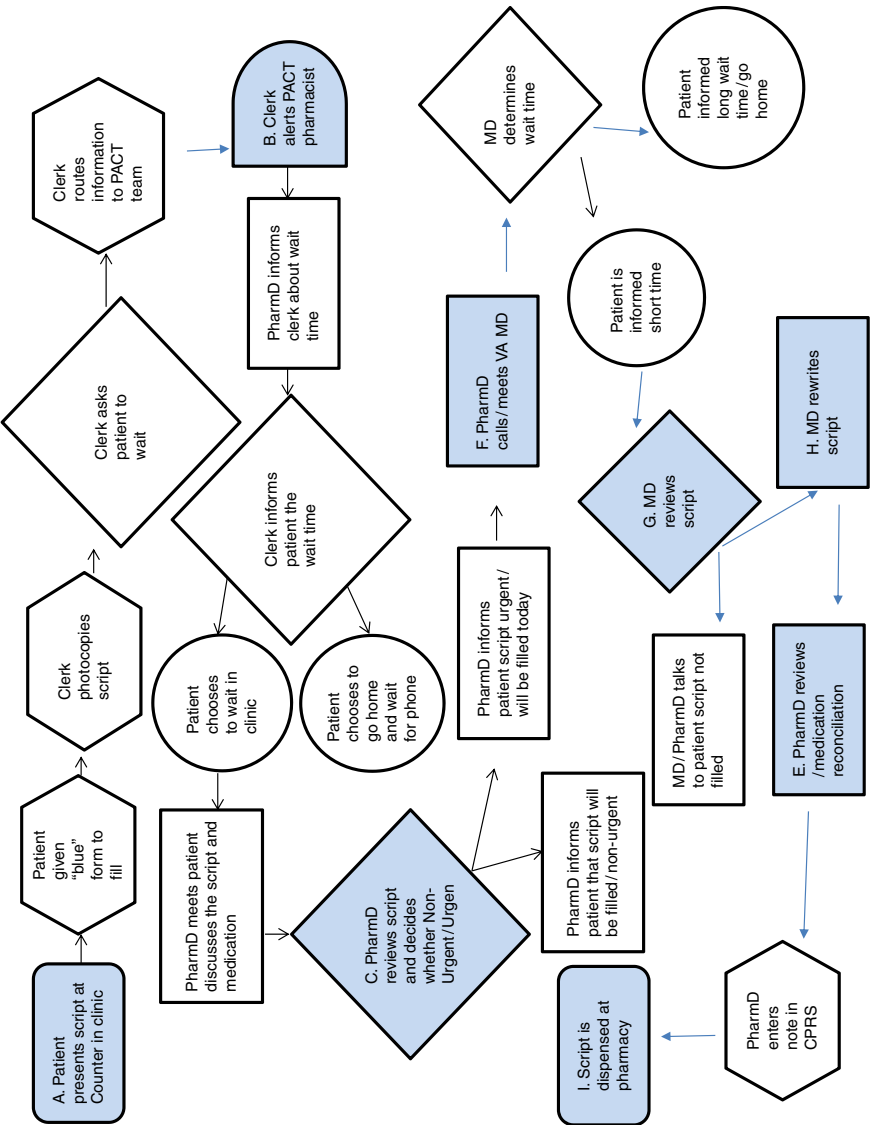


Figure 2.
Future state process
map: outpatient
walk-in with non-VA
prescription

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