Utilization of Lean Methodology to Improve Quality and Efficiency of Rehabilitation Electronic Health Record Documentation

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Abstract

Providing efficient, accurate, and timely patient health information is the overriding aim of an electronic health record (EHR) documentation system. As new technologies evolve and regulatory requirements continue to change, administrators who find limitations in earlier iterations of EHR systems may need to rethink existing systems and processes. Seeking to optimize quality of patient care, the leadership of the Department of Physical Medicine and Rehabilitation at an academic medical center initiated a quality improvement project utilizing Lean methodology to guide redesign of an inefficient, first-generation EHR documentation system. Baseline data were collected using therapist/EHR interaction time studies, therapist productivity measurements, and stakeholders' surveys. Existing documentation templates, available technology, and regulatory requirements were evaluated. Outcomes included mean reductions in time spent using the EHR from 2.8 hours per day to 1.9 hours per day per therapist, increases in patient care time from 53 percent to 71 percent, and overall improvements in internal and external stakeholders' satisfaction from 17 percent to 97.4 percent and 43 percent to 80.3 percent, respectively. The implementation of Lean methodology applied to EHR documentation template inefficiencies proved to be an effective way of reducing time spent in the EHR by therapists, improving therapist productivity, and increasing satisfaction of internal and external stakeholders.

Keywords: electronic medical record (EMR); electronic health record (EHR); Lean methodology; documentation; quality; efficiency; productivity

Introduction

Providing well-organized, accurate, and timely patient health information is an important aim of an electronic health record (EHR) documentation system. By the end of 2014, three-fourths of the acute care hospitals in the United States had transitioned away from exclusively paper-based health records to some form of electronic system that provided the ability to capture clinician notes in addition to other basic EHR functionality.[1] A major concern among clinicians is that EHR adoption can interfere with practice productivity.[2] Studies have shown that clinicians spend extra time entering data in the EHR, and it can negatively affect the time spent on patient care.[3, 4] As the numbers of EHR users have grown, some early adopters of EHR products have recognized the inherent process and design limitations and are reevaluating, redesigning, and even replacing earlier versions of health record automation.[5, 6]

Lean methodologies, which have been used for several decades in the industrial sector, are increasingly being applied to healthcare to drive quality improvement in order to reduce or eliminate

errors, delays, and redundancy.[7] The leadership of the Department of Physical Medicine and Rehabilitation of an academic medical center identified ongoing EHR limitations following the adoption of a first-generation documentation system designed for inpatient and outpatient physical therapists and occupational therapists (PTs and OTs). Lean methodology was applied utilizing the Define, Measure, Analyze, Improve and Control (DMAIC) framework to modify and enhance the existing patient care documentation system. (See Table 1.)

Methods

Define

The central problem identified by rehabilitation therapists when utilizing the original EHR was reliance on a poorly designed documentation template characterized by an excessive amount and redundancy of information, which resulted in a protracted, unclear text rendition. Rehabilitation therapists, physicians and other providers often described difficulty finding important material in the patient evaluation or treatment notes. Despite the fact that the system was custom-built for the department, neither the end users (rehabilitation therapists) nor the note readers (physicians and other providers) had been included in the initial planning phases, nor had they been given an opportunity to provide feedback on the template design or content.

Department leadership noticed a reduction in staff productivity and a substantial decrease in job satisfaction related to increased documentation time after the initial implementation of the original system. The number of complaints from external stakeholders related to poor readability of therapy documentation, ineffective communication, and reduced timeliness of therapy documentation being entered into the EHR increased.

The department leadership identified as a strategic goal the improvement of quality, satisfaction, and communication with documentation. A multidisciplinary team that included rehabilitation therapists, nurses, and physicians was created. All team members participated in Lean methodology training, and a team leader and a coach were assigned to the team to act as advisors and assist in maintaining the project's scope.

The scope of the project was limited to improving the department's documentation process efficiency and note templates. The potential benefits included reduced time interacting with the EHR (chart review, documentation, and ordering), increased time for direct patient care, increased staff productivity, and improved communication of patient care to other providers. The target populations were internal stakeholders (therapists and rehabilitation leadership group) and external stakeholders (physicians, nurses, case managers, and third-party payers).

The team developed a project charter and identified three project aims:

1. Reduce the average amount of time therapists interact with the EHR by 35 percent;
2. Increase staff productivity in units of services charged per patient by 10 percent; and
3. Improve stakeholders' satisfaction to 80 percent in the stakeholder satisfaction survey.

The gap in quality was staff dissatisfaction with EHR documentation and the length of time it took to complete documentation. Factors contributing to the gap included poor readability of therapy notes, overproduction and processing of the information, and cumbersome data entry in the note templates.

Measure

Performance measure tools used by the team included stakeholder satisfaction surveys, an EHR interaction time study, and staff productivity reports. The stakeholder satisfaction surveys were sent to

internal and external stakeholders to determine level of satisfaction with the documentation notes. The survey data were collected through a REDcap (Research Electronic Data Capture) questionnaire. REDcap is a metadata-driven software tool to expedite electronic data capture. The survey was developed with a quantitative design to provide a percentage of overall satisfaction with the communication provided to customers and the functionality of the documentation form for the end user. It was sent to 190 stakeholders (136 external and 54 internal), with a 47 percent response rate for external stakeholders and 59 percent response rate for internal stakeholders. According to the survey results, the overall satisfaction of the external and internal stakeholders was 43 percent and 17 percent, respectively. The internal stakeholders' survey focused on the therapists' overall satisfaction with the existing process of documenting and their satisfaction with existing content, layout, and functionality, while the external stakeholders' survey focused on the providers' overall satisfaction with note readability and the content of information communicated on the note.

An EHR interaction time study was performed to determine the average time spent by staff in six primary work activity categories (patient care, documentation, chart review, ordering/scheduling patients, meetings, and other). A random sample of therapists was chosen and included OTs, PTs, outpatient practice, inpatient practice, 10-hour workday therapists, and 8-hour workday therapists. A minimum of two therapists in each category were included, for a total of 25 percent sampling of the department's 54 therapists. Due to lack of funding for specific digital time study data collection instrumentation, the time study was performed by each individual therapist. A time study worksheet was developed and included the six categories being evaluated and a place to write time-in and time-out information for each category. The baseline data showed that therapists were spending 31 percent of their work time on documentation of treatment and a total of two to eight hours per day interacting with the EHR.

Therapist productivity was measured on the basis of the units of service charged per patient. The units of service are medical code sets used to report services provided by the therapists for billing purposes. This measure was collected from the Therapist Daily Productivity report that tracked individual therapists and department average production and was generated from daily charges entered by therapists. The average productivity in the first quarter of the year was 1.4 units of service per patient in the hospital and 2.1 units of service per patient in the clinic.

Several quality improvement tools were used to study the therapists' work processes (waste walk and process map) and to analyze how much time therapists dedicated to certain work activities (Pareto chart). Several external stakeholders on the team performed a waste walk observation of the patient treatment and documentation processes.

Institutional Review Board (IRB) approval for this study was determined to be unnecessary because the project was deemed a quality improvement activity. The project received approval from the Mayo Clinic Quality Academy as a quality improvement study.

Analyze

The baseline data showed low staff productivity and notable job dissatisfaction due to the increased amount of time the staff spent interacting with the EHR. The therapists' documentation of services provided was reported to be ineffective, with poor readability of therapy documentation by providers, because the information was difficult to find and not entered in a timely manner. The documentation was done in electronic forms in the EHR, and therapists had a selection of eight forms that could be used, depending on the discipline (OT or PT) and the location of services (hospital or clinic).

The team observed the following types of waste in the documentation process: overproduction, overprocessing, motion, reprioritization, defects, and misapplication of therapist skills. The process map that was developed identified all the steps needed and the areas in the chart where the therapists had to go for chart review, charging, or documentation. The process map also identified further waste in the documentation process. The hospital documentation template included 29 expanded sections, of which only 18 were utilized. The clinic documentation template included 20 sections, of which only 13 were utilized. The team members identified these findings by performing more than 60 patient chart reviews. A

Pareto chart was created using the EHR interaction time study data (see Figure 1). It demonstrates that documentation was taking 31 percent of the therapists' time.

After evaluation of the current state, and in view of the issues identified, the team focused on streamlining the content of the notes and used technology to improve the flow and design of the documentation. Team members met with staff to engage them in the process of reducing and eliminating unnecessary sections and content within their existing documentation, utilizing a 5S (sort, set in order, shine, standardize, and sustain) Lean methodology process.

The team investigated regulatory requirements needed for reimbursement and inclusion in the documentation and brainstormed various technology options that were available within the EHR system utilized by Mayo Clinic. A different documentation application available in the EHR system was chosen for its improved readability, variety of free text and structured template/standardized language options, and compatibility with speech recognition software.

Improve

The creation of customized notes and implementation was done in three phases beginning with the smallest group:

- Phase 1: Clinic OT notes (3 therapists and 2 documentation templates)
- Phase 2: Clinic PT notes (13 therapists and 2 documentation templates)
- Phase 3: Hospital OT and PT notes (36 therapists and 4 documentation templates)

Phase 1 was the pilot phase, and the same process was repeated for Phases 2 and 3.

The team identified all regulatory requirements for rehabilitation documentation. They met with members of the financial services and Joint Commission strategy groups to discuss differences in the regulatory requirements for the hospital and clinic and required elements in the documentation content for PT and OT. The content was then reduced and simplified. Focus group meetings were scheduled to allow department staff to provide input on the new documentation notes.

After the regulatory requirements were identified, current content was reduced, and customer input was factored in, the team met with a member of the Department of Information Technology (IT) to create customized documentation templates. This process was repeated for the development of notes for all three phases. In total, eight documentation templates were created: an initial evaluation and a return visit template for each discipline and each area of practice. The team was also granted approval to develop a rehabilitation summary page for chart review. The whole process required 55 hours from the IT resource.

The notes had a compliance check built in for all regulatory requirements and could not be electronically signed unless these items were completed. This change eliminated the manual chart review that had to be done quarterly to ensure compliance.

The implementation process included staff training for a total of 52 therapists and communication to the external stakeholders of changes to the notes. The implementation timeline was done in phases that were completed one to two months apart in order to accommodate the different areas of practices and disciplines:

- Staff training and implementation of clinic OT notes
- Staff training and implementation of clinic PT notes
- Staff training and implementation of hospital OT and PT notes
- Implementation of the rehabilitation summary page for chart review

Remeasurement of all baseline data including EHR interaction time studies, satisfaction surveys for internal and external stakeholders, and staff productivity was completed 60 days after the last phase implementation.

Analysis of data showed that the project met or nearly met the goals set initially and within the time frame of 60 days after implementation (see Table 2). The goal of decreasing the therapists' time in the EHR was expected to lead to the possibility of therapists having more time available for direct patient care. The postimplementation EHR interaction time study showed that patient care time increased from 53 percent to 71 percent (see Figure 2 and Figure 3).

The staff productivity goal of a 10 percent increase was surpassed in the hospital (actual 1.7 units) and nearly met in the clinic (actual 2.3 units). In order to charge more units of service per patient, the therapists are spending more quality time with the patients who need skilled services (see Figure 4).

The same stakeholder satisfaction surveys were sent out 60 days after implementation. The internal stakeholders' overall satisfaction surpassed the goal of 80 percent (actual 97 percent), and the external stakeholders' satisfaction met the goal. The internal stakeholders were satisfied with the overall interaction with the new templates, including the easy-to-use design. The external stakeholders were satisfied with the readability of the notes and proper communication of patient care provided (see Figure 5 and Table 3).

Control

This project was initiated because of a substantial increase in dissatisfaction of therapists with documentation time and dissatisfaction of physicians and other providers with note readability and clarity. The utilization of Lean methodology enabled the team to identify and remove repetition, redundancy, and overproduction. The therapists and other providers were given the opportunity to provide input on the note content and design, and the team worked closely with members of the IT department to use technology to facilitate documentation in the EHR.

The team learned that it is beneficial to have an efficient and concise note template with the most frequently used fields and an electronic check of compliance with regulatory requirements. The rehabilitation therapists are now spending less time on documentation and more time with patients, and the text rendition of the notes is clear and objective.

The process also showed that it is important to facilitate a collaborative environment to allow for input from end users on the note content and design. The result of this process was a very favorable satisfaction survey. By engaging staff participation from the beginning of this project, the team facilitated acceptance of the process and has not experienced resistance to change.

The only noteworthy barrier that had to be navigated in this project was the cumbersome process of approval by the IT department. This barrier was minimized by having a member of the IT department on the team, who was able to provide information on available resources.

This project has been transitioned to a permanent workforce group made up of department leadership and therapists. This group will review and approve any requests to add, modify, or correct the current documentation templates.

Conclusion

For healthcare facilities moving away from paper-based documentation systems, EHR systems have largely delivered on promises of improved efficiencies in document storage, distribution, and instantaneous availability to simultaneous users. Automation of manual processes typically can be expected to lead to improved quality of process outcomes. When applied to medical care, improvements in the flow, accuracy, and timeliness of information may translate into larger societal benefits, such as

reductions in healthcare-related costs, patient mortality and morbidity. Reduced medical errors, shorter hospital lengths of stay, and higher patient satisfaction scores are further examples of improved practices.

Despite gains in these areas, similar efficiencies may be less evident in the areas of documentation creation, readability, and usability of information found in provider evaluations and treatment notes, and reports of increased documentation time have led to reduced direct patient care time.

As new and improved technologies evolve and regulatory requirements continue to change, healthcare information managers and hospital/clinic administrators who find limitations in earlier iterations of EHR systems may find themselves needing to reevaluate, redesign, or replace existing systems and processes. This implementation of Lean methodology applied by Mayo Clinic Rehabilitation Services proved to be an effective approach to identify inefficiencies in the first-generation EHR documentation templates and processes. Contributing to the success of the Mayo Clinic project were several key fundamental elements, including following the framework of the DMAIC process and collaborating with end users on note content and design. Systematic problem analysis and management of the change process using the DMAIC method led to overall improvements in the areas of rehabilitation therapist time spent in the EHR, therapist productivity, and internal and external stakeholder satisfaction. Once the framework for the project was established, programming changes required less than 60 hours of IT resources and minimal external resources.

A similar quality improvement process may be applicable and relevant to other multidisciplinary clinical settings that are experiencing staff dissatisfaction and reduced productivity due to lengthy interaction with an EHR. This academic medical center has plans to utilize a similar process and methodology during the enterprise EHR convergence that will involve all rehabilitation sites for this institution in the near future.

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Notes

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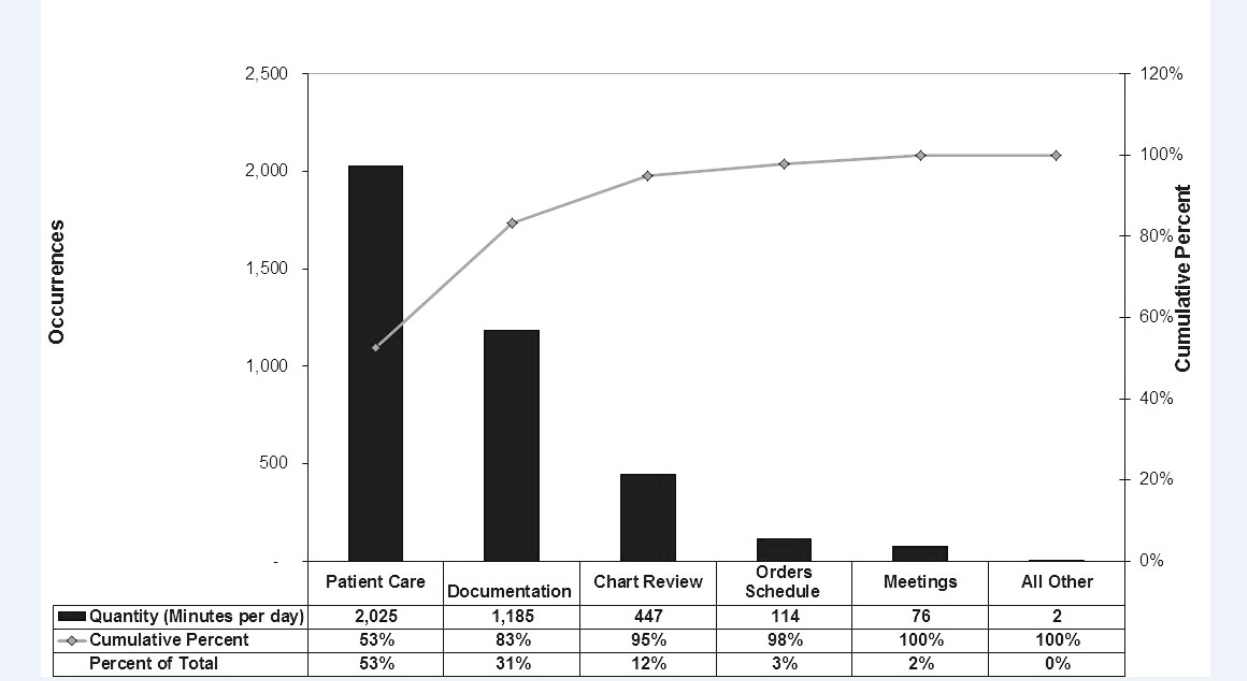
Figure 1

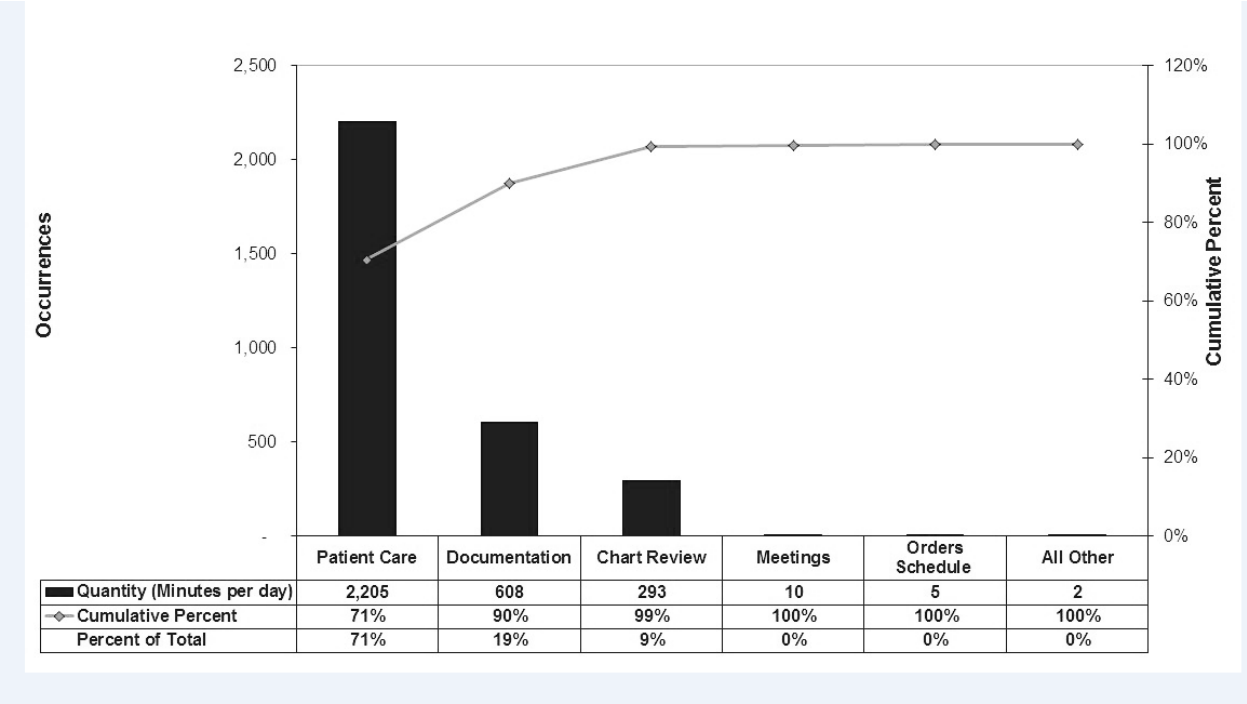
Pareto Chart Before Implementation



	Patient Care	Documentation	Chart Review	Orders Schedule	Meetings	All Other
Quantity (Minutes per day)	2,025	1,185	447	114	76	2
Cumulative Percent	53%	83%	95%	98%	100%	100%
Percent of Total	53%	31%	12%	3%	2%	0%

Figure 2

Pareto Chart After Implementation



	Patient Care	Documentation	Chart Review	Meetings	Orders Schedule	All Other
Quantity (Minutes per day)	2,205	608	293	10	5	2
Cumulative Percent	71%	90%	99%	100%	100%	100%
Percent of Total	71%	19%	9%	0%	0%	0%

Figure 3

Electronic Health Record (EHR) Interaction and Patient Care Time as Percentage of Therapists' Total Time

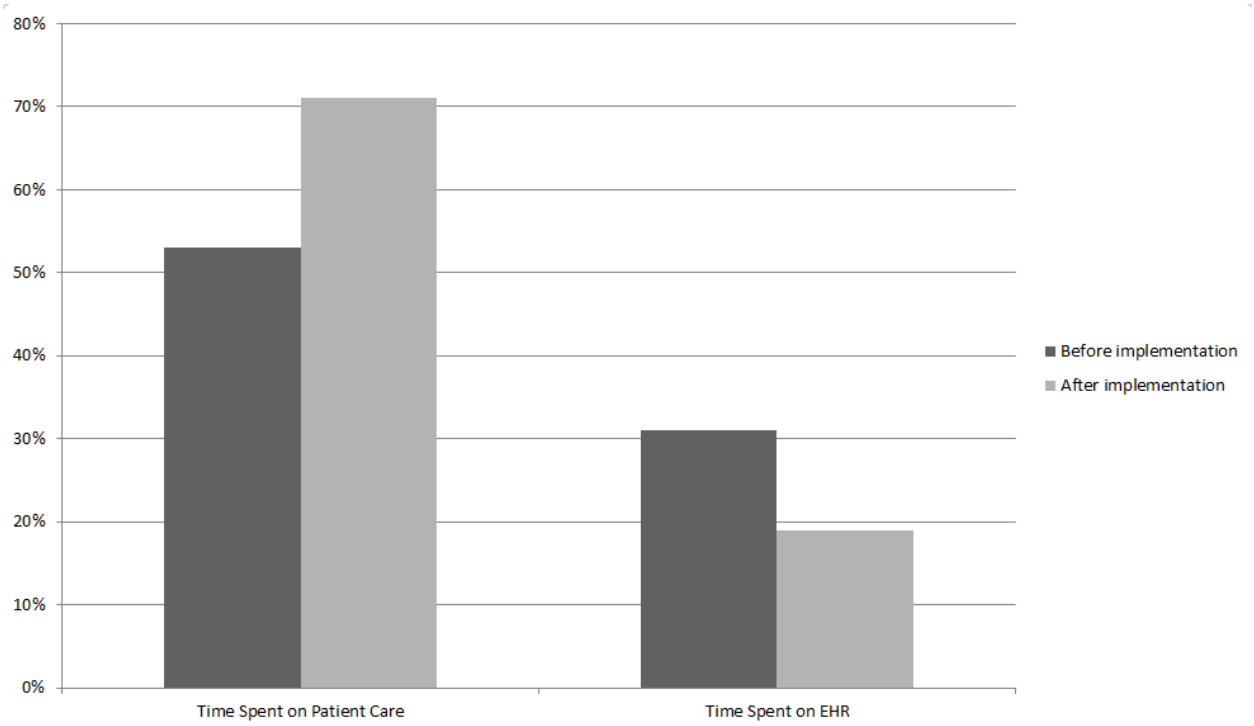


Figure 4

Therapists' Units of Service per Patient

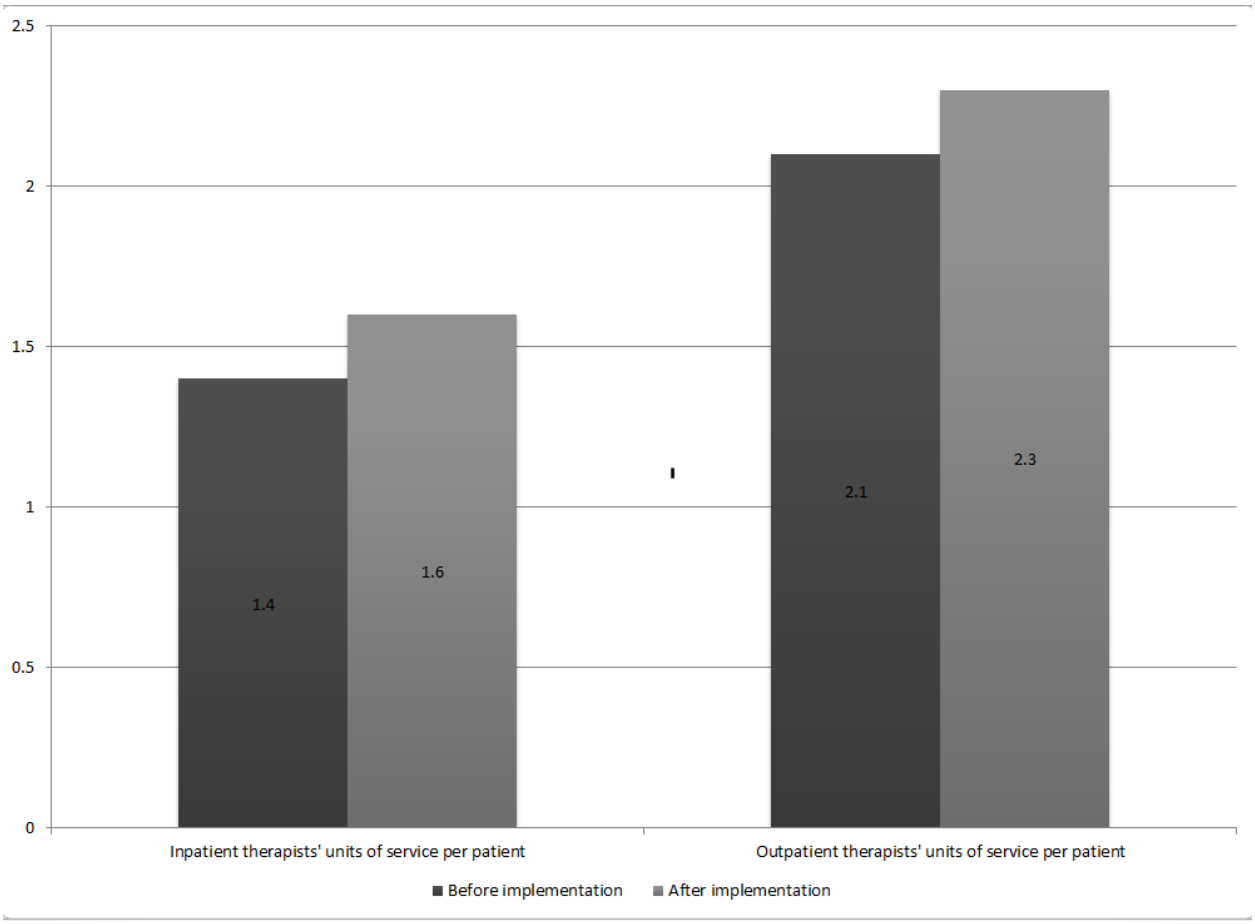


Figure 5

Stakeholder Satisfaction

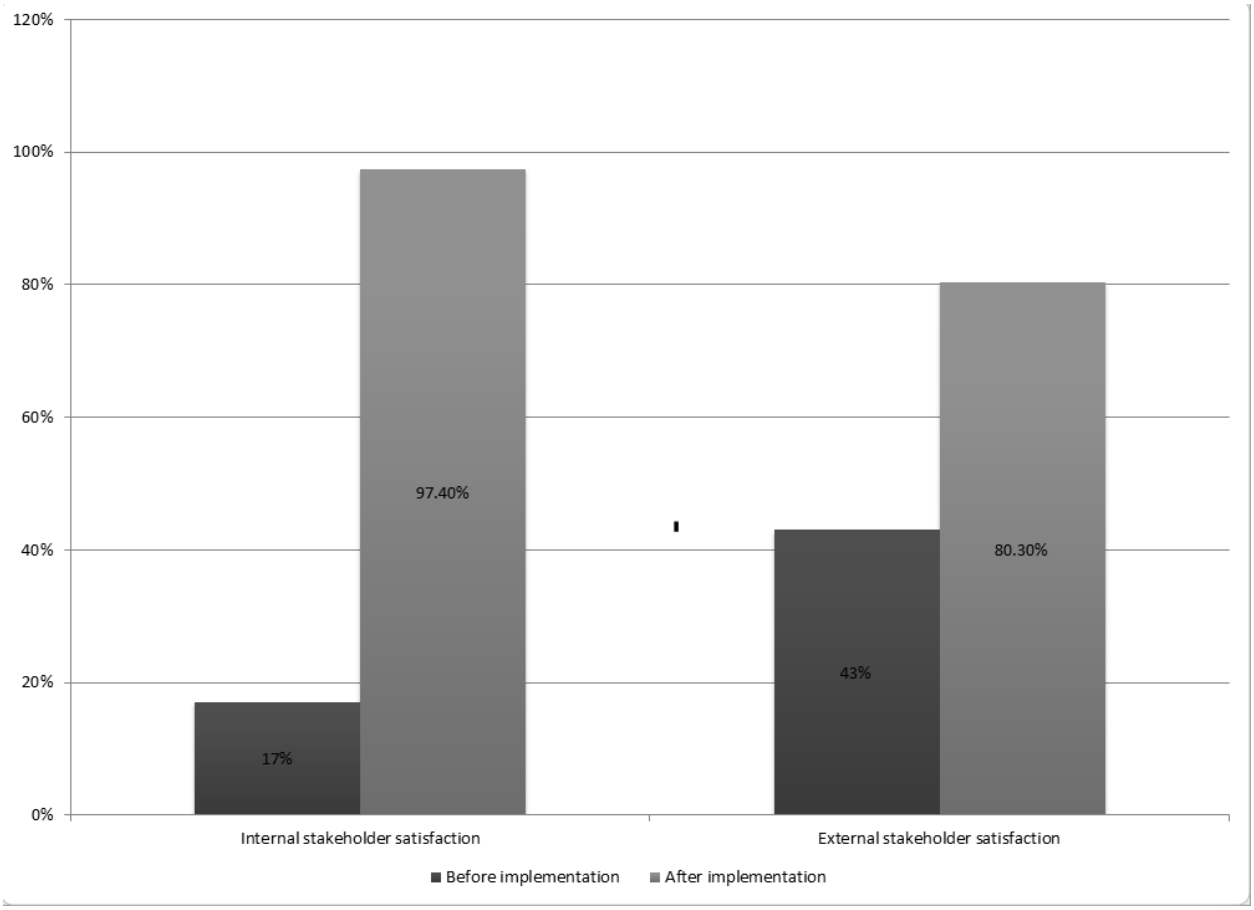


Table 1

DMAIC Framework

Define	**Measure**	**Analyze**	**Improve**	**Control**
Define the problem	Quantify the problem	Identify the cause of the problem	Implement and verify the solution	Maintain the solution

Table 2

Comparison of Preimplementation and Postimplementation Data

Metric	Baseline	Target	Actual
Reduce time interacting with electronic health record	2.8 hours	1.8 hours (35%)	1.9 hours
Therapist productivity (hospital)	1.4 units	1.6 units (10%)	1.7 units
Therapist productivity (clinic)	2.1 units	2.4 units (10%)	2.3 units
Customer satisfaction (internal)	17%	80%	97%
Customer satisfaction (external)	43%	80%	80%

Note: Units are units of service charged per patient.

Table 3

Comparison of Preimplementation and Postimplementation Stakeholder Satisfaction Surveys

Satisfaction Measure	**Before Implementation**	**After Implementation**
Internal stakeholder satisfaction		
Overall satisfaction	**17%**	**97.40%**
Time to complete documentation	6%	98.45%
Content of notes	37%	92.40%
Layout of notes	8%	96.95%
Quality of text rendition	17%	100%
External stakeholder satisfaction		
Overall satisfaction	**43%**	**80.30%**
Ability to find “Assessment” information	28%	78.47%
Ability to find “Mobility” information	28%	75.96%
Ability to find “Pain” information	31%	84.14%
Ability to find “Function” information	31%	82.52%
Ability to find “Discharge” information	31%	78.47%