Successful Resident Engagement in Quality Improvement: The Detroit Medical Center Story

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ABSTRACT

Background In 2014, the Detroit Medical Center launched a new program to engage residents and fellows in a strategy to deliver optimal care within 1 year, focusing on quality at an earlier stage of their careers and preparing them for working posttraining.

Methods Residents from clinically relevant residency and fellowships programs were selected to be Resident Quality Directors. The project involved development of an interactive electronic health record (EHR) checklist to visually depict real time gaps in 40 process measures, while focusing on 14 areas related to stroke and venous thromboembolism (VTE) prophylaxis. We also implemented an incentive approach, using a pay-for-performance (P4P) model.

Results The project included 800 residents led by 14 resident quality directors. We were able to achieve 100% resident participation. Prior compliance with VTE quality measures 6 months was 88.5%, with performance increasing to 94.2% ($P < .006$) at 6 months and 100% at 12 months ($P < .005$) after the intervention. The VTE prophylaxis score improved from the 89.7% to 92.9% range at inception to 100% by 12 months. A similar steady improvement of stroke process measures was observed, with a 100% compliance within 12 months. The institution made 4 incentive payments to trainees (ranging from \$300 to \$4,000 per year). The remaining 26 process measures remained at goal with above 95% compliance.

Conclusions This quality improvement initiative was associated with system-wide quality performance on VTE prevention and stroke care process measures, which was facilitated by a interactive EHR-based checklist and linkage to P4P incentive payments.

Introduction

In 1999, the groundbreaking report from the Institute of Medicine, *To Err is Human*, led to widespread awareness of gaps in patient safety.¹ Recently, the Accreditation Council for Graduate Medical Education unveiled the Clinical Learning Environment Review process, which is considered a pathway to institutional excellence and aspires to promote resident and fellow engagement in quality improvement activities.²

In 2014, the Detroit Medical Center (DMC) noted a significant opportunity to improve our performance on venous thromboembolism (VTE) prevention and stroke care. These were chosen as intervention targets, as they were new quality metrics that our system started reporting on publicly in 2014.

We decided to focus on these conditions as VTE is the most common cause of hospital deaths,³ and VTE thromboprophylaxis is considered “the No. 1 patient safety practice” for hospitalized patients according to the Agency for Healthcare Research & Quality (AHRQ).⁴ In addition, stroke mortality and morbidity—a major cause of disability—remain high in the United States.³

The goal of this study was to determine if a hospital-wide, electronic health record (EHR)-based program using financial incentives and led by residents could improve adherence to guidelines for hospital VTE and stroke prophylaxis, and also be acceptable and feasible.

Although many hospital-based quality improvement projects have been developed, none have involved a system-wide approach led by residents and fellows from multiple training programs, included several quality measures simultaneously, and embedded measures in the EHR.

Methods

A total of 800 residents and fellows from DMC clinically relevant programs (anesthesiology, emergency medicine, family medicine, internal medicine and subspecialties, neurology, obstetrics and gynecology, orthopaedic surgery, pediatrics, physical medicine and rehabilitation, psychiatry, surgery, and the transitional year) were directly involved in 1 or more core quality measures on a regular basis. We selected 14 residents from the programs above to be resident quality directors. This pioneering group formed the first resident-led DMC Resident Quality and Safety Council, chaired by a chief resident champion who assumed the role of executive director of resident

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engagement in quality and patient safety. The chief chosen had been elected vice president of the Resident Council, and had already led a successful overhaul of the electronic sign-out process to improve transitions in care at the institution. He was also selected to be the first quality and patient safety fellow. The chief resident worked closely with both the designated institution officer and the chief medical officer.

Innovation

Resident/Fellow Engagement: Given that checklists have been demonstrated to improve patient safety,⁵ Phase 1 of the project involved the development of a novel, interactive EHR checklist (the DMC Optimal Care Widget⁶) to visually depict real time gaps in up to approximately 40 quality measures for 2014–2015. The project focused on 14 areas related to stroke and VTE prophylaxis, since these were new quality metrics implemented on January 1, 2014 (TABLE). The EHR-based tool was developed in conjunction with our EHR vendor, and is available to other facilities utilizing the same EHR. The widget was launched for adult patients at DMC on January 1, 2014. It was housed in each patient's EHR Summary Page, and auto-populated with measures relevant to the patient's electronically captured diagnoses on admission.

As the primary users of the widget, daily engagement by the resident directors led to their involvement in more than 50 rapid-cycle changes to the program within the first 6 months of its move into production, with each resident director being involved in a few rapid-cycle changes. These consisted of feedback

What was known and gap

Academic medical centers seek to improve their performance on common quality metrics.

What is new

An innovative resident engagement program and electronic health record (EHR)-based quality tool were associated with improved performance on venous thromboembolism prevention and stroke care process measures.

Limitations

Single institution study; multiple intervention components make attribution of effectiveness complex.

Bottom line

The EHR-based tool is available to other facilities utilizing the same vendor and allows the intervention to be adapted by other academic medical centers.

received from the resident directors, nursing staff, physicians, and site administrative leadership regarding mechanisms that needed to be refined (eg, a pop-up alert would be triggered at the time of a patient being discharged to remind the provider to prescribe statin for an ischemic stroke patient if it had not been prescribed).

There was system-wide education on the widget and the widget app.⁶ The widget app is available via smartphone and contains guidelines on quality metrics and a user guide.

With the help of the resident directors, lapses in care related to a provider (resident, fellow, midlevel provider, or attending physician) resulted in feedback through a text page with a call back and real time education via telephone. A lapse in care would show up as "incomplete" on the electronic widget with a timer visible for time-sensitive measures. Resident

TABLE

Core Measure Sets for Venous Thromboembolism (VTE) and Stroke (STK)

Core Measure Sets	Explanation
VTE-1	Venous thromboembolism prophylaxis
VTE-2	Intensive care unit venous thromboembolism prophylaxis
VTE-3	Venous thromboembolism patients with anticoagulation overlap therapy
VTE-4	Venous thromboembolism patients receiving unfractionated heparin with dosages/platelet count monitoring by protocol or nomogram
VTE-5	Venous thromboembolism warfarin therapy discharge instructions
VTE-6	Hospital-acquired potentially preventable venous thromboembolism
STK-1	Venous thromboembolism prophylaxis
STK-2	Discharged on antithrombotic therapy
STK-3	Anticoagulation therapy for atrial fibrillation/flutter
STK-4	Thrombolytic therapy
STK-5	Antithrombotic therapy by end of hospital day 2
STK-6	Discharged on statin medication
STK-8	Stroke education
STK-10	Assessed for rehabilitation

FIGURE 1
Preimplementation and Postimplementation Venous Thromboembolism Composite Performance ($P < .005$).

FIGURE 2
Preimplementation and Postimplementation Stroke Composite Performance ($P < .005$).

directors would review the widget on a daily basis and provide feedback to providers when gaps were seen. The decision support steps are illustrated in the BOX.

Incentives: We implemented a 2-pronged approach to incentives. Using a pay-for-performance (P4P) model, all trainees engaged in 1 or more quality measures were eligible for a quarterly quality financial bonus if the system attained its overall target of delivering optimal care 95% of the time for each core measure set. In addition, we provided a separate payment for resident quality directors who were more engaged in the day-to-day functioning of the program and thus had a larger time investment. The incentive payments were funded by the hospital system since compliance with these quality metrics ensured overall financial incentives from the Centers for Medicare & Medicaid Services (CMS).

Education: Launching the program required the face-to-face delivery of a series of educational sessions to all major graduate medical education programs, nurse practitioners and physician assistants, and attending physicians from January 1, 2014 to December 31, 2015. Most sessions were integrated into existing didactic programming (eg, noon conferences, grand rounds, and morning reports) at least once a month. Overall, 35 educational sessions were provided. The content emphasized 6 evidence-based core measures to promote the prevention of VTE and 8 measures to optimize care for patients with acute stroke⁷⁻¹³ (TABLE).

This project was deemed by the institution's Institutional Review Board as an activity limited to quality improvement activities designed specifically to evaluate, assure, or improve performance within a hospital.

Analysis: Data on VTE prevention measures were sampled and abstracted following Joint Commission and the CMS guidelines.¹⁴ We compared baseline performance for 6 months prior to program implementation with that from January 2015 (12 months postimplementation). In addition to standard descriptive statistics, the Mann-Whitney U test was applied to continuous variables and the chi-square test to categorical variables to ascertain significance. SPSS version 22 software (IBM Corp, Armonk, NY) was used for analyses. All P values were 2-tailed.

Results

This innovation project involved 14 resident directors leading 800 residents in a quality improvement project, with 100% of the residents participating. The VTE prophylaxis core measure prior to checklist implementation and resident engagement was 88.5%. Significant improvement was noted during the 6 postintervention months, with performance increasing to 94.2% (Mann-Whitney U test with $P < .006$) at 6 months and 100% at 12 months ($P < .005$; BOX). The VTE prophylaxis score (VTE-1 in the TABLE) improved from the 89.7% to 92.9% range at inception to 100% by 12 months; this was sustained in 2015 ($P < .005$). The VTE core measures 1 to 6 (TABLE) showed steady improvement between January and December 2014. The DMC VTE composite score improved from 91.3% in January to 99.7% in December 2014 ($P < .005$; FIGURE 1).

Similar trends in performance were noted with stroke process measures. Six months prior to intervention, performance was 88% of target compared to 96.6% within 6 months postintervention ($P < .024$). Steady improvement in the 8 components of stroke process measures was observed, with a 100% compliance within 12 months ($P < .005$; FIGURE 2).

Box Decision Support Steps

- The checklist was coupled with an alert that auto-calculated the risk of venous thromboembolism (VTE) for each admitted patient and quality management orders that allowed a patient's widget to be activated at any point during the hospitalization should new diagnoses be considered.
- Providers interacted directly with the checklist to place missing orders or to complete documentation relative to a measure (eg, contraindications to VTE chemoprophylaxis).
- Real time, aggregate, unit-based views of patient checklists in visible states of completion were conducive to resident monitoring and use at daily management safety huddles conducted by lead residents.
- The daily huddles were held on each unit at every hospital within our academic institution.
- The attendees consisted of attending physicians, nursing staff, case management, social workers, and nursing leadership.
- The daily huddles were held during the mornings and focused on patient safety incidents/concerns, quality metrics, and throughput issues that would impact safe transitions of care.
- The tool aligned with e-measure submission. E-measure submission refers to direct, real time submission of quality metrics to regulatory agencies, such as the Centers for Medicare and Medicaid Services, without the need for manual abstraction.

Besides the 14 measures related to stroke and VTE prophylaxis, the remaining 26 measures remained at goal with above 95% compliance.

Approximately 825 staff hours were dedicated to the development and implementation of the widget app and 40 hours to lecture development and delivery. The financial incentives for each resident ranged from \$300 to \$4,000 annually. The lowest amount was assigned to trainees with the lowest number of quality metrics to deal with on a day-to-day basis, and the highest amount to the resident directors in recognition of their work effort. To date, all residents have met all performance targets and have achieved their maximum incentive payments. The cost of the widget app was \$6,400, and the cost of developing the user guide was \$1,200. Information technology costs totaled \$75,000, and the annual total cost of the program, including educational activities and incentives, was around \$250,000.

Discussion

To our knowledge, this quality improvement initiative marks the first time trainees from diverse graduate medical education programs have aligned around a unified vision to engage providers and attained 100%

compliance with VTE prevention and stroke process measures in 1 year. Through daily oversight of their respective units, resident directors were able to assess care gaps in real time and provide rapid-cycle feedback to the rest of the residents. The provision of real time feedback is a marked improvement over the past practice of abstracting patient charts up to 6 weeks after discharge to identify gaps in care.

The real time systemwide monitoring and interventions led to improvement in compliance with evidence-based care, demonstrated by a 100% compliance for VTE-1 (prophylaxis) for several consecutive months after the intervention.

The formation of the Resident Quality and Safety Council empowered residents and fellows to pursue leadership roles and to engage their peers and attendings in global quality improvement.

The total cost of the programs was around \$250,000, and we observed a healthy debate by the Resident Council and Graduate Medical Education Council around the P4P elements of the program. Advocates for the P4P program highlighted the success of various programs currently in existence,¹⁵ while those opposed believed trainees should not be incentivized to provide routine, evidence-based care. The P4P program was ultimately supported by both committees.

We believe the incentive program not only enhanced resident/fellow awareness and participation, but also contributed to the sustained behavior change we have observed. The institution plans to sustain the effort and maintain the incentive program in the near future.

A limitation of the program is the fact that we could not determine which component was the key to our initiative. We believe that all 3 main components (the widget, the resident leadership, and the incentive program) played important roles. While our compliance with process measures improved significantly, the impact on outpatient compliance with medications and discharge instructions (important for both stroke and VTE measures) have not been measured, nor was residents' acceptance of the program and their application of skills gained through the initiative. However, residents generally endorsed the program, and this was evident by their high participation to the educational sessions and their support of the program at the Resident Council and other forums.

Since the implementation of the engagement program, there has been an enthusiastic response from residents in becoming a resident quality director, and we made the sixth quarterly incentive payment in November 2015. The program has been expanded to include reducing readmissions and reducing catheter associated urinary tract infections and central line associated bloodstream infection rates.

Conclusion

In conclusion, this innovative, feasible, and scaleable program was associated with an improvement in system-wide quality performance on VTE prevention and stroke care process measures, which were facilitated by an interactive E-based checklist and linkage to P4P incentives. The EHR-based tool developed and tested in our innovative project is available to other facilities utilizing the same EHR vendor, and allows the intervention to be adopted or adapted by other academic medical centers.

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