Evaluation of the Impact of a Student Pharmacist–Supported Program to Improve Hospital-Based Quality Measures

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Abstract

Background. Although previous studies have demonstrated positive impact of student pharmacists on clinical interventions, no published studies to date have demonstrated the specific impact of student pharmacists on improving National Hospital Inpatient Quality Measures (NHIQM). **Objective.** To evaluate the impact of a student pharmacist–supported program targeted at improving the venous thromboembolism (VTE) quality measures set forth by the NHIQM. **Methods.** Retrospective review of VTE quality measure compliance at a community nonteaching hospital. During this time, student pharmacists supported a VTE prophylaxis program that evaluated admitted patients for chemical or mechanical prophylaxis needs. Compliance to VTE quality measures were also evaluated by a trained medical data abstractor based on criteria given by the Joint Commission. **Results.** Four major NHIQM criteria for VTE were selected for evaluation. National and state averages were compared to the overall hospital averages across various timeframes. The student-supported program demonstrated consistently high performance for the VTE-1 and VTE-5 measures. **Conclusion.** Student pharmacists have opportunities in improving inpatient quality measures and can play a significant role in patient care through thorough evaluation and intervention.

Keywords

venous thromboembolism, quality measures, student pharmacist, intervention

Introduction

Previous studies have illustrated the impact student pharmacists can have during advanced pharmacy practice experiences (APPE).^{1–4} Shogbon reports a 97% acceptance rate and \$280,297 savings with clinical interventions from 120 fourth-year pharmacy students on advanced institutional, medication safety, or internal medicine rotations at a non-teaching hospital.¹ Pham reports a 92% acceptance rate of clinical interventions by fourth-year pharmacy students on an internal medicine clerkship.² Clinical interventions recorded include drug route conversion, providing drug information, recommending alternative agents, and dose evaluation, among others.^{1,2}

To our knowledge, no published studies to date have demonstrated the specific impact of student pharmacists on improving hospital-based quality measures. The Joint Commission has developed a Specifications Manual for National Hospital Inpatient Quality Measures (NHIQM) for acute myocardial infarction (AMI), heart failure (HF), pneumonia (PN), surgical care improvement project (SCIP), children's asthma care (CAC), venous thromboembolism (VTE), and stroke (STK).⁵ This study evaluated the impact

of a student pharmacist–supported program, specifically targeted at improving the VTE quality measures set forth by the NHIQM.

There are 6 original quality measures set by the NHIQM for VTE, 5 of which that were in place in 2015. The 5 quality measures can be found in Table 1. Please note VTE-4 has been removed from the NHIQM due to consistently high performance among all hospitals.⁵ VTE-1 assesses the number of patients who received VTE prophylaxis or have documentation why VTE prophylaxis was not given within 48 hours of hospital admission or surgery end date. VTE-2 is the same quality measure as VTE-1, except it is specific for patients in the intensive care unit. VTE-3 assesses the number of patients diagnosed with confirmed VTE who

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Table 1. Description of Quality Measures for Venous Thromboembolism (VTE) as Described by the National Hospital Inpatient Quality Measures (NHIQM).

NHIQM 2015—VTE ⁶	
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

received overlapping parenteral anticoagulation and warfarin therapy until warfarin was therapeutic (international normalized ratio [INR] 2-3) and a total of 5 days of overlap therapy had passed. Providers may discontinue the overlap of parenteral anticoagulation if it is documented that the risk of bleeding outweighs the risk of complications from a possible VTE. VTE-5 assesses the number of patients diagnosed with confirmed VTE that are discharged on warfarin with written instructions that address compliance issues, dietary advice, follow-up monitoring, and information about the potential for adverse drug reactions and interactions. VTE-6 assesses the number of patients diagnosed with confirmed VTE during hospitalization, which was not present prior to hospitalization, who did not receive proper VTE prophylaxis while in the hospital.⁵

Methods

This study involved a retrospective review of VTE quality measure compliance at a community nonteaching hospital from October 2012 to February 2015. During this time, APPE students supported a VTE prophylaxis program at the hospital. During orientation, students were educated by a clinical pharmacist on proper VTE prophylaxis and trained in identifying patients that would be candidates for chemical or mechanical prophylaxis. All patients admitted to the hospital were considered for evaluation for the need of VTE prophylaxis. Compliance to the VTE quality measures were also evaluated by a trained medical data abstractor based on criteria given by the Joint Commission for each quality measure. Each month, a random sample of patients was selected for evaluation based on sampling methods set forth by the Joint Commission and the Centers for Medicare and Medicaid Services.⁵ Compliance rates were subsequently compared to the national and state averages for each quality

measure. National and state averages were obtained from The Joint Commission Health Care Quality Data Download Website.⁷ These averages were from the most recent 1-year time frame that data were available (July 2013 to June 2014).

Results

Of the 6 original quality measures for VTE set forth by the Joint Commission, 4 were evaluated in this study. As previously mentioned, VTE-4 is no longer a part of the NHIQM due to consistently high performance in this area. As a result, data collection was discontinued for this measure. Data for VTE-6 were collected; however, no national or state data exist for this measure because the Joint Commission does not display data on measures that are not endorsed by the National Quality Forum.⁸ For the remaining 4 quality measures (VTE-1, VTE-2, VTE-3, and VTE-5), data were evaluated in a few different respects. First, national and state averages were compared to the overall hospital (student-led program) average for the duration of the study (October 2012 to February 2015). Second, national and state averages were compared to the most recent 1-year hospital averages (March 2014 to February 2015). Finally, 1-year hospital averages were compared to national and state averages for the specific time frame of July 2013 to June 2014.

For VTE-1, the hospital outperformed national and state averages in all aspects of evaluation, with the exception of the overall average. In this case, the state average (94.2%) outperformed the hospital (93.4%). For VTE-2 and VTE-3, the hospital was outperformed by both the state and national averages in all aspects of evaluation. In contrast, for VTE-5, the hospital outperformed the state and national averages in 2 out of 3 methods of evaluation, only being outperformed by the state and national averages when compared to the hospital's overall average. See Table 2 for compliance rates between each group.

Discussion

APPE students that participated in the VTE prophylaxis program at the hospital rotated through in 4-week periods. At the beginning of each rotation, new students were educated on the program and trained in identifying patients that would be candidates for prophylaxis. Training involved one-on-one education with their pharmacy preceptor about proper VTE prophylaxis, resources available to help identify patients that need VTE prophylaxis, and how to utilize medical charts and computer software to identify patients on proper prophylaxis. Students were expected to complete the VTE prophylaxis report every morning, Monday through Friday, and communicate the results to their pharmacy preceptor. If any discrepancies were found, students

Table 2. Comparison of Average Compliance Rates of the National Hospital Inpatient Quality Measures for Venous Thromboembolism (VTE)^a.

	VTE-1 Compliance Rate	VTE-2 Compliance Rate	VTE-3 Compliance Rate	VTE-5 Compliance Rate
Hospital (October 2012 to February 2015)	93.4% (n = 40)	94.8% (n = 5)	86.4% (n = 7)	89.1% (n = 5)
Hospital (March 2014 to February 2015)	97.0% (n = 40)	93.5% (n = 5)	93.0% (n = 7)	94.2% (n = 5)
Hospital (July 2013 to June 2014)	95.8% (n = 40)	95.5% (n = 5)	91.8% (n = 7)	96.3% (n = 5)
Indiana average (July 2013 to June 2014)	94.2%	97.6%	98.4%	81.3%
National average (July 2013 to June 2014)	92.9%	96.0	95.7%	91.3%

^aN values are the average of all sample sizes taken for each measure.

Table 3. Contraindications to Chemical or Mechanical Venous Thromboembolism (VTE) Prophylaxis Frequently Documented by Doctor of Pharmacy Students.

Contraindications to chemical prophylaxis
Warfarin therapy prior to admission; on hold due to high INR
Clinically significant thrombocytopenia
Recent cerebral, gastrointestinal, or genitourinary hemorrhage
Recent intracranial or intraocular surgery or traumatic brain injury
Within 24 hours of neuroaxial anesthesia/analgesia
High-risk wound
Anticoagulation therapy not warfarin for atrial fibrillation
Continuous IV heparin therapy day of or day after admission
Patient is ambulatory and low risk for VTE
Patient/family refused
Active major bleeding
Contraindications to mechanical prophylaxis
Warfarin therapy prior to admission; on hold due to high INR
Patient/family refused
Bilateral lower extremity trauma
Bilateral lower extremity amputee
Anticoagulation therapy not warfarin for atrial fibrillation
Continuous IV heparin therapy day of or day after admission
Patient is ambulatory and low risk for VTE

Abbreviations: VTE, venous thromboembolism; INR, international normalized ratio; IV, intravenous.

were also expected to document the event appropriately and communicate directly with the physician and/or nurse of the patient at risk to resolve the issue. If contraindications to chemical or mechanical prophylaxis were identified, students were expected to complete a checkbox in the electronic medical chart outlining the specific issue (see Table 3). Documentation of all interventions took place using the electronic medical chart, as well as an Excel database file secured in the clinical pharmacy office.

It is important to note that within the 4-week time period each student was at the hospital, it was estimated that the students were responsible for completing the VTE report about 70% of the time. This is due to the fact that students only worked Monday through Friday and, occasionally, participated in activities outside of the pharmacy. When students were absent and unable to complete the report, a clinical pharmacist at the hospital assumed care of the patient list. There was also lack of weekend coverage for completing the VTE prophylaxis reports. This is one explanation for possible gaps in proper VTE prophylaxis coverage. Any patient that was admitted Friday afternoon through Sunday evening was not checked by the VTE prophylaxis program until Monday morning. According to the quality measures, proper VTE prophylaxis must be implemented within 48 hours of admission; thus, any patient admitted Friday afternoon through Saturday morning that does not initially receive proper VTE prophylaxis would be considered a “miss” if it is not corrected until Monday morning.

Of the 4 quality measures we were able to measure and compare, 2 were lower than the national and state averages in all aspects of evaluation: VTE-2 and VTE-3. This finding could be due to a few different reasons. First, for VTE-2, VTE-3, and VTE-5, the sample sizes collected for determining rates of compliance were very small. The average sample sizes for VTE-2, VTE-3, and VTE-5 were 5, 7, and 5 patients, respectively. This is compared to the average sample size of VTE-1 being 40 patients. Therefore, having a small sample size could significantly skew the data for 1 month if there is even one “miss” for that month. National and state averages have a much larger sample size, considering it is an average of all hospitals, and thus there is a much smaller risk of skewing the data, even if individual hospitals have small sample sizes.

An additional method that helped us determine why VTE-2 and VTE-3 were lower than the national and state averages was by looking at the most common reason for

Figure 1. Monthly comparison of compliance rates for venous thromboembolism prophylaxis (VTE-1).

Figure 2. Monthly comparison of compliance rates for intensive care unit venous thromboembolism prophylaxis (VTE-2).

misses in each category. For VTE-2, the most commonly documented reason for a “miss” was due to the patient being on some other type of anticoagulant, either oral (ie, warfarin, rivaroxaban, dabigatran, etc) or injectable (ie, heparin, enoxaparin, argatroban), that was not properly documented. In this case, this means that many of the documented “misses” were not actual misses in proper VTE prophylaxis. For VTE-3, the most commonly documented reason for a miss was discontinuation of overlapping/bridge anticoagulation before the INR was over 2 AND a total of 5 days of overlap therapy had passed. In some cases, bridge therapy was being discontinued after INR was therapeutic, with no regard to duration. This was a key education point for hospital staff and students to help improve this quality measure and, as seen in Figure 3, there has been a significant improvement in this measure over time.

For all quality measures, except VTE-2, there was an upward trend in compliance rates as time passed (see Figures 1-4). This is a result of improvement in the student-supported VTE program over time and demonstrates that this student-supported program has had a significant impact

in improvement of quality measures at the hospital. One dispute of this finding may be that there has been an increased awareness about proper VTE prophylaxis among hospital staff over this same time period. This is a possibility and could be due to increased awareness nationally through groups such as the NHIQM or simply because a VTE prophylaxis program was implemented at the hospital.

The next steps of this program will be to address issues that were found through evaluation of our data and possible expansion to involvement in other key quality measures outlined by NHIQM. Specific improvements in VTE-2 and VTE-3 can be made to help bring these measures above the national and state averages. This can be accomplished through evaluation of our documentation of the most common reason for misses. Improvements will come through additional education to new pharmacy students during their orientation, as well as to other hospital staff on an individual basis or in a group setting. One other simple way to potentially improve compliance rates is by expanding the VTE prophylaxis program to include week-end coverage.

Figure 3. Monthly comparison of compliance rates for venous thromboembolism patients with anticoagulation overlap therapy (VTE-3).

Figure 4. Monthly comparison of compliance rates for venous thromboembolism warfarin therapy discharge instructions (VTE-5).

Table 4. Description of Quality Measures for Stroke (STK) as described by the National Hospital Inpatient Quality Measures (NHIQM).

NHIQM 2015—STK⁹

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

Another area that is being investigated as an excellent avenue for pharmacy students' intervention is on stroke quality measures. There are 8 stroke quality measures currently supported by the NHIQM (see Table 4). A student-supported program, similar to the one presented in this article, could be implemented and included in the students' orientation and daily tasks. Proving the impact of a

student-supported program with an additional NHIQM area would be of paramount importance in the expansion of this idea.

Conclusion

With appropriate training and guidance, student pharmacists have opportunities to evaluate and intervene on specific patient care programs that lead to improvements in National Hospital Inpatient Quality Measures. This study evaluated VTE prophylaxis specifically, but opportunities to expand to other quality measures (such as stroke) are feasible and encouraged.

Authors' Note

Dr. Bergman is currently a visiting scientist at Eli Lilly & Company.

Declaration of Conflicting Interests

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References

1. Shogbon AO, Lundquist LM. Student pharmacists' clinical interventions in advanced pharmacy practice experiences at a community nonteaching hospital. *Am J Pharm Educ*. 2014;78(3):50.
2. Pham DQ. Evaluating the impact of clinical interventions by PharmD students on internal medicine clerkships: the results of a 3 year study. *Ann Pharmacother*. 2006;40:1541-1545.
3. Slaughter RL, Erickson SR, Thompson PA. Clinical interventions provided by doctor of pharmacy students. *Ann Pharmacother*. 1994;28:665-670.
4. Thompson AN, Osgood TS, Ragucci KR. Patient care interventions by pharmacy students in the intensive care unit. *Am J Health Syst Pharm*. 2007;64:1788-1789.
5. The Joint Commission. Specifications manual for national hospital inpatient quality measures. http://www.jointcommission.org/specifications_manual_for_national_hospital_inpatient_quality_measures.aspx. Accessed July 19, 2015.
6. The Joint Commission. Venous thromboembolism. http://www.jointcommission.org/venous_thromboembolism/. Accessed July 19, 2015.
7. The Joint Commission. The Joint Commission Health Care Quality Data Download Website. <http://www.healthcarequalitydata.org/>. Accessed April 18, 2015.
8. National Quality Forum. Venous thromboembolism. http://www.qualityforum.org/measures_reports_tools.aspx. Accessed July 19, 2015.
9. The Joint Commission. Stroke (SKT) Core Measure Set. <http://www.jointcommission.org/assets/1/6/Stroke.pdf>. Accessed July 19, 2015.