Using Stroke Order Sets to Improve Compliance With Quality Measures for Ischemic Stroke Admissions

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Creation of electronic health record order sets may improve adherence to The Joint Commission National Quality Measures for care of veterans with ischemic stroke.

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Stroke and cardiovascular disease (CVD) create a heavy economic burden on the health care system in the US.[1] About 795,000 people have a stroke in the US each year. In 2013, stroke was the cause of 1 in every 20 deaths in the US.[2] On average, someone in the US has a stroke every 40 seconds, and someone dies of one about every 4 minutes.[3] Stroke also accounts for 889,000 hospitalizations per year.[4,5]

Stroke has been studied widely, and evidence-based guidelines have been created for the management of stroke. Despite these published guidelines for stroke care, inconsistencies in stroke management of veterans still exist. These inconsistencies led to the creation of guidelines that include quality measurements for the care of veterans with stroke.

Several campaigns have been mounted to bolster quality care for veterans with ischemic stroke. These include the Primary Stroke Center Certification by The Joint Commission (JC),[6] Get With the Guidelines by the American Stroke Association,[7] the Paul Coverdell Registry by the Centers for Disease Control and Prevention,[8] and other efforts by the National Quality Forum (NQF) and the Centers for Medicare and Medicaid Services.[9] These organizations have independently and collaboratively established quality metrics associated with health care delivery for the care of veterans with stroke. Some of these metrics have been distinguished as performance measures, or metrics that are suitable for public reporting, and may be used for comparing institutions and rewarding those who meet specific thresholds (ie, pay for performance).[10]

The aim of this project was to increase compliance at the Atlanta VA Medical Center (VAMC) in Decatur, Georgia, with JC National Quality Measures for the care of veterans with ischemic stroke, thus providing optimal care for veterans admitted for ischemic stroke management.

There are 3 phases in the management of a patient with a stroke: stroke presentation, admission/management, and discharge. This project focused on the admission/management phase. The stroke presentation phase is completed in the emergency department (ED), and the discharge phase has a check list for stroke, including atrial fibrillation (AF) and counseling prior to discharge. Data from the check list and counseling were not included in this project.

Specific attention was given to the following JC measures: stroke (STK) 1, STK 5, and STK 10 because the Atlanta VAMC was below the national average for these core measures for fiscal year 2015. Compliance was accomplished by creating order sets for the admission and subsequent care of veterans with ischemic stroke, tracking order set usage, and reporting regularly to the medicine/admitting team members on use rates and meeting quality measures. This project underwent the quality vs research review process and was determined to be a quality improvement (QI) project, so the project did not require institutional review board approval.

METHODS

At the Atlanta VAMC, all patients admitted for stroke workup or management are admitted to the medicine service. The medicine admitting teams are composed of an attending physician, a medicine resident, a nurse practitioner (NP), a pharmacist, and 2 interns; and the hospitalist team composed of a hospitalist. The project began January 1, 2016, and ended December 31, 2016.

The hospitalist created evidence-based admission orders for all patients admitted for stroke or transient ischemic attack (TIA). The measures used were from the JC Specification Manual for Joint Commission National Quality as well as The American College of Cardiology/American Heart Association classification of care metrics.[5]

The order sets were reviewed and confirmed by a neurologist. The JC quality measures required for the care of patients admitted for stroke management were embedded in these order sets. These order sets were placed directly under the general admission orders in the Computerized Patient Record System (CPRS) (Figures 1 and 2). Every admitting physician was oriented to where the order sets were placed and how to use them. The order sets were reviewed and approved by the local pharmacy and therapeutic committee. The admitting physicians were then requested to use the stroke order set for the admission and care of every veteran admitted for further management of stroke.

The quality measures included:
- STK 1: Veteran admitted for stroke received venous thromboembolic (VTE) prophylaxis in a timely manner. Pharmacologic management for VTE prophylaxis with subcutaneous low-molecular weight heparin and/or application of bilateral sequential compression devices were tracked.
- STK 5: Veteran admitted for stroke administered antithrombotic therapy by end of hospital day 2. Aspirin, aspirin/dipyridamole, and ticlopidine were tracked.
- STK 10: Veteran admitted for stroke assessed for rehabilitation services during admission. Physical therapy and occupational therapy consult placements were tracked. Quality measures, such as ad-

FIGURE 1 Where to Find Order Set in the Computerized Patient Record System

FIGURE 2 Layout of Order Set
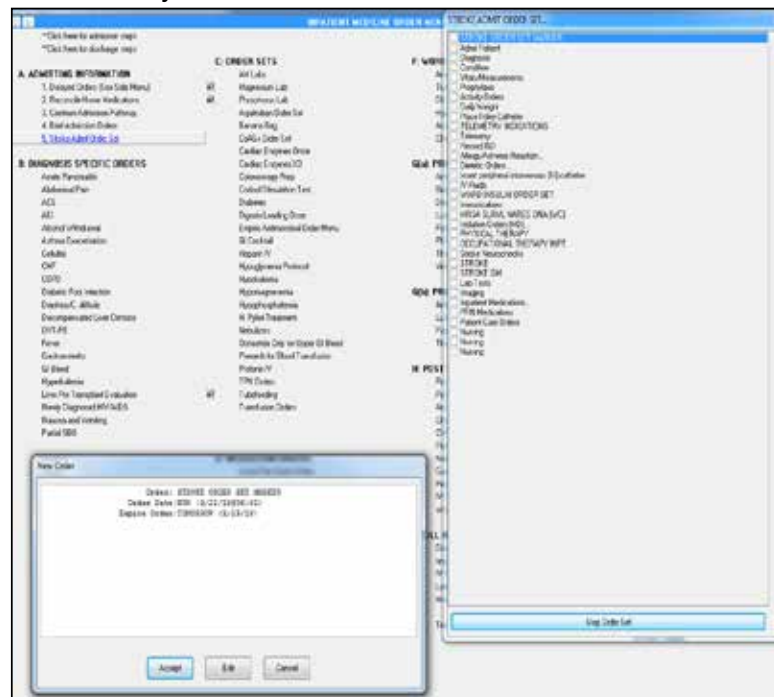
ministration of tissue plasminogen activator (tPA), were not embedded in the order set because veterans who met the criteria for tPA were immediately administered tPA in the ED or transferred to the closest stroke center.

In this QI project, only quality measures that had to be completed in the inpatient

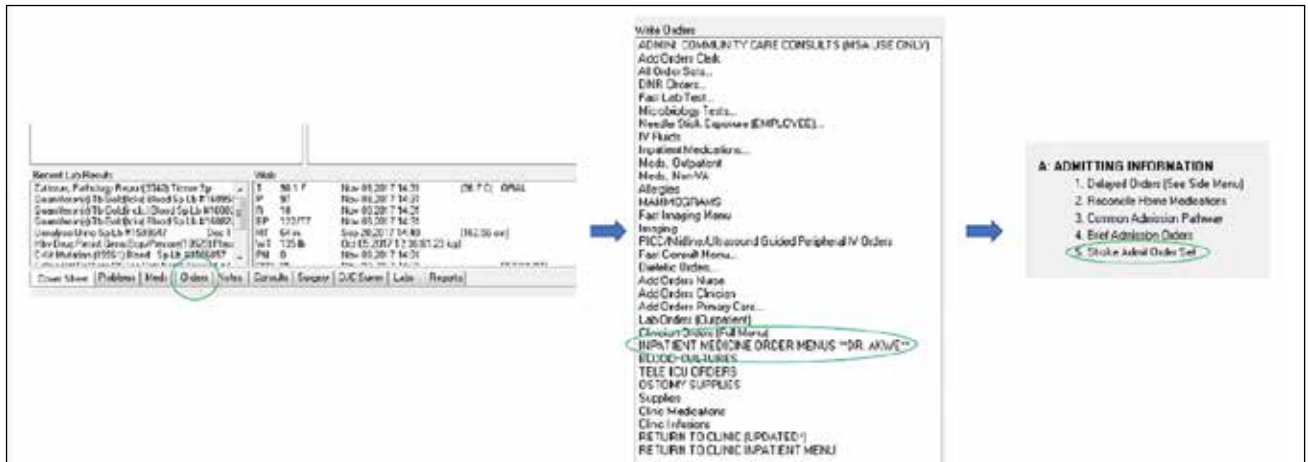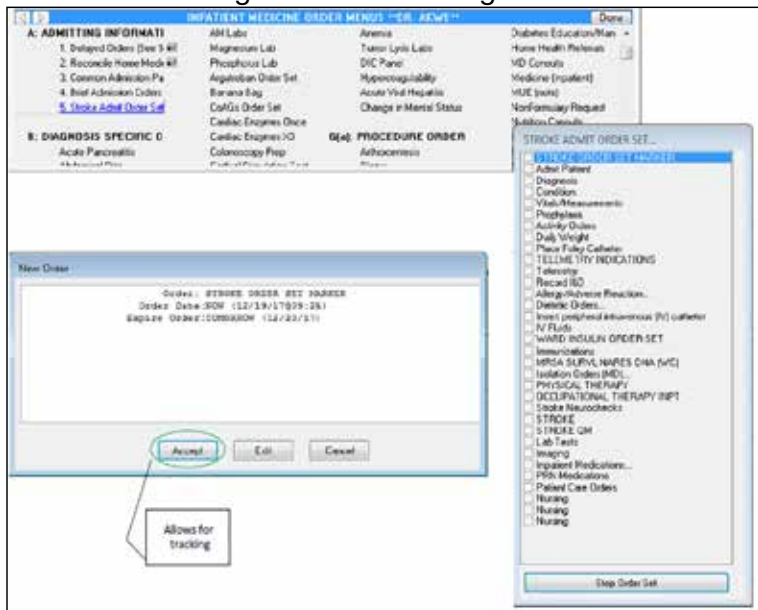**FIGURE 3A** Navigating to the Stroke Admit Order Set

FIGURE 3B Tracking of Order Set Usage

ing the unique identifier Stroke Order Set Marker, which allowed for querying using structured query language (SQL) within the Corporate Data Warehouse. By joining with information specialists, a SQL query was written to pull all stroke admissions, which included the admitting medicine team and order set use. The order set use was tracked every time the orders were accepted (Figures 3A and 3B).
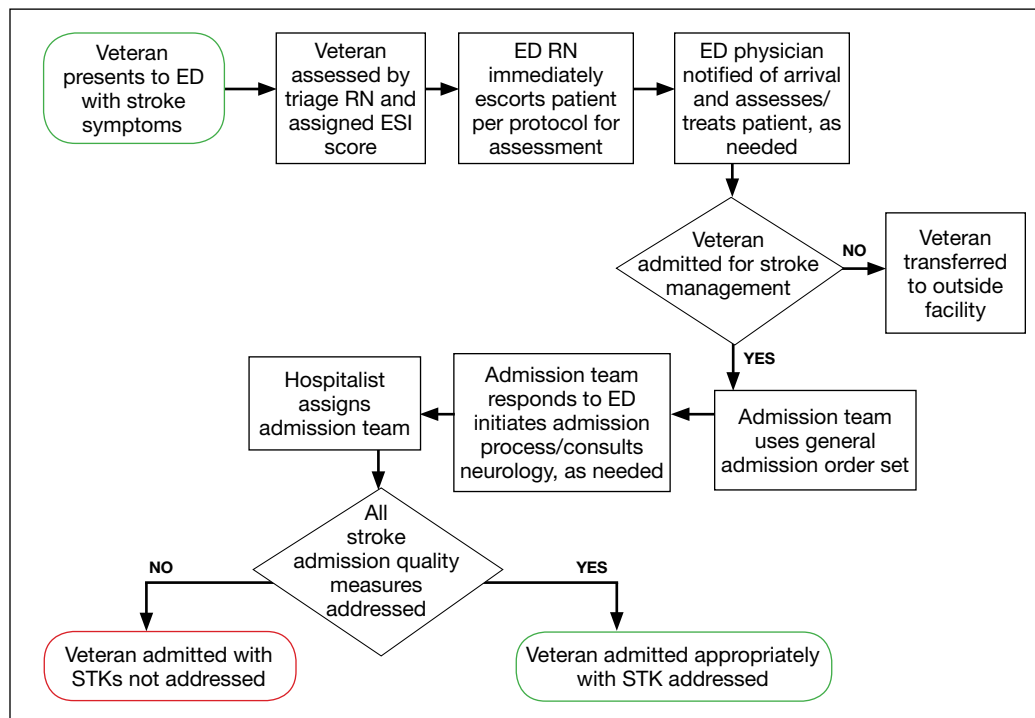
Next, all admissions were checked through chart review for compliance with quality measures. Admissions that had not been completed for all quality measures were identified, and the physicians or NPs caring for those veterans were alerted. These order sets were supposed to be used during admission of all patients admitted for stroke management or workup; however, some patients were admitted without the use of the order sets.

The successful completion of the quality measures were then compared between the groups of patients admitted using the order set and the group of patients in which the order set was not used at their admission. The physicians were provided acceptable reasons, including contraindications to certain medications such as patient history of allergy. The admitting physician made decisions on the antiplatelet medications to use or on neurology recommendations. The neurology department was consulted on all patients who had acute or subacute ischemic stroke findings on magnetic resonance imaging (MRI).

setting were included. Quality measures such as tPA administration, National Institutes of Health (NIH) Stroke Scale timely documentation, swallow screen prior to po intake, and stroke transfers were completed in the ED prior to clearance for admission, so these were not included in the project. The Atlanta VAMC ED has protocols to care for these patients, but they do not have order sets with markers that could trace their usage.

All admission orders placed were reviewed by a QI team to check whether the stroke order set had been used. The ability to determine order set use was accomplished by add-

FIGURE 4 Preintervention Flow Chart for Stroke Admissions

Abbreviations: ED, emergency department; ESI, Emergency Severity Index; RN, registered nurse; STK, The Joint Commission stroke quality measures.

At the beginning of the month, internal medicine residents from Emory University and Morehouse School of Medicine received orientation on the use of the stroke order set from the team NP and chief resident. Tips on how to use the CPRS and how to access the stroke order sets also were created. Whenever a medicine team was called to admit a patient for stroke/TIA management, the ED doctors reminded the admitting physician to use the order set. The NP reminded the team to use the order set on their admission days.

One challenge the project faced was the continuous change in the admitting team pool: Some residents did not remember to use the stroke order sets. Another challenge was that the CPRS had no prompt for the admitting physician to use the order set. Other challenges existed for using the stroke order set for continuous compliance improvement at its creation (Figures 4 and 5).

RESULTS
Of 323 admitted patients with stroke, 93 admissions were entered using the stroke order set.

Out of these completed orders, 85 (91%) veterans admitted for ischemic stroke or TIA management received timely VTE prophylaxis, and 8 (9%) veterans did not. Of the 230 admissions completed without using the stroke order set, 167 (73%) veterans received timely VTE prophylaxis, and 63 (28%) veterans did not. Additionally out of the 93 veterans admitted using the stroke order set, 74 (80%) veterans admitted for the management of ischemic stroke received antithrombotic therapy by end of hospital day 2, whereas 19 (20%) veterans did not, and there were no clear contraindications documented as to why.

For veterans admitted without using the order set, 167 (73%) veterans admitted for the management of ischemic stroke received antithrombotic therapy by the end of hospital day 2, whereas 76 (33%) veterans did not. Last, 90 (97%) of the 93 veterans admitted for stroke workup using the order set were assessed for rehabilitation services during admission, whereas 3 (3%) were not. For the veterans who were admitted without using the stroke order set, 162 (70%) were assessed

FIGURE 5 Postintervention Flow Chart for Stroke Admissions
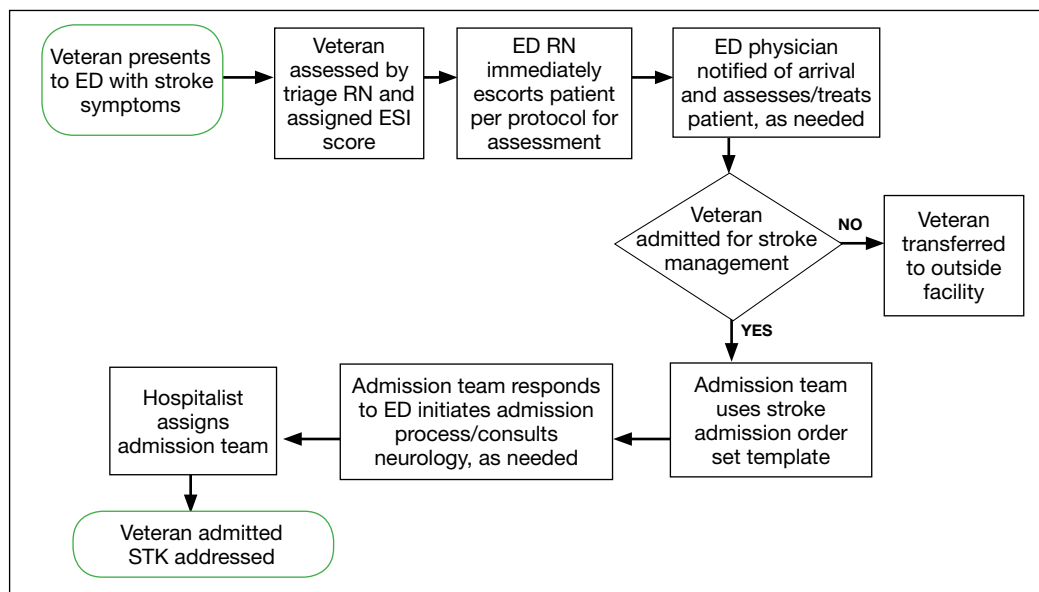
Abbreviations: ED, emergency department; ESI, Emergency Severity Index; RN, registered nurse; STK, The Joint Commission stroke quality measures.

for rehabilitation services during admission, whereas 68 (30%) were not.

Out of 969 compliance measures looked at, 237 measures were missed and 732 measures were appropriately completed irrespective of whether the stroke order set was used. Out of the 279 admissions where the stroke order set was used, 249 (89%) quality measures were met. Out of the 690 admissions where the stroke order set was not used, 207 (30%) quality measures were missed, compared with 30 (11%) of the quality measures missed when the stroke order set was used ($P < .001$) (Table).

The study threshold for meeting the standards was the national average for 2015, which was 91.1% for the administration of VTE prophylaxis in a timely manner, 97.9% for administering antithrombotic therapy by end of hospital day 2, and 94.2% for assessment of the patient by rehabilitation services during the admission.

DISCUSSION

Despite the repeated training and orientation, compliance to the order set usage was not optimal, likely secondary to a frequent change in the pool of admitting physicians using the order set. Also, the order set was new to staff,

thus, admitting physicians sometimes forgot to use them. The next step in this project will be to create an order set for the ED with markers for tracing usage. These order sets will include all quality measures that need to be completed in the ED, such as the NIH Stroke Scale timely documentation, tPA administration data, swallow screen prior to po intake, and stroke transfers.

This QI project also streamlined the process for stroke admissions. With the creation of the order set, all orders needed for stroke were available to the admitting physician, resulting in less need for searching the order individually from a large pool of orders (Figures 3 and 4).

Several reputable institutions have quality metrics and performance measures typically focused on processes of care based on specific clinical guidelines recommendations. Clinical guidelines are usually based on sufficient evidence that failure to provide the recommended care is likely to result in suboptimal clinical outcomes. Stroke quality measure compliance is part of the Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU) initiative, and most hospitals will be required to report these measures in order to receive full Medicare payments.[11]

Limitations

Limitations of this study relate to CPRS functions, which must be specifically activated at different VA sites in order to enable the use of these functions. Also, the successful creation of these order sets depended on the information specialist's knowledge of the capabilities of the CPRS.

CONCLUSION

Gaps in practice and recommended guidelines can be bridged by creating standardized admission orders embedded with required quality measures. The Atlanta VAMC project showed that the use of a standardized stroke admission order set significantly improved compliance to quality measures for veterans admitted for ischemic stroke management. This is consistent with a study completed in the ED, which showed that for veterans hospitalized for acute ischemic stroke, electronic order set use was associated with increased use of IV tPA.[12] Creating order sets can be challenging, but if these barriers can be overcome, with the first order set, similar templates can be used to create order sets for other clinical conditions, such as heart failure, sepsis, and chronic obstructive pulmonary disease exacerbation.

Author disclosures

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Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies.

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TABLE Results of Use of Stroke Order

The Joint Commission Measures	Stroke Order Set Used		Stroke Order Set Not Used		P Value
	Not Missed, No. (%)	Missed, No. (%)	Not Missed, No. (%)	Missed, No. (%)	
STK 1: Timely VTE prophylaxis administered	85 (91)	8 (9)	167 (73)	63 (28)	< .002
STK 5: Veteran received antithrombotic therapy by end of hospital day 2.	74 (80)	19 (20)		76 (33)	< .035
STK 10: Veteran assessed for rehabilitation services during admission	90 (97)	3 (3)	162 (70)	68 (30)	< .001
Total	**249 (89)**	**30 (11)**	**483 (70)**	**207 (30)**	**< .001**

Abbreviations: STK, The Joint Commision stroke quality measures; VTE, venous thromboembolism.