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Venous thromboembolism performance measurement in the United States: An evolving landscape with many stakeholders

Barbara I. Braun, PhD[1], **Karen M. Kolbusz, MBA, BSN, RN**[2], **Michele R. Bozikis, MPH**[1], **Stephen P. Schmaltz, PhD**[1], **Karon Abe, PhD, CAPT, USPHS**[3,4], **Nimia L. Reyes, MD, MPH**[3,4], **Michelle N. Dardis, MSN, MBA, RN**[2]

[1]Department of Research, Division of Healthcare Quality Evaluation and Improvement, The Joint Commission, Oakbrook Terrace, Illinois, USA

[2]Department of Quality Measurement, Division of Healthcare Quality Evaluation and Improvement, The Joint Commission, Oakbrook Terrace, Illinois, USA

[3]Epidemiology & Surveillance Branch, Division of Blood Disorders and Public Health Genomics, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

[4]National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Abstract

Venous thromboembolism (VTE), including deep vein thrombosis and pulmonary embolism, is a life-threatening, costly, and common preventable complication associated with hospitalization. Although VTE prevention strategies such as risk assessment and prophylaxis are available, they are not applied uniformly or systematically across US hospitals and healthcare systems. Hospital-level performance measurement has been used nationally to promote standardized approaches for VTE prevention and incentivize the adoption of guideline-based care management. Though most measures reflect care processes rather than outcomes, certain domains including diagnosis, treatment, and continuity of care remain unmeasured. In this article, we describe the development of VTE prevention measures from various stakeholders, measure strengths and limitations, publicly reported rates, the impact of technology and health policy on measure use, and perspectives on future options for surveillance and performance monitoring.

INTRODUCTION

Since 2000, several organizations have promulgated and often required reporting of performance measures focusing on venous thromboembolism (VTE) and related conditions. As the science of performance measurement has evolved, there have been substantial

Correspondence: Karen M. Kolbusz, MBA, BSN, RN, Department of Quality Measurement, Division of Healthcare Quality Evaluation and Improvement, The Joint Commission, One Renaissance Blvd, Oakbrook Terrace, IL 60181, USA. kkolbusz@jointcommission.org.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

changes to VTE measurement which may not be well understood by front-line hospital providers and staff.

This article aims to provide an overview of VTE-related performance measurement activities including:

- How the measures were developed and used by various stakeholders
- A description of individual measures, their strengths and limitations, and publicly reported measure rates
- How these measures have evolved over time with changes in technology and policy, and
- Perspectives on future opportunities for enhanced VTE surveillance and performance monitoring.

Though a comprehensive patient-centered approach to VTE prevention addresses care across the continuum of care settings (e.g., transitions to ambulatory and post-acute care settings), this article focuses on the inpatient hospital setting where the majority of performance measurement activities have occurred. It expands on the work of Michota et al. by addressing measure changes over time.[1]

Much of the measure implementation information comes from The Joint Commission's experience in VTE measure development and/or published literature. Initial and last reported measure rate information was obtained by downloading the data sets from the CMS Hospitals archived data snapshots website.[2]

THE IMPORTANCE OF MEASURING VTE-RELATED PERFORMANCE

VTE is a common preventable hospital complication, frequently extending the length of stay and increasing hospital mortality.[3–5] Each year in the United States, it is estimated that VTE, including deep vein thrombosis (DVT) and pulmonary embolism (PE), affects as many as 900,000 people, is responsible for up to 300,000 deaths, and is associated with healthcare costs of approximately $10 billion.[6,7] Hospital-associated venous thromboembolism (HA-VTE) is often preventable but VTE prevention strategies, including risk assessment and appropriate prophylaxis, are not applied uniformly or systematically across US hospitals and healthcare systems.[8]

Performance measures indicate the level to which care processes conform to established care standards including clinical guidelines.[9] When standardized within or across hospitals, performance measures can be used:

- To assess organization-level baseline performance and track changes over time, including changes following a quality improvement intervention or to compare performance between specific patient populations or units.[10]
- To establish provider-level benchmarks and provide feedback to clinicians on their performance and peer-based comparisons.[11]

- To provide national estimates of performance for policymakers and guideline developers.
- To satisfy the measurement and reporting requirements of regulatory bodies and accrediting organizations.
- To help inform consumers' and insurers' choice of providers based on performance measure rates.
- To drive change through payer-led initiatives such as financial incentives or penalties tied to levels of performance.

Although there are many benefits to using performance measures, publicly reported performance measures can have adverse effects, especially when rewards and penalties are applied.[12] For example, VTE prophylaxis measures may encourage inappropriate anticoagulation in low-risk patients leading to unintended bleeding events when measures do not incorporate risk assessment.[13] Gaming can occur when staff influence measured performance by intentionally altering factors other than care processes, such as when adding medical record documentation after discharge (e.g., reason for no prophylaxis) intending to ensure passing of a measure.[11,14] Also, the strength of the evidence linking greater hospital-level use of prophylaxis to lower rates of VTE in certain patient populations has been questioned.[15,16] The effectiveness of applying financial incentives and penalties to performance measure data remains controversial.[17–19]

EARLY VTE-RELATED MEASURES (2000–2010) USED IN PUBLIC REPORTING

Over the years, several major US stakeholders have engaged in VTE measure-related activities, including the National Quality Forum, the Centers for Medicare and Medicaid Services, The Joint Commission, and the Agency for Healthcare Research and Quality.

In 2003, the National Quality Forum (NQF), a not-for-profit membership-based organization, convened an expert steering committee to identify consensus standards and measures for public reporting that would advance VTE prevention and care. Shortly thereafter, NQF released a seminal report which included a framework for the relationship among policies, practices, and performance measures as well as an initial set of policy and practice statements, 17 key characteristics of preferred practices, and two measures of VTE prophylaxis for surgery patients.[9] The report called for the use of multidisciplinary teams to determine VTE prevention and care activities that address four domains:

- *Risk assessment*: Standardized, externally validated VTE risk assessment models (RAMs) are tools that can promote comparison across different units within hospitals as well as across hospitals.
- *Prophylaxis*: VTE prophylaxis includes a variety of pharmacological or mechanical interventions that may be implemented during hospitalization to prevent a VTE.

- *Diagnosis*: Diagnostic testing is necessary to confirm a VTE diagnosis whenever patients present with suspected VTE or develop symptoms during the hospital stay.
- *Treatment*: Therapeutic management of VTE primarily consists of anticoagulation therapy with either vitamin K antagonists or direct oral anticoagulant medications. Thrombolytic therapy and/or surgical procedures may be indicated for some patients.

Collaborative measure-related efforts among NQF, CMS, and the Joint Commission

In 2005, NQF collaborated with The Joint Commission to issue a call for VTE-related structure, process, or outcome measures. With guidance from a Technical Advisory Panel and the NQF Steering Committee, candidate measures were identified, developed, and pilot tested by The Joint Commission from 2005 to 2007 and endorsed by NQF in 2008.[20]

CMS soon joined efforts with NQF and The Joint Commission to add VTE to its list of hospital-reported core measures. This collaboration resulted in a final set of six measures specified for manual data collection from the medical record (known as chart-abstracted measures) and added to the CMS/Joint Commission aligned *Specifications Manual for National Inpatient Quality Measures*, Version 3.0b in October 2009. See Table 1 for a description of each measure.

The chart-abstracted VTE measures were publicly reported by CMS under the Inpatient Quality Reporting (IQR) Program on the Hospital Compare website from 2013 through 2019 as part of several quality-related initiatives. These initiatives included financial incentives for reporting and/or penalties for poor performance.[21,22] These data were also used in The Joint Commission's ORYX initiative which integrated performance measurement data into the accreditation process.[23] ORYX chart-abstracted data used for accreditation continue to be publicly reported on The Joint Commission's Quality Check website.[24] Table 2 presents CMS publicly reported baseline measure rates and latest values.

CMS and CDC collaborative efforts for Surgical Care Improvement Project (SCIP) measures

In 2006, CMS launched SCIP, a national partnership between CMS and CDC, with the goal of lowering surgical morbidity and mortality.[25] Following a 2008 Surgeon General report, two measures specific to VTE prophylaxis were added to the SCIP measure set to address the extent to which patients in certain surgical populations had an order or actually received prophylaxis.[5] These were later used in CMS quality reporting programs and by The Joint Commission.[26,27] Tables 1 and 2 describe the current status and rates for the SCIP VTE measures.

FROM CHART-ABSTRACTED TO DIGITAL MEASURE DATA COLLECTION

In approximately 2009, the field of performance measurement transitioned to an electronic data collection approach as a result of the American Recovery and Reinvestment Act (ARRA) and the Health Information Technology for Economic and Clinical Health

(HITECH) Act. ARRA included a mandate to incentivize healthcare providers to use an electronic health record. HITECH promoted the adoption and meaningful use of health information technology and encouraged the development of health information systems through the establishment of standards and requirements for the electronic transmission of certain health information.[28]

The collection of performance measure data electronically started with developing electronic clinical quality measures (eCQMs). CMS describes eCQMs as tools that help measure and track the quality of health care services that eligible hospitals and critical access hospitals (CAHs) provide, as generated by a provider's electronic health record (EHR).[29]

In 2010, The Joint Commission began to re-engineer the chart abstracted VTE measures as eCQMs. VTE-1 and VTE-2 were developed as eCQMs (eVTE-1 and eVTE-2) and trialed by hospitals on a voluntary basis in 2015. CMS implemented eVTE-1 and eVTE-2 in 2016 as part of the IQR program. As of January 2023, eCQM data are publicly available from CMS at the hospital level.[30] In alignment with CMS, The Joint Commission ORYX performance measurement requirements for 2023 include submitting a minimum of four eCQMs from a list of 16 available eCQMs, which includes VTE eCQMs. As of June 2023, The Joint Commission has not publicly reported any eCQM data on its website.[31]

Beginning in 2020, the concept of electronic measurement evolved to encompass digital quality measures (dQMs).[32] dQMs accommodate data from electronic sources beyond the EHR (e.g., registries, case management systems). dQMs use structured, coded data to pull health information that can be electronically transmitted via interoperable systems. An eCQM is one example of a dQM.[33] Eventually, the intent is to evolve from semi-automated to fully automated electronic measures.

Patient safety indicators (PSIs)

The Agency for Healthcare Research and Quality (AHRQ), the lead Federal agency charged with improving healthcare safety and quality, considers delivery of appropriate VTE prophylaxis to be an essential patient safety practice.[10,34,35] To facilitate improvement, AHRQ supported development and updates to a VTE-related guidance document entitled "Preventing Hospital-Associated Venous Thromboembolism: A Guide for Effective Quality Improvement."[10,36]

Regarding measurement, AHRQ developed a set of PSIs for potentially avoidable in-hospital complications and adverse events under a contract with the University of California Davis, University of California San Francisco, and Stanford University.[37] PSIs are currently used by hospitals to assess the incidence of specific patient events and in CMS performance-based payment initiatives. PSI 12 "Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate" is among several indicators that comprise a composite measure for monitoring performance over time.[38] See Tables 1 and 2 for additional information.

OTHER VTE-RELATED MEASURES

In 2007, the CDC's Paul Coverdell National Acute Stroke Registry partnered with the Joint Commission and the American Heart Association/American Stroke Association to develop and release stroke performance measures.[39] The VTE-related measure used in this program relates to the timeliness of VTE prophylaxis as described in Table 1 (STK-1). This same measure is used by The Joint Commission in its Disease-Specific Care (DSC) stroke center certification programs.[40] Certified primary stroke centers, thrombectomy-capable stroke centers, and comprehensive stroke centers are required to collect and submit data monthly for this measure to achieve and sustain these certification designations.

The American College of Surgeons (ACS) stewards a hospital based, risk and case-mix-adjusted measure related to DVT and PE to monitor clinical outcomes as defined by the ACS National Surgical Quality Improvement Program for adult surgical patients 65 years of age and older. The American Academy of Neurology (AAN) developed a VTE measure related to stroke and stroke rehabilitation, and the American Society of Plastic Surgeons (ASPS) developed a VTE measure related to perioperative care.[41]

Recently, CMS contracted with IMPAQ International, LLC research services to develop new eCQMs about harm to hospitalized patients for possible use in CMS programs. A medication-related bleeding measure is under modification following the completion of initial testing.[42] Another measure targeting surgical patients who experience harm related to a postoperative VTE during hospitalization is under development.[43]

POSSIBLE FOCUS AREAS FOR FUTURE MEASUREMENT

Despite the large number of measures and their widespread use nationally, there remain several domains of VTE-related care that are not currently being addressed.[9] Examples of gaps in measuring performance include VTE and bleeding risk assessment at admission, changing risk levels during hospitalization, surveillance for hospital-associated VTE events, appropriateness of treatment, continuity of care at discharge to other settings, and patient medication adherence over time. Regarding risk assessment, though more than 15 externally validated VTE and bleeding RAMs exist, there is currently no consensus on which VTE RAMs are preferred in the United States.[44] Incorporating validated risk assessment models into clinical decision support systems should facilitate accurate and less burdensome measurement of the appropriateness of prophylaxis and enable linkage to VTE outcomes.[45,46] Another domain for future measures is diagnostic testing. Testing to confirm a VTE diagnosis is a necessary component for future measure development related to therapeutic management.

Beyond topic area gaps, most existing measures reflect processes rather than outcomes. Though process measures may be easier to interpret and may not require risk adjustment, outcome measures are needed to validate the appropriateness of the processes.[47] However, outcome measures need to be carefully constructed to minimize surveillance bias.[48]

Others are exploring the development of patient-reported outcome-based performance measures (PRO-PM). A PRO-PM "is a way to aggregate the information from patients into

a reliable, valid measure of performance at the measured entity level"; it is unclear whether these measures have been developed for VTE-related topics.[49] Artificial intelligence (AI) presents an opportunity to proactively predict and prevent VTE. Researchers have applied a variety of AI methods to predicting differing types of VTE; however, guidance for implementing AI models within clinical practice remains immature and policymakers are actively considering frameworks for safe and ethical use of AI in health care.[50,51]

MEASURE IMPLEMENTATION CONSIDERATIONS FOR EVALUATING VTE-RELATED PERFORMANCE

One key step toward enhancing VTE measures nationally is prioritizing what is most important to measure. This often requires a consensus process among stakeholders. To be considered for national use, performance measures must meet criteria established for measure endorsement including (a) important to measure, (b) scientifically acceptable, (c) feasible to collect, and (d) useable and relevant.[52] After development, a measure must undergo preimplementation testing.[53] Ongoing maintenance and evaluation are essential steps to ensure continued relevance and assess the impact and usefulness of measures over time.

Measure implementation considerations are paramount to minimize the burden of data collection and maximize the effectiveness of using the measures for improvement. CMS recognized the burden and misalignment potential that multiple performance measurement requirements can create and proposed a new approach to aligning measures across its more than 20 quality programs. The Universal Foundation, based on a "building block" approach, will address gaps and increase the use of outcome, patient-reported, and digitally reportable measures.[54] It is not yet known whether the Universal Foundation effort will address VTE-related measures.

CMS will also leverage the Fast Healthcare Interoperability Resources (FHIR) technology which emphasizes interoperability in data collection for digital quality measures using a standardized terminology, a data model, and a transport mechanism.[55] FHIR is the modern, internet-based approach selected by the Office of the National Coordinator (ONC) to transport data between various IT applications. As of December 2022, all ONC-certified IT developers must provide their customers with FHIR-based application programming interfaces (APIs).[56] The next phase of implementation will require healthcare organizations to exchange quality measure information in FHIR. The Joint Commission has since translated the VTE eCQMs to FHIR for this purpose.

In collaboration with CMS, CDC has begun evaluating the feasibility of implementing FHIR-based healthcare-associated VTE surveillance through the CDC's National Healthcare Safety Network (NHSN), the nation's largest tracking system for healthcare-associated infections. The NHSN is developing FHIR-based digital patient safety measures that include the topic of VTE.[57] This effort has the potential to become a national surveillance system for VTE that captures process and outcome performance measure data across the continuum of care settings.

DISCUSSION

This article describes the evolution of data collection and uses for hospital-level VTE-related performance measures over time. Additionally, it is intended to stimulate thinking regarding future measurement options and activities.

Perhaps the most substantial change in VTE measurement has been the shift from chart-based measures to digital measures. The extent to which shifting to digital quality measures will improve measure accuracy and reduce the burden remains to be determined. The usefulness of current and future measures depends on how interpretable the data are and how sensitive the measures are to changes in care – the most important measure of usefulness for quality improvement. Of course, perceived usefulness will vary depending on who is using the measures and for what purpose; history has shown it is impossible for individual measures to satisfy all possible users.[58]

Though this article has focused on standardized measurement for external entities, it is important to note the value of measurement for internal quality improvement. Measuring performance within hospitals over time is integral to a promising approach for improving performance known as anticoagulation stewardship, which is modeled after major activities involved in antimicrobial and diagnostic stewardship. In 2022, the NQF together with The Anticoagulation Forum released a guidance document listing core elements for anticoagulation stewardship which include securing administrative leadership commitment, establishing accountability with a multidisciplinary approach, measuring performance, and implementing reliable care processes across the continuum.[59]

Limitations

The scope of measures addressed in this paper did not include measures used for ambulatory care or clinician-level performance measurement. One can find examples of ambulatory measures in other measure repositories such as the CMS Measure Inventory Tool (CMIT).[60] We did not systematically search the literature for other organizations that may have developed relevant measures and may have missed other organizations active in or new to the VTE measurement arena. There may also be other VTE measure strengths and weaknesses not described in Table 1.

CONCLUSIONS

Though measurement of VTE-related performance has been in the national spotlight for many years, there remain gaps in processes being measured and several opportunities for improvement. Examples of topic areas for future measurement include risk assessment, appropriateness of prophylaxis and treatment, as well as continuity of care across settings. The transition to digital quality measures has the potential to incorporate greater clinical detail with less data collection burden while addressing more topic areas with enhanced specificity. Additional research is needed to demonstrate the accuracy of data collection and the value of using these measures in public reporting. Innovative initiatives are needed to progress toward the goal of improving patient safety and health outcomes for all at risk of VTE.

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TABLE 1

Summary of venous thromboembolism related national performance measures for hospitals.

Measure identifier, name, and steward	Measure description	National implementation dates (start to end)	Use and current status (as of June 2023)	Comments (strengths, weaknesses)
SCIP-VTE-1 Surgery patients with recommended VTE prophylaxis ordered CBE ID 0217,[a,b] Measure steward: CMS	This measure assesses the percentage of surgery patients with recommended VTE prophylaxis ordered anytime from hospital arrival to 48 h after surgery end time	October 1, 2008 to December 31, 2015	CMS and The Joint Commission Retired	Strengths: • Emphasizes timely VTE prophylaxis • Focuses on the physician order process • Recommends VTE prophylaxis options for specified groups of surgical patients Weaknesses: • Nonspecific for care setting: non-ICU versus ICU • Retrospective data collection • Variation may exist in the assignment of ICD codes
SCIP-VTE-2 Surgery patients who received appropriate VTE prophylaxis within 24 h prior to surgery to 24 h after surgery CBE ID 0218,[a,b] Measure steward: CMS	This measure assesses the percentage of surgery patients who received appropriate VTE prophylaxis within 24 h prior to surgical incision time to 24 h after surgery end time	October 1, 2008 to December 31, 2015	CMS and The Joint Commission Retired	Strengths: • Emphasizes timely VTE prophylaxis • Focuses on the administration process • Recommends VTE prophylaxis options for specified groups of surgical patients[c] Weaknesses: • Consecutive doses and missed doses not measured after 24 h post-op • Nonspecific for care setting: non-ICU versus ICU • Narrow time frame within 24 h before or after surgery[c] • Retrospective data collection[c] • Variation may exist in the assignment of ICD codes
VTE-1 VTE prophylaxis CBE ID 0371[a] Measure steward: The Joint Commission	This measure assesses the percentage of patients who received VTE prophylaxis or have documentation why no VTE prophylaxis was given the day of or the day after hospital admission or surgery end date for surgeries that start the day of or the day after hospital admission	January 1, 2013 to June 30, 2016 Chart abstracted measure for manual abstraction. Reengineered as electronic clinical quality measure eVTE-1	CMS and The Joint Commission Retired	Strengths: • Emphasizes timely VTE prophylaxis • Focuses on non-ICU setting Weaknesses: • Captures only the first dose administered:

Measure identifier, name, and steward	Measure description	National implementation dates (start to end)	Use and current status (as of June 2023)	Comments (strengths, weaknesses)
				• process steps between initial dose and VTE outcome not measured[f] • Consecutive doses and missed doses not measured • Appropriateness of the type of prophylaxis selected for individuals or groups of patients not measured[c] • Narrow time frame; prophylaxis on the day of or day after admission (or the day of or the day after surgery for surgeries that start the day of or the day after hospital admission)[c] • Retrospective data collection[c] • Variation may exist in the assignment of ICD codes
VTE-2 Intensive Care unit VTE prophylaxis CBE ID 0372[a] Measure steward: The Joint Commission	This measure assesses the percentage of patients who received VTE prophylaxis or have documentation of why no VTE prophylaxis was given the day of or the day after the initial admission (or transfer) to the ICU or surgery end date for surgeries that start the day of or the day after ICU admission (or transfer).	January 1, 2013, to June 30, 2016 Chart abstracted measure for manual abstraction. Reengineered as electronic clinical quality measure eVTE-2.	CMS and The Joint Commission Retired	Strengths: • Emphasizes timely VTE prophylaxis • Focuses on ICU setting Weaknesses: • Captures only the first dose administered: • process steps between initial dose and VTE outcome not measured[f] • Consecutive doses and missed doses not measured • Appropriateness of the type of prophylaxis selected for individuals or groups of patients not measured[c] • Narrow time frame; prophylaxis on the day of or day after ICU admission or transfer[c] • Retrospective data collection[c] • Variation may exist in the assignment of ICD codes
VTE-3 VTE patients with anticoagulation overlap therapy CBE ID 0373[a] Measure steward: The Joint Commission	This measure assesses the percentage of patients diagnosed with confirmed VTE who received an overlap of parenteral (IV or subcutaneous [subcu]) anticoagulation and warfarin therapy. For patients who received less than 5 days of overlap therapy, they should be discharged on both medications or have a *Reason for Discontinuation of Parenteral Therapy*. Overlap therapy should be administered for at least	January 1, 2013 to June 30, 2016	CMS and The Joint Commission Retired	Strengths: • Emphasized the benefit of overlap therapy to achieve optimal anticoagulation for the treatment of acute VTE. Weaknesses: • Complex measure; challenging to manual abstract from a paper medical record. • Retrospective data collection

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Measure identifier, name, and steward	Measure description	National implementation dates (start to end)	Use and current status (as of June 2023)	Comments (strengths, weaknesses)
	5 days with an INR greater than or equal to 2 before discontinuation of the parenteral anticoagulation therapy, discharged on both medications or have a *Reason for Discontinuation of Parenteral Therapy*.			• Variation may exist in the assignment of ICD diagnosis codes
VTE-4 VTE patients receiving unfractionated heparin with dosages/ platelet count monitoring by protocol CBE ID 0374[a] Measure steward: The Joint Commission	This measure assesses the percentage of patients diagnosed with confirmed VTE who received IV UFH therapy dosages AND had their platelet counts monitored using defined parameters such as a nomogram or protocol.	January 1, 2013 to September 30, 2015	CMS and The Joint Commission Retired	Strengths: • Encouraged use of weight-based a PTT-adjusted UFH protocols over standard UFH dosing to achieve therapeutic anticoagulation. • HIT occurs more commonly in patients who receive UFH than in those who receive LMWH. To detect HIT, platelet count monitoring is recommended for all patients treated with UFH. Weaknesses: • Protocols for managing IV UFH were not defined in the measure specifications; lack of a standardized nomogram • Retrospective data collection • Variation may exist in the assignment of ICD codes
VTE-5 VTE discharge instructions CBE ID 0375[a] Measure steward: The Joint Commission	This measure assesses the percentage of patients diagnosed with confirmed VTE that are discharged to home, home care, court/law enforcement, or home on hospice care on warfarin with written discharge instructions that address **all** four criteria: compliance issues, dietary advice, follow-up monitoring, and information about the potential for adverse drug reactions/interactions.	January 1, 2013, to December 31, 2016	CMS and The Joint Commission Retired	Strengths: • Patient education promotes successful outcomes and may help reduce hospital readmission. • Complemented the Joint Commission National Patient Safety Goal “Reduce the likelihood of patient harm associated with the use of anticoagulant therapy.”[d] Weaknesses: • Measured patient education documentation rather than the quality of education provided or the impact on health outcomes. • Retrospective data collection • Variation may exist in the assignment of ICD codes
VTE-6 Incidence of potentially preventable VTE CBE ID 0376[a] Measure steward: The Joint Commission	This measure assesses the percentage of patients diagnosed with confirmed VTE during hospitalization (not present at admission) who did not receive VTE prophylaxis between hospital admission and the day before the VTE diagnostic testing order date.	January 1, 2013, to December 31, 2019 2013 to Present	CMS and The Joint Commission (Retired for CMS) Chart-abstracted measure currently used for Joint Commission Hospital Accreditation	Strengths: • Outcome measure rather than process measure Weaknesses: • Complex measure; challenging to manually abstract from a paper medical record.

Measure identifier, name, and steward	Measure description	National implementation dates (start to end)	Use and current status (as of June 2023)	Comments (strengths, weaknesses)
				• Restricted to patients with nonprincipal diagnosis of VTE not present on admission[c] • Excludes patients with VTE present on admission[c] • Assumes that VTE was not preventable if prophylaxis was administered before the VTE diagnostic order date[c] • Not risk-adjusted • Retrospective data collection • Variation may exist in the assignment of ICD codes
STK-1 VTE prophylaxis CBE ID 0434[a] Measure steward: The Joint Commission	This measure assesses the percentage of ischemic or hemorrhagic stroke patients who received VTE prophylaxis or have documentation why no VTE prophylaxis was given the day of or the day after hospital admission	January 1, 2013, to June 30, 2016 2005 to Present	CMS and The Joint Commission (Retired for CMS) Chart-abstracted measure currently used for Joint Commission Disease-Specific Care Stroke Certification programs for primary stroke centers, thrombectomy-capable stroke centers, and comprehensive stroke centers Reported by the American Heart Association/American Stroke Association Get With The Guidelines® (GWTG)—Stroke Registry and the CDC Paul Coverdell National Acute Stroke Registry (PCNASR)	Strengths: • Emphasizes timely VTE prophylaxis • Focuses only on patients assigned and ICD-10-CM Principal Diagnosis Code for ischemic or hemorrhagic stroke Weaknesses: • Captures only the first dose administered: process steps between initial dose and VTE outcome not measured[f] • Consecutive doses and missed doses not measured • Appropriateness of the type of prophylaxis selected for individual stroke patients not measured[c] • Narrow time frame; prophylaxis (day of or day after admission[c] • Retrospective data collection[c] • Variation may exist in the assignment of ICD codes
eVTE-1 VTE prophylaxis CMIT ID 758[e] Measure steward: The Joint Commission	This measure assesses the percentage of patients who received VTE prophylaxis or have documentation of why no VTE prophylaxis was given the day of or the day after hospital admission or surgery end date for surgeries that start the day of or the day after hospital admission	2016 to Present	CMS and The Joint Commission eCQMs CMS voluntary IQR reporting 2015 eCQMs CMS required 2016 Electronic clinical quality measure (eCQM) currently used for CMS Inpatient Quality Reporting (IQR) Program and Joint Commission	Strengths: • Emphasizes timely VTE prophylaxis • Focuses on non-ICU setting • Electronic abstraction • Uses some structured data sets (e.g., SNOMED, Rx Norm, LOINC) Weaknesses: • Captures only the first dose administered:

Measure identifier, name, and steward	Measure description	National implementation dates (start to end)	Use and current status (as of June 2023)	Comments (strengths, weaknesses)
			Hospital Accreditation Program (HAP)	• process steps between initial dose and VTE outcome not measured[f] • Consecutive doses and missed doses not measured • Appropriateness of the type of prophylaxis selected for individuals or groups of patients not measured[c] • Narrow timeframe; prophylaxis on the day of or day after admission (or the day of or the day after surgery for surgeries that start the day of or the day after hospital admission)[c] • Variation may exist in the assignment of ICD codes
eVTE-2 Intensive care unit venous thromboembolism prophylaxis CMIT ID 399[e] Measure steward: The Joint Commission	This measure assesses the percentage of patients who received VTE prophylaxis or have documentation of why no VTE prophylaxis was given the day of or the day after the initial admission (or transfer) to the ICU or surgery end date for surgeries that start the day of or the day after ICU admission (or transfer).	2016 to Present	CMS and The Joint Commission eCQMs CMS voluntary IQR reporting 2015 eCQMs CMS required 2016 eCQM currently used for CMS IQR Program and Joint Commission Hospital Accreditation Program (HAP)	Strengths: • Emphasizes timely VTE prophylaxis • Focuses on ICU setting • Electronic abstraction • Uses some structured data sets (e.g., SNOMED, Rx Norm, LOINC) Weaknesses: • Captures only the first dose administered: • process steps between initial dose and VTE outcome not measured[f] • Consecutive doses and missed doses not measured • Appropriateness of the type of prophylaxis selected for individuals or groups of patients not measured[c] • Narrow time frame; prophylaxis on the day of or day after ICU admission or transfer[c] • Variation may exist in the assignment of ICD codes
PSI-12 Perioperative pulmonary embolism or deep vein thrombosis rate CBE ID 0450[a] Measure steward: AHRQ	This measure reports the rate of perioperative pulmonary embolism or proximal deep vein thrombosis (secondary diagnosis) per 1000 surgical discharges for patients ages 18 years and older	July 31, 2008, to May 10, 2021	Agency for Healthcare Research and Quality	Strengths: • Focuses on National Quality Strategy priorities • Focuses only on patients with surgical diagnoses or operating room procedure codes[c] • Outcome measure Weaknesses:

Measure identifier, name, and steward	Measure description	National implementation dates (start to end)	Use and current status (as of June 2023)	Comments (strengths, weaknesses)
				• Some patients who are readmitted with VTE may be captured, but only if VTE is not the primary reason for admission[c] • Not risk-adjusted
PSI-90 Patient safety and adverse events composite (New Version) **PSI-90** Complication/ patient safety for selected indicators composite (old version) CBE ID 0531[a] Measure steward: CMS	This measure is a composite that summarizes patient safety across multiple indicators for the CMS Medicare fee-for-service population. Note: PSI-12 is one of the indicators included in this composite measure.	September 16, 2021 New Version FY 2023, 2024, 2025, 2026 Old Version FY 2018	CMS Current Use: Payment Program, Public Reporting, Regulatory and Accreditation Programs	Strengths: • Focuses on highly prevalent conditions • Patient-and caregiver-focused • Low data collection burden • Outcome-focused • Risk adjusted Weaknesses: N/A

Note: CBE ID number formerly NQF ID number before March 27, 2023. Abbreviations: AHRQ, Agency for Healthcare Research and Quality; aPTT, activated partial thromboplastin clotting time; CBE, consensus based entity; CDC, Centers for Disease Control and Prevention; CMS, Centers for Medicare & Medicaid Services; CMIT, Centers for Medicare & Medicaid Services Measures Inventory Tool; eCQM, electronic clinical quality measure; FY, Fiscal Year; GWTG, Get With The Guidelines®; HAP, hospital accreditation program; HIT, heparin induced thrombocytopenia; ICD, International Classification of Diseases; ICD 10 CM, International Classification of Diseases, Tenth Revision, Clinical Modification; ICU, intensive care unit; INR, international normalized ratio; IPPS, inpatient prospective payment system; IQR, inpatient quality reporting; IV, intravenous; LMWH, low molecular weight heparin; LOINC, logical observation identifier names and codes; N/A, not applicable; NQF, National Quality Forum; ORYX, Performance Measurement System for Joint Commission Hospital Accreditation; PCNASR, Paul Coverdell National Acute Stroke Registry; PSI, patient safety indicator; Rx Norm, normalized names for clinical drugs; a standardized nomenclature for clinical drugs; SCIP, surgical care improvement project; SNOMED, Systematized Nomenclature of Medicine; SNOMED CT, Systematized Nomenclature of Medicine—Clinical Terms; STK, stroke; Sub cu, subcutaneous; TBD, to be determined; UFH, unfractionated heparin; VTE, venous thromboembolism.

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[b] Centers for Medicare and Medicaid Services. HVBP measures. Hospital Value Based Purchasing (HVBP) Program FY 2020–2028 measures. 2023. Accessed on 2023 June 8. https://qualitynet.cms.gov/inpatient/hvbp/measures.

[c] Maynard.[10]

[d] National Patient Safety Goal, NPSG.03.05.01. https://www.jointcommission.org/standards/national-patient-safety-goals/hospital-national-patient-safety-goals/.

[e] Centers for Medicare and Medicaid Services. Measures Inventory. 2023. Accessed on 2023 June 8. https://cmit.cms.gov/cmit/#/MeasureInventory.

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TABLE 2

CMS reported VTE performance measure rates.

Measure identifier and name	First data year reported[a]	Number of hospitals	Aggregate (national) rate (%)	Last data year reported	Number of hospitals	Aggregate (national) rate (%)
SCIP-VTE-1 Surgery patients with recommended VTE prophylaxis ordered	2008	4417	91.7	2012	3566	98.4
SCIP-VTE-2 Surgery patients who received appropriate VTE prophylaxis within 24 h prior to surgery to 24 h after surgery	2008	4415	89.2	2015	545[b]	99.5
VTE-1 VTE prophylaxis	2013	3510	88.0	2015	3618	94.2
VTE-2 ICU VTE prophylaxis	2013	2972	93.6	2015	2935	97.1
VTE-3 VTE patients with anticoagulation overlap therapy	2013	2755	94.2	2015	2486	94.0
VTE-4 VTE patients receiving unfractionated heparin with dosages/ platelet count monitoring by protocol	2013	2020	98.1	2015	581[b]	99.4
VTE-5 VTE discharge instructions	2013	2559	82.0	2016	1957	92.9
VTE-6 Incidence of potentially preventable VTE	2013	1386	7.2	2018	1248	2.4
STK-1 VTE prophylaxis	2013	2726	88.0	2016	2680	97.6
eVTE-1[c] VTE prophylaxis	2022	2935	89.5	NA	NA	NA
eVTE-2[c] ICU VTE prophylaxis	2022	3011	95.8	NA	NA	NA
PSI-12[d] Perioperative VTE rate	2013	3124	4.67	2022	2992	3.63
PSI-90[d] Patient safety composite	2013	3404	0.88	2022	3074	1.00

Note: Twenty-four months of hospital discharge data are required before public reporting. This note is part of footnote c and does not apply to the whole table. Abbreviations: eVTE, electronic venous thromboembolism (clinical quality measure); ICU, intensive care unit; NA, not available; PSI, patient safety indicator; SCIP, surgical care improvement project; STK, stroke; VTE, venous thromboembolism.

[a]Data for the table were obtained by downloading the data sets from the CMS Hospitals archived data snapshots website, https://data.cms.gov/provider-data/archived-data/hospitals, one data set for each year. Most of the measures were obtained from the Timely_and_Effective_Care-Hospital data files, with the exception of the PSI measures which were obtained from the CMS_PSI_decimal_file data file. The numerators and denominators were then aggregated over each measure in the annual data set to compute the results in the table, except for the PSI data where the values were averaged over hospitals. Twelve months of hospital discharge data are required before public reporting.

[b] Partial year reporting due to change in CMS requirements.

[c] First year with 12 months of data; prior years (2016–2021) required one or two self-selected quarters of data; reporting voluntary in 2015.

[d] Methodology for calculating PSIs has changed over time.