eCQM Component	Description
eCQM Title	**Hospital Harm - Postoperative Venous Thromboembolism**
eCQM Identifier (Measure Authoring Tool)	1061
NQF Number	Not Applicable
eCQM Version Number	0.0.024
GUID	7e887cc3-8e90-401c-bb55-ba4c562cb03c
Measurement Period	January 1, 20XX through December 31, 20XX
Measure Steward	Centers for Medicare & Medicaid Services (CMS)
Measure Developer	IMPAQ International
Endorsed By	None
Description	The proportion of inpatient hospitalizations for patients 18 years of age or older at admission, who have at least one surgical procedure during the encounter, and who suffer the harm of a postoperative venous thromboembolism (VTE) during the encounter. A postoperative venous thromboembolism (VTE) is defined as a pulmonary embolism (PE) or deep vein thrombosis (DVT) following a surgical procedure during the encounter.
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Measure Scoring	Proportion
Measure Type	Outcome
Stratification	None
Risk Adjustment	None
Rate Aggregation	None

eCQM Component	Description
Rationale	In-hospital postoperative venous thromboembolism (VTE) is associated with poor clinical outcomes including fatal pulmonary embolism (PE), post-thrombotic syndrome in the leg, and anticoagulation related bleeding (Bysshe et al., 2017). Despite a reported 17% reduction in the incidence of postoperative VTE between 2014 to 2017, the rate of postoperative VTE in hospitals remains high in the United States (Agency for Healthcare Research and Quality, 2017), leaving opportunity to further reduce the occurrence of these events. The American College of Chest Physicians (ACCP) estimates the cumulative untreated 35-day postoperative risk of VTE is 4.3% (PE 1.5%, deep vein thrombosis (DVT) 2.8%) after major orthopedic surgery (Falck-Ytter et al., 2012). The ACCP estimates this risk decreased to 1.8% (PE 0.55%, DVT 1.25%) when patients were treated with low molecular weight heparin (Falck-Ytter et al., 2012). Moreover, one study found, that Medicare's implementation of a policy to not reimburse hospitals for cases of hospital acquired PE or DVT was associated with a 35% lower incidence of these adverse events (Gidwani et al., 2015). These findings suggest that 1) there remains room for improvement, and 2) a reimbursement policy that penalizes poor patient safety outcomes can be a significant driver in reducing the incidence of hospital-acquired VTE. Adoption of this measure has the potential to improve the quality of care for surgical patients and, therefore, advance the quality of care in patient safety, which is a priority area identified by the National Quality Strategy (Agency for Healthcare Research and Quality, 2017). While this measure is an adapted version of an existing measure for perioperative VTE (PSI 12), re-specification as an eCQM would fill a gap in measurement for the all-payer population.
Clinical Recommendation Statement	This measure identifies acute postoperative VTE events diagnosed and treated in the hospital. Rates of postoperative VTE can be considered an indicator of the quality of care provided by a hospital, and this measure will help to identify hospitals that have persistently high rates. This measure could incentivize hospitals to reduce the incidence of postoperative VTE and enable them to more reliably assess harm reduction efforts and modify their quality improvement efforts in near real-time.
Improvement Notation	A lower proportion indicates better quality.
Reference	Reference Type: CITATION Reference Text: 'Maynard G. Preventing Hospital-Associated Venous Thromboembolism: A Guide for Effective Quality Improvement. 2nd ed. Rockville, MD: Agency for Healthcare Research and Quality; 2016. https://www.ahrq.gov/patient-safety/resources/vtguide/appc.html.'
Reference	Reference Type: CITATION Reference Text: 'O'Donnell M, Weitz JI. Thromboprophylaxis in surgical patients. Can J Surg. 2003;46(2):129-135.'
Reference	Reference Type: CITATION Reference Text: 'Agency for Healthcare Research and Quality. National Scorecard on Hospital-Acquired conditions Updated Baseline Rates and Preliminary Results 2014-2017.'

eCQM Component	Description
Reference	Reference Type: CITATION Reference Text: 'Bysshe T, Yue Gao M, Krysta Heaney-Huls M, et al. Draft Final Report Estimating the Additional Hospital Inpatient Cost and Mortality Associated with Selected Hospital Acquired Conditions.; 2017. www.ahrq.gov.'
Reference	Reference Type: CITATION Reference Text: 'Carey K, Stefos T. Measuring the cost of hospital adverse patient safety events. Health Econ. 2011;20:1417-1430. doi:10.1002/hec.1680.'
Reference	Reference Type: CITATION Reference Text: 'Rogers SO, Kilaru RK, Hosokawa P, Henderson WG, Zinner MJ, Khuri SF. Multivariable Predictors of Postoperative Venous Thromboembolic Events after General and Vascular Surgery: Results from the Patient Safety in Surgery Study. J Am Coll Surg. 2007;204(6):1211-1221. doi:10.1016/j.jamcollsurg.2007.02.072.'
Reference	Reference Type: CITATION Reference Text: 'Caprini JA. Thrombosis risk assessment as a guide to quality patient care. Disease-a-Month. 2005;51:70-78. doi:10.1016/j.disamonth.2005.02.003.'
Reference	Reference Type: CITATION Reference Text: 'Gould MK, Garcia DA, Wren SM, et al. Prevention of VTE in nonorthopedic surgical patients. Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2012;141(2):e227S-e277S. doi:10.1378/chest.11-2297.'
Reference	Reference Type: CITATION Reference Text: 'Falck-Ytter Y, Francis CW, Johanson NA, et al. Prevention of VTE in orthopedic surgery patients. Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2012;141(2):e278S-e325S. doi:10.1378/chest.11-2404.'
Reference	Reference Type: CITATION Reference Text: 'Kearon C, Akl EA, Ornelas J, et al. Antithrombotic Therapy for VTE Disease. Chest. 2016;149(2):315-352. doi:10.1016/j.chest.2015.11.026.'
Reference	Reference Type: CITATION Reference Text: 'Anderson DR, Morgano GP, Bennett C, et al. American Society of Hematology 2019 guidelines for management of venous thromboembolism: Prevention of venous thromboembolism in surgical hospitalized patients. Blood Adv. 2019;3(23):3898-3944. doi:10.1182/bloodadvances.2019000975.'

eCQM Component	Description
Reference	Reference Type: CITATION Reference Text: 'Konstantinides S V., Meyer G, Bueno H, et al. 2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European respiratory society (ERS). Eur Heart J. 2020;41(4):543-603. doi:10.1093/eurheartj/ehz405.'
Reference	Reference Type: CITATION Reference Text: 'Excellence NI for H and C. Venous Thromboembolism in over 16s: Reducing the Risk of Hospital-Acquired Deep Vein Thrombosis or Pulmonary Embolism.; 2018. https://www.nice.org.uk/guidance/ng89/resources/venous-thromboembolism-in-over-16s-reducing-the-risk-of-hospitalacquired-deep-vein-thrombosis-or-pulmonary-embolism-pdf-1837703092165.'
Reference	Reference Type: CITATION Reference Text: 'Kahn SR, Diendéré G, Morrison DR, et al. Effectiveness of interventions for the implementation of thromboprophylaxis in hospitalised patients at risk of venous thromboembolism: An updated abridged Cochrane systematic review and meta-analysis of randomised controlled trials. BMJ Open. 2019;9:e024444. doi:10.1136/bmjopen-2018-024444.'
Reference	Reference Type: CITATION Reference Text: 'Agency for Healthcare Research and Quality. Patient Safety Indicator 12 (PSI 12) Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate. 2019. https://www.qualityindicators.ahrq.gov/Downloads/Modules/PSI/V2019/TechSpecs/PSI_12_Perioperative_Pulmonary_Embolism_or_Deep_Vein_Thrombosis_Rate.pdf.'
Reference	Reference Type: CITATION Reference Text: 'Geerts WH, Bergqvist D, Pineo GF, et al. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines (8th edition). Chest. 2008;133(6):381S-453S. doi:10.1378/chest.08-0656.'
Reference	Reference Type: CITATION Reference Text: 'Avorn J, Winkelmayer WC. Comparing the costs, risks, and benefits of competing strategies for the primary prevention of venous thromboembolism. Circulation. 2004;110(Suppl IV):IV 25-IV32. doi:10.1161/01.CIR.0000150642.10916.ea.'
Reference	Reference Type: CITATION Reference Text: 'Sadeghi B, Romano PS, Maynard G, et al. Mechanical and suboptimal pharmacologic prophylaxis and delayed mobilization but not morbid obesity are associated with venous thromboembolism after total knee arthroplasty: A case-control study. J Hosp Med. 2012;7(9):665-671. doi:10.1002/jhm.1962.'

eCQM Component	Description
Reference	Reference Type: CITATION Reference Text: 'Chandrasekaran S, Ariaretnam SK, Tsung J, Dickison D. Early mobilization after total knee replacement reduces the incidence of deep venous thrombosis. ANZ J Surg. 2009;79:526-529. doi:10.1111/j.1445-2197.2009.04982.x.'
Reference	Reference Type: CITATION Reference Text: 'Pearse EO, Caldwell BF, Lockwood RJ, Hollard J. Early mobilisation after conventional knee replacement may reduce the risk of post-operative venous thromboembolism. J Bone Jt Surg - Ser B. 2007;89-B(3):316-322. doi:10.1302/0301-620X.89B3.18196.'
Reference	Reference Type: CITATION Reference Text: 'CDC. Diagnosis and Treatment of Venous Thromboembolism. https://www.cdc.gov/ncbddd/dvt/diagnosis-treatment.html#:~:text=Duplex ultrasonography is an imaging,when a clot breaks up. Published 2020.'
Reference	Reference Type: CITATION Reference Text: 'Lim W, Le Gal G, Bates SM, et al. American Society of Hematology 2018 guidelines for management of venous thromboembolism: Diagnosis of venous thromboembolism. Blood Adv. 2018;2(22):3226-3256. doi:10.1182/bloodadvances.2018024828.'
Reference	Reference Type: CITATION Reference Text: 'Ortel TL, Neumann I, Ageno W, et al. American Society of Hematology 2020 guidelines for management of venous thromboembolism: treatment of deep vein thrombosis and pulmonary embolism. Blood Adv. 2020;4(19):4693-4738. doi:10.1182/bloodadvances.2020001830.'
Reference	Reference Type: CITATION Reference Text: 'Marashi SM. Venous thromboembolism (VTE) harm measurement and risk assessment in real-time using electronic health records (EHR). 2018.'
Reference	Reference Type: CITATION Reference Text: 'The Joint Commission. VTE-6 Hospital Acquired Potentially-Preventable Venous Thromboembolism.'
Reference	Reference Type: CITATION Reference Text: 'Saving Lives and Saving Money: Hospital-Acquired Conditions Update. Rockville, MD; 2016. https://www.ahrq.gov/hai/pfp/2014-final.html.'

eCQM Component	Description
Reference	Reference Type: CITATION Reference Text: 'Gidwani R, Bhattacharya J. CMS Reimbursement Reform and the Incidence of Hospital-Acquired Pulmonary Embolism or Deep Vein Thrombosis. J Gen Intern Med. 2015;30(5):588-596. doi:10.1007/s11606-014-3087-3.'
Reference	Reference Type: CITATION Reference Text: 'Agency for Healthcare Research and Quality. About the National Quality Strategy. https://www.ahrq.gov/workingforquality/about/index.html. Published 2017. Accessed July 23, 2020.'
Reference	Reference Type: CITATION Reference Text: 'White RH, Keenan CR. Effects of race and ethnicity on the incidence of venous thromboembolism. Thromb Res. 2009;123(SUPPL. 4). doi:10.1016/S0049-3848(09)70136-7.'
Definition	Inpatient hospitalizations: Includes time in the emergency department or observation when these encounters are within an hour of the inpatient admission. A postoperative venous thromboembolism (VTE) is defined as a pulmonary embolism (PE) or deep vein thrombosis (DVT) during the encounter for postoperative patients, with VTE not present on admission (POA). Present on admission (POA) is defined as the conditions present at the time the order for inpatient admission occurs. The POA Indicator is intended to differentiate conditions present at the time of admission from those conditions that develop during the inpatient admission. A POA Indicator of Y = yes (Diagnosis was present at time of inpatient admission). A POA Indicator of N = no (Diagnosis was not present at time of inpatient admission.) A POA Indicator of W = clinically undetermined A POA Indicator of U = documentation insufficient to determine if the condition was present at the time of inpatient admission

eCQM Component	Description
Guidance	To calculate the hospital-level measure result, divide the total numerator events by the total number of qualifying encounters (denominator). For qualifying encounters (denominator), include all patients 18 years of age or older at the start of the encounter who have a surgical procedure during the encounter. Exclude encounters from the denominator for patients with: 1. A venous thromboembolism (VTE) diagnosis Present On Admission (POA) Indicator = Y (Diagnosis was present at time of inpatient admission) or W (Clinically undetermined). 2. An obstetrical condition diagnosis during the encounter. To create the numerator, for each encounter identify an occurrence of postoperative VTE. Evidence of a postoperative VTE is determined by: A diagnostic imaging study performed after the surgery and at least one of the following: 1) A non-heparin anticoagulation therapy within 24 hours after the imaging study. OR 2) Heparin therapy within 24 hours after the imaging study, with at least 2 aPTT heparin therapy monitoring tests or at least 2 Anti Factor Xa Assays within 35 hours of the start of heparin therapy administration. OR 3) Placement of an inferior vena cava (IVC) filter within 24 hours after the imaging study. OR 4) An encounter diagnosis of VTE not present on admission. Only one harm (qualifying postoperative VTE) is counted per encounter. This eCQM is an episode-based measure. An episode is defined as each inpatient hospitalization or encounter that ends during the measurement period. This version of the eCQM uses QDM version 5.6. Please refer to the eCQI resource center (https://ecqi.healthit.gov/qdm) for more information on the QDM.
Transmission Format	TBD
Initial Population	Inpatient hospitalizations where the patient is 18 years of age or older at the start of the encounter, and at least one surgical procedure was performed during the encounter.
Denominator	Equals Initial Population

eCQM Component	Description
Denominator Exclusions	Inpatient hospitalizations for patients with venous thromboembolism (VTE) present on admission, as evidenced by a diagnosis Present On Admission (POA) Indicator = Y (Diagnosis was present at time of inpatient admission) or W (Clinically undetermined) Inpatient hospitalizations for patients with obstetrical conditions.
Measure Observations	
Numerator	Inpatient hospitalizations for patients with a postoperative venous thromboembolism (VTE). Evidence of a postoperative VTE is determined by: A diagnostic imaging study performed after the surgery and at least one of the following: 1) A non-heparin anticoagulation therapy within 24 hours after the imaging study. OR 2) Heparin therapy within 24 hours after the imaging study, with at least 2 aPTT heparin therapy monitoring tests or at least 2 Anti Factor Xa Assays within 35 hours of the start of heparin therapy administration. OR 3) Placement of an inferior vena cava (IVC) filter within 24 hours after the imaging study. OR 4) An encounter diagnosis of VTE not present on admission.
Numerator Exclusions	None
Denominator Exceptions	None
Supplemental Data Elements	For every patient evaluated by this measure also identify payer, race, ethnicity and gender

Terminology

- code "aPTT in Blood by Coagulation assay" ("LOINC Code (3173-2)")
- code "Birth date" ("LOINC Code (21112-8)")
- code "Heparin unfractionated [Units/volume] in Platelet poor plasma by Chromogenic method" ("LOINC Code (3274-8)")
- valueset "Abdominal or Pelvic CT Scan with Contrast" (2.16.840.1.113762.1.4.1147.160)
- valueset "CT Angiography of Chest" (2.16.840.1.113762.1.4.1147.155)
- valueset "Emergency Department Visit" (2.16.840.1.113883.3.117.1.7.1.292)
- valueset "Encounter Inpatient" (2.16.840.1.113883.3.666.5.307)
- valueset "Ethnicity" (2.16.840.1.114222.4.11.837)
- valueset "General or Neuraxial Anesthesia" (2.16.840.1.113883.3.666.5.1743)

- valueset "Heparin for VTE Treatment" (2.16.840.1.113762.1.4.1147.179)
- valueset "Inferior Vena Cava (IVC) Filter Placement" (2.16.840.1.113762.1.4.1147.151)
- valueset "Non Heparin Anticoagulants for VTE Treatment" (2.16.840.1.113762.1.4.1147.172)
- valueset "Observation Services" (2.16.840.1.113762.1.4.1111.143)
- valueset "Obstetrics" (2.16.840.1.113883.3.117.1.7.1.263)
- valueset "Obstetrics VTE" (2.16.840.1.113883.3.117.1.7.1.264)
- valueset "ONC Administrative Sex" (2.16.840.1.113762.1.4.1)
- valueset "Payer" (2.16.840.1.114222.4.11.3591)
- valueset "Present on Admission = Yes or Clinically Undetermined" (2.16.840.1.113762.1.4.1147.197)
- valueset "Present on Admission = No or Documentation Insufficient to Determine" (2.16.840.1.113762.1.4.1147.198)
- valueset "Pulmonary Ventilation/Perfusion (VQ) Scan" (2.16.840.1.113762.1.4.1147.170)
- valueset "Race" (2.16.840.1.114222.4.11.836)
- valueset "Ultrasound of Upper or Lower Extremities" (2.16.840.1.113762.1.4.1147.165)
- valueset "Venous Thromboembolism" (2.16.840.1.113883.3.117.1.7.1.279)

Data Criteria (QDM Data Elements)

- "Diagnosis: Obstetrics" using "Obstetrics (2.16.840.1.113883.3.117.1.7.1.263)"
- "Diagnosis: Obstetrics VTE" using "Obstetrics VTE (2.16.840.1.113883.3.117.1.7.1.264)"
- "Diagnostic Study, Performed: Abdominal or Pelvic CT Scan with Contrast" using "Abdominal or Pelvic CT Scan with Contrast (2.16.840.1.113762.1.4.1147.160)"
- "Diagnostic Study, Performed: CT Angiography of Chest" using "CT Angiography of Chest (2.16.840.1.113762.1.4.1147.155)"
- "Diagnostic Study, Performed: Pulmonary Ventilation/Perfusion (VQ) Scan" using "Pulmonary Ventilation/Perfusion (VQ) Scan (2.16.840.1.113762.1.4.1147.170)"
- "Diagnostic Study, Performed: Ultrasound of Upper or Lower Extremities" using "Ultrasound of Upper or Lower Extremities (2.16.840.1.113762.1.4.1147.165)"
- "Encounter, Performed: Emergency Department Visit" using "Emergency Department Visit (2.16.840.1.113883.3.117.1.7.1.292)"
- "Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient (2.16.840.1.113883.3.666.5.307)"
- "Encounter, Performed: Observation Services" using "Observation Services (2.16.840.1.113762.1.4.1111.143)"
- "Laboratory Test, Performed: aPTT in Blood by Coagulation assay" using "aPTT in Blood by Coagulation assay (LOINC Code 3173-2)"
- "Laboratory Test, Performed: Heparin unfractionated [Units/volume] in Platelet poor plasma by Chromogenic method" using "Heparin unfractionated [Units/volume] in Platelet poor plasma by Chromogenic method (LOINC Code 3274-8)"
- "Medication, Administered: Heparin for VTE Treatment" using "Heparin for VTE Treatment (2.16.840.1.113762.1.4.1147.179)"
- "Medication, Administered: Non Heparin Anticoagulants for VTE Treatment" using "Non Heparin Anticoagulants for VTE Treatment (2.16.840.1.113762.1.4.1147.172)"
- "Patient Characteristic Birthdate: Birth date" using "Birth date (LOINC Code 21112-8)"
- "Patient Characteristic Ethnicity: Ethnicity" using "Ethnicity (2.16.840.1.114222.4.11.837)"
- "Patient Characteristic Payer: Payer" using "Payer (2.16.840.1.114222.4.11.3591)"
- "Patient Characteristic Race: Race" using "Race (2.16.840.1.114222.4.11.836)"
- "Patient Characteristic Sex: ONC Administrative Sex" using "ONC Administrative Sex (2.16.840.1.113762.1.4.1)"
- "Procedure, Performed: General or Neuraxial Anesthesia" using "General or Neuraxial Anesthesia (2.16.840.1.113883.3.666.5.1743)"
- "Procedure, Performed: Inferior Vena Cava (IVC) Filter Placement" using "Inferior Vena Cava (IVC) Filter Placement (2.16.840.1.113762.1.4.1147.151)"