Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.
eFigure 1. Diagram of Venous Thromboembolism Events Considered Hospital Acquired

According to Time of Diagnosis

| Pre-existing VTE | HA-VTE | Unrelated VTE |
|------------------|--------|---------------|
| Prior to admission | Day 0 of admission | 48 hours post admission | Rest of admission | Day of discharge | 90 days post discharge |
eFigure 2. Diagram of Criteria and Logic for Determination of Hospital-Acquired Venous Thromboembolism Events

Indication of definitive diagnosis: CT definitive for PE (#pe2)

Indication of diagnosis (at least one of):
- ICD codes for VTE
- Abnormal vascular ultrasound (DVT)
- CT suspicious for PE (#pe1)

Indication of VTE treatment or death (at least one):
- Referral to anticoagulation clinic
- First visit with anticoagulation clinic
- New blood thinner Rx
- New ICD for "long-term anticoagulation"
- IVC filter
- Death from VTE during admission

Indication of definitive diagnosis: CT definitive for PE (#pe2)

OR

AND

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**eFigure 3.** Histogram of No. of Days Between Discharge and Detection of Hospital-Acquired Venous Thromboembolism Event

*eFigure 3 legend:* histogram depicting the distribution of the number of days from discharge until detection of a HA-VTE event
eFigure 4. Time Course of Hospital-Acquired Venous Thromboembolism Events Occurring During Admission or After Discharge

eFigure 4 legend: time course of HA-VTE events that happened during the index admission or after discharge, with cases censored at 90 days after discharge.
eFigure 5. Mortality Rates With No. at Risk

Cumulative mortality rate

Days to Mortality

Number at risk

| Condition           | Days to Mortality |
|---------------------|-------------------|
| HA PE + DVT         | 1263 1279 1260 1240 1213 1181 1151 1118 1083 1046 1027 1008 989 970 959 946 936 923 911 |
| HA-DVT              | 7946 7853 7721 7553 7385 7210 7043 6898 6746 6591 6478 6300 6207 6116 6049 5978 5917 5827 |
| HA PE               | 4032 3996 3915 3842 3757 3680 3612 3533 3458 3348 3248 3206 3174 3145 3111 3090 3062 |
| No VTE              | 1008171 1075782 1057182 1042298 1024439 1018798 1005023 1000815 993117 986057 979669 973763 968266 962892 957713 952780 948062 943516 938099 |
| Unknown VTE         | 572 570 565 561 559 549 543 535 525 520 512 508 498 492 484 481 481 479 474 |

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eFigure 6. Readmission Rates With No. at Risk

|                  | Days to Readmission |
|------------------|----------------------|
|                  | 0          | 10         | 20         | 30         |
| HA PE + DVT      | 1290       | 927        | 683        | 517        |
| HA PE            | 4032       | 2954       | 2272       | 1861       |
| HA–DVT           | 7948       | 6038       | 4842       | 4127       |
| Unknown VTE      | 572        | 471        | 407        | 399        |
| No VTE           | 1068171    | 983000     | 913129     | 865990     |

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## eTable 1. Prevalence of Specific Hospital-Acquired Venous Thromboembolism Definition Criteria Items

| HA-VTE criterion       | Admissions with this criterion: n (%) | Admissions with this criterion within admissions resulting in HA-VTE: n (%) | Admissions with this criterion within admissions not resulting in HA-VTE: n (%) |
|------------------------|--------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| VTE ICD codes          | 19,156 (1.72%)                       | 13,000 (93.91%)                                                             | 6,156 (0.56%)                                                                |
| Abnormal vascular US   | 8,443 (0.76%)                        | 5,687 (41.08%)                                                              | 2,756 (0.25%)                                                                |
| CT with possible PE (#PE1) | 255 (0.02%)                         | 66 (0.48%)                                                                  | 189 (0.02%)                                                                  |
| CT with definite PE (#PE2) | 261 (0.02%)                        | 261 (1.89%)                                                                 | (0%)                                                                          |
| Referral to anticoagulation clinic | 9,494 (0.85%)            | 7,417 (53.58%)                                                              | 2,077 (0.19%)                                                                |
| First visit with anticoagulation clinic | 8,530 (0.77%)            | 7,378 (53.30%)                                                              | 1,152 (0.1%)                                                                 |
| New medication for VTE | 31,384 (2.82%)                      | 10,347 (74.75%)                                                             | 21,037 (1.92%)                                                               |
| ICD for long term anticoagulation | 16,239 (1.46%)           | 3,879 (28.02%)                                                              | 12,360 (1.13%)                                                               |
|                          | Count     | Percentage |
|--------------------------|-----------|------------|
| IVC filter               | 1,685     | 0.15%      |
|                          | 1,346     | 9.72%      |
|                          | 339       | 0.03%      |
| In hospital death after receiving anticoagulation | 746       | 0.07%      |
|                          | 255       | 1.84%      |
|                          | 491       | 0.04%      |
**eTable 2. Distributions of Total Numbers of Positive Criteria for Hospital-Acquired Venous Thromboembolism in Admissions With and Without Associated Venous Thromboembolism**

| Number of positive HA-VTE criteria | Admissions resulting in HA-VTE: n (%) | Admissions not resulting (without) HA-VTE: n (%) |
|------------------------------------|--------------------------------------|-----------------------------------------------|
| 0                                  | 0 (0%)                               | 1,059,224 (96.45%)                             |
| 1                                  | 10 (0.07%)                           | 30,457 (2.77%)                                |
| 2                                  | 4,260 (30.77%)                       | 7,751 (0.71%)                                 |
| 3                                  | 2,436 (17.6%)                        | 591 (0.05%)                                   |
| 4                                  | 2,983 (21.55%)                       | 145 (0.01%)                                   |
| 5                                  | 3,125 (22.57%)                       | 3 (0%)                                        |
| 6                                  | 964 (6.96%)                          | 0 (0%)                                        |
| 7                                  | 63 (0.46%)                           | 0 (0%)                                        |
| 8                                  | 2 (0.01%)                            | 0 (0%)                                        |
| 9-10                               | 0 (0%)                               | 0 (0%)                                        |
| **Total**                          | **13,843 (100.00%)**                 | **1,098,171 (100.00%)**                        |
**eTable 3. Baseline Demographics of Patients With and Without Venous Thromboembolism**

Analysis is at the patient level.

| Variable                          | Entire cohort (N = 529,492)/n (%) | Patients with no HA-VTE (N = 519,082)/n (%) | Patients with HA-VTE (N = 10,410)/n (%) | p value |
|-----------------------------------|-----------------------------------|---------------------------------------------|----------------------------------------|---------|
| Legal sex at time of admission    |                                   |                                             |                                        | 0.6     |
| Male                              | 260,640 (49.2%)                   | 255,488 (49.2%)                             | 5,152 (49.5%)                         |         |
| Female                            | 268,797 (50.8%)                   | 263,539 (50.8%)                             | 5,258 (50.5%)                         |         |
| Missing                           | 55                                | 55                                          | 0                                      |         |
| Median age at time of first admission in study period - Median (IQR) | 67.0 (54.0, 79.0) | 67.0 (54.0, 79.0) | 70.0 (59.0, 80.0) | <0.001 |
| Number of admissions in study period - Median (IQR) | 1.0 (1.0, 2.0) | 1.0 (1.0, 2.0) | 3.0 (2.0, 6.0) | <0.001 |
| Race/Ethnicity                    |                                   |                                             |                                        |         |
| Asian                             | 75,238 (14.2%)                    | 74,328 (14.3%)                              | 910 (8.7%)                            | <0.001 |
| Black                             | 52,697 (10.0%)                    | 51,186 (9.9%)                               | 1,511 (14.5%)                        |         |
|                      | Hispanic     | Other/Unknown | White       |
|----------------------|--------------|---------------|-------------|
|                      | 79,398 (15.0%) | 78,165 (15.1%) | 307,439 (58.1%) |
|                      | 1,233 (11.8%)  | 1,233 (11.8%)  | 6,551 (62.9%)  |
| Requires interpreter (%yes) | 24,766 (4.7%) | 24,443 (4.7%) | 323 (3.1%) | <0.001 |
| Received prophylaxis in first 48h | 200,323 (37.8%) | 195,871 (37.7%) | 4,452 (42.8%) | <0.001 |
**eTable 4. Multivariable Analysis of Risk Factors Associated With Hospital-Acquired Venous Thromboembolism**

Analysis is at the admission level.

| Variable                                    | Odds Ratio | 95% CI         | p-value  |
|---------------------------------------------|------------|----------------|----------|
| Male                                        | 1.07       | 1.01, 1.13     | 0.02     |
| BMI >30                                     | 1.13       | 1.06, 1.2      | <0.001   |
| Age at time of admission (Median, IQR)      | 1.00       | 1.1            | 0.08     |
| Previous VTE                                | 1.88       | 1.73, 2.05     | <0.001   |
| Surgery/trauma last 30d                     | 1.48       | 1.31, 1.67     | <0.001   |
| Active cancer                               | 1.87       | 1.68, 2.09     | <0.001   |
| Thrombophilia                               | 1.47       | 1.15, 1.88     | <0.001   |
| Current admission for infection             | 1.07       | 1.01, 1.14     | 0.02     |
| Current admission for/with heart or respiratory failure | 0.92       | 0.84, 1        | 0.05     |
| Current admission for stroke                | 0.67       | 0.57, 0.8      | <0.001   |
| Active smoker                               | 0.81       | 0.73, 0.9      | <0.001   |
| Poorly controlled DM (A1c>10%)              | 0.98       | 0.81, 1.18     | 0.82     |
| Last Hg at time of admission <10 g/dL       | 1.40       | 1.29, 1.51     | <0.001   |
| Last platelet number at time of admission   |            |                |          |
| >=500,000/μL                                | 1.59       | 1.37, 1.84     | <0.001   |
| Major hemorrhage in last 30d prior to admission | 1.13       | 0.99, 1.31     | 0.08     |
| Any pharmacological VTE prophylaxis in first 48h | 1.30       | 1.22, 1.38     | <0.001   |
|                           | Odds Ratio | 95% Confidence Interval | p-Value |
|---------------------------|------------|-------------------------|---------|
| Asian                     | 0.63       | 0.57-0.70               | <0.001  |
| Black                     | 1.20       | 1.10-1.31               | <0.001  |
| Hispanic                  | 0.75       | 0.68-0.82               | <0.001  |
| Other/Unknown             | 0.72       | 0.58-0.88               | <0.001  |
| Requires interpreter      | 1.01       | 0.86-1.18               | 0.94    |
| COPS ≥50                  | 1.12       | 1.05-1.20               | 0.001   |
| LAPS ≥100                 | 1.32       | 1.23-1.42               | <0.001  |
| Proteinuria/micro-albuminuria | 0.99      | 0.86-1.14               | 0.86    |
| PICC line or infusion port at admission | 1.73 | 1.54-1.94               | <0.001  |
| Antidepressant            | 0.93       | 0.87-1.00               | 0.05    |
| Hormonal Treatment        | 1.00       | 0.85-1.17               | 0.96    |
| Reduced Mobility          | 1.85       | 1.63-2.11               | <0.001  |
eAppendix. Definitions of Variables

In all cases where International Classification of Diseases (ICD) codes were used, both ICD 9 and 10 versions were included.

HA-VTE Outcome

Theoretical definition: any new diagnosis of VTE starting at least 48h after initiation of index admission and up to 90 days after discharge.

Operational definition: Logic: “true” if any of the following criteria combinations are met:

- (1 AND 2); or
- 4; or
- (1 OR 2 OR 3) AND (5 OR 6 OR 7 OR 8 OR 9 OR 10)

HA-VTE Criteria definitions:

1. Theoretical definition: ICD codes describing HA-VTE events

   Operational definition: “true” if one of these ICD9 or ICD10 codes were first entered as an encounter diagnosis or in problem list at least 48h after initiation of index admission and up to 90 days after discharge.

   - ICD 9: 415.1, 415.11, 415.19, 451.1, 451.11, 453.2, 453.2, 453.3, 453.8, 453.9, 453.4, 453.41, 453.42, 453.40, 453.41, 453.82, 453.83, 453.84, 453.85, 453.89
   - ICD 10: I26.0; I26.9; I80.1; I80.2; I80.3; I80.8; I80.9; I82.2; I82.4; I82.6; I82.8; I82.9; I82.A1; I82.B1; I82.C1; O22.3; O87.1; O88.2;
If it is not possible to distinguish when during the admission the ICD code was entered, then include any of these ICD codes if they were started (first entered) DURING the admission and up to 90 days after discharge

2. Theoretical definition: vascular ultrasound showing HA-VTE
   Operational definition: “true” if “Abnormal” result or flag (“!”) present for vascular ultrasound with test date/time (defined in this case as the date and time labeled “exam end”) is at least 48h after initiation of index admission and up to 90 days after discharge

3. Theoretical definition: CT pulmonary angiogram showing possible HA-VTE
   Operational definition: “true” if a CT pulmonary report with the text string “#pe1” in it, with test date/time (time labeled “exam end”) at least 48h after initiation of index admission and up to 90 days after discharge.
   note: #pe1 is a tag added to CT reports by radiologists to denote a suspicion for PE. It was introduced to KPNC in 06/2020 and is not universally adopted.

4. Theoretical definition: CT pulmonary angiogram showing definite HA-VTE
   Operational definition: “true” if a CT pulmonary angiogram report with the text string “#pe2” in it, with test date/time (time labeled “exam end”) at least 48h after initiation of index admission and up to 90 days after discharge
   note: #pe2 is a tag added to CT reports by radiologists to denote a definitive diagnosis of PE. It was introduced to KPNC in 06/2020 and is not universally adopted.
adopted.

5. **Theoretical definition:** a referral to anticoagulation clinic for HA-VTE

   **Operational definition:** “true” if an eConsult (i.e., internal referral via proprietary referral system at KPNC) to anticoagulation clinic with any of the following Problem/Reason Codes (PRCs) was placed at least 48h after initiation of index admission and up to 90 days after discharge

   - “DVT/PE-VTE (warfarin)” *this PRC existed and has stayed the same since 4/16/2003*
   - “DVT/PE - VTE (DOAC)” *this PRC existed and has stayed the same since 4/9/2015*

6. **Theoretical definition:** a visit with anticoagulation clinic for HA-VTE

   **Operational definition:** “true” if:

   - No prior anticoagulation clinic encounter within 180 days prior to index admission AND
   - Has an anticoagulation clinic encounter within 90 days or less after date of discharge from index admission (see definition and example below) AND
   - The first anticoagulation clinic Progress Note after discharge from index admission includes any of the following verbiage anywhere in the note: “VTE” OR “PE” OR “DVT” or “deep vein thrombosis” or “pulmonary embolism” (not case sensitive).
7. **Theoretical definition:** a new medication given to treat HA-VTE  
   **Operational definition:** “true” if: first order for one of the drugs below is signed at least 48 hours after initiation of index admission and within 90 days from date of discharge AND none of these drugs below were filled for at least 1 year prior to index admission (internal pharmacy codes were used to identify all relevant formulations of the drugs below):
   - Warfarin any dose/regimen
   - Apixaban any dose/regimen
   - Rivaroxaban any dose/regimen
   - Dabigatran any dose/regimen
   - Enoxaparin if given twice or three times a day at any dose>30mg, or if given once daily with dose being >0.8mg/kg where kg is based on the most recent weight prior to the enoxaparin order

8. **Theoretical definition:** an ICD code denoting that the patient is on a long-term anticoagulant  
   **Operational definition:** ICD10 code Z79.01, ICD 9 code V58.61: “true” if one of these codes first entered at least 48h after initiation of index admission and up to 90 days after discharge. Exclude if the same code was previously entered or existed in the problem list (unresolved problem) in the 6 months prior to index admission.
   
   *If it is not possible to distinguish when during the admission the ICD code was entered, then include any of these ICD codes if they were started (first entered)*
DURING the admission and up to 90 days after discharge

9. **Theoretical definition:** an IVC filter was inserted as a substitute for anticoagulation as treatment for HA-VTE

**Operational definition:** "true" if CPT code 37191 OR ICD10 code Z95.828 OR ICD-9-CM procedure code 38.7 first entered at least 48h after initiation of index admission and up to 90 days after discharge

*If it is not possible to distinguish when during the admission the ICD code was entered, then include any of these ICD codes if they were started (first entered) DURING the admission and up to 90 days after discharge*

10. **Theoretical definition:** a patient who died during the index admission after receiving therapeutic anticoagulation

**Operational definition:** "true" if: the patient died DURING the index admission AND an order set relating to therapeutic anticoagulation was used during this index admission

**Definitions of HA-VTE subtypes**
For each admission that has a positive HA-VTE outcome, determine whether they had HA DVT, HA PE or both

1. **HA DVT**
   a. **Theoretical definition:** any new diagnosis of HA DVT starting at least 48h after initiation of index admission and up to 90 days after discharge
   b. **Operational definition:** in patients with HA-VTE as defined above:
i. If outcome criterion #2 (abnormal US) is positive: code as true (1); otherwise:

ii. If outcome criterion #1 (ICD codes) included any of the following ICD codes for DVT, code as true:

   1. ICD 9: 451.1, 451.11, 453.2, 453.3, 453.8, 453.9, 453.4, 453.41, 453.42, 453.40, 453.82, 453.83, 453.84, 453.85, 453.89

   2. ICD 10: I80.1; I80.2; I80.3; I80.8; I80.9; I82.2; I82.4; I82.6; I82.8; I82.9; I82.A1; I82.B1; I82.C1; O22.3; O87.1; O88.2;

iii. If (i) and (ii) above are not true, code as false (0)

2. HA PE

   a. Theoretical definition: any new diagnosis of HA PE starting at least 48h after initiation of index admission and up to 90 days after discharge

   b. Operational definition: in patients with HA-VTE:

      i. If outcome criterion #3 (#pe1) OR outcome criterion #4 (#PE2) is positive: code as true (1); else,

      ii. If outcome criterion #1 (ICD codes) included any of the following ICD codes for DVT, code as true:

          1. ICD9: 415.1, 415.11, 415.19

          2. ICD10: I26.0; I26.9;

      iii. If (i) and (ii) above are not true, code as false (0)
Determining timing of HA-VTE event

1. Time to first VTE from admission
   a. Theoretical definition: number of days since admission time to time of first
      HA-VTE event (if it occurred)
   b. Operational definitions:
      i. Time of HA-VTE is defined as:
         1. For patients who meet HA-VTE outcome criterion #2
            (abnormal ultrasound) and/or #3 (#PE1) and/or #4 (#PE2): it
            is the time of the earliest of these three criteria
         2. For patients who do not meet HA-VTE criteria #2, #3, or #4
            AND they meet criterion #1 (ICD codes): the time of HA-VTE
            would be defined as the earliest time in which any of the
            following HA-VTE criteria were met: #5 (AC clinic referral),
            #6 (AC clinic note/visit), #7 (medication for VTE), #8 (ICD for
            long-term AC), #9 (IVC filter), or #10 (for this criterion #10,
            time would be timing of the specified relevant order sets and
            not time of death)
      ii. Time to VTE from admission = Time of HA-VTE minus time of
          admission
2. Time to first VTE from discharge: similar definition as “Time to VTE from admission” above but the calculation uses the time of discharge instead of time of HBS admission order set
Definitions of HA-VTE predictors and risk factors

Padua Predictive Score components:

1. Active cancer: True if any of the following:
   a. ICD codes for cancer + ICD code for metastasis placed in the last 6 months prior to the index admission, and not present more than 6 months prior to the admission. Do not include resolved problems from problem list
      i. ICD code for of “any malignancy”: ICD 9 codes: 140.x-172.x; 174.x-195.8; 200.x-208.x. ICD 10 codes: C00.x-C26.x; C30.x-C34.x; C37.x-C41.x; C43.x, C45.x-C58.x; C60.x-C76x; C81.x-C85.x; C88.x; C90.x-C97x; AND
      ii. ICD code of “metastatic solid tumor”: ICD 9 196.x-199.1; ICD 10 C77.x-C80.x
   OR
   b. Received any antineoplastic medication (chemotherapy, immunotherapy, targeted therapy, etc) in the 6 months prior to the index admission based on internal pharmacy codes. These included only completed orders for IV antineoplastic medications or filled outpatient prescriptions. Medications with non-oncological indications (e.g., rituximab) were excluded; OR
   c. The patient had any radiation oncology appointment/treatment in the 6 months prior to the index admission; OR
   d. The patient had new staging information in their problem list cancer staging module signed in the past 6 months with a stage III or IV cancer
2. **Previous VTE**: true if at any point in time prior to day of index admission the patient had:

   a. **ICD codes (including resolved problems from problem list):**

      i. **ICD 9**: V12.51, V12.52, V12.55, 415.0, 415.11, 415.19, 416.2, 416.8, 444.1, 444.21, 444.22, 444.81, 444.89, 444.9, 451.11, 451.19, 451.81, 451.83, 453.2, 453.3, 453.40, 453.41, 453.42, 453.50, 453.51, 453.52, 453.72, 453.73, 453.74, 453.76, 453.77, 453.79, 453.82, 453.83, 453.84, 453.85, 453.86, 453.87, 453.89, 453.9, 673.20, 673.21, 673.22, 673.23, 673.24, 673.80, 673.81, 673.83, 673.84, 639.6.

      ii. **ICD 10**: I26.02, I26.09, I26.99, I27.24, I27.82, I74.11, I74.2, I74.3, I74.4, I74.5, I74.8, I74.9, I80.10, I80.11, I80.12, I80.13, I80.201, I80.202, I80.203, I80.209, I80.211, I80.212, I80.213, I80.219, I80.221, I80.222, I80.223, I80.229, I80.231, I80.232, I80.233, I80.239, I80.291, I80.292, I80.293, I80.299, I80.8, I82.210, I82.211, I82.220, I82.221, I82.290, I82.291, I82.3, I82.401, I82.402, I82.403, I82.409, I82.411, I82.412, I82.413, I82.419, I82.421, I82.422, I82.423, I82.429, I82.431, I82.432, I82.433, I82.439, I82.441, I82.442, I82.443, I82.449, I82.491, I82.492, I82.493, I82.499, I82.4Y1, I82.4Y2, I82.4Y3, I82.4Y9, I82.4Z1, I82.4Z2, I82.4Z3, I82.4Z9, I82.501, I82.502, I82.503, I82.509, I82.511, I82.512,
I82.513, I82.519, I82.521, I82.522, I82.523, I82.529, I82.531, I82.532, I82.533, I82.539, I82.541, I82.542, I82.543, I82.549, I82.591, I82.592, I82.593, I82.599, I82.5Y1, I82.5Y2, I82.5Y3, I82.5Y9, I82.5Z1, I82.5Z2, I82.5Z3, I82.5Z9, I82.601, I82.602, I82.603, I82.609, I82.621, I82.622, I82.623, I82.629, I82.701, I82.702, I82.703, I82.709, I82.721, I82.722, I82.723, I82.729, I82.890, I82.891, I82.90, I82.91, I82.A11, I82.A12, I82.A13, I82.A19, I82.A21, I82.A22, I82.A23, I82.A29, I82.B11, I82.B12, I82.B13, I82.B19, I82.B21, I82.B22, I82.B23, I82.B29, I82.C11, I82.C12, I82.C13, I82.C19, I82.C21, I82.C22, I82.C23, I82.C29, O08.2, O88.211, O88.211, O88.212, O88.212, O88.213, O88.213, O88.219, O88.22, O88.23, O88.811, O88.812, O88.813, O88.819, O88.82, O88.83, T81.718A, T81.72XA, T82.817A, T82.818A, Z86.711, Z86.718, Z86.72;

OR

b. Anticoagulation clinic visit progress note which included any of the following strings anywhere in the note: “VTE” OR “DVT” or “deep vein thrombosis” or “pulmonary embolism” but NOT any of following strings anywhere in the note: "prophylax" OR "PPX"

3. Reduced mobility/bedrest: True if any of the following:
a. ICD9 codes (do not include resolved problems with these codes): 094.1, 344.00, 344.01, 344.02, 344.03, 344.04, 344.09, 344.1, 344.9 placed any time before index admission; OR

b. ICD10 codes (do not include resolved problems with these codes): G80.0, G80.1, G80.2, G80.8, G82.20, G82.21, G82.22, G82.50, I69.365, M62.3 placed any time before index admission; OR

c. “bedrest” or “bed rest” order placed during the encounter but prior to admission time (i.e., in the emergency room)

d. During the encounter and prior to admission time, true if nursing flowsheet variables CLOF (clinician assessed level of function) or PLOF (patient reported level of function) were indicative of severe dysfunction or bed bound

4. Thrombophilia: “true” if any of the following:
   a. Has ICD9 code: 289.81 OR any of these ICD10 codes: D68.5, D68.51, D68.52, D68.59, D68.6, D68.61, D68.62, D68.69 placed at any time before index admission (do not include resolved problems with these codes); OR
   b. Lab results obtained at any time prior to index admission identifying prothrombin gene mutation or factor V Leiden

5. Recent trauma/surgery: “true” if during the 30 days prior to the index admission an operating room was used for this patient (excluding all minor procedure suites

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6. Age 70 or above: “true” if age was ≥70 years at time of index admission

7. Heart or respiratory failure: any of the following:
   a. Heart failure: use of any dose of IV (not PO or any other form) of 
      medication from pharmaceutical class loop diuretics during admission 
      encounter prior to admission time. Internal pharmacy codes were used to 
      identify these medications
   b. Respiratory failure: use of any oxygen supplementation higher than 4L/min 
      at any point during index admission prior to admission time

8. Current admission for CVA or TIA: “true” if an order set for CVA or TIA 
   management, or for thrombolytics was used during the admission encounter 
   before admission time
   Note: In KPNC these order sets are mandated for any suspicion of TIA/CVA and 
   are universally used.

The original Padua Predictive Score element for stroke also included acute 
myocardial infarction, but we have excluded this variable as most patients with 
AMI would have received some therapeutic doses of anticoagulation early in their 
admission.
9. Current admission for acute infection: true if any IV antibiotics given (order was completed) during current admission before time of admission. Internal pharmacy codes were used to identify these medications.

Notably, the original Padua Score elements combined acute infection with acute rheumatological disorders, but we have excluded the latter since in our system these are almost exclusively treated in the outpatient setting.

10. $BMI \geq 30 \ (weight[kg]/(height[m])^2)$: Calculate BMI on day of index admission (weight in kg on day of index admission, or if not available most recent weight in kg prior to index admission, divided by squared most recent height in meters on or prior to day of index admission). True if BMI = 30 or higher. Note: we found rare instances when weight or height were entered incorrectly, thus we excluded this variable (left as “missing” if BMI ≤ 12 or ≥ 60).

11. Ongoing hormonal treatment: true if of the criteria below is positive:
   
   a. if has an active ICD code in problem list for hormonal treatment on day of index admission:
      
      ICD-10: Z79.890, Z79.81 or ICD-9: V07.4
   
   b. any relevant medications (administered in office or dispensed at outpatient pharmacy) up to 6 months prior to index admission. Internal pharmacy codes were used to identify these medications.
**Additional identified risk factors**

12. Active tobacco smoker: True if at time of index admission, the Social History documentation in the EHR was one of the following:

   a. Current Every Day Smoker; OR
   b. Current Some Day Smoker; OR
   c. Smoker, Current Status Unknown; OR
   d. Heavy Tobacco Smoker; OR
   e. Light Tobacco Smoker

13. Poorly controlled diabetes: True if the last hemoglobin-A1c test was resulted within a year prior to time of admission time and was $\geq 10.0\%$ or higher

14. Low hemoglobin: true if the last hemoglobin test was resulted within a month prior to time of admission and was lower than 10.0

15. High platelet count: true if: True if the most recent platelet test was resulted within a month prior to time of admission and was $\geq 500,000$ or higher

16. PICC line or infusion port: true if at the time of admission the patient had any type of line which included the word “PICC” or “port” (under LDA or “lines/drains/airways” in nursing flowsheets)
17. Use of serotonergic antidepressants: true if a prescription of any medication from the following pharmaceutical subclasses was dispensed in the pharmacy up to 6 months prior to index admission: Serotonin-Norepinephrine Reuptake Inhibitors (SNRIs), Selective Serotonin Reuptake Inhibitors (SSRIs), Menopausal Symptoms Suppressant-SSRI Antidepressant Type, Serotonin-2 Antagonist-Reuptake Inhibitors (SARIs). Internal pharmacy codes were used to identify these medications.

18. Microalbuminuria: true if within 6 months prior to admission date the patient had any abnormal result of the urine albumin/creatinine ratio lab test.

19. COMorbidity Point Score $\geq 50$ (COPS; with one year lookback period) and Laboratory Acute Physiology score $\geq 100$ (LAPS; with 72-hour lookback) on day of admission. COPS and LAPS are illness severity indices that can be automatically calculated in real time, and were developed and validated at KPNC$^1$.

20. Recent major hemorrhage: if any of the following ICD codes were entered in encounter diagnoses or problem list within 30 days prior to date of admission:
   a. ICD 9: 423, 423.1, 430, 431, 432.1, 432.9, 455.2, 455.5, 455.8, 456, 456.1, 456.2, 456.21, 456.8, 459, 459.31, 459.32, 459.33, 459.81, 530.7, 531, 531.1, 531.11, 531.21, 531.3, 531.4, 531.41, 531.5, 531.51, 531.61, 532, 532.1, 532.11, 532.3, 532.4, 532.5, 532.6, 533, 533.3, 533.4, 533.5,
b. ICD 10: I31.2, I60.9, I61.9, I62.1 I62.9, I85.01, I85.11, K22.6, K22.8,
K25.0, K25.1, K25.2, K25.3, K25.4, K25.5, K25.6, K26.0, K26.1, K26.2,
K26.3, K26.4, K26.5, K26.6, K27.0, K27.1, K27.2, K27.3, K27.4, K27.5,
K27.6, K28.1, K28.2, K28.4, K28.5, K29.01, K29.21, K29.41, K29.51,
K29.61, K29.71, K29.91, K31.811, K55.21, K57.11, K57.13, K57.31,
K57.33, K62.5, K62.6, K64.4, K64.8, K66.1, K92.0, K92.1, K92.2, R04.0,
R04.2, R04.89, R04.9, R31.0, R31.1, R31.21, R31.29, R31.9, R58,
S06.300A, S06.300D, S06.300S, S06.301A, S06.301S, S06.307S,
S06.308A, S06.308S, S06.309A, S06.309D, S06.309S, S06.310A,
S06.319D, S06.320A, S06.321A, S06.329A, S06.329D, S06.329S,
S06.330A, S06.331A, S06.331D, S06.339A, S06.339D, S06.339S,
S06.340A, S06.340D, S06.341A, S06.341D, S06.341S, S06.349A,
S06.349D, S06.349S, S06.359A, S06.359S, S06.360A, S06.360S,
S06.361A, S06.362S, S06.369A, S06.369D, S06.369S, S06.370A,
S06.370D, S06.370S, S06.372A, S06.379A, S06.379D, S06.379S,
S06.380A, S06.389A, S06.4X0A, S06.4X0D, S06.4X0S, S06.4X1A,
S06.4X1D, S06.4X2A, S06.4X9A, S06.4X9D, S06.4X9S, S06.5X0A,
S06.5X0D, S06.5X0S, S06.5X1A, S06.5X1D, S06.5X1S, S06.5X2D,
21. Race and ethnicity: as documented in the EHR at time of admission. At KPNC race and ethnicity are self-reported as two separate variables.

22. Requirement for language interpreter: as documented in the EHR at time of admission. If no value was entered, this was considered to be “no requirement”
Definitions of HA-VTE prophylaxis

- Theoretical definition: Did the patient receive any dose of pharmacological prophylaxis during the first 48h of admission

- Operational Definition: Binary outcome. “True” if one of the medications below was given (order for the medication was completed) during the first 48 hours since time of admission:
  - Enoxaparin if given once daily with dose being <0.8mg/kg (where kg is based on the most recent weight prior to the enoxaparin order) OR if given at 30mg twice a day regardless of weight
  - Heparin if given at dose of 5000-7500 Units subcutaneous (not intravenous) at any interval (once, twice or more per day)
  - Note: no other agents (e.g., fondaparinux, dalteparin) are routinely used for HA-VTE prophylaxis in our healthcare system. Internal pharmacy codes were used to identify these medications above

Definitions of therapeutic anticoagulation in first 48 hours

- Note: this definition was used as part of the exclusion criteria (see Methods section)

- Theoretical definition: received order for therapeutic anticoagulation <48 hrs after time of admission

- Operational Definition: “true” if an order for one of the drugs below is signed within 48 hours after initiation of index admission. The order has to be completed (not cancelled) at any time point, but signed within 48h as above
  - Warfarin any dose/regimen
• Apixaban any dose/regimen
• Rivaroxaban any dose/regimen
• Dabigatran any dose/regimen
• Enoxaparin if given twice a day at a dose > 30mg or three times a day at any dose, or if given once daily with dose being >=0.8mg/kg where kg is based on the most recent weight prior to the enoxaparin order
• Heparin: true if given intravenously (not subcutaneous) at any dose >1000 units in total (*for example, 100 units/ml given 5ml total =500 would not be included*)
• Note: Internal pharmacy codes were used to identify these medications above