Treating DVT Within a Health Care System

A systematic approach to health care delivery for patients with deep vein thrombosis.

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Despite the ubiquity of the problem, deep vein thrombosis (DVT) management has been surprisingly inconsistent. In a review of DVT management across our system, we found a large variation in time from symptom presentation to diagnosis and from diagnosis to treatment. A common clinical scenario was that during the day, a patient calls the primary care physician (PCP) with the complaint of a swollen extremity. The patient is often sent to the emergency department or urgent care center, wait an average of 5 to 6 hours, and then a noninvasive duplex scan is obtained. By the time the study is performed, the PCP's office is closed, the emergency department physician manages the patient, and treatment is then turned over to the PCP. Specialty referrals were made in selective cases with inconsistent criteria for referral. Treatment regimens were not standardized among clinicians, leading to inefficiency and patient dissatisfaction.

Sentara Medical Group (SMG) is composed of more than 400 multispecialty physicians providing health care in southeastern Virginia. Our group of 14 vascular surgeons is part of SMG and provides the majority of vascular care for the area. Sentara Healthcare, SMG's parent company, operates seven local hospitals and has more than 14 inpatient and outpatient peripheral vascular laboratories (PVLs). Inpatient and outpatient care is coordinated through Sentara eCare, which is an electronic medical record that is used throughout the Sentara network of physicians and hospitals.

In an effort to address inconsistent DVT care in our system, we have developed the Sentara Medical Group Acute DVT Treatment Protocol. Based on the American College of Chest Physicians Evidence-Based Clinical Practice Guidelines, the program is designed to: (1) standardize DVT management across the Sentara integrated health care system using evidence-based practice guidelines; and (2) stratify treatment in accordance with the severity of DVT and identify patients who may benefit from more aggressive DVT treatment, including catheter-directed mechanical and pharmacologic thrombolysis.

Patients who are identified as having a potential DVT are expedited into a PVL for imaging studies and, if the results are positive, they are expedited to the vascular specialty practice. Utilizing Sentara eCare, patients enter the system via their PCP or a hospital emergency department. Triggered by a chief complaint of extremity swelling, pain, or discoloration, the Wells score has been incorporated into the electronic medical record encounter. The higher the score, the more priority the PVL order is given. Centralized scheduling then schedules the imaging study based on urgency, patient preference, and location. A negative study is reported back to the PCP or emergency department for further evaluation or workup as deemed appropriate.

A positive study automatically triggers a referral to the vascular specialty practice. The timeliness of the referral is determined by preset guidelines. The vascular specialty practitioner then performs a standard clinical evaluation with the objectives of:

- Confirming the diagnosis (reconcile/correlate clinical and imaging data)
- Establishing treatment regimen and duration
- On-site laboratory analysis
- On-site initiation of therapy
- Patient and family education (standardized educational packets distributed)
- Scheduling clinical and imaging follow-up
- Coordinating (order laboratory follow-up) with PCP
- Communicating with PCP or other health care providers involved in the patient's care

The electronic medical record features "Smart Set," which incorporates all of the above into a single, standardized encounter. The patient's orders, encounter note, and follow-up are conveniently organized in the electronic medical record. The standardization of management is expected to translate into more efficient care with improved patient satisfaction and outcomes. ■

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SENTARA MEDICAL GROUP ACUTE DVT TREATMENT PROTOCOL

PURPOSE

(1) To standardize the management of DVT across the Sentara health care system in accordance with evidence-based practice guidelines.

(2) To stratify treatment in accordance with the severity of DVT and identify patients who may benefit from more aggressive treatment of DVT, including catheter-directed mechanical and pharmacologic thrombolysis.

DIAGNOSIS

Guidelines for referral of patients to the acute treatment center will use clinical criteria (Wells score) and laboratory assay with D-dimer if and when available.

Indications for Treatment	Wells Score[a]
Active cancer (treatment ongoing, within the previous 6 months, or palliative)	+ 1
Paralysis, paresis, or recent cluster immobilization of the lower extremities	+ 1
Recently bedridden > 3 days or major surgery within 12 weeks requiring general or regional anesthesia	+ 1
Localized tenderness along the distribution of the deep system	+ 1
Entire leg swollen	+ 1
Calf swelling 3 cm larger than asymptomatic side, measured 10 cm below the tibial tuberosity	+ 1
Pitting edema combined to the symptomatic leg	+ 1
Collateral, superficial veins, nonvaricose	+ 1
Alternative diagnosis at least as likely as DVT	– 2

[a]*Low risk: Wells score = 0, no referral.*

Moderate risk: Wells score = 1–2, refer for PVL study within 24–48 hours.

High risk: Wells score = ≥ 3, PVL study on the same day.

Outpatient care should be provided, if possible, weekdays from 8:00 AM to 3:30 PM. If no outpatient facility is available after 3:00 PM or on weekends, the patient should be sent to the emergency department.

PATIENTS REFERRED FOR PVL STUDY OF SUSPECTED DVT

If PVL study is negative, the PCP is notified, and further workup or follow-up is arranged. If PVL study is positive, a vascular specialist triage arranges outpatient evaluation from 8:00 AM to 3:30 PM.

After 3:30 PM on weekdays and on weekends:

- Wells score = 0, follow-up with PCP.
- Wells score = 1–2, PVL at vascular specialist triage within 24 hours.
- Wells score = > 2, emergency department.

From 3:30 PM on Friday until 3:30 PM on Sunday seek an emergency department evaluation:

- Positive D-dimer test, immediate PVL study.
- Negative D-dimer test, outpatient PVL study.

STRATIFICATION OF TREATMENT BY SEVERITY OF DVT

Calf Vein DVT

Calf vein DVT occurs when there is a clot distal to the popliteal vein or no popliteal vein involvement. All calf vein DVTs should be managed on an outpatient basis. Appropriate treatment choices include:

- Antiplatelet therapy and repeat ultrasound in 5 days.
- If follow-up study shows DVT progression (see *Femoropopliteal DVT* treatment guidelines).
- If follow-up study is negative for DVT progression, no further evaluation is needed unless recurrent signs or symptoms occur.
- Poor candidates for anticoagulation should receive no treatment but should be followed-up for significant change in symptoms.

Femoropopliteal DVT

- Standard anticoagulation either inpatient or outpatient depending on the severity of symptoms, with fondaparinux for 5 days and warfarin totaling 3 months.
- Follow-up with vascular specialist triage in 3 months for repeat imaging and vascular consultation to consider discontinuation of therapy.
- Poor candidate for anticoagulation (active bleeding, major surgery within 24 hours or anticipated within 14 days, noncompliance, fall risk, central nervous system lesion, etc.) should receive a referral to a vascular specialist practitioner for consideration of inferior vena cava filter placement.
- Support stockings (30–40 mm Hg, calf high).

Iliofemoral DVT, Occlusive Femoropopliteal DVT, or Nonocclusive Femoropopliteal DVT With Recalcitrant Symptoms Despite Usual Standard Treatment

- Inpatient standard anticoagulation with either low-molecular-weight or unfractionated heparin or fondaparinux and conversion to warfarin.
- Vascular consultation for consideration of lytic therapy.
- For idiopathic DVT, consider hypercoaguable and/or malignancy workup.

TREATMENT GUIDELINES FOR THROMBOLYTIC THERAPY

Identify the cohort of patients who may benefit from thrombolytic therapy based on these criteria:

- Proximal (iliofemoral DVT) with significant symptoms or femoropopliteal DVT and recalcitrant history despite usual treatment.
- Low risk.
- Good functional status.
- No active bleeding.
- No major surgery within 14 days.
- Life expectancy > 1 year.
- Onset of symptoms < 14 days.
- No known central nervous system lesions.