

Modern Practices in Anticoagulation: Practical Strategies for Diagnosis and Management of Acute VTE

Acute VTE: Diagnosis and Management

Jori May, MD

Assistant Professor of Medicine
Division of Hematology/Oncology
The University of Alabama at
Birmingham School of Medicine
Birmingham, Alabama

Stephan Moll, MD
Professor

Department of Medicine
Division of Hematology
University of North Carolina
Chapel Hill, North Carolina

**Paul A. Lewis, MD, FAAFP, ABPM-
CI, CPE, CPHIMS**

BayCare Medical Group
Clearwater, Florida

Jori May: All right, hello everyone. Thanks for joining. Today, we are going to be discussing our first in a series of six topics on venous thromboembolism. So, my name is Jori May. I am an Assistant Professor at the University of Alabama at Birmingham. I'm a hematologist with a focus on thrombosis and coagulation. I will serve as your moderator. I'm fortunate to have two additional experts here with me today and I'm going to ask them to introduce themselves. I'll preface by saying we are going to be using our first names throughout the podcast. So, let's start. Paul, would you like to tell us a little bit about yourself?

Paul Lewis: Sure, thank you, Jori. Yes, Paul Lewis. I'm a family physician with BayCare Medical Group in Clearwater, Florida. I'm also a Clinical Assistant Professor with the University of South Florida College of Medicine in the Department of Family Medicine. And I've been practicing primary care for about 20 years now.

Jori May: Wonderful. Well, it'll be excellent to have your perspective as a primary care provider expert. And Stephan.

Stephan Moll: Jori, thank you very much. I'm an adult hematologist. I'm at the University of North Carolina in Chapel Hill in North Carolina. I'm a faculty member here. My focus is thrombosis and anticoagulation, clinical issues, clinical research to some degree, and education. And I'm thrilled to be part of this program.

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Learning Objectives

- Outline risk stratification strategies in patients who present with symptoms of DVT or PE
- Identify tools that clinicians can use to effectively and accurately make the differential diagnosis of DVT or PE
- Evaluate clinical strategies for defining the clot and utilize this information in the development appropriate management plans for patients with DVT or PE

Jori May: Wonderful. Well, let's dive right into our discussion. So again, our topic today is acute VTE, talking about diagnosis and management. Our objectives are going to be to discuss risk stratification strategies for patients who present to the primary care clinic with symptoms of DVT or PE, so deep vein thrombosis or pulmonary embolism. We're going to talk about tools that clinicians can use to make a differential diagnosis for DVT or PE, and then clinical strategies for how we define a clot, how we identify appropriate management strategies.

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Case 1

- 52-year-old female calls her primary care doctor with 1 week of left leg pain and swelling
- No precipitating factors
- Leg is diffusely swollen, some redness from the knee down



Jori May: So, all good discussions start with a case in medicine. So, we're going to try and focus our discussion around individual cases today. So, our first case is going to be a 52-year-old female who calls her primary care doctor to say, "I've had swelling of my left leg for about a week. It's swollen and it's painful. I can't identify anything that caused it, no precipitating factors." And she describes it as really being diffusely swollen, some areas of redness that are identified from the knee down.

So, Paul, I assume you've gotten this call before, probably many times. And so, when you get this phone call, what are you thinking about? What would you do next for this person?

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Paul Lewis: Yeah, absolutely, Jori. And again, usually this is the sort of thing that your nurse asks you in between patients that we have this person calling and they have these complaints. And obviously with something with unilateral leg swelling, leg pain, the first questions is, do I need to get this patient to see me? What is going on with this individual? If possible, I'm trying to get some additional history, again, it might be challenging if it's through a nurse. So oftentimes you'll need to bring these folks in. And either I want to see her or have her see an urgent care clinic, or again, if that's not available, it's a weekend or evening, then obviously may have to send her to the emergency room as a sort of a last resort overall.

So, after you determine again the location, let's just sort of assume that I could get her in the office. So hopefully they call in the morning, I can get them in the afternoon. That's an ideal, not always reality. And once I get them in, obviously do a more thorough exam. Again, there was no precipitating factors. So that's always something you try to elicit obviously from the individual. Get the history, how that occurred. And then, as you're having this discussion with the patient, start going through the differential diagnosis. Obviously, a 50-year-old female presenting with leg pain, again, what are her other factors or other comorbidities, obviously, medications that she's on also. And of course, has anything like this ever happened to her before? Are her legs usually swollen or has she ever had venous thromboembolism, for example, before in the past?

In primary care, always, a good physical exam is something worth doing. And so, get her in there, take a look at obviously the leg, look at the good leg, perhaps do some measurements of the leg, assess the presence of edema, peripheral pulses of course. If she's having any pain there, as well as again, you know, so examine the rest of the leg, skin itself and look at it there. So that's again, in terms of at least some initial...

Jori May: Well, I think that's really helpful. I think you highlight some challenges that are real world challenges of the logistics of how to take care of the patient. Can I see them in the office? Do I have access to labs today? Do I have access to imaging? Does this patient need to go to the ER? Does this patient need to go to urgent care? And so, I'm sure that's the biggest challenge for being the first person to get that phone call is making those decisions. And like, yeah, I think you highlighted some great points of things that you're looking for in the chart, things that you're looking for when you do have the option to see the patient. And so, I think that's really helpful.

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Jori May: So, Stefan, I wonder if you could maybe add, from a hematologist perspective, there are some tools that exist to help us assess the likelihood of a DVT in a patient. Because as Paul said, there's other things this could be. There's a long differential for swelling of the legs. But can you speak maybe to some of the tools that exist from kind of the textbook answer of how we could maybe assess the likelihood of DVT in this patient?

Stephan Moll: I'm happy to do that. I'm going to say though, first, the patients that I see are different to the ones that Paul sees as a hematologist and Jori, you too, as a hematologist. We typically see patients who have had a blood clot before and then they call our office with exactly the same issue. I have new swelling, new pain, is this a DVT? Our pre-test probability that this patient has a recurrent DVT is typically higher than Paul's pre-test probability that his patient has a DVT, because we know our patient had a DVT. So that's a little different story. But for the people who have not had a blood clot before, who present with leg swelling, so, those would be the ones who present to the primary care physician. In general, there's a recommendation that one does a pre-test probability. And Paul and colleagues and we do that often more with our experience and not in a structured manner.

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Wells' Criteria for DVT

Calculates risk of DVT based on clinical criteria.

- The Wells' score is less useful in hospitalized patients¹
- There are a few versions of this criteria with minor differences based on this study; this set is the most widely validated²

Active cancer Treatment or palliation within 6 months	No 0	Yes +1
Bedridden recently >3 days or major surgery within 12 weeks	No 0	Yes +1
Calf swelling >3 cm compared to the other leg Measured 10 cm below tibial tuberosity	No 0	Yes +1
Collateral (nonvaricose) superficial veins present	No 0	Yes +1
Entire leg swollen	No 0	Yes +1
Localized tenderness along the deep venous system	No 0	Yes +1
Pitting edema, confined to symptomatic leg	No 0	Yes +1
Paralysis, paresis, or recent plaster immobilization of the lower extremity	No 0	Yes +1
Previously documented DVT	No 0	Yes +1
Alternative diagnosis to DVT as likely or more likely	No 0	Yes -2

Wells' Criteria for DVT. Accessed February 26, 2024 at: <https://www.mdcalc.com/calc/362/wells-criteria-dvt>.
 1. Silveira PC, et al. Performance of Wells Score for Deep Vein Thrombosis in the Inpatient Setting. *JAMA Intern Med.* 2015 Jul;175(7):1112-7. 2. Wells PS, et al. Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. *N Engl J Med.* 2003 Sep 25;349(13):1227-35.

Stephan Moll: But people have promoted a structured approach to that. And the most famous one are the so-called Wells criteria, and named after Phil Wells in Canada, who published them first. And these are clinical criteria, how the patient presents, that makes it more or less likely that the presenting symptoms are DVT or, in the respiratory situation, a PE. And these are things that Paul mentioned that he would look for. And the way this is structured is, and this is available on the web, the Wells Criteria, that one looks at the patient and gives the patient one point if one of these following criteria is present, and then one adds up the criteria at the end, and it comes out with “this is not likely a DVT” or “this is likely a DVT”.

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Stephan Moll: And these are the typical risk factors.

- Does a patient have cancer, active cancer? Well, if the cancer patient presents with leg symptoms, that could well be a DVT more likely than if the patient does not have cancer.
- Had the patient been bedridden for three days or more days or had major surgery in the last three months? It's typically the last three months that we look for.
- If the calf swelling is pretty pronounced, more than three centimeters, then you get one point.
- Is the entire leg swollen, rather than just the focal area? Focal would be more likely obviously a superficial thrombophlebitis.
- Is it pitting edema in the symptomatic leg, then you get one point. If it's pitting edema bilaterally, that's less likely a DVT.
- And does a patient have chronic immobility from paralysis, a recent cast, a boot immobilizer, then you get one point, it's more likely a DVT.
- If the patient had a previous DVT, then the patient gets one point.
- And if you think, look, there's an alternative reason, like it looks like a cellulitis, there's been a bug bite. There has been some trauma with interruption of the skin integrity and now it's reddish around it. If another diagnosis is more likely then you actually subtract two points.

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Alternative diagnosis to DVT as likely or more likely	No 0	Yes -2

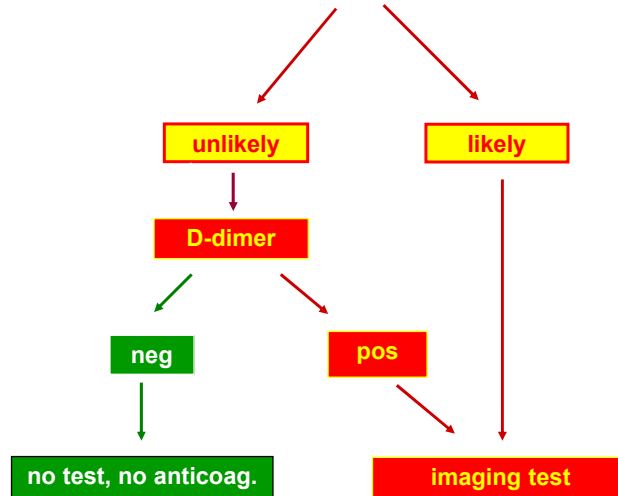
- score < 2: DVT unlikely
- score ≥ 2: DVT likely

Wells' Criteria for DVT. Accessed February 26, 2024 at: <https://www.mdcalc.com/calc/362/wells-criteria-dvt>.
1. Silveira PC, et al. Performance of Wells Score for Deep Vein Thrombosis in the Inpatient Setting. *JAMA Intern Med.* 2015 Jul;175(7):1112-7. 2. Wells PS, et al. Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. *N Engl J Med.* 2003 Sep 25;349(13):1227-35.

Stephan Moll: Then you add up the points. And if the patient barely had any points, then you conclude well, a DVT is unlikely.

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Wells' Criteria for DVT: Clinical Suspicion for DVT



Wells' Criteria for DVT. Accessed February 26, 2024 at: <https://www.mdcalc.com/calc/362/wells-criteria-dvt>.

1. Silveira PC, et al. Performance of Wells Score for Deep Vein Thrombosis in the Inpatient Setting. *JAMA Intern Med.* 2015 Jul;175(7):1112-7. 2. Wells PS, et al. Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. *N Engl J Med.* 2003 Sep 25;349(13):1227-35.

Stephan Moll: In that situation one could do a D-dimer blood test. And if the D-dimer is negative in a patient where we didn't think this was a DVT, then we're done. We don't need to get a Doppler ultrasound. So, low pretest probability, negative D-dimer, no imaging needed.

But if the added points are high, then it is well likely this is a DVT, then the D-dimer would not be appropriate to do. One needs to get an imaging study. The D-dimer would be waste and would be malguided.

And if we had only very few points, we didn't think this was a DVT, but the D-dimer is positive, that makes a DVT more likely, and then we need to get an imaging study. So at least in academia, and what's been promoted in our health care system is to do this formal pre-test probability assessment, then use, if one has available, a D-dimer so that we don't scan everybody with some leg symptoms, the health care costs, et cetera.

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Stephan Moll: But I don't know how widely this gets done in the US, even though the American College of Physicians, a number of years ago, I think 2015, said everybody should do this when they think about a DVT. But Paul, what is your experience? Do you have a D-dimer available? Do you ever use a D-dimer? And what do you hear from colleagues?

Paul Lewis: Yeah, and you mentioned this early on, Stephen, is again, some of the way you do is experiential and empiric, right? So, it's always nice to know the science and refresh ourselves on the science and the clinical assessment models that are behind it. Again, the D-dimer, I know that with a low-to-moderate pre-test probability, that that's something that I should be ordering.

And again, it gets into some of the logistics of, can I get the D-dimer back in a timely fashion? And again, you have a lab that you might be able to do a stat D-dimer on, as well as get the results. Oftentimes that's no. I have again, occasionally done that. If it's early in the day and they have a certain insurance that I know that lab is reliable and maybe I have a lower pretest probability, then it's nice just to reassure yourself to get that negative D-dimer back. And then you say, okay, we're good. Maybe I should look somewhere else in the differential. So, I know it's in the back of my head. Again, the logistics are probably what makes it the most challenging to operationalize it. So, if I can't get that D-dimer, and I do think that the DVT venous thromboembolism is one of my higher ranked differentials, then obviously at that point, I'll go ahead and try and get the ultrasound and confirm or refute my clinical suspicion.

Stephan Moll: And Paul, if I could add that one of the problems is, and many physicians are not aware of it, the D-dimer comes in different normal ranges, different units. Many tests go up to 500 as being normal, but if you use different units, it goes up to 250. One is called the D-dimer unit, DDU, and the other one is called fibrinogen FEU, fibrinogen equivalent unit.

So, one needs to be, if you use a D-dimer, you need to know which tests are we using and what is the D-dimer value, what is the normal range that makes it difficult for people. In addition to that, there are probably, and I'm guessing a little 15 or 16 different D-dimer assays on the market, and only some of them have been appropriately investigated that they're really useful and predictive of a low or high, of a presence of a DVT. So, one needs to know which D-dimer one uses, which assay that is, and whether it's been well-established for DVT-PE exclusion.

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Jori May: Yeah, I think those are great points is that, you know, these scoring systems do exist, but again, logistics often guide us as to what's actually feasible for our patients. I think going over the Wells criteria is helpful because it's a nice reminder of what are the things that increase the likelihood of DVT. Even if you're not using that scoring system, you know, making sure that you're thinking about patients with malignancy or you're thinking about the clinical characteristics to look for on exam. So, it can be helpful.

Stephan Moll: In a more perfect healthcare system, I think there would be a more systematic approach to a sore leg or a swollen or painful leg presentation where people would have the ability to use a pre-test probability assessment, would have access to a D-dimer to limit these expensive, go quickly to Doppler ultrasound investigation. And maybe, not maybe, better structured healthcare systems have that. And there's a big role for people like you, Jori. You do systems-based hematology. One of your main interests is to improve healthcare delivery systems. And this is one of them where you need, one needs to work with the primary care physicians, but particularly also the emergency rooms that do the pre-test probability. But I think that's lacking in a number of institutions.

Jori May: That's an excellent point. It is an area of interest for me. And I think particularly focusing on how we can do this type of work in a primary clinic so that we're keeping these people out of the emergency room if they don't need to be there, which is a resource that's in such short supply for many these days. So, I think it's worth highlighting that if there is opportunity to focus on this work within your health system, it's a really valuable pursuit.

Stephan Moll: And, Jori, we tried that here at UNC a number of years ago to create a sore leg clinic where primary care physician would see a patient with a sore leg and then do the pre-test probability with a point-of-care D-dimer. And it didn't work out. The structure was meant to be if a DVT then is diagnosed or a PE, that the patient would get sent to the hematologist for the DVT-PE treatment, the established DVT-PE, but the part about the sore leg clinic just logistically didn't work out. And maybe that's a limitation of an academic center, maybe that's better in a well-structured Kaiser Permanente type of system. But we were able to create the acute DVT clinic, that part, and we'll get to that later on when we talk about treatment, but this sore leg clinic and the pretest probability was a struggle and continues to be.

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Paul Lewis: You mentioned treatment. And again, Jori or Stephen, at some point in our discussion, would love your opinion on empirically treating somebody if you have a high suspicion and you can't get either a D-dimer or a ultrasound and you maybe don't want to send them to the ER, what is the right thing to do? So, I would love at some point your thoughts on that.

Stephan Moll: I think for me, fairly easy to say. The one or two time or three time dose of an anticoagulant in most patients is quite safe. Obviously you select out the patients who have a significant increased risk of bleeding, et cetera. but if you really have a pretty high suspicion that this is a DVT or a PE, that does not need to go to the emergency room, I think it's very reasonable to use an anticoagulant for one or two doses until the Doppler ultrasound is available. And we've done that here at my institution because the Doppler techs used to go home in the late afternoon. Now they stay until I think it's 10 p.m. But people who came to the emergency room with a suspicion for DVT and there was no Doppler ultrasound at night, they would get an anticoagulant and the next day they would get the Doppler ultrasound. The point of care, the development of the point of care devices has changed that to some degree. But there are also some caveats to that because people sometimes were then sent home with a blood thinner or with even a prescription and then they went to the pharmacy and the cost was prohibitive so that they didn't take it then and that's also not good.

Paul Lewis: I appreciate that opinion. It's always something kind of in the back of my mind. And I have done it before, but you always say, is there any harm? I don't want to cause any harm and trying to balance those out. So, I appreciate that opinion.

Jori May: I will add, and I think the logistics of that is really, again, we keep coming back to logistics, unfortunately, because I think it's the reality of what we do every day. But what's nice about the oral factor 10A inhibitors like apixaban and rivaroxaban is they work immediately. So, you know, it used to be that patients needed to have contact with the healthcare system in order to be anticoagulated. So, it's just a matter of filling a prescription. There are a lot of barriers to that. But the one thing I would say is that online, there's usually access to what they call their 30-day free card.

There are patient support programs for apixaban and rivaroxaban, and through the pharmaceutical companies, there's often the availability for a 30-day supply for free. So, I encourage providers to look at the website, guide their patients through that

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process, just because filling that prescription is often a huge barrier, particularly if we're talking about a one or two-time dose until we sort this out. And we don't want to send a patient to the pharmacy where we're truly concerned and they're unable to access the medication that they need. So just a tip from something I've run into before.

Stephan Moll: Jori, I want to just highlight that again, if I may, because it's such a common thing that I hear when I see the patients and three months later for the question, how long do I treat with, should I be on anticoagulation? That initially when they were sent home from wherever with a prescription, they did not know about the patient support programs. And that's true for apixaban, rivaroxaban, dabigatran, and edoxaban as well, for all four direct oral anticoagulants, not just that the first three months are four weeks, activity free, but also then that subsequently patients, at least the ones who have insurance, can get the drug for \$10 a month. This does not apply to Medicare and Medicaid and TRICARE patients or uninsured patients, but it's so important to find out what would be the cost and are there other support programs.

Our university here, the hospital, offers the indigent population support programs because otherwise the cost is in the several hundred, \$600, \$700 and if they get sent home from the emergency room or some physician's office and then go to the pharmacy, the consequence may be either they pay so much money or they just don't buy it and don't take it even though they have an acute DVT. And that's one of the main benefits of the acute DVT clinic that we've developed that this gets where patients can be seen within, the goal is within two days of the diagnosis that we immediately catch when something like that happens.

Paul Lewis: One of the things I saw very quickly, I saw here, I'm not an emergency room doctor, but I thought it was a fascinating model. They actually had a starter pack of an oral 10A inhibitor in the ER. And they actually gave them, once they made the diagnosis of a DVT, they'd give them a two week starter and then sort of follow up either with your primary care physician or hematologist. So that seems like it has overcome some of the issues you all were referring to.

Jori May: Yes, absolutely. And we do that at our institution. It's difficult to set up, but so valuable when it does work. Leaving with a starter pack in hand is just such a service to patients. So, if you have the opportunity to promote that at your institution to any listeners, it's a great option.

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Case 1, continued

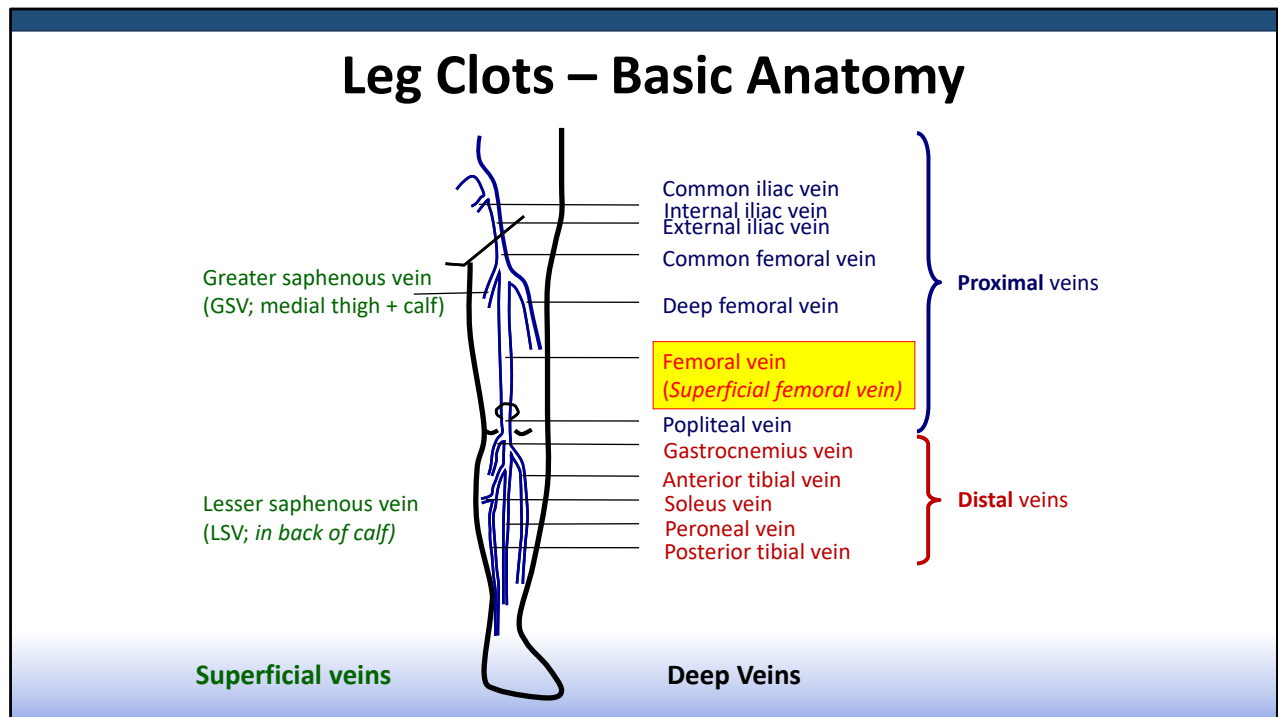
- Patient is seen in the office; exam findings confirm patient's description by phone
- Wells score: 1
- D-dimer elevated
- Ultrasound showed occlusive thrombus in the femoral vein (formerly called superficial femoral vein)



Jori May: So, we've already kind of ventured in talking about anticoagulation. So, it makes sense that we transition now to talking about what we're going to do for our patient. So, let's say that she ends up logistically making it to the office, which is a rare occurrence, and her exam findings really confirm what we saw, what we heard from her on the phone. If we were to go through the formal process, let's say theoretically her Wells score is only one, we obtain a D-dimer that's elevated and we get an ultrasound and she is found to have, if we read the report, it says an occlusive thrombus in the superficial femoral vein.

And so, Dr. Moll or Stefan, if you get a report and says, ah, a clot in the superficial femoral vein, what are you thinking? And really, how do you approach a patient that does have a clot on ultrasound? What are the things that you're asking or things that people should be looking for?

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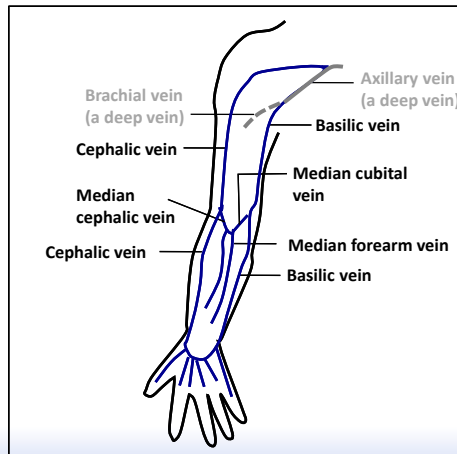


Stephan Moll: Yes. So, the first thing always is to define the clot. What are we really dealing with? And what we read here, the superficial femoral vein was renamed into femoral vein 25 years ago, but many Doppler labs still call it superficial femoral vein. And I have heard this, that people call me, quick consult. I have a patient with a superficial femoral vein, not very symptomatic. It's a superficial clot. I plan to just observe the patient, not realizing that the superficial femoral vein is the main deep vein in the thigh. And because people sometimes thought it was a superficial vein and clot, it was renamed into femoral vein that definitely needs anticoagulation because it's a proximal DVT. So, the definition is really important.

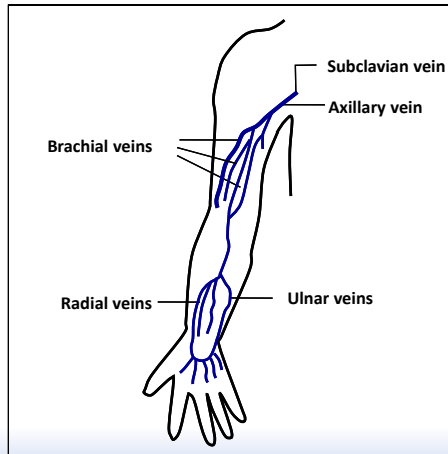
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Arm Clots – Basic Anatomy

Superficial Veins



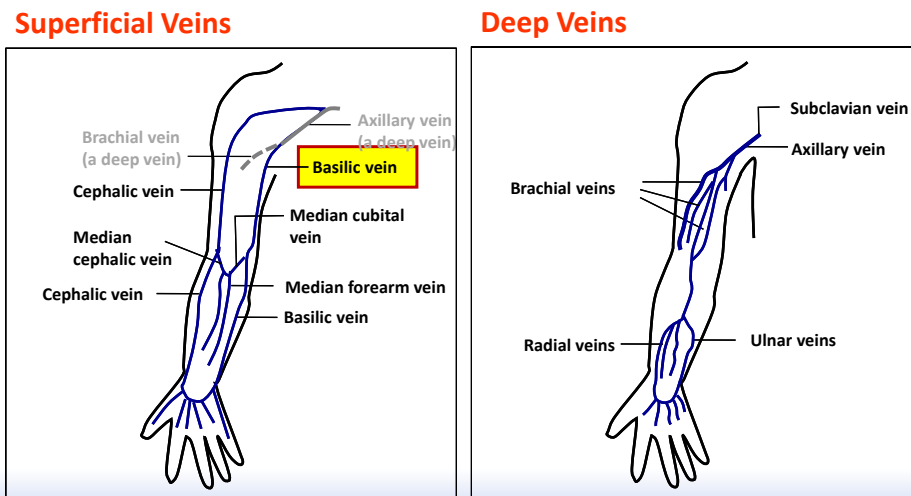
Deep Veins



Stephan Moll: The other place where misnomers are not, misinterpretations are not uncommon in real cases that I've heard about and have been called about, people confuse the basilic vein in the arm and the brachial vein.

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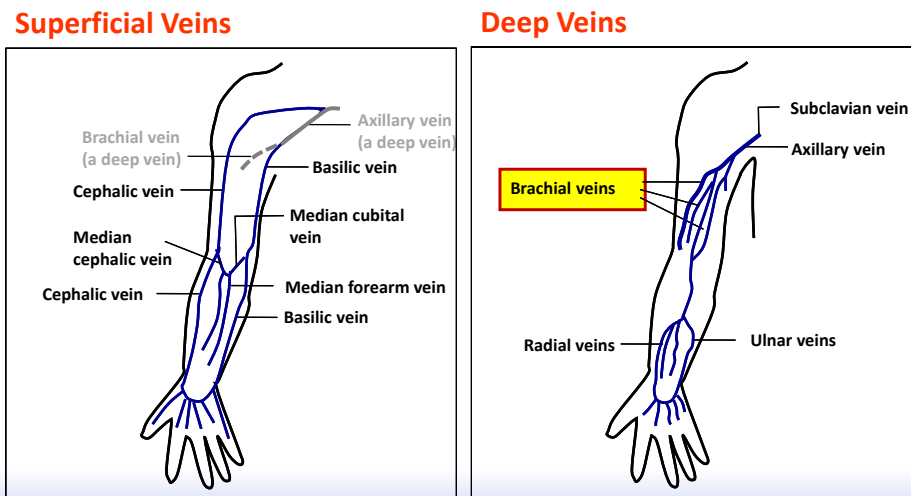
Arm Clots – Basic Anatomy



Stephan Moll: So, the basilic vein is a superficial vein, does not need treatment or short-term treatment depending on the risk factors but not long-term treatment.

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Arm Clots – Basic Anatomy



Stephan Moll: Whereas the brachial vein is the main proximal vein in the arm, a proximal arm DVT needs to be treated at least with three months and then make a decision based on what risk factors were present, is it long-term or not.

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Stephan Moll: People need to be clear about the anatomy when they're dealing with a DVT. And then the second thing beyond the anatomy that's important is proximal DVTs always need to be treated if that can be safely done, always need to be treated for at least three months. Whereas a distal DVT does not necessarily need to be treated if it's not very symptomatic and the risk factor is gone. For example, a patient flies from here to Asia, well, returns from Asia or from Europe, and then has a little bit of leg pain. Somebody does a Doppler, and they have an intramuscular soleal vein DVT. And then we think about anatomy, soleal vein, that's a distal DVT, or be it a perineal vein, very mild symptoms, the risk factor of travel is gone. That patient may not need anticoagulation, and typically doesn't if it's mild symptoms. Whereas if it's a similar patient with a perineal distal DVT who has underlying cancer, that patient with a persistent risk factor would be treated with anticoagulation.

So, proximal DVT always needs to be treated and proximal is popliteal vein and above. Anything below the popliteal vein, and that's where the veins split up into the posterior tibial, the anterior tibial, the perineal, and then there's the gastrocnemius and the soleal vein, the distal DVT may not need treatment. So, important to know the anatomy and define the clot.

Jori May: So, that's very helpful. I think even if it's just a quick Google, if you're not familiar with the venous anatomy to make sure, hey, is this deep? Is this superficial? Is this distal? Is this proximal? For someone who's not familiar with looking at ultrasound reports, that can be very helpful.

I think the next thing to think about in my mind is always, well, the clot is there, but then why did it happen? And so, Stephan, I was hoping you could also take us through kind of your approach to thinking about risk factors for clots. So, if a patient comes in, now we have a patient who has a clot, we said that there weren't provoking factors, but if we take a step back, what are the things that we need to be thinking about, asking the patient about or investigating for, in order to figure out if we can find any risk factors?

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VTE Risk Factors: A..., B..., C...		
Weak risk factors (OR < 2)	Moderate risk factors (OR 2 – 9)	Strong risk factors (OR > 10)
• Bed rest > 3 days • Diabetes mellitus • Arterial hypertension • Immobility due to sitting (e.g. prolonged car or air travel) • Increasing age • Laparoscopic surgery (e.g. cholecystectomy) • Obesity • Pregnancy • Varicose veins	• Arthroscopic knee surgery • Autoimmune disease • Blood transfusion • Central venous lines • Intravenous catheters and leads • Chemotherapy • Congestive heart failure or respiratory failure • Erythropoiesis-stimulating agents • Hormone replacement therapy (depends on formulation) • In vitro fertilization • Oral contraceptive therapy • Post-partum period • Infection (specifically pneumonia, urinary tract infection, HIV) • Inflammatory bowel disease • Cancer (highest risk in metastatic disease) • Paralytic stroke • Superficial vein thrombosis • Thrombophilia	• Fracture of lower limb • Hospitalization for heart failure or atrial fibrillation/flutter (within previous 3 months) • Hip or knee replacement • Major trauma • Myocardial infarction (within previous 3 months) • Previous VTE • Spinal cord injury



Konstantinides SV and Meyer G. The 2019 ESC Guidelines on the Diagnosis and Management of Acute Pulmonary Embolism. *Eur Heart J*. 2019 Nov 1;40(42):3453-3455. doi: 10.1093/eurheartj/ehz726

VTE is typically multifactorial:
A..., B..., C...

Stephan Moll: And so that's in the discussion with the patient. And that's really beyond the definition of the clot. The second really important point to define are the various risk factors, because DVTs and PEs are typically multi-factorial. It's not just one thing.

So, there's some mild risk factors....

...some more strong risk factors, a medium risk factor...

...and then some strong. And in the Wells criteria, they only look at a few of them.

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VTE Risk Factors: A...., B...., C....		
Weak risk factors (OR < 2)	Moderate risk factors (OR 2 – 9)	Strong risk factors (OR < 10)
• Bed rest > 3 days • Diabetes mellitus • Arterial hypertension • Immobility due to sitting (e.g. prolonged car or air travel) • Increasing age • Laparoscopic surgery (e.g. cholecystectomy) • Obesity • Pregnancy • Varicose veins	• Arthroscopic knee surgery • Autoimmune disease • Blood transfusion • Central venous lines • Intravenous catheters and leads • Chemotherapy • Congestive heart failure or respiratory failure • Erythropoiesis-stimulating agents • Hormone replacement therapy (depends on formulation) • In vitro fertilization • Oral contraceptive therapy • Post-partum period • Infection (specifically pneumonia, urinary tract infection, HIV) • Inflammatory bowel disease • Cancer (highest risk in metastatic disease) • Paralytic stroke • Superficial vein thrombosis • Thrombophilia	• Fracture of lower limb • Hospitalization for heart failure or atrial fibrillation/flutter (within previous 3 months) • Hip or knee replacement • Major trauma • Myocardial infarction (within previous 3 months) • Previous VTE • Spinal cord injury



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VTE is typically multifactorial:
A...., B...., C....

Stephan Moll: For example, the birth control pill hormonal therapy is not included into the Wells criteria. But there are a number of, we have talked about the immobility, the cast, the hormone replacement therapy, pregnancy, postpartum state, family history, and then the major trauma, major surgery, major hip or knee replacement, colon surgery, hysterectomy.

So, my approach always is, and I do that maybe almost too much. It's really an ABC approach that I want to be clear, define the different risk factors, because eventually the question will come up...

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Stephan Moll: ...how long should this patient be on anticoagulation? And that depends on which of the risk factors were transient and which ones are permanent, which risk factors were mild and which ones were really significantly contributing. So, this multifactorial awareness and the ABC is important.

Jori May: Well, I think that's nice to highlight. When you're seeing this patient acutely with a new clot, certainly want to be considering those things, but recognizing many of them are not necessarily going to change your acute management. We're going to come back to this topic in future podcasts about really those things are guiding your long-term management. But at the same time, those things are hopefully circulating in your mind when you're meeting this patient and dealing with an acute clot as well.

Stephan Moll: And Jori, exactly what you now say, because it does not change acute management, a thrombophilia workup in this situation is not appropriate or helpful, because whether you find a thrombophilia or not, the treatment is the same, this patient needs anticoagulation. The thrombophilia workup comes in later, it may be three months or six months when the decision needs to be made, should we treat with long-term anticoagulation? And I make that as a general statement.

There is an occasional situation, typically the heme-, probably the hematologist would be involved, where we think about an unusual strong family as to whether it could be an antithrombin deficiency, where you may replace with antithrombin, and more recently antiphospholipid antibodies. If you test and you test positive, would you use warfarin rather than a direct oral anticoagulant? But in general, thrombophilia testing is not appropriate in the acute setting.

Jori May: That's great to highlight, because I think that's often a knee-jerk reaction, but we'll definitely talk about that in detail in future podcasts. But I think the acute question that a lot of primary care doctors have to answer is basically, does this patient need to be admitted or not? And I think, Paul, if you have additional thoughts on anything we were talking about before too, please go ahead.

Paul Lewis: No, again, I think the ABCs are valuable. To your point, obviously, when you're thinking about the duration of treatment, but when you're seeing that patient, if you don't at least consider the venous thromboembolism, in your differential diagnosis, well, whether that's a thrombus or a PE, you're going to miss it, right? So, if you don't think about what is this individual patient that's presenting to me, what is

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their risk factors, just like we do with any other disease states. You have to have at least some basic knowledge of all those categories when you're making that initial determination. So, but great, great point. So, yeah, again, if you have that diagnosis, that's always a dilemma, less so now than perhaps in the past, but again, how are you going to manage the patient? And as you mentioned, if we can get them the medication, that's great. And obviously all the logistical factors that go into that.

I guess some other things I think about, of course, is their social situation, their living situation, other social determinants of health, and then also are they on other medications that might cause them to bleed. I know a lot of the medicines that people are on, are often they're on multiple medications, right? So, always when you're adding that medication, you're thinking, huh, I wonder what risk I'm added or other interactions that are occurring with this medication.

Jori May: I think those are great considerations. And we'll talk about kind of assessing bleeding risk, but I think you're mentally doing that checklist already. And I think what always comes to mind for me, particularly is people who are on aspirin for other indications. You know, do they need to, can we hold the aspirin if we're starting anticoagulation? Are they taking NSAIDs where those can be held as well? So, it's not just a prescribe and be done. You know, there's a lot of things to consider when you're starting an anticoagulant.

I don't know if anyone has any kind of closing thoughts on this case before we jump to a second case, any additional thoughts before we move on.

Stephan Moll (35:36.643)

Jori, I wanted to make one point about the Doppler ultrasound as a caveat too. When we define the clot, there are criteria on the Doppler ultrasound when a clot looks acute or fresh versus chronic. And unfortunately, a number of Doppler ultrasound labs don't report that, they just, they may see a patient just say DVT present or filling defect present.

But there are three criteria that make a clot look fresh. And one is that the clot is spongy on compression, whereas the chronic scar tissue, the vessel is firm and not spongy. The acute one, the clot looks hypoechoic, blackish. The chronic scar tissue looks whitish, hyperechoic. And the acute clot vein is often dilated, whereas the

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chronic scar tissue vessel is retracted and small. And it takes several weeks to maybe three or four months, not well studied, to go from this more acute-appearing clot to the more chronic scar tissue appearing changes. The problem is that sometimes if a patient presents with leg swelling, maybe they had a clot previously, and then the Doppler says, oh, there is a DVT present in the thigh. That may just be the scar tissue from the previous one. So, it does make a difference at times. And then I talk to the Doppler ultrasound tech, I typically ask for the most senior person. They are the ones who read the ultrasounds. The radiologists just bill for it, more or less. But get the most experienced person, or from the outside lab when a patient's referred, ask for their Doppler ultrasound report. And sometimes I have to call the more senior tech at the outside institution and ask them, you reported DVT present, but how did it look so that one can get a better assessment?

Paul Lewis: And, Jori, just one other thing, especially that primary presentation of advanced thromboembolism, the patient always has lots of questions, right? Whether it's them or their family. So, I always try to educate them or refer them to other resources because it is overwhelming, right? The first time they have an event. And so, they usually have so many questions more than I can answer in a visit in the office or even a follow-up visit from an ER. So many questions, and so I think education is important for these patients.

Stephan Moll: How do you address that? What do you give to the patients?

Paul Lewis: Well, I try to refer, again, resources that are out there, that are certainly on the internet. There's a number of sites, I think, that are available. And again, my issue with sites is I always make sure that they're vetted and they're valid. And so, there are a few that I use. But again, you all are experts, I'm always open to suggestions.

Stephan Moll: There's certainly one that I use. And because exactly the education of the patient is extremely important, and I think it makes an impact on them. And I did not find really good information a number of years ago. We created our own brochure, which we've had recently updated. It's available, published through the Vascular Medicine Journal as a peer-reviewed journal. It was just published last year. It's entitled something like, newly diagnosed with DVT and PE, what the patient wants to know. There's an English version and a Spanish version as well, and they...

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Stephan Moll: ...talk about the diagnosis, the treatment, what to expect, short-term, long-term, and those issues, and we give that in our transition clinic, and even when I see patients at three months or six months, give it to them as information material.

The other resource, and it is a National Blood Clot Alliance, NBCA at Stop the Clot, which Paul, you know also. It's a credible and good resource for patients with DVT-PE as a patient information education advocacy national organization, at StopTheClot.org.

And then finally the other one that I really like a lot, and Jori knows them well, as well and I do too is the Anticoagulation Forum at ACForum.org. And this is an organization by healthcare professionals, mostly anticoagulation providers, pharmacists, many nurses, nurse practitioners, physicians also, which has incredible information material, not only on DVT-PE, but also on AFib, anticoagulation interruption and anticoagulation use with gastric bypass surgery patients, et cetera. So that's ACForum.org.

Jori May: All great resources. Thank you both for highlighting those.

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Case 2

- Patient is seen in the office with shortness of breath, 2 weeks duration
- Vital signs are stable but HR 110s, no hypoxia
- D-dimer elevated
- CTA with LUL segmental and subsegmental PTE

Jori May: And so, let's go ahead and move on to another case. And we'll say that we have a similar patient who comes into Paul's office, but now is complaining of shortness of breath for the past two weeks. If we check her vital signs when she comes in, her blood pressure is stable, she's not hypoxic, but her heart rate is in the one-teens. As Paul mentioned, thinking about PE is probably the hardest part in this, in this case is so, always keeping that front of mind and a patient with shortness of breath. But we're going to jump ahead and say that we do some risk stratification, we assess pre-test probability, we do end up checking a D-dimer which is elevated, and we get a CT angiography which shows a left upper lobe segmental and subsegmental pulmonary embolism.

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Jori May: So, with that case in mind, we talked about what we're looking for on defining our clot on a lower extremity ultrasound, but Stephan, what are you thinking about when you're looking at a CT report for a new pulmonary embolism?

Stephan Moll: Yeah, thank you. So, it's the same thought process. First, define the clot, and then define the risk factor. And the definition is if the report says there's a PE, particularly the subsegmental one, which is a small PE, I always question, is that real or not. Is it a motion artifact? Is it a flow artifact? Was this suboptimal contrast filling of the CT scan? It's a mixing artifact? There are so many reasons to have a false positive test. And before you say this is a PE and you need to be on anticoagulation for three months or even worse, so if it's unprovoked for long term, you want to know that you're really dealing with a PE. And it's not infrequent that, at least with these smallish ones, subsegmental PE particularly, I call the most senior radiologist and just have them review the scan and say, what do you think about this?

I tend to look at them myself as well on, I don't tend to, I make a real big effort. Sometimes radiologists call a supplemental PE, an acute PE, and that is just – an acute PE can be radiologically diagnosed, or at least is a suggestion if it's a larger PE, because an acute PE is more central and there's contrast around it, whereas the chronic PE is more eccentric on the blood vessel wall. But with the really small PE, you cannot tell whether it's acute or chronic. And the radiologist may just use the clinical symptoms and then interpret that as showing acute, but it could be a chronic PE or could be just a false positive test. And then I want to know, that's the main thing, be sure what are we dealing with.

And then the second thing is it's nice to know how physiologically significant the PE is, because the size itself doesn't really matter that much. Sometimes people call it something a massive PE because it's big, but a massive PE, really, is a PE that has physiological consequences. Massive means there's such a right heart strain that the patient has hypotension. If there's right heart strain without hypotension, but right heart strain either by the CT parameters at the right side, the right ventricular diameter divided by left ventricular is less than one or less than 0.1 right versus more than one, or sometimes considered more than 0.9. That's evidence of right heart strain or then eventually by cardiac echo or by troponin leak. If there is right heart strain without hypertension, that's a sub-massive intermediate risk PE.

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And then there's a low-risk PE where there's no right heart strain. Even though the low-risk PE could be relatively large by parameters. And that is important, not so much for the primary care physician, but just for the understanding that the massive needs thrombolytic therapy. Obviously, the sub-massive at the border of massive, so significant right heart strain often thrombolytic therapy is being considered. But the low-risk PE clearly does not need thrombolytics, and even the sub-massive PE there, not everybody needs, definitely not everybody needs thrombolytics. So, defining into massive, sub-massive, and sub-massive also called intermediate risk or low-risk PE is a good thing to do. And then after the definition, I go to the VT risk factors, the ABC, the multifactorial, to see which ones were transient and permanent, because that then eventually influences how long we'll treat.

Jori May: That's really helpful. And so, for Paul, you get a phone call, presumably from your radiologist, about this CT scan. And so, I'm interested to hear your thought process on how do you decide if this is somebody that you're comfortable managing as an outpatient, starting their anticoagulation, versus someone that you feel like you might need to send to the emergency department? Are there things that you look for to help you make that decision?

Paul Lewis: Yeah, absolutely, Jori. So, and I think Stephan mentioned a few of them to look out for to begin with. And again, I think even as a primary care physician, the fact that you order the CT angio and you didn't send them to the ER in the first place. So that's the first, because oftentimes what I've seen and I work with residents is they suspect pulmonary embolism and before they even think about doing the D-dimer or the CTA or the VQ or whatever you're going to do, they just immediately say, I'm going to send them to ER, even if they're clinically stable. So, it's always something in the back of my mind. But again, this patient early on, think about the case, you said that they were not hypoxic. I believe that the heart rate was, patient was tachycardic, which obviously is a symptom you often see in pulmonary embolism.

Paul Lewis: But they were not, I don't believe they were hypotensive or if you didn't have a blood pressure, if you could get one or perhaps you did one in the office before. Otherwise, again, I know that the, and I've read that the paradigm is that you can start treating some of these pulmonary embolism patients low risk as an outpatient, but the question I always ask myself is, do I have the guts to do that? And how do I risk stratify the patients to do so?

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Paul Lewis: And so again, I often will have to refer to the literature or think through that as well as the other things we talked about earlier, other social determinants of health and other patient characteristics that make them unreliable or can't get medication, all those things we talked about. So for me, it would be a minority of patients that I'd feel comfortable treating as an outpatient, but I know I think again, this is something that, the more you do it, the more you become comfortable with. And so, it's important to know who is it safe to do this in.

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Simplified PESI (Pulmonary Embolism Severity Index)

Predicts 30-day outcomes of patients with PE, with fewer criteria than the original PESI.

Age, years	≤80 0	>80 +1
History of cancer	No 0	Yes +1
History of chronic cardiopulmonary disease	No 0	Yes +1
Heart rate, bpm	<110 0	≥110 +1
Systolic BP, mmHg	≥100 0	<100 +1
O ₂ saturation	≥90% 0	<90% +1

Simplified PESI (Pulmonary Embolism Severity Index). Accessed February 26, 2024 at: <https://www.mdcalc.com/calc/1247/simplified-pesi-pulmonary-embolism-severity-index>.

Jori May: Yeah, you know, that's an area that I find particularly interesting. It's something we've focused on at our institution because there are scoring systems that exist to help make that decision. So, one of the scoring systems you may have heard of is the simplified PESI score and PESI stands for Pulmonary Embolism Severity Index. There is a full PESI score. It's much more involved. The simplified version includes criteria for age, as well as comorbidities like a history of cancer, or chronic cardiopulmonary disease, heart rate, blood pressure, and oxygen saturation. So, some pretty easy to access information.

And in patients who have a score, basically meet any of those specific criteria, those patients are ones that need to be potentially admitted to the hospital and managed, versus those that do not have any of those high risk criteria, they have a score of zero, they can be safely managed as an outpatient.

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Jori May: And this is something that's been studied enough at this point that it's entering into guideline-based care. So, guidelines for management of pulmonary embolism now include statements on patients that are risk stratified to be treated as an outpatient can be done so safely. But as you say, Paul, a lot of it is having a health system in place to support the individual provider in doing that. And so, I think it's helpful to know that these tools are out there.

But certainly understanding that the logistics of doing that can be really challenging.

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Hestia Criteria for Outpatient Pulmonary Embolism Treatment

Identifies low-risk PE patients safe for outpatient treatment.

Use in hemodynamically stable patients with acute PE

Hemodynamically unstable sBP <100 mmHg and HR >100, needing ICU care, or by clinician judgment	No 0 Yes +1	PE diagnosed while on anticoagulation	No 0 Yes +1
Thrombolysis or embolectomy needed For reasons other than hemodynamic instability	No 0 Yes +1	Severe pain needing IV pain medication required >24 hr	No 0 Yes +1
Active bleeding or high risk for bleeding GI bleeding or surgery ≤2 weeks ago, stroke ≤1 month ago, bleeding disorder or platelet count <75 x 10 ⁹ /L, uncontrolled HTN (sBP >180 or dBP >110), or by clinician judgment	No 0 Yes +1	Medical or social reason for admission >24 hr (infection, malignancy, no support system)	No 0 Yes +1
>24 hrs on supplemental oxygen required to maintain SaO₂ >90%	No 0 Yes +1	Creatinine clearance >30 mL/min by Cockcroft-Gault	No 0 Yes +1
		Severe liver impairment By clinician judgment	No 0 Yes +1
		Pregnant	No 0 Yes +1
		Documented history of heparin-induced thrombocytopenia (HIT)	No 0 Yes +1

Hestia criteria for Outpatient Pulmonary Embolism Treatment. Accessed February 26, 2024 at: <https://www.mdcalc.com/calc/3918/hestia-criteria-outpatient-pulmonary-embolism-treatment>.

Jori May: The simplified PESI is not the only score. There's something also called the HESTIA criteria. All of these exist on the internet, on MedCalc. So, for people who have this patient in their clinic and want some assistance in making that decision of, do I need to admit this patient or not, I would keep in mind those two clinical tools in order to guide you, knowing that there is robust data behind them to suggest it could be safe to keep this patient out of the emergency department, out of the hospital, and safely manage them in their home.

Stephan Moll: And, Jori, if I may add to the Hestia criteria, something that I found interesting, and I've thought about the Hestia criteria a good bit, and I like them, even patients with right heart strain, if you apply the Hestia criteria, a number of people with right heart strain can also be treated as an outpatient. Now, this is referring to patients who may have a mild troponin leak or just on CT or if one does an echo, some mild right heart strain, but they do as well as an outpatient as an inpatient. So, while many of us, many physicians have felt increasingly comfortable to treat a large number of patients with DVT as outpatient, a good number of PE patients can also be safely and effectively treated as outpatients if, as you say, the logistics are appropriate.

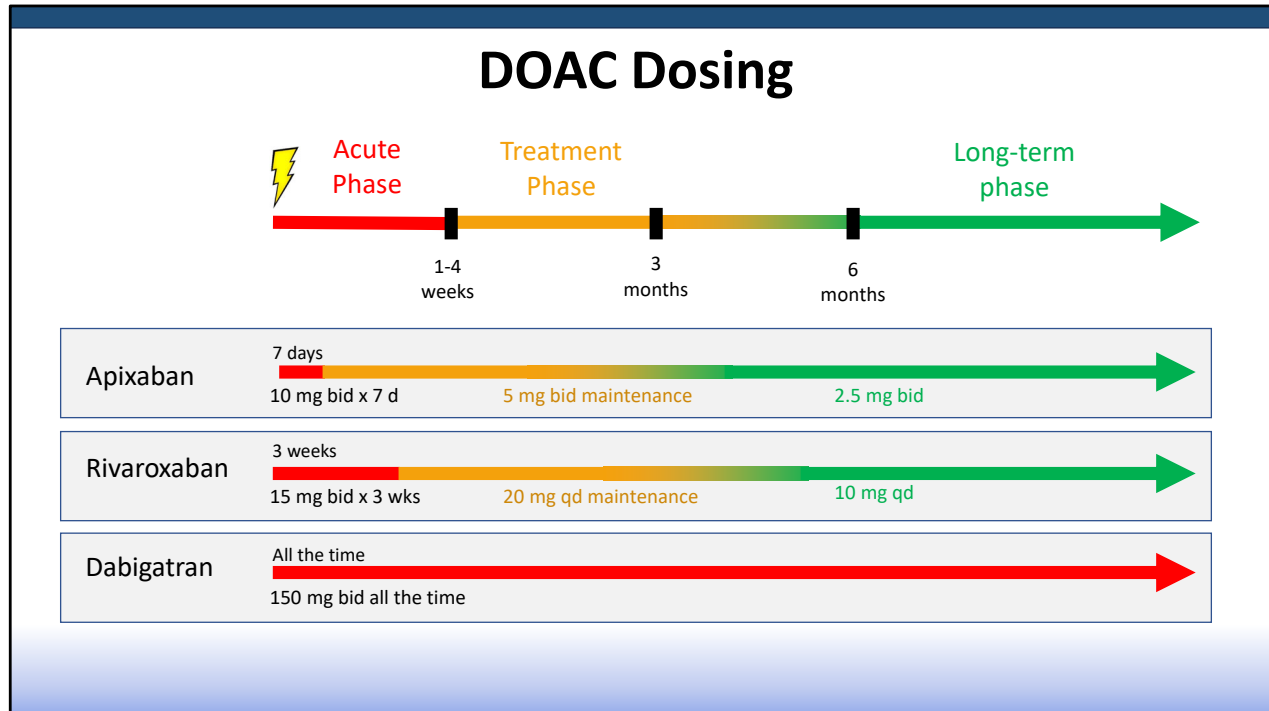
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Jori May: Absolutely. Thanks for highlighting that. So, if we're talking about starting anticoagulation, let's talk about the details of what that actually means. I think we've alluded to it with this idea of a starter pack, but Stephan, can you speak to, with the more common direct oral anticoagulants that we now use, how do you start a patient on anticoagulation?

Stephan Moll: Yeah, and the recommendation these days by various guidelines is that a direct oral anticoagulant is preferable over warfarin because of less risk of intracranial bleeding. And that seems to be real, particularly with the two that are mostly used in the US, apixaban and rivaroxaban. And warfarin, as we know, is cumbersome for the patient as well as for the healthcare professional. So, DOACs, really, in my mind is the go-to drug and increasing, with most people, has been the immediate thought to go to.

The key really is, number one, the cost of it. We've talked about the copay cards that are available for all of them. Then the second thing is the dosing. Even before the dosing, the key is that the healthcare professional gets a baseline creatinine because apixaban and rivaroxaban are cleared partially in the kidney. Apixaban 25%, rivaroxaban about one-third, 33%. Dabigatran, 80%, and the edoxaban, the Japanese direct 10A inhibitor, which is barely available in the US, has I think, I forgot what it is, 30 or 40% somewhere in between. So, creatinine needs to be obtained in the CBC as a baseline for platelet count and just make sure they are not anemic.

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Stephan Moll: And then once that has been obtained, the next thing to keep in mind is that what we, there are different thoughts, what is called the acute treatment phase versus the more over the next three months, the treatment phase, so the acute phase. And you'll notice that the direct oral anticoagulants are dosed differently.

For example, the apixaban is at a higher dose for the first seven days, and then it's lowered to the maintenance dose, initially 10 milligram twice daily for one week and then five milligram twice daily for the remaining time and eventually at six months, and we'll get to that in one of the future podcasts, one can actually lower the dose in some patients.

But the acute phase for rivaroxaban is three weeks, so the FDA approval is 15 milligrams twice daily for three weeks before you lower to the maintenance dose of 20 milligram once daily.

And with dabigatran, it's the same dose. There is no acute phase and secondary treatment phase, it's the same dose throughout. And the errors that we see, and I'm sure you have seen is that some people either they don't get started on the initial acute phase higher dose, or they get started on a higher dose and they get never dose reduced to the maintenance dose.

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Stephan Moll: So, whatever drug one uses, simple as it sounds, it's important to really know the dosing of it, for how long and to make sure that the patient knows that. The patient may not perceive that with all the things that are going on. This information is also in the patient handout material that I mentioned, the one in English and Spanish, because that's been an observation we've had not infrequently that the dosing doesn't get right for various reasons.

Jori May: And I think it's really important to highlight this dosing and that this is different from how we dose these same medications in another common condition of atrial fibrillation. So that, if you're starting anticoagulation with apixaban or rivaroxaban and Afib, there is no kind of acute phase increased dose, whereas in the VTE world there is. And so, I think that's often an area of confusion. So, although we think of these newer anticoagulants as being easy and safer, they still come with their own risks. And I think in particular, being aware of the dosing for the specific indication that you're prescribing them is really essential.

Stephan Moll: And Jori, the fact that we use for apixaban only seven days of a higher intensity and for rivaroxaban for three weeks and for dabigatran, no higher dose initially or no lower dose, it reflects it scientifically. We don't know what is really the, is there a need for an acute phase, higher dose and how long is this acute phase? But mentally, just to make it simple, I think to think about the first few weeks, first four weeks or is typically where the clot is not wall-adherent, to maybe a higher risk for clot progression. It's a time where we also tell patients maybe you shouldn't be quite not run a marathon in the first four weeks and take it a little more easy that until the clot is more firm, wall-adherent, less risk for PE, that's more the acute phase before it goes into the secondary prevention phase.

Paul Lewis: And, Jori, I was going to, again, I really, as I think of this from a primary care perspective, I really like that progression of acute, and then moving on based on the number of months, it's a great way to think about it if you don't have a hematologist involved in the case. And then my other point I was going to make is, we actually had a few errors with dosing early on, and we were able to change our dosing in the EMR and actually label it.

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Paul Lewis: So, we now have one that says for atrial fib dosing, we've got thromboembolism starting and continuing. So, that's been really helpful. Again, we had to work with our EMR folks to do that, but that's actually prevented a lot of errors.

Jori May: That's fantastic. Yes.

Stephan Moll: Jori, so, you mentioned earlier that sometimes we see these patients who are on long-term aspirin and then they have a clot and then you need to start anticoagulation and people forget to stop the aspirin, et cetera. Tell us a little bit, if I may, I'm not the moderator, but how do you assess bleeding risk and to decide how do we, the patient needs anticoagulation, but there's some bleeding risk, how do you weigh that?

Jori May: Yeah, so that's a great question. And it kind of again comes back to the themes that we keep touching on, is there are some tools to help us, but a lot of times our patients exist outside of those tools. One of the things that I do think about using, there is a score that's validated to assess bleeding risk in VTE patients.

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VTE-BLEED Score

Assesses risk of bleeding while on anticoagulation.

Use this tool to estimate the risk of major or clinically relevant bleeding after day 30 of anticoagulation administration for acute VTE. The original study enrolled patients who were taking either warfarin or dabigatran.

Active cancer	No 0	Yes +2
Male patient with uncontrolled hypertension	No 0	Yes +1
Anemia	No 0	Yes +1.5
History of bleeding	No 0	Yes +1.5
Renal dysfunction (creatinine clearance 30-60 mL/min)	No 0	Yes +1.5
Age ≥ 60 years	No 0	Yes +1.5

VTE-BLEED Score. Accessed February 26, 2024 at: <https://www.mdcalc.com/calc/10467/vte-bleed-score>.

Jori May: I think we're all familiar more with bleeding risk as associated with atrial fibrillation and how we manage those patients in the cardiac world, but there's something called the VTE bleed score, which looks specifically at patients with VTE and their bleeding risk. It's not necessarily a hard and fast that you shouldn't, you know, you interpret it as not anticoagulating a patient if they have a certain score. In my mind, what this is, is basically gives me a framework to assess for reversible bleeding risk factors in a patient.

So, what are the things that I know might increase their bleeding risk? And are any of them modifiable? Is there anything that I can do when I'm starting anticoagulation to decrease that risk? So, the components of the VTE bleed score are all given different points. But things that increase the bleeding risk are active malignancy, specifically male patients with uncontrolled hypertension, patients who are already anemic, they have a history of bleeding, those that have renal dysfunction, a creatinine clearance of 30 to 60 or even less than that. And then older patients, an age greater than or equal to 60 is what's used in this risk score.

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Jori May: So, thinking about those things is always part of my initial assessment when I'm starting into coagulation. Stephan, you asked specifically about aspirin. And so, this is an area of particular interest for me. And Stephan and I have recently published on this topic of, when in a patient who maybe is on aspirin for secondary prevention of a stroke that they had in the past, or is on aspirin maybe for a remote history of stent placement, for a history of MI. Do you need to continue that aspirin if you're starting them on anticoagulation? Many times, the answer is no, that aspirin can actually be deprescribed. The reason for that is when we are making these decisions about antithrombotic therapy, right? It's, do adding additional therapies decrease that risk of thrombosis? Is it actually helpful? But then also does it increase the bleeding risk? And so what we know in a lot of situations with arterial disease where patients are on aspirin where if they're on anticoagulation, it often offers some of that protective effect in the arterial circulation that the aspirin was previously offering. And so the aspirin is not maybe necessary from that regard. And we definitely know that adding anticoagulation with aspirin on top significantly increases that bleeding risk. So, it's a very complex topic, but I would encourage all providers to think about and look at that medication list and say, is this aspirin truly necessary if I'm starting anticoagulation in this patient?

The other things that I think are always important to think about in a patient where you're concerned about bleeding or really anybody who you're starting anticoagulation, if that is a person who menstruates, we have to be aware of that when we're starting anticoagulation. So, talking to people about their menstrual bleeding, anticipating that it's going to increase if we are starting anticoagulation and making sure that there's contingency plans in order to deal with that, really should be part of that upfront conversation, unfortunately often is not.

So again, a huge, it's not a prescribe and be done, unfortunately, there's really a lot of other factors to take into account.

Stephan Moll: And Jori, the good thing is since we'll have additional podcasts, the issue of arterial and venous disease will be in detail with several cases discussed down the line. And I'm really happy that you mentioned the heavy menstrual bleeding. And we'll talk about the assessment of that and the treatment options that we have because often people don't think about it, don't treat it, and the woman suffers, but there are interventions that we can do.

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Stephan Moll: So, Jori, I never used the VTE bleed score, even though I've worked in VTE for many years. And I think this is pretty common sense and I think Paul agrees with that. This, yes, somebody who has active cancer, particularly if it's colon cancer or lung cancer that is already has some had some bleeding or hypertension, we know increased risk for intracranial bleeding, etc., etc, renal dysfunction, low body weight in females who are elderly, those are particularly high-risk bleeding patients. People who have had a bleed before, they have had a portal vein clot now, they have varices, they have thrombocytopenia, they have liver cirrhosis and coagulopathy. All that is not mentioned here in the VTE bleed score, but we assess that clinically more as a gestalt. So, the VTE bleed score in my mind is okay for clinical studies, but for clinical purpose, I personally don't use it and don't think it anyway. I'm not sure it's Paul, what do you think? How do you approach it, Paul?

Paul Lewis: Yeah, I think on a global sense, looking at their bleeding risk factors, again, as a primary care physician, I'm always trying to balance bleeding versus thrombosis and sort of that teeter-totter effect. And I guess I would say I probably use a little bit more of my gestalt as opposed to using a calculator, but it's nice to always refer to these sort of tools, especially if you're not as familiar, if you're newer to clinical practice or perhaps you're still in training. It's always nice to know what these tools and risk assessment models have as their roots overall.

Stephan Moll: And then, Jori, you mentioned aspirin, but we should also at least mention the over-the-counter drugs, supplements that patients take. Many of them have some antiplatelet effect, garlic and ginkgo and vitamin E and fish oil. Whether that really leads to an increased bleeding risk in patients is not well studied typically, but I always caution about these supplements, particularly the ones that I mentioned with antiplatelet effect, but there are a number of others. I'm not a big fan of supplements, but particularly in a patient on anticoagulation, I try to tell the patient limit as much as you can.

Jori May: That's a great point. I think there are so many themes that we have touched on already in this first episode that I have no doubt that we're going to have a lot more to talk about as we continue in the series. But I think we're coming up on the end of time.

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Conclusion and Take-home Points

- Define the clot: DVT acute vs chronic; proximal vs. distal, superficial vs. deep, PE subsegmental vs. elsewhere; low risk, intermediate risk, high-risk

Jori May: So, I would ask maybe Paul to end us with some take-home points of, as the primary care provider in the group, the one who's being the first one to get these calls and see these patients. What are some things that you see as kind of the key take home points for providers about DVT and PE acute management?

Paul Lewis: Yeah, absolutely. And again, I certainly appreciate all your expertise on our discussion today because many of these topics often go through my mind. It's always wonderful to have consultants and experts such as you all to review these with. But some great take home points overall is again, making sure you define the clot. As Stephen mentioned, where exactly is that clot in terms of the anatomy? Proximal vs distal, is that clot acute or chronic, hopefully perhaps based on symptoms, you can somewhat tell that. Very important, again, I heard superficial versus deep, and I have to say I'm very happy they've changed the nomenclature. And hopefully our radiologists will continue to use the new nomenclature, not the old one. Excellent points about, if you do a pulmonary embolism, where is that located, and what else are you seeing on that CT angio?

Conclusion and Take-home Points

- Define the clot: DVT acute vs chronic; proximal vs. distal, superficial vs. deep, PE subsegmental vs. elsewhere; low risk, intermediate risk, high-risk
- Identify the risk factors: Multifactorial; A..., B... , C...

Paul Lewis: The other thing we talked about, again, whether it's initial, making the initial diagnosis is what is that patient's risk factors? I know we'll talk more about that in terms of duration of treatment, but do they have, again, weak risk factors, moderate, or do they have strong risk factors for thrombosis?

Conclusion and Take-home Points

- Define the clot: DVT acute vs chronic; proximal vs. distal, superficial vs. deep, PE subsegmental vs. elsewhere; low risk, intermediate risk, high-risk
- Identify the risk factors: Multifactorial; A..., B... , C...
- Tools to assist in outpatient workup: Wells scores, empiric anticoagulation

Paul Lewis: All these tools we talked about for risk assessment models, such as the Well score and empiric anticoagulation, also very valuable.

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Conclusion and Take-home Points

- Define the clot: DVT acute vs chronic; proximal vs. distal, superficial vs. deep, PE subsegmental vs. elsewhere; low risk, intermediate risk, high-risk
- Identify the risk factors: Multifactorial; A..., B... , C...
- Tools to assist in outpatient workup: Wells scores, empiric anticoagulation
- Outpatient management is safe and effective in many patients. Consider risk scores like sPESI/HESTIA, VTE-BLEED

Paul Lewis: And then, I think we had a great discussion on bleeding risk also, with things you could do perhaps to decrease a patient's bleeding risk, as well as making sure you have an assessment of that bleeding risk, at least in a global sense, and what else you can do. You mentioned again, perhaps holding other anticoagulants, discussing with perhaps their cardiologists, et cetera, while they're on a DOAC, and again, great, great points there, as well as, again, educating the patients so they can avoid things like NSAIDs and not accidentally take ibuprofen excessively. So, all really, really great points that I learned today.

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Acute VTE: Diagnosis and Management

Jori May, MD

Assistant Professor of Medicine
Division of Hematology/Oncology
The University of Alabama at
Birmingham School of Medicine
Birmingham, Alabama

Stephan Moll, MD
Professor

Department of Medicine
Division of Hematology
University of North Carolina
Chapel Hill, North Carolina

**Paul A. Lewis, MD, FAAFP, ABPM-
CI, CPE, CPHIMS**
BayCare Medical Group
Clearwater, Florida

Jori May: Wonderful. Well, I just want to thank you both for joining me. Thank you to Paul and Stefan. I think this was a great discussion. This concludes our overview of the diagnosis and management of acute VTE. So, in our next podcast, we're going to be talking about clinical considerations for duration of therapy. So, what we all keep alluding to and what often is the crux of the question for managing these patients. So, I'm looking forward to that. So, please to our listeners, don't forget to complete your CE evaluation and claim your CE credit.

We thank you for your attention and we hope to have you tune in for our next podcast.