2018 MID-ATLANTIC
CONFERENCE

8th ANNUAL CURRENT CONCEPTS IN
VASCULAR THERAPIES

2018

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MD FACS

April 27, 2018

VTE Algorithm: Diagnosis and Treatment

Disclosures

- None

Objectives

- 1. Diagnosis and Treatment algorithm for Acute Pulmonary Embolism
- 2. Diagnosis and Treatment algorithm for Acute DVT

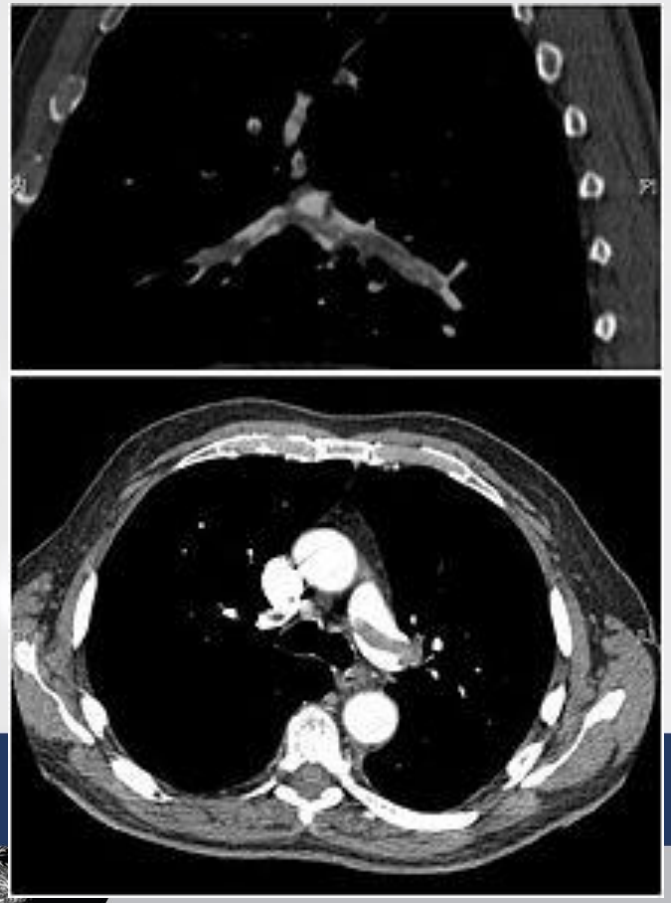
WHAT WOULD YOU DO?

WWYD?

- 45 year old female comes to the ER with chest pain and shortness of breath.
- She has had a prior DVT for which she received coumadin for a year.
- She stopped her blood thinner 3 months ago.
- Elective ankle surgery 2 weeks ago.
- HR 115
- BP 90/60
- O2 sat 94% on Non Re-breather

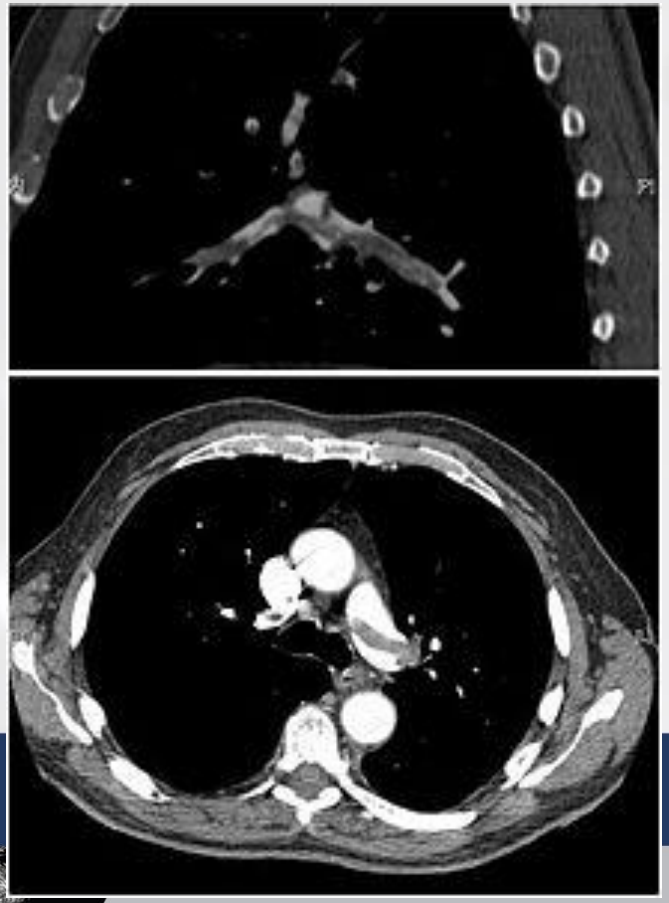
WWYD?

- Echo shows dilated right ventricle
- BNP 1200
- Troponin 1.2



WWYD?

- What now?
- Who makes the decision?
- How do they make the decision?
- Will the best treatment plan be offered to this patient?



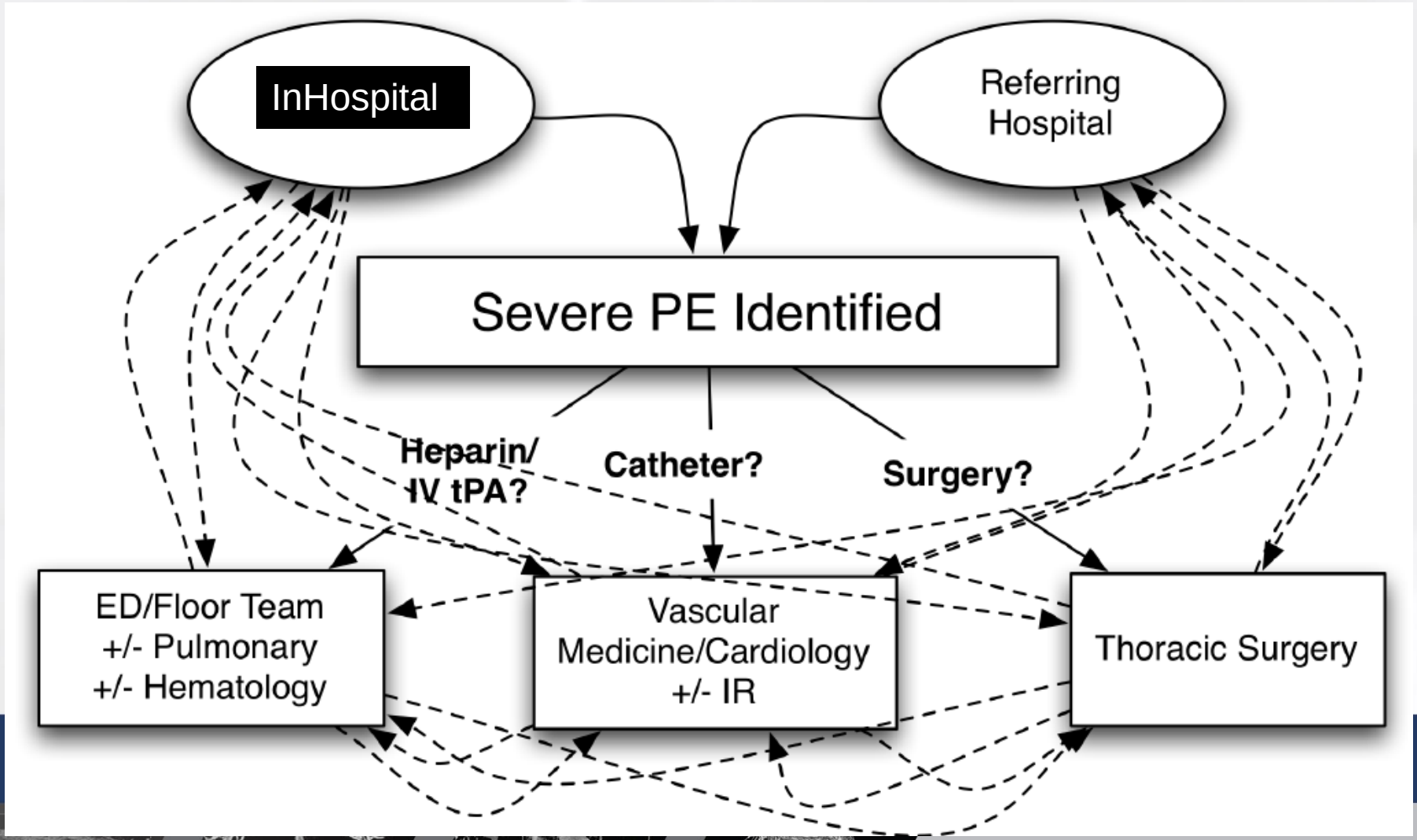
Our System

- Admitted to hospitalist
  - Pulmonary Critical Care Consult
    - Consider systemic TPA
      - 2/3 of TPA withheld in appropriate patients due to concerns of bleeding risk
    - Therapeutic anticoagulation
  - CT Surgery Consult
    - Is there a role for embolectomy
  - Vascular Surgery Consult
    - Is there a role for catheter directed TPA
    - What is the source of the Clot

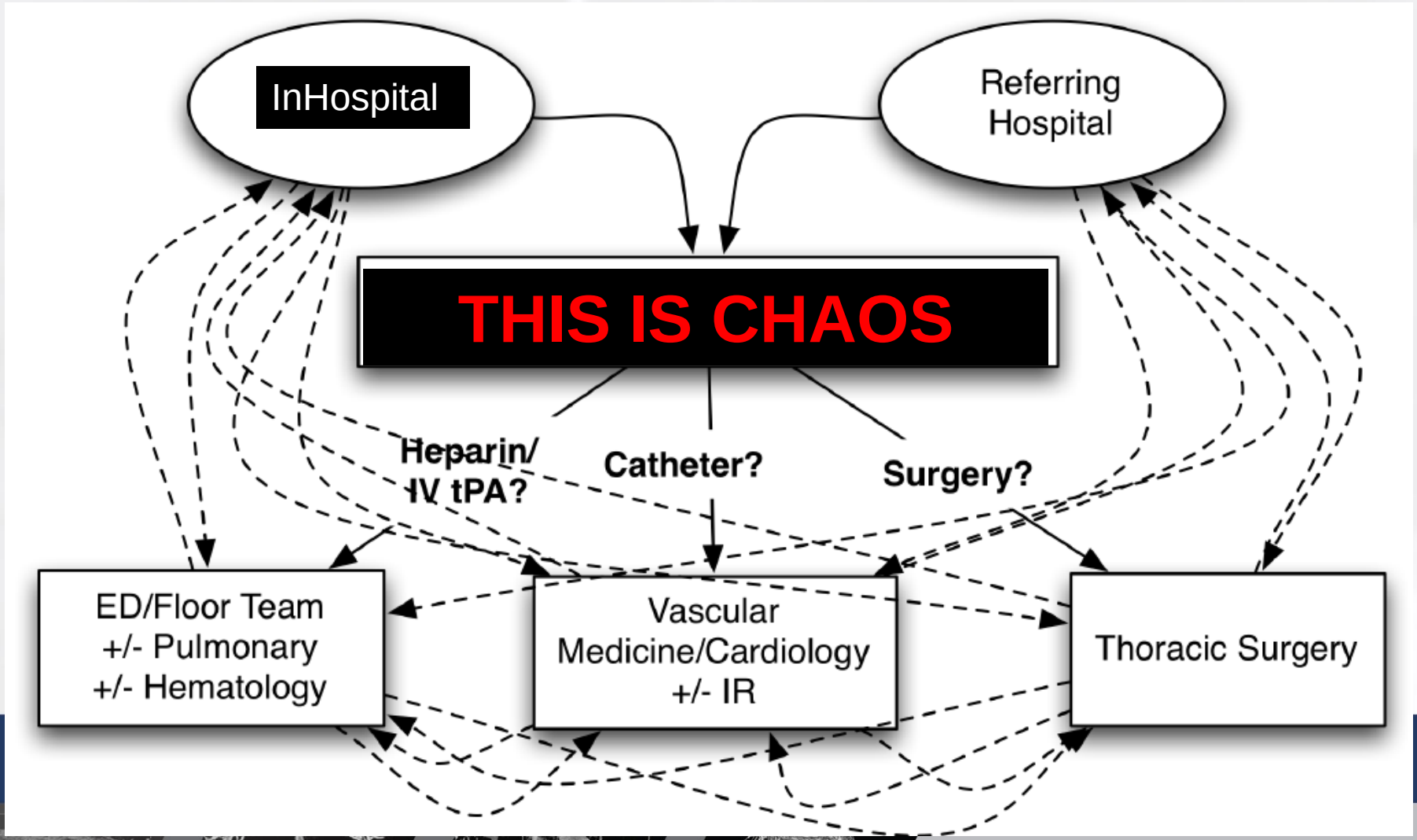
Our System

- 6 notes in the computer
- No centralized discussion amongst doctors to determine the best treatment for this patient
- Is this the optimal solution for our patient?

Other Systems



Other Systems



HOW DOES THE RIGHT MODEL WORK?

73 year old male with chest pain and shortness of breath

- Admission testing included
  - CT scan
  - Pro BNP
  - Echo
  - Troponin
  - BMP
  - CBC
  - PT/INR

- Echo demonstrated large RV
  - Paradoxical motion of septum
  - Estimated PA pressures of 55
- Pro BNP 256
- CTA Chest:

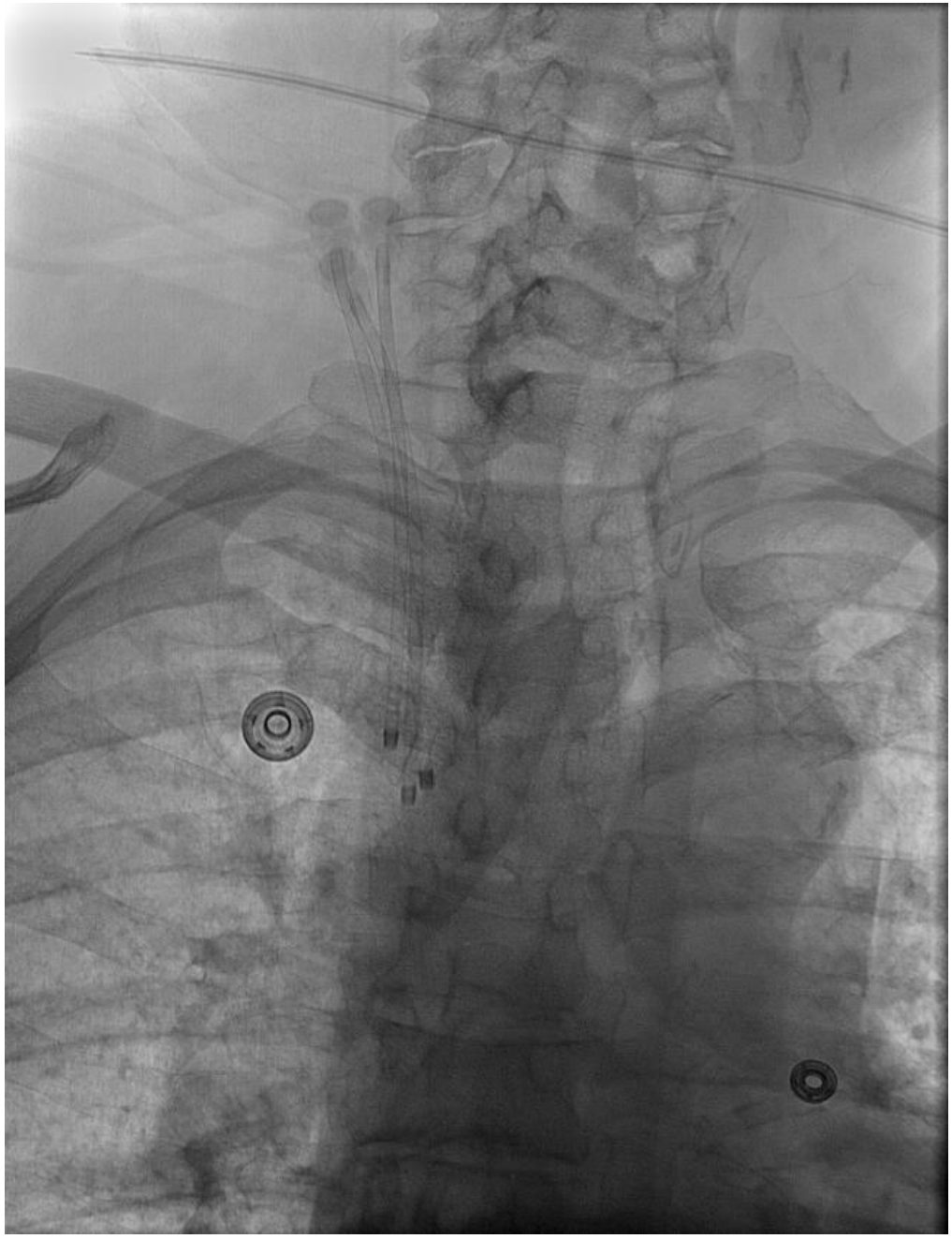

R
L
20CM
20CM

Multidisciplinary Discussion

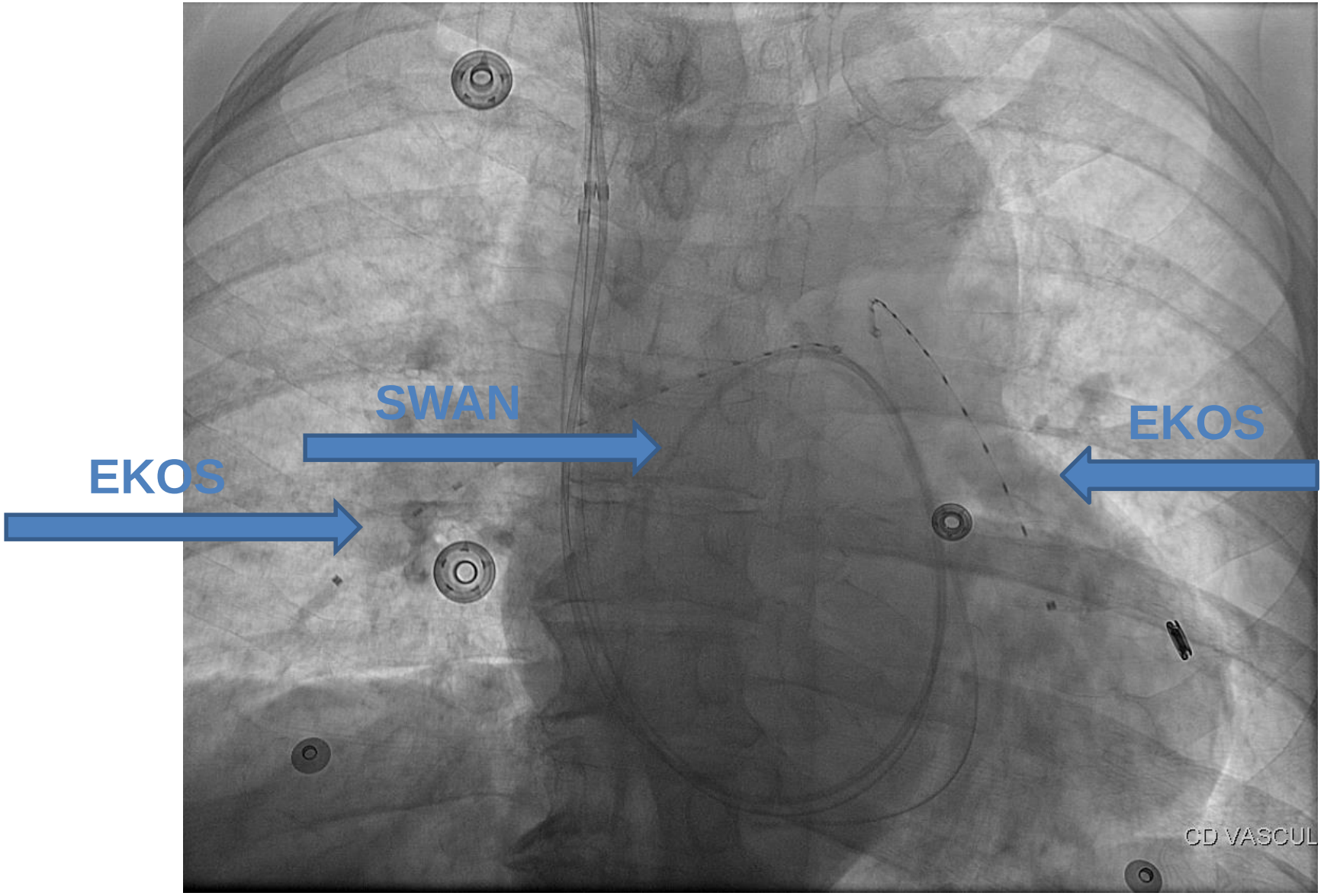
- Risks and benefits of TPA at 73 years old
- Thrombus burden and classification of his PE
  - 100 mg TPA systemic
  - 50 mg TPA systemic
  - Low dose catheter directed TPA
  - Open embolectomy
  - Systemic anticoagulation and supportive care

How was this case handled

- Pt was started on therapeutic heparin
- Catheter directed therapy to the bilateral PE
  - Low Dose TPA given his age of >70.
- LE Duplex and IVC duplex showed a L femoral and iliac DVT
  - No symptoms so no surgical therapy




CD VASCU


SWAN
EKOS
EKOS
CD VASCUL

POD #1

- TPA administered at 1mg/hr/catheter
- Low dose heparin in each sheath
- Swan PA pressures monitored until resolution of PA hypertension
- Fibrinogen, PTT, CBC and hemodynamics monitored for signs/symptoms of bleeding

Post Op Care

- Discharge planning
  - Plan for 12 months of anticoagulation
  - Compression stockings 30-40mmHg for two years
  - 72 hour echo to look for resolution of right heart strain
  - 3 month follow up appt. to assess for resolution of right heart strain and symptoms of post thrombotic syndrome

So How Do We Get There?

- Step one
  - Prompt Identification of Disease
- Step two
  - Risk Stratification
- Step three
  - Develop a Patient and Disease Specific Plan

Disease Identification

- Co
  juc

DVT Modified Wells Criteria

VASCULAR HPT

Wells Criteria

For use in the emergency department setting only

Active cancer (ongoing treatment or within last 6 months, or palliative)	1
Paralysis, paresis or recent plaster immobilisation of lower extremities	1
Recently bedridden >3 days and/or major surgery within 4 weeks	1
Local tenderness	1
Thigh and calf swollen	1
Calf swelling 3 cm > asymptomatic side (measured 10 cm below tibial tuberosity)	1
Pitting oedema in symptomatic leg only	1
Dilated superficial veins (non-varicose) in symptomatic leg only	1
Alternative diagnosis as or more likely than DVT	-2

Low probability: ≤ 0	Moderate probability: 1-2	High probability ≥ 3

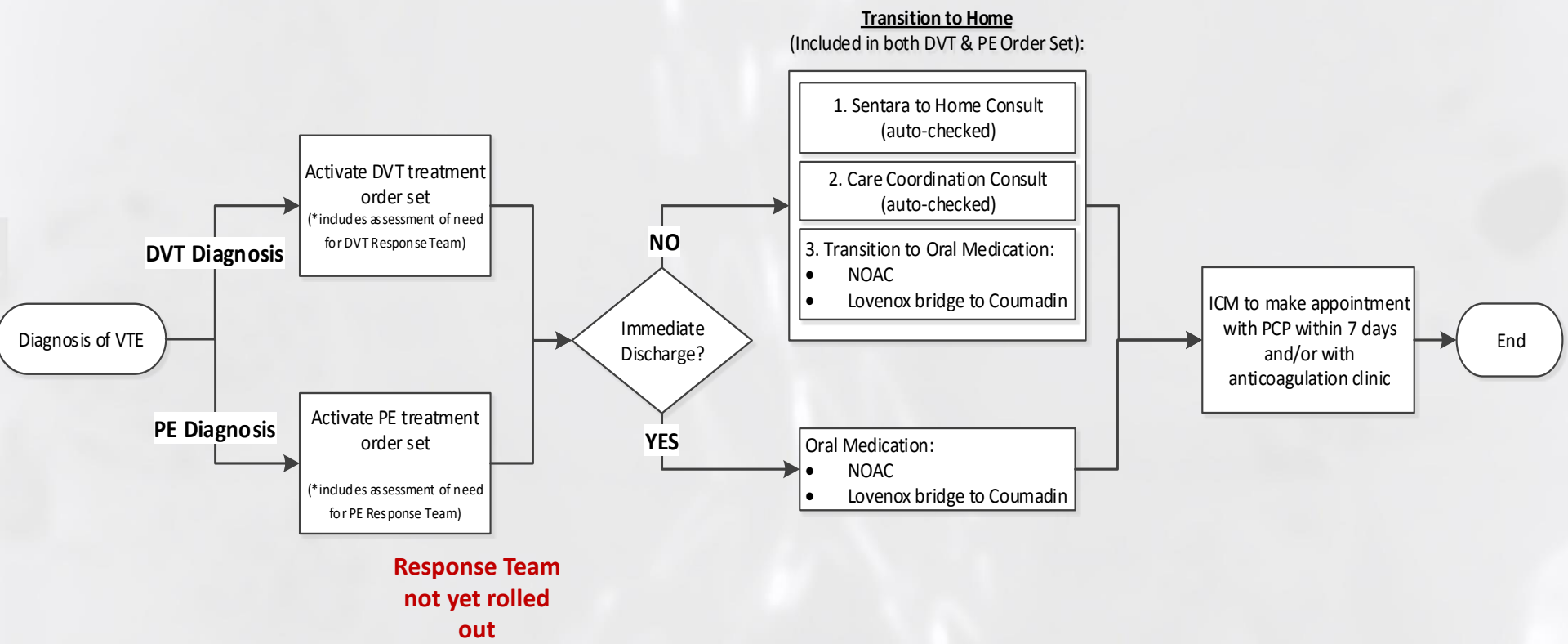
Probability of VTE increases from 3 to 75 % as wells score increases

PE Modified Wells Criteria

Table 1. Wells Prediction Rule for Diagnosing Pulmonary Embolism: Clinical Evaluation Table for Predicting Pretest Probability of Pulmonary Embolism*

Clinical Characteristic	**Score**
Previous pulmonary embolism or deep vein thrombosis	+ 1.5
Heart rate >100 beats per minute	+ 1.5
Recent surgery or immobilization (within the last 30 d)	+ 1.5
Clinical signs of deep vein thrombosis	+ 3
Alternative diagnosis less likely than pulmonary embolism	+ 3
Hemoptysis	+ 1
Cancer (treated within the last 6 mo)	+ 1
Clinical Probability of Pulmonary Embolism	**Score**
Low	0-1
Intermediate	2-6
High	≥7

*Reprinted from Am J Med, Vol. 113, Chagnon I, Bounameaux H, Aujesky D, et al, Comparison of two clinical prediction rules and implicit assessment among patients with suspected pulmonary embolism, pp 269-75, Copyright 2002.


Transition to Home
(Included in both DVT & PE Order Set):
1. Sentara to Home Consult (auto-checked)
2. Care Coordination Consult (auto-checked)
3. Transition to Oral Medication:
• NOAC
• Lovenox bridge to Coumadin
Activate DVT treatment order set
(*includes assessment of need for DVT Response Team)
DVT Diagnosis
Diagnosis of VTE
PE Diagnosis
Activate PE treatment order set
(*includes assessment of need for PE Response Team)
Response Team not yet rolled out
NO
Immediate Discharge?
YES
Oral Medication:
• NOAC
• Lovenox bridge to Coumadin
ICM to make appointment with PCP within 7 days and/or with anticoagulation clinic
End

Activate DVT and PE Orderset

▼ Massive Pulmonary Embolism (Shock/Hemodynamic Collapse)

ⓘ If impending arrest or need for vasopressor agents due to suspected right ventricular failure:

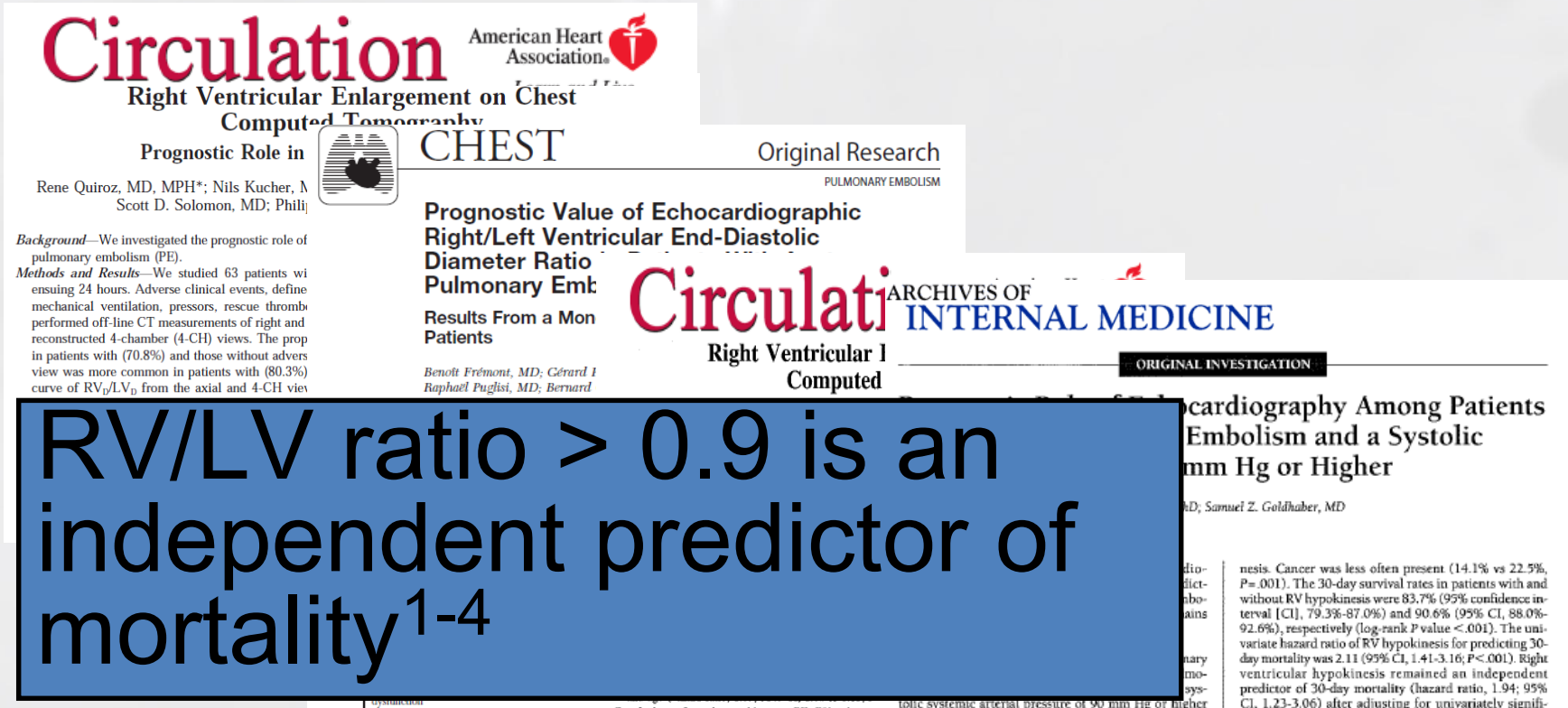
Definition of Massive PE:
- Persistent hypotension SBP < 90 or
- Hypotension that requires vasopressor support or
- Respiratory failure requiring intubation or noninvasive ventilation or
- Cardiac Arrest due to Pulmonary Embolism

1. Dial 1-2 and notify operator of need for Pulmonary Embolism Response Team Alert.
2. After discussion with PE Response Team, order systemic thrombolysis if no contraindications.
3. Consider CT surgery consultation for open embolectomy.

Risk Stratification

- Pulmonary Embolism
  - Massive
  - Submassive
  - Asymptomatic
- DVT
  - Limb Treatening Phlegmasia
  - Proximal Disease (Iliac and IVC)
  - Distal Disease (Calf, Popliteal and Femoral Veins)

Why Treat Submassive PE?



RV/LV ratio > 0.9 is an independent predictor of mortality[1-4]

1.Quiroz, Circ 2004; 109:2401-2404
2.Frémont, Chest 2008; 133;558-362
3.Schoef, Circ 2004; 110:3276-3280
4. Kucher, Arch Intern Med 2005; 165:1777-1781

ARCHIVES OF
INTERNAL MEDICINE

ORIGINAL INVESTIGATION

Association of Persistent Right Ventricular Dysfunction at Hospital Discharge After Acute Pulmonary Embolism With Recurrent Thromboembolic Events

Patients with persistent RV dysfunction at discharge:

8 times more likely to have **recurrent PE**
4 times higher in **mortality rate**

than patients with RV dysfunction regressed at discharge[6]

symptomatic, recurrent fatal or nonfatal VTE.

Arch Intern Med. 2006;166:2151-2156

Grifoni, Arch Intern Med 2006; 166:2151-215

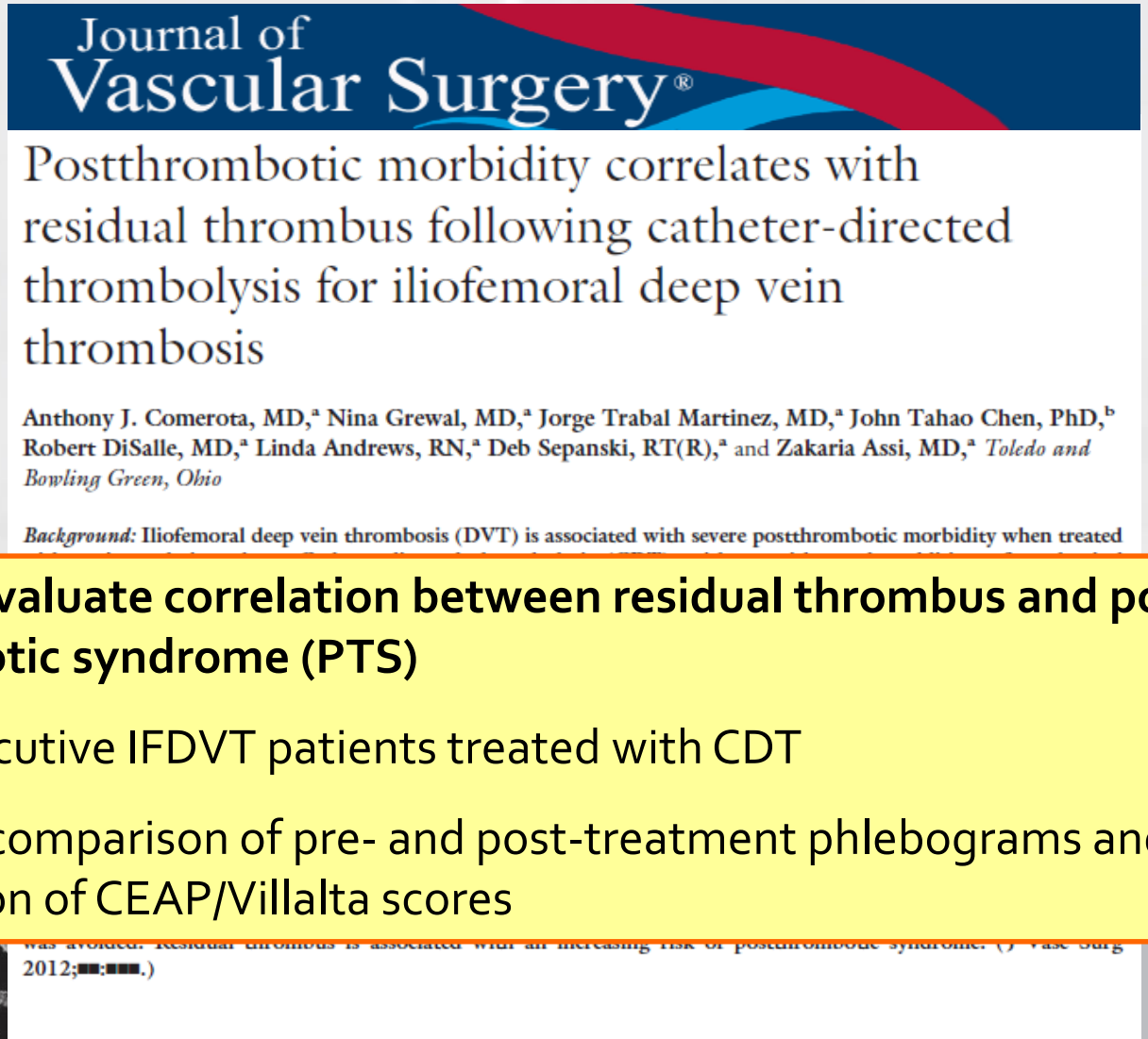
Risk Stratification

▼ MASSIVE PE

- [x] MASSIVE PE Panel
  - [x] CBC WITH DIFFERENTIAL
    STAT, ONE TIME First occurrence Today at 0020, Lab Performed
  - [x] PT-INR
    STAT, ONE TIME First occurrence Today at 0020, Lab Performed
  - [x] APTT
    STAT, ONE TIME First occurrence Today at 0020, Lab Performed
  - [x] NT PROBNP
    STAT, ONE TIME First occurrence Today at 0020, Lab Performed
  - [x] TROPONIN
    STAT, ONE TIME First occurrence Today at 0020, Lab Performed
  - [x] Echo Cardiogram Complete
    STAT, ONE TIME First occurrence Today at 0020
    Indication for Exam: Pulmonary embolism, acute, to guide therapy
    Portable Exam @ Bedside? Yes
    Echocardiographic contrast agent will be used per protocol for patients with inadequate visualization: Yes
    Is discharge today contingent on echo: No
    PE evaluation study to be done during business hours 7AM to 7 PM. If after hours, please ensure Echo is completed by 9 AM the following morning.
  - [ ] CT CTA CHEST PULMONARY... If not previously ordered
    STAT, ONCE, Starting 4/27/18
  - [ ] PVL IVC (INCLUDES IVC/ILIAC VEINS)
    STAT, ONCE, Starting 4/27/18, Suspected PE
  - [x] PVL VENOUS EXAM LE BILATERAL R/O DVT
    STAT, ONCE First occurrence Today at 0020
    Indication for Exam: SUSPECTED PE
    Is discharge contingent on imaging order? NO
  - [ ] PVL VENOUS EXAM UE BILATERAL R/O DVT...If Lower extremity study is negative
    STAT, ONCE, Starting 4/27/18, If LE Study is negative

Greater thrombus removal gives lower PTS rate

Comerota et al. J Vasc Surg. 2012 Mar;55(3):768-73.



Journal of Vascular Surgery®

Postthrombotic morbidity correlates with residual thrombus following catheter-directed thrombolysis for iliofemoral deep vein thrombosis

Anthony J. Comerota, MD,[a] Nina Grewal, MD,[a] Jorge Trabal Martinez, MD,[a] John Tahao Chen, PhD,[b] Robert DiSalle, MD,[a] Linda Andrews, RN,[a] Deb Sepanski, RT(R),[a] and Zakaria Assi, MD,[a] *Toledo and Bowling Green, Ohio*

Background: Iliofemoral deep vein thrombosis (DVT) is associated with severe postthrombotic morbidity when treated

2012;■■:■■■.)

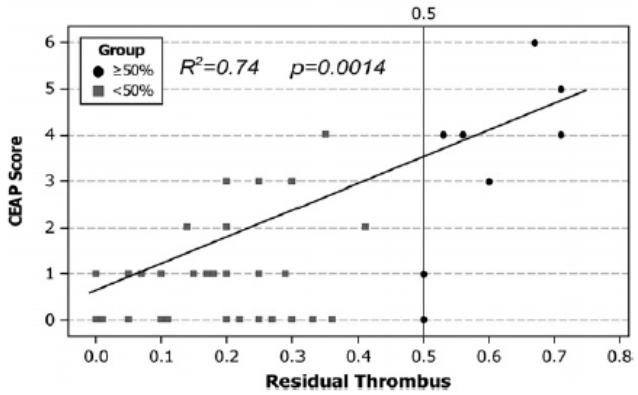
Study to evaluate correlation between residual thrombus and post-thrombotic syndrome (PTS)

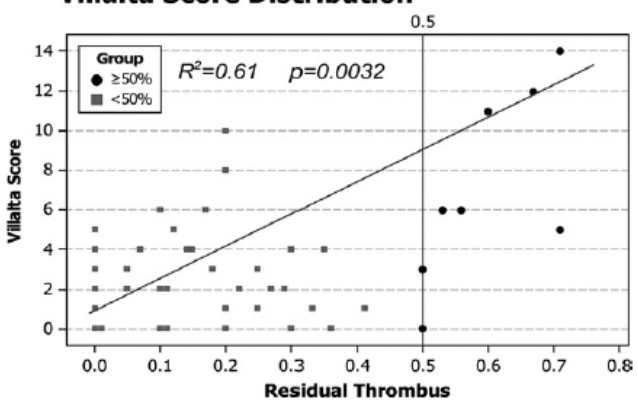
- 71 consecutive IFDVT patients treated with CDT
- Blinded comparison of pre- and post-treatment phlebograms and evaluation of CEAP/Villalta scores

Greater thrombus removal gives lower PTS rate

Comerota et al. J Vasc Surg. 2012 Mar;55(3):768-73.

Journal of Vascular Surgery®





First study to demonstrate:

- **Direct** and **significant** correlation of between PTS scores and thrombus clearance
- Conclusion: when thrombus clearance is complete, PTS can be avoided

Treatment Algorithm Massive PE

- [ ] Heparin ONLY - Pulmonary embolism heparin infusion. standard weight-based heparin (80 units/kg bolus +18 units/kg/hr drip) dosing per pharmacy. For patients with contraindication to alteplase.
  Standard weight-based heparin (80 unit/kg bolus + 18 unit/kg/hr drip). May be used for DVT, PE, AFIB, acute ischemic extremity. Indication:{Select One:28985}
- [ ] Warfarin and PT-INR panel
- [ ] tPA 100mg bolus dose panel
- [ ] tPA 50mg bolus dose panel

▼ Transition to Home

▼ Consults

ICM Consult automatically generated to schedule PCP appointment within 7 days at discharge and anticoagulation services appointment, if necessary.
- ICM Consult Process

- [x] Sentara to Home - Pharmacy Consult
  Routine, RX TO DC First occurrence Today at 0020
  Need help with an additional medication? Yes
  Need help with an additional medication? Yes
  List additional requests or questions:

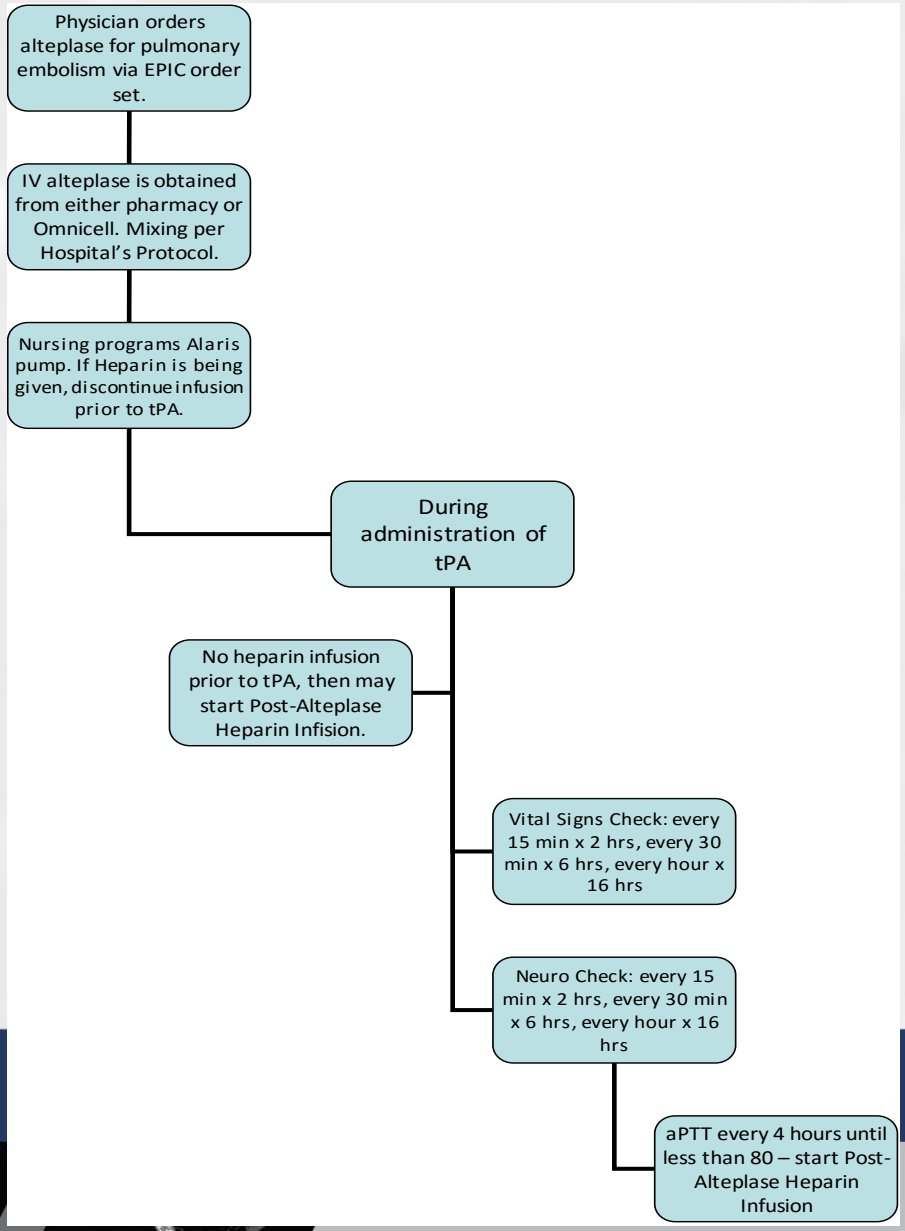
Asymptomatic PE and DVT

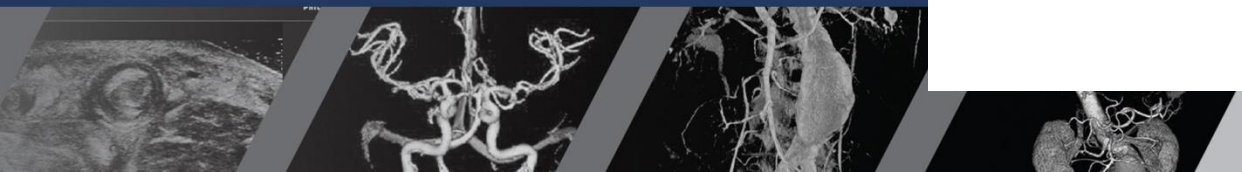
Medications

- [ ] Enoxaparin (LOVENOX) injection
  1 mg/kg, Subcutaneous, 2 TIMES DAILY
- [ ] Weight based heparin dosing per pharmacy once height and weight obtained (Includes PTTs)
  Standard (80 unit/kg bolus + 18 units/kg/hr drip) heparin dosing for DVT/PE/Atrial Fibrillation. Please indicate if you do not wish a heparin bolus to be given at initiation of drip:
- [ ] Heparin to Warfarin (COUMADIN) bridge - Pharmacy to dose (Includes PT/INR)
- [ ] Apixaban (ELIQUIS) DVT/PE Treatment Panel
- [ ] Rivaroxiban (XARELTO) DVT/PE Treatment Panel

tPA Education

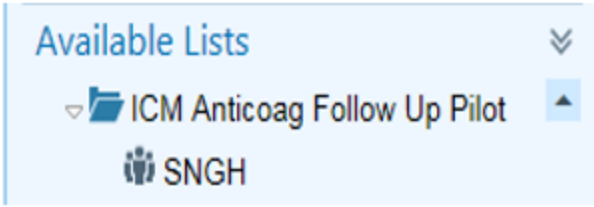
- A need for administration of tPA in a patient with acute PE occurred.
- Nursing treatment algorithm for administration of TPA
- Decrease time to infusion therapy and decrease bleeding risks



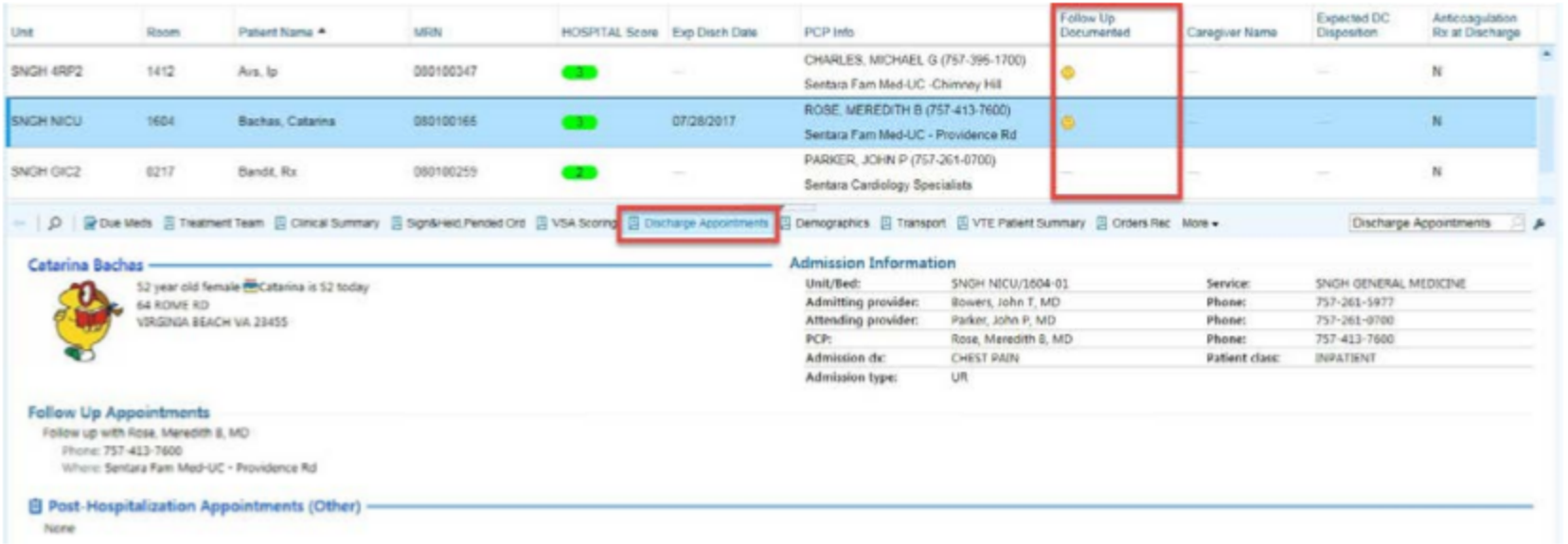


ICM Anticoag Follow Up System List

A new system list has been created for patients who need follow-up due to a **Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE)**. To access the list, select the System Lists folder, select the ICM Anticoag Follow Up Pilot system list, and then select your hospital.



The list only includes DVT and PE patients who need post discharge follow-up anticoagulation care. The **Follow Up Documented** column will display an icon if any appointments have been entered using the Post DC Follow Up navigator. You can see the details of any existing appointments by selecting the **Discharge Appointments** report in Patient List.



ICM Anticoag Follow Up System List Expectation Details

The ICM Anticoag Follow Up System List should be worked by sorting by Expected Discharge Date (EDD) and ensuring all patients getting discharged within 48-72 hours meet the below expectations. If any of the key criteria are missing, such as EDD or discharge plan, this should be escalated to the care team and reviewed at MDRs.

If a patient stays on this list past their expected discharge date, that patient should be reviewed to ensure that they will not miss their scheduled follow-up PCP or anticoagulation appointments due to a later discharge date.

Expectations for each patient on the ICM Anticoag Follow Up System List are as follows:

1. Patients that are planning to be discharged should have a post-discharge PCP appointment scheduled within 7 days of discharge. A PCP will need to be identified that can see the patient within 7 days if they do not currently have one.
2. **Patients on Coumadin** need their INR checked within 72 hours. Anticoagulation clinics are an option that can be utilized. Work with the patient's provider to determine the best option for the patient and schedule an appointment for within 72 hours of discharge, if needed. If an anticoagulation clinic is to be used, ensure the provider has completed the referral in Epic before calling (844) 544-6004 to schedule the appointment. Once the appointment is scheduled, ask the anticoagulation services clinic scheduler to remove the patient from their follow-up list to avoid duplication of efforts.
3. Patients should use Sentara to Home, if available, so they have their anticoagulation medication in their hands before they leave the hospital. Be mindful of discharges scheduled for when Sentara to Home is not opened,
4. For patients being discharged to another facility, coordinate with the discharge provider to ensure the patient is discharged on an anticoagulant. If the patient is on Coumadin, also ensure that the patient leaves with an order to get their INR checked within 72 hours.

The scheduling of the patient's appointments should be done in collaboration with the patient and/or the patient's identified caregiver to ensure that the date/time selected is one that the patient is able to make. Efforts should also be made to ensure that the patient has transportation to the appointment. PCP and contact information in Epic should be verified and updated if necessary.

ICM Anticoag Follow Up Script Guide for Schedulers

From the person making the appointment:

If patient on Coumadin:

"Hello, my name is _____. I am your Integrated Care Manager. We want to help prepare you for a smooth transition out of the hospital and to your next level of care. It looks like you will probably leave the hospital in about 2-3 days. One of the most important things you need to do when you leave the hospital is get your blood tested within 72 hours to make sure your blood thinner medication is working as desired. I see here that your primary care physician is Dr._____. Is that correct? I would like to give his/her office a call to see if they can give you that test and follow-up on your anticoagulation care. "

If patient NOT on Coumadin:

"Hello, my name is _____. I am your Integrated Care Manager. We want to help prepare you for a smooth transition out of the hospital and to your next level of care. It looks like you will probably leave the hospital in about 2-3 days. One of the most important things you need to do when you leave the hospital is ensure you follow-up with your primary care physician within the first week. I see here that your primary care physician is Dr._____. Is that correct? I would like to give his/her office a call so we can set up your follow-up appointment. "

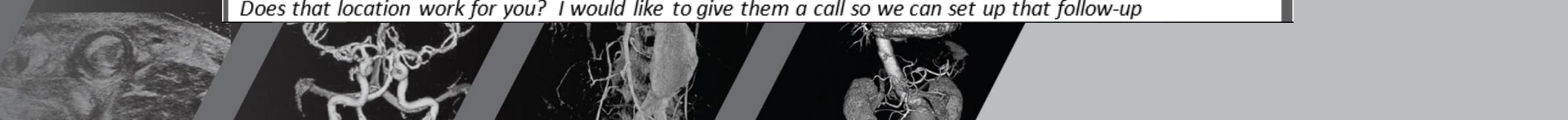
Phone call initiated at bedside with patient/caregiver.

"Hi, this is _____ one of the integrated care managers at Sentara _____Hospital. I am calling to make an appointment for_____. He/She needs a post hospitalization anticoagulation follow-up appointment within the next 3 days (if on Coumadin)/7 days (if not on Coumadin)."

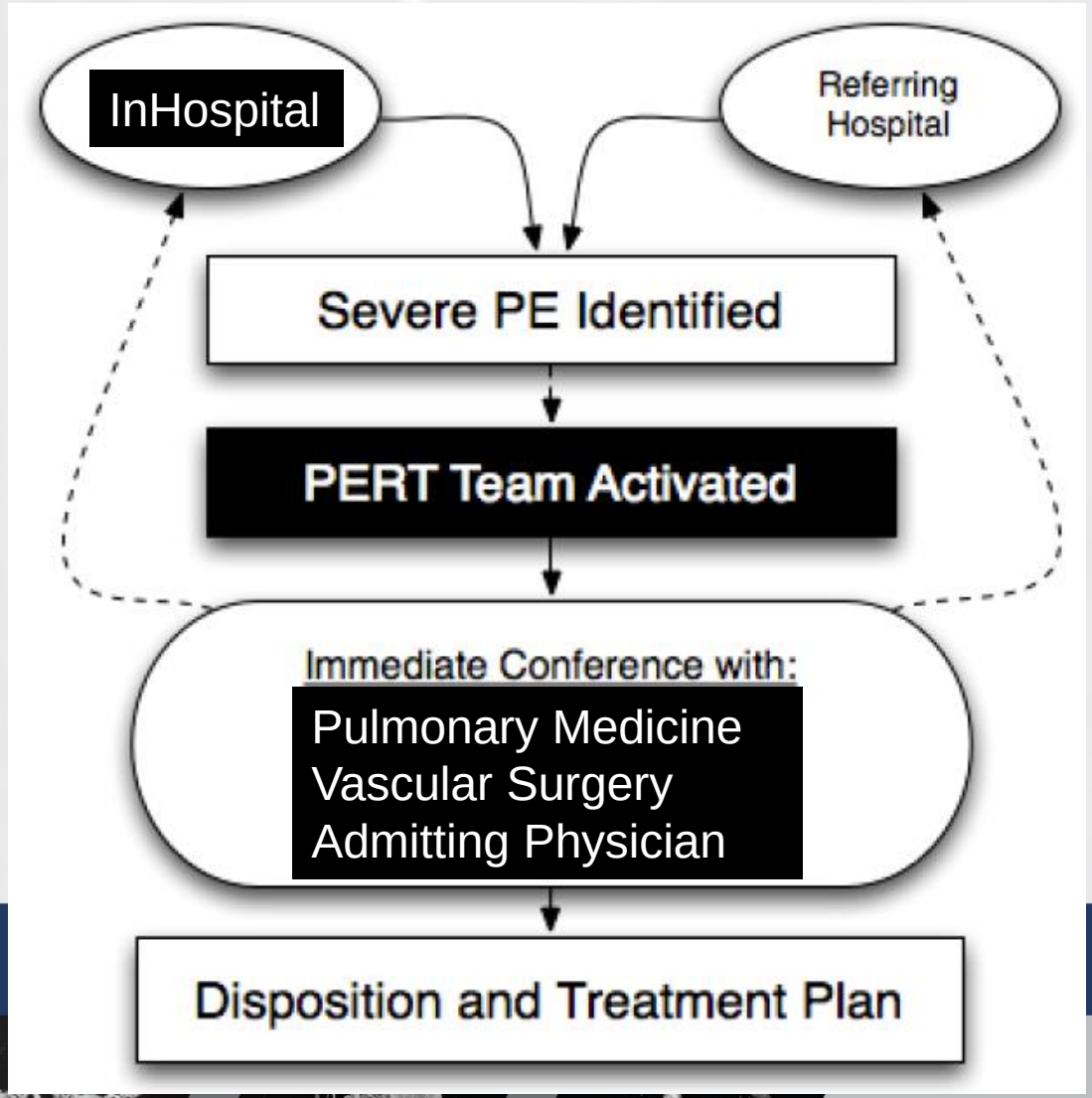
"Mr/Ms _____would you be able to go and do you have transportation to an appointment on _____ at _____? Oh you do, great! I am going to get that scheduled for you now."

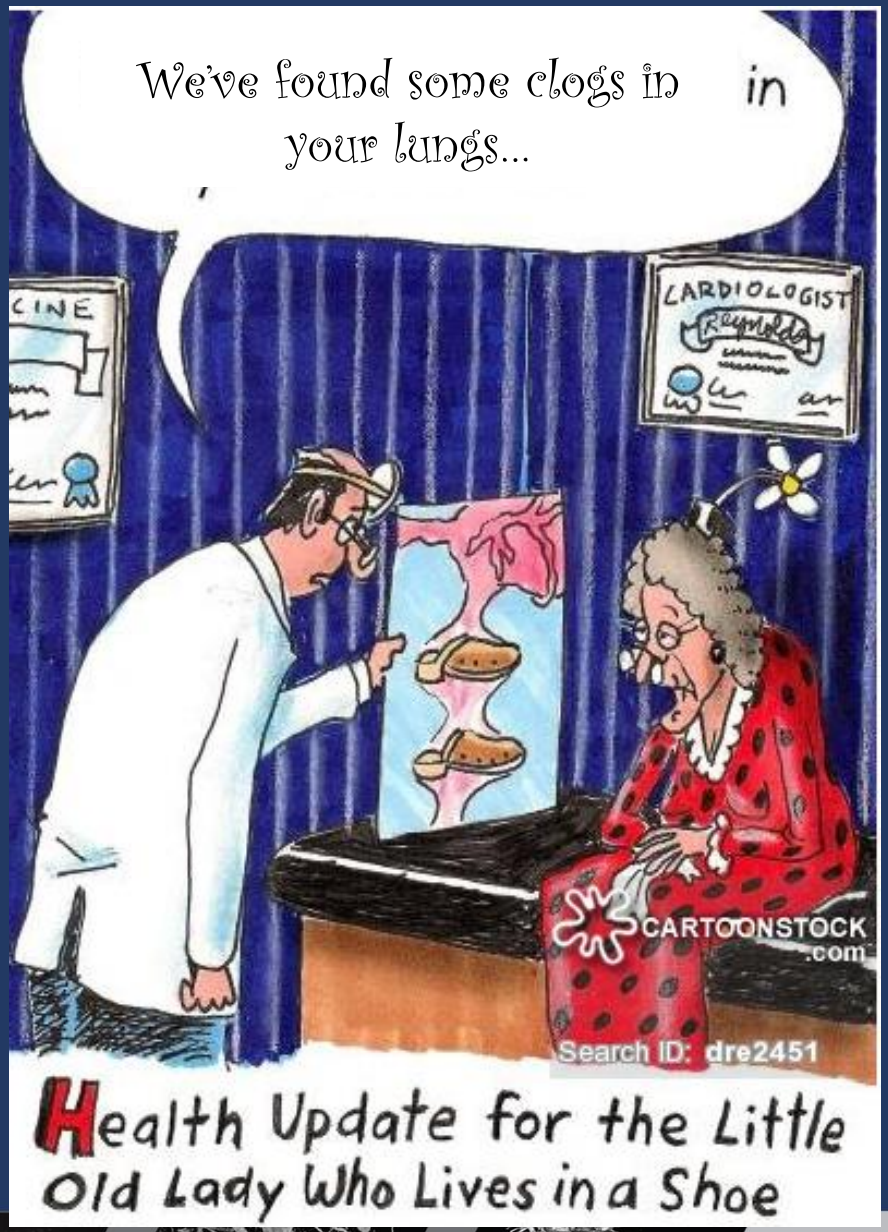
"Okay, Mr/Ms _____I have scheduled your appointment for _____ at _____. This appointment will be documented on your discharge instructions for you."

"I spoke with your primary care physician's office and they requested you go to a different location for that 72-hour post-discharge blood test. Dr._____ suggested you make an appointment with _____. Does that location work for you? I would like to give them a call so we can set up that follow-up



PE Reponse Team




We've found some clogs in your lungs...
in
CINE
CARDIOLOGIST
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Search ID: dre2451
Health Update for the Little Old Lady Who Lives in a Shoe