The Weekly Probe

7th October 2016 **Volume 13 Issue 33**

Research Uptakes – an update from Gina regarding the departmental research projects which are currently enrolling patients:

1. Fascia Iliaca Block (FIB) Study: We are collecting data on the use and effectiveness of ultrasound guided blocks in hip fracture patients. Please enter hip fracture patients, including those with contraindications to FIB, in the black book kept next to the ropivacaine supply on the top left hand shelf in the medication room. If you want to learn how to perform the block please talk to Gina.

2. Pneumothorax trial – randomised to active vs conservative management of primary spontaneous pneumothorax. The trial folder is located on the shelf behind the communications clerk. Please contact the research coordinator (usually Allison Moore) before seeking informed consent.

3. Airway Registry of ED intubations. If you intubate a patient please complete the form located on the difficult airway trolley and leave it in the Resus drug cupboard or in an envelope in Gina Watkins' pigeon hole next to the locker room.

4. SIESTA study: If you sedate an adult (18 years and over) for acute agitation please complete the forms regarding drugs used and any complications in the green and grey folder in the resus drug cupboard. There is a medical form and a nursing observation form to be completed. They comprise mainly tick boxes so are not onerous. Please leave completed forms in the envelope at the back of the folder.

THIS WEEK

D-dimer , PERC and PEs

Last week we discussed the d-dimer particularly in the context of potential PEs.

There were a number of take home points including:

- Know your test – be aware that there are different tests with differing specificity and sensitivity – both SSWAHS and SESIAHS use the STA LIATEST

- Know your units (correcting the typo from last week)

    - Units are expressed as mg/L, µg/L, or ng/mL. However there are **2 ways** to report the d-dimer levels.
    - Some labs have a cut off of less than 0.5 mg/L fibrinogen-equivalent units (FEU)
    - Other labs use d-dimer units or DDU with a cut off of 0.25mg/L-
    - 1 FEU = 2 X D-DU
    - This explains why some labs (eg SESIAHS including Sutherland, and outside labs including Laverty and Douglas Hanley Moir) have a cut off of 0.5 mg/L (500mcg/L) FEU

- Others such as SSWAHS (including Liverpool, Fairfield and C'town) at 0.25 mg/L (250 mcg/L) DDUs.
- DDimer 0.25 mg/L (DDU) = 250mcg/L (DDU) = 0.5 mg/L (FEU) = 500mcg/L (FEU)

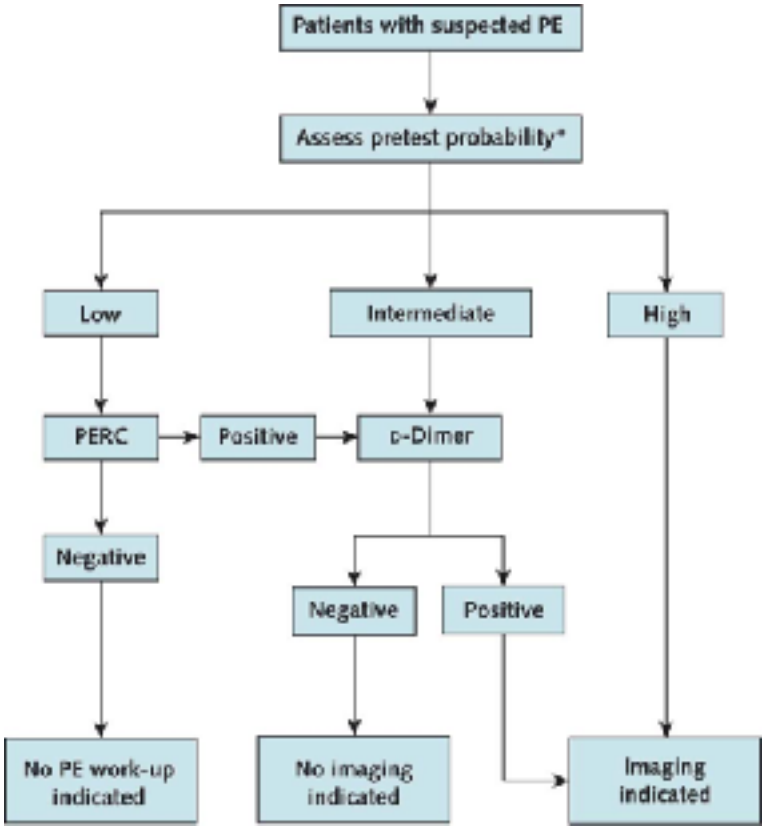
- Use your clinical gestalt (based on who gets PEs, and how they present) and validated clinical decision tools to determine the pre-test probability
    - Likely / high risk PE- organise imaging +/- treatment
    - Unlikely / Low – intermediate
        - Consider d-dimer to rule out if less than the specific cut-off (0.5 / 500 or 0.25 / 250) or an age related cut off if > 50yo of < 10 X age (FEUs).
        - It is not a "rule in" test as the specificities are poor particularly for groups such as pregnant patients.

As an extension of these THPs, the article by Raja referenced below also discusses the PERC rule and ties these points together with six Best Practice Advice guidelines. These were published last year on behalf of the American College of Physicians, so it's a reputable source.

Their motivation is to reduce the overuse of imaging. They acknowledge that PE is difficult to diagnose at times as no risk factor, patient symptom or clinical sign can definitively underlying rule in or rule out a PE. However they feel there is an underuse of stratification tools such as the Well's or Geneva scores, misuse of d-dimers (pre and post stratification), and a subsequent over ordering of CTPAs.

Despite the increased use of CTPA there is an increase in the diagnosis of PEs (especially inconsequential controversial subsegmental clots – "all dots are not clots") with minimal or no associated change in mortality.

It's best to introduce their algorithm and "talk around it".



Clinical Practice Advice 1 – Use a validated clinical prediction rule to estimate pretest probability eg Well's or Geneva. You can find these in CIAP- Tools – MDcalc. It's best to use the MIMS link through Firstnet as the calculator may not work on some filtered PCs on the "ED floor"

- Note that neither Well's or Geneva have been found to be superior to the other or to risk stratification based on clinical gestalt.

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- Reminder that the Well's can be give you a 3 part score of low (0-1)-intermediate (2-4) or high (> 6) , or a 2 part of PE likely (>4) – PE unlikely (0-4)
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Clinical Advice 2- do not use a d-dimer or imaging studies on those with a low pre-test probability and who meet **all 8** criteria of the Pulmonary Embolism Rule out Criteria (PERC)

- This was designed to identify low risk patients in whom the risks of any testing including d-dimers outweigh the risks of PE

PERC

- The following eight factors constitute the PE rule-out criteria (PERC):
- Age less than 50 years
- Heart rate less than 100 bpm
- Oxyhemoglobin saturation ≥95 percent
- No hemoptysis
- No estrogen use
- No prior DVT or PE
- No unilateral leg swelling
- No surgery or trauma requiring hospitalization within the past four weeks

- Note is not a screening tool for all patients and should be applied to those with low pre-test probability post stratification with Wells or Geneva tools.
- A large metaanalysis from 2013 of 12 studies determined that the overall proportion of missed PEs by using PERC was 0.3% (44 of 14844) with a sensitivity of 97%

Clinical Advice 3 – obtain a high sensitivity d-dimer in the non-high risk patients with the exception of those low risk patients who can be ruled out with the PERC rule.

Last week we discussed the sensitivity of the LIA test for PEs which studies have found it to be ~ 90-99%. Subsequently all guidelines confirm the use of a –ve d-dimer in a low pre-test probability patient as an indication that the patient does not need further imaging.

What about the intermediate risk patient? The article also suggests that a –ve test in an intermediate risk patient is also an indication that no further investigations are required.
They quote a number of studies

- Gupta's group used the LIA test to further assess 627 patients who had been stratified by the Geneva score (281 low probability – 330 intermediate probability- 16 high probability). CT angiography showed that 28 patients had PE (six in the low-probability group, 17 in the intermediate-probability group, and five in the high-probability group). The sensitivity and negative predictive value of the d-dimer assay were 100% & 100% (low-clinical-probability group); 100% & 100% (intermediate-probability group); and 80%, 80% (high-probability group). Link

- Warren's group focused on 1969 intermediate risk patients (well's) in whom 22.7% were found to have a PE. They used a different type of d-dimer yet found a negative d-dimer (IL test and Bio-pool) to have a sensitivity of 99.5% and a negative predictive value of 98.9% link
- Perrier used the Geneva score and a VIDAS ELISA test – 674 low or intermediate risk patient in whom 220 had a d-dimer < 500 – none had a thromboembolic event within 3 months of followup link
    - VIDAS ELISA has been compared to the STA LIA test and a number of studies have found to have similar sensitivities link

Clinical Advice 4 - Use age adjusted thresholds in those > 50yo – see levels noted earlier- see last week's probe for further info on the initial study – confirmed with a metaanalysis of 13 studies (12497 pts) which showed a sensitivity of > 97%

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Clinical Advice 5- Don't image those patients with d-dimers below the age related cut-offs

Clinical Advice 6 – In the patients who stratify as high probability they suggest not to perform a d-dimer and to obtain a CTPA (VQ scan or other imaging if contraindications). The discussion of the pros and cons of CTPA , VQ scans (planar imaging (which gives you a low, intermed or high probability and subsequently more inconclusive results) and multiplanar CT spect (which gives you a yes or no answer)) and ultrasound is beyond the scope of this discussion. However they briefly comment on non-CTPA options:

- Lower limb venous duplex may be considered as the initial test in those with symptoms of PE and DVT- a positive result will lead to the same treatment for different manifestation of the same disease. Note that there is no benefits of excluding an asymptomatic DVT after a –ve CTPA
- VQ for those with a contraindication to CTPA (contrast allergy / renal failure) +/- relatively normal lungs (reflected by normal CXR or no known pulmonary Dx)

Caveat – Most of this stratification process test is excellent but not perfect.
However the alternative of not using this stratification is that there can be significant "costs" and implications. However as with any stratification tool you need to include the words of advice to patients, relatives and GPs that " further imaging may be required if clinically indicated" , see your GP or return if you have X,Y, or Z or you are worried about progressive symptoms – ie "leave the door open"

Refs

- Raja AS et al, Evaluation of patients with suspected acute pulmonary embolism: Best practice advice from the Clinical Guidelines committee of the American College of Physicians *Ann Intern Med* doi:10.7326/M14-1772 link
- Van der Hulle T et al Recent developments in the diagnosis and treatment of pulmonary embolism J Int Med 2015; doi:10.1111/joim.12404

JOKE / QUOTE OF THE WEEK

Please forward any funny and litigious quotes you may hear on the floor (happy to publish names if you want)

THE WEEK AHEAD
Tuesdays - 14:30 – 15:30 Intern & JMO teaching -Thomas & Rachel Moore
Wednesday- 0800-0900 Critical Care Journal Club. ICU Conf Room / 14:30 – 15:30 Intern & JMO teaching -Thomas & Rachel Moore
Thursday 0730-0800 Trauma Audit. Education Centre / 0800-0830 MET Review Education centre / 1300-1400 Medical Grand Rounds. Auditorium.

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