

# Changing the approach to investigating venous thromboembolism in the emergency department

**Dr Stacy Goergen:** NICS–Royal Australian and New Zealand College of Radiologists Fellow  
 Director of Research, Department of Diagnostic Imaging, Southern Health, Victoria  
 Contact: [stacy.goergen@southernhealth.org.au](mailto:stacy.goergen@southernhealth.org.au)

## 1. Clinical practice guideline

Evidence-based guidelines designed to help emergency department (ED) medical staff at all levels of expertise and training decide when imaging is indicated in patients with suspected venous thromboembolism (VTE).

## 2. Stakeholders

- Southern Health executive.
- Royal Australian and New Zealand College of Radiologists.
- Radiologists, medical imaging technologists, nuclear medicine specialists, and emergency medical staff of Southern Health.

## 3. Evidence-practice gap

Realisation that due to the lack of consistent and evidence-based approach to the investigation of suspected VTE, patients were:

- being exposed unnecessarily to ionizing radiation, and
- being inappropriately and inconsistently diagnosed and managed.

## 4. Implementation strategies

- Educating stakeholders about extent of problem.
- Developing a reminder system to incorporate decision rules into imaging test requests (see sample form at right).
- Early involvement of key ED physicians in developing and piloting paper-based request forms.
- Gate-keeping by medical imaging technologists (MITs) to reject inappropriate requests for testing.
- Monthly feedback about compliance to ED medical staff and MITs.
- Personal phone calls to non-compliant medical staff/MITs to find out why they did not comply.
- Engagement of chief MITs at all participating hospitals in encouraging their staff, through e-mail and personal discussion, to be effective gatekeepers.
- Jars of lollies with reminders about the need for appropriate requests taped on lids and placed in ultrasound, nuclear medicine, CT and emergency clinical areas!

**Deep Vein Thrombosis Imaging Request**

U/R: \_\_\_\_\_ DOB: \_\_\_\_\_  
 Name: \_\_\_\_\_ M/F: \_\_\_\_\_  
 Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Billing Details:  
 RMBHS  TAC  
 WC  Vets  
 Private  Other

ED cubicle no.: \_\_\_\_\_  
 Monitored Yes / No \_\_\_\_\_  
 Outpatient clinic no.: \_\_\_\_\_

Probable probability of DVT\* (in patients with symptoms in both legs, the more symptomatic leg is used)  
 (\* Decision rule reference on reverse)

- Calf swelling of more than 3 cm compared with the asymptomatic leg (measured 10 cm below tibial tuberosity) 1
- Painful, supine or recent plaster immobilisation of the leg 1
- Previously documented deep vein thrombosis 1
- Recently bedridden for 3 days or more, or major surgery within the previous 12 wks 1
- Localised tenderness along the deep vein system 1
- Swelling of entire leg 1
- Pitting oedema greater in the more symptomatic leg 1
- Collateral superficial veins (nonvaricose) 1
- Active cancer, or cancer treatment within the past 6 months 1
- Alternative diagnosis at least as likely as DVT -2

Score: \_\_\_\_\_

\*\*\* A score of 2 or more indicates that the probability of deep vein thrombosis is likely; a score of less than 2 indicates that the probability of deep vein thrombosis is unlikely.

Unlikely (score of < 2) → Probable probability of DVT\* → Likely (score of ≥ 2)

D-dimer (≥ 0.2 mg/L) → Imaging (see post imaging treatment on reverse)

Negative (< 0.2 mg/L) → Discharge or treat other condition

Examination Requested: Log to be examined left / right / both  
 Clinical Details: \_\_\_\_\_  
 Pregnant Yes/No: \_\_\_\_\_ D-dimer: \_\_\_\_\_  
 Copy of report to: \_\_\_\_\_

Signature: \_\_\_\_\_ Name: \_\_\_\_\_ Page: \_\_\_\_\_ Date: \_\_\_\_\_

Diagnostic Imaging: Monash Medical Centre 9594-2200 Fax 9594-6687  
 Dandenong Hospital 9554-8175 Fax 9554-8654  
 Casey Hospital 8768-1265 Fax 8768-1966

\*Wells PS, Anderson DR, Rodger M, et al.  
 Evaluation of D-dimer in the Diagnosis of Suspected Deep-Vein Thrombosis  
 N Engl J Med 2003; 349: 1227-1235

\* If patient has had lower limb vein ultrasound, but not had Calf Vein Ultrasound a repeat leg vein ultrasound is indicated in one week.

## 5. Data

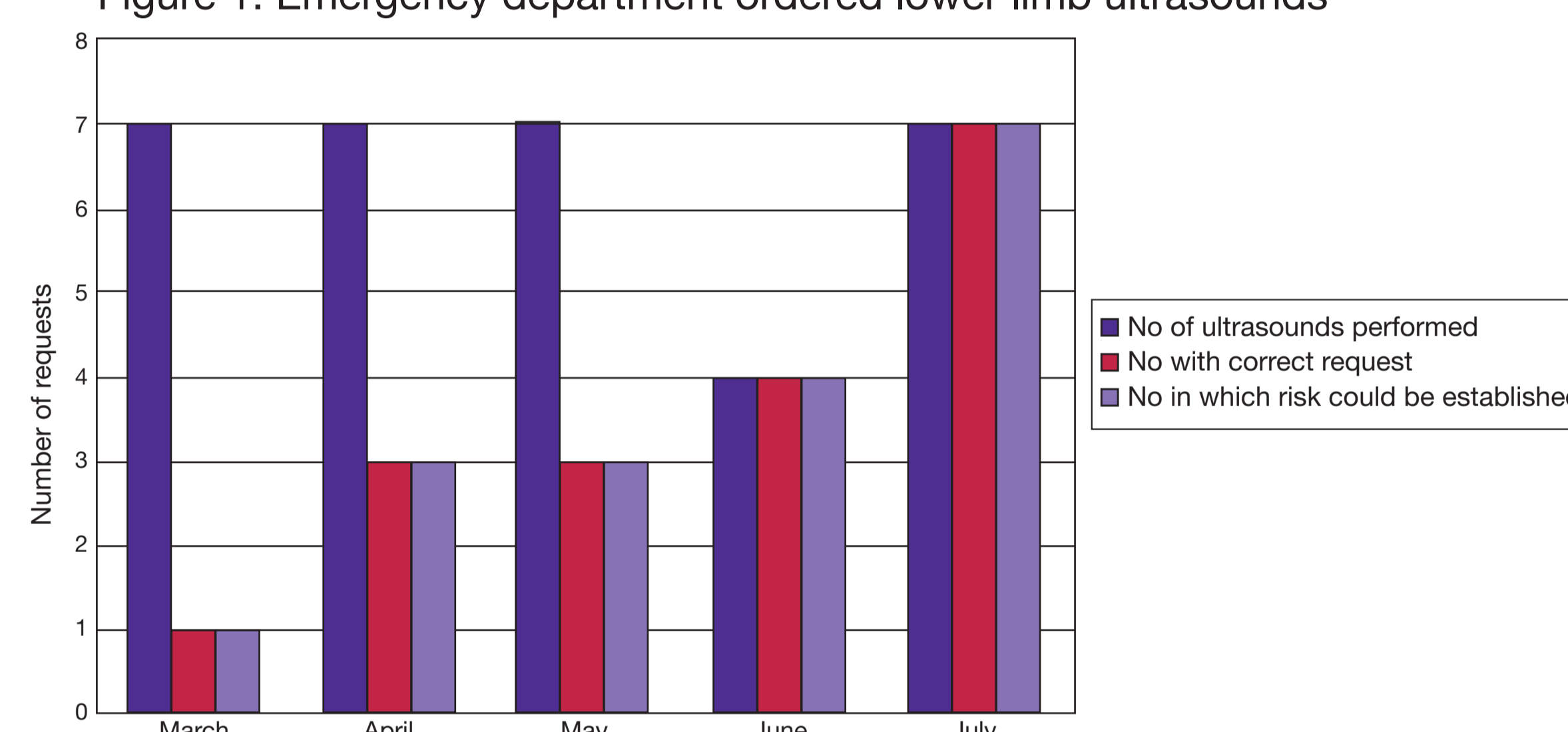
- Audit of paper request forms used to order lower limb venous ultrasound, CT pulmonary angiography and ventilation perfusion lung scanning studies, in order to determine the proportion of patients who had documentation of risk assessment on the request form as well as the proportion that had D-dimer assay used to exclude pulmonary embolism (PE) or deep vein thrombosis (DVT).
- Hospital pathology database and departmental picture archiving and communication system.

## 6. Results

Collection of two months' data following commencement of implementation shows:

- 80% compliance with the PE guideline, an increase from 60% at baseline
- 50% compliance with the DVT guideline, an increase from 16% at baseline (see figure 1 below).

Figure 1: Emergency department ordered lower limb ultrasounds



## 7. Barriers

- Getting MITs to reject inappropriate requests.
- Organisational size (3 hospitals with around 200,000 ED attendances per year).
- High staff turnover.
- Varying levels of clinical experience.
- Inconsistency of staff working hours.

## 8. Enablers

- Zero tolerance policy to inappropriate referrals for patients with suspected VTE by medical imaging technologists, although this did not always work in practice.
- Use of a dedicated request form that was easily identifiable and problem specific.

## 9. Resources

- NICS–RANZCR Fellowship.
- Departmental provision of data collection support by nurse with research and computer skills.

## 10. Key messages

- A sound but simple guideline, a good education program, and a high level of involvement and support by the main targets of the clinical practice change are not enough.
- Gate-keeping that forces compliance by those who are unaware of changes to practice is essential.
- High levels of support and encouragement from managers and reinforcement of messages is vital, particularly in a multi-campus institution.
- Seeking continual feedback, and acting on it, from all participants is essential because they are the best source of information about why things may not appear to be working.
- Rewards, reminders, and tenacity also help!

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