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Exploring sub-optimal use of an electronic risk assessment tool for venous thromboembolism

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ABSTRACT

International guidelines and consensus groups recommend using a risk assessment tool (RAT) to assess Venous Thromboembolism (VTE) risk prior to the prescription of prophylaxis. We set out to examine how an electronic RAT was being used (i.e. if by the right clinician, at the right time, for the right purpose) and to identify factors influencing utilization of the RAT. A sample of 112 risk assessments was audited and 12 prescribers were interviewed. The RAT was used as intended in only 40 (35.7%) cases (i.e. completed by a doctor within 24 h of admission, prior to the prescription of prophylaxis). We identified several reasons for sub-optimal use of the RAT, including beliefs about the need for a RAT, poor awareness of the tool, and poor RAT design. If a user-centred approach had been adopted, it is likely that a RAT would not have been implemented or that problematic design issues would have been identified.

1. Introduction

Venous Thromboembolism (VTE – the formation of a blood clot in the deep vein of the leg or pelvis, and/or the clot travelling to the lungs) is reported to be the most common preventable cause of death in hospitals (Findlay et al., 2010; Michota, 2007). VTE results in approximately 5000 deaths per year in Australia (Access Economics, 2008) and in more deaths than AIDS, breast cancer, prostate cancer and traffic accidents combined in the USA and UK (John Hopkins Medicine, 2015). There is now overwhelming evidence indicating that mechanical and pharmacological prophylaxis are extremely effective in reducing VTE risk (Findlay et al., 2010; National Institute for Health and Clinical Excellence, 2010) but appropriate prophylaxis is not always prescribed and VTE remains a significant problem for hospitals (National Institute for Health and Clinical Excellence, 2010; Kakkar et al., 2004; Ahmad et al., 2002; Learhinan and Alderman, 2003; Cohen et al., 2008; De Zylva et al., 2012). Many interventions (e.g. dissemination of guidelines, education, feedback, computer-based decision support) have been trialed and implemented to improve appropriate use of VTE prophylaxis in hospitals, but these demonstrate varying levels of success (Michota, 2007; Lau and Haut, 2014; Tooher et al., 2005). Interventions shown to be effective are those that are mandatory (e.g. a hard stop in an electronic system where the user is unable to proceed with ordering tests or medications for a patient until VTE prophylaxis is prescribed) and integrate well into user workflow (Lau and Haut, 2014; Streiff et al., 2012). However, to date, no comparative analyses of different interventions have been published to assess their relative effectiveness in improving VTE prophylaxis prescribing. Thus, there is limited quantitative comparative evidence to guide the design or selection of an appropriate strategy.

International guidelines and consensus groups recommend using a risk assessment tool (RAT) to assess VTE risk prior to the prescription of prophylaxis (Cohen et al., 2005; The Australia & New Zealand Working Party on the Management & Prevention of Venous Thromboembolism, 2010; NSW Health, 2010a; National Health, 2011; Geerts et al., 2008). There is also evidence to suggest that use of a RAT, in combination with prescribing advice, can improve appropriate use of VTE prophylaxis and reduce VTE occurrence (Haut et al., 2012; Novis et al., 2010; Lau et al., 2015; Zeidan et al., 2013). In 2010, the New South Wales (NSW)

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government issued a policy directive stating that all patients admitted to any NSW public hospital must be assessed for risk of VTE (NSW Health, 2010b). Following dissemination of the directive, in 2011 the study site, a teaching hospital in NSW, designed and implemented an electronic RAT, and revised their VTE prophylaxis policy to specify that patients must be individually assessed for their risk of VTE using the electronic tool within 24 h of admission to hospital.

Despite the requirement for all patients to be risk assessed, previous audits at the study hospital have shown that the electronic VTE RAT is rarely utilised. For example, only 69 (4.4%) of the 1582 patients admitted to the hospital in August 2013 (excluding day-only admissions) were risk assessed using the RAT. In this study, we set out to determine why this might be the case. In particular, we aimed to determine how the RAT was being used (i.e. if by the right clinician, at the right time, for the right purpose) and to identify factors influencing completion of an electronic risk assessment. With limited knowledge of current user perceptions of VTE prevention and of the RAT, we undertook an exploratory study with no a priori hypotheses.

2. Methods

2.1. Study site and risk assessment tool

This study was undertaken at a 320-bed teaching hospital in Sydney, NSW, Australia. Previous snap-shot audits at the site revealed that approximately 70% of patients receive appropriate VTE prophylaxis. Clinical information systems in place at the time of the study included an Electronic Medical Record (EMR) which allowed ordering of tests and imaging, an electronic prescribing system (MedChart®) and a results reporting system. These systems were not integrated but interfaced. The hospital has a multifaceted VTE prevention program in place, as shown in Table 1.

In late 2011, the study hospital's VTE committee (see Table 1) designed and implemented an electronic RAT (Figs. 1–4) to facilitate the assessment of a patient's VTE risk level prior to the prescription of VTE prophylaxis. The VTE committee articulated RAT requirements to the hospital's IT department and several iterations of the tool were reviewed and refined by the committee before a final version was adopted. As shown in Fig. 1, the tool comprises a series of drop-down menus and free-text boxes. Doctors select risk factors from each drop-down list (Fig. 2) and these appear in the text boxes beneath each drop-down (Fig. 3). Following completion, the RAT classifies patients as high-risk or low-risk (based on the risk factors that have been selected) and this risk level is communicated to doctors via an alert symbol on each patient's EMR. As shown in Fig. 4, users must hover their mouse over the alert symbol to determine their patient's risk level. The tool was intended to be used in combination with a prescribing protocol available within the electronic prescribing system.

The on-line tool is embedded within the hospital's EMR, adjacent to other patient assessments (e.g. Waterlow pressure injury assessment, falls risk assessment). Hospital policy stipulates that doctors are responsible for completing the VTE risk assessments within 24-h of patient admission, but does not specify who or where assessments should be performed. That is, the RAT could be completed by any doctor on a team (i.e. junior or senior) and from any location (e.g. while on a ward-round, in a doctor's office). Doctors must have knowledge of and voluntarily seek out the RAT. No reminders are presented and no alerts are triggered if an assessment is not performed.

Prior to hospital-wide implementation, a small pilot study was run where doctors working on one hospital ward were given an opportunity to use the tool for a period of four weeks. For the duration of the pilot study period, the VTE clinical nurse consultant provided one-on-one support and training to users and was available on the ward to assist doctors if they encountered any problems. After the trial, doctors were asked about the tool's usefulness and any problems they encountered. Feedback was generally positive and full implementation then proceeded.

To notify staff of tool implementation, posters were displayed throughout the hospital and one-on-one education was provided to the majority of current medical and nursing staff by the VTE clinical nurse consultant. This comprised a brief demonstration of how to locate and navigate through the tool, and distribution of a one-page step-by-step guide. Staff orientation was also amended to ensure all new staff would be informed of the RAT and policy.

2.2. Study design

This study comprised two stages: a review of risk assessments and interviews with prescribers.

2.3. Risk assessment review

To examine how the RAT was being used, a sample of risk assessments was audited. Patients who were risk assessed for VTE were sequentially identified via the EMR's 'key performance indicator (KPI)' module on a weekly basis. All patients who were risk-assessed using the RAT were visible in the KPI module and all were included in our sample. Two researchers (SR & PS) prospectively audited patients each week until at least 100 risk-assessed patients were included (3 months). In total, 112 risk assessments were audited (more than 100 because all risk-assessed patients were reviewed each week, and in the final week of data collection, 13 risk assessments were completed). 112 of 2401 (4.7%) patient admissions during this study period were risk assessed using the RAT. Electronic prescriptions and patient notes for all 'risk-assessed' patients were reviewed and the following data collected: patient

Table 1
VTE prevention program in place at the study hospital.

Component	Description
VTE hospital policy	This policy, available on the hospital intranet, outlines roles and responsibilities related to managing VTE (of doctors, nurses and pharmacists) and includes a 1-page prevention guideline
VTE committee	Multidisciplinary team that meets monthly to review the policy and issues related to policy compliance. Committee comprises a Vascular Medicine physician, the VTE Clinical Nurse Consultant, a Haematologist, Orthopaedic Surgeon, VTE pharmacist, Medication Safety Pharmacist, Clinical Research Fellow and a Patient Safety and Quality representative
VTE Clinical Nurse Consultant	Conducts on-going bedside teaching for clinicians, monitors high risk groups and 'intervenes' when high risk patients are not given appropriate prophylaxis, provides one-on-one education to clinicians
Education	Regular in-services and annual training to all junior doctors and nurses. During training, staff are informed of the VTE hospital policy and RAT
Prescribing protocols	Order-sets available in the hospital electronic prescribing system (MedChart®). These are medication orders pre-populated with appropriate values, allowing clinicians to place an order for VTE prophylaxis with one mouse-click

Note: VTE = venous thromboembolism, RAT = risk assessment tool.