

# VTE prophylaxis for major abdominal surgery: A hospital audit and nurses' survey for quality improvement

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## ABSTRACT

**Objective:** The objective of this study is to assess and improve VTE prophylaxis practices in major abdominal surgery through a hospital audit and nurses' survey.

**Primary aims:** Evaluate adherence to VTE prophylaxis guidelines in abdominal surgery, identify improvement opportunities in VTE prevention and assess the effectiveness of current prophylactic measures.

**Nurses' survey:** Evaluate surgical nurses' knowledge and implementation of VTE prophylaxis and identify educational gaps to improve VTE prevention.

**Secondary aims:** Integrate audit and survey insights: Gain insight into VTE management practices, to develop quality improvement programs for better prophylaxis and outcomes.

**Background:** Guidelines for the prevention of venous thromboembolism (VTE) in surgical patients involve risk assessment, followed by chemical and mechanical prophylaxis. Often, VTE risk assessments are not completed which leads to inappropriate or inadequate prophylaxis. The current guidelines suggest that a healthcare provider, such as a nurse or physician, should conduct the VTE risk assessment for each patient.

**Study design and methods:** Initially, a prospective audit was conducted to examine VTE prophylaxis practices at a tertiary hospital. This VTE audit was conducted alongside a nurses' survey to assess current VTE prophylaxis practices. Both measures were taken to review the quality of care provided to surgical patients.

**Results:** The practice of VTE prophylaxis shows high utilisation of all three prophylactic modalities but a lack of risk assessment documentation in the medical records. Nurses, although perceiving it as their responsibility, do not conduct assessments for venous thromboembolism risk.

**Conclusion:** Based on the audit and survey results, the hospital has not fully adopted the guidelines for venous thromboembolism prophylaxis in major abdominal surgery cases. There is a lack of proper risk assessment documentation, and nurses are not consistently engaged in conducting these.

**Implications for research, policy, and practice:** This paper presents valuable insights into the current prescribing practices for VTE prophylaxis after major abdominal surgery, as gleaned from a clinical audit and a survey of nurses. The hospital audit indicates that overall, all three are being used, instead of

## RESEARCH ARTICLES

two. While this approach does not contravene current guidelines, the use of both stockings and compression devices is not needed, instead adding new risks, unnecessary nursing workload and financial cost to health services. Further, this approach may prolong recovery with patients unable to mobilise while wearing compression devices to take part in rehabilitation programs.

**What this paper adds:**

- This paper adds to the existing literature by highlighting the gap between recommended guidelines and the actual implementation of VTE prophylaxis practices in the context of major abdominal surgery.
- These results provide meaningful clinical relevance about VTE prophylaxis practice for nurses and surgeons involved major abdominal surgery.
- The continuing education of Australian nurses should include an emphasis on VTE risk assessment and prevention.

**Keywords:** Venous thromboembolism (VTE), Deep vein thrombosis (DVT), Pulmonary Embolism (PE), VTE prophylaxis

**List of abbreviations**

DVT	Deep Vein Thrombosis
GCS	Graduated Compression Stockings
IPCD	Intermittent Pneumatic Compression Devices
JHH	John Hunter Hospital
LMWH	Low Molecular Weight Heparin
PE	Pulmonary Embolism
RACS	Royal Australasian College of Surgeons
RCT	Randomised Controlled Trial
REDCap	Research Electronic Data Capture
VTE	Venous Thromboembolism

## INTRODUCTION

Conducting a venous thromboembolism (VTE) hospital audit and a nurses' survey at the same hospital can provide a comprehensive approach to understanding and improving the management of VTE in the healthcare setting. Both methods serve different purposes and together offer valuable insights into different aspects of VTE prevention and care.

The VTE hospital audit involves a systematic review and assessment of the hospital's practices, protocols, and outcomes related to VTE prevention, diagnosis, and treatment. The primary objectives of this audit was to evaluate the hospital's adherence to clinical guidelines, identify potential areas for improvement, and assess the effectiveness of existing VTE prevention measures. The audit includes data on risk assessment practices, appropriate use of prophylactic measures, and adherence to treatment guidelines.

The nurses' survey focused on gathering feedback from healthcare providers directly involved in patient care. In the context of VTE, nurses play a crucial role in risk assessment, preventive measures, patient education, and monitoring. Their perspectives and experiences can offer unique insights into the challenges and barriers faced during the implementation of VTE prevention strategies.

By conducting both a hospital audit and a nurses' survey, healthcare organisations can gain a comprehensive understanding of the entire VTE prevention process. The hospital audit provides objective data and performance metrics, while the nurses' survey offers subjective insights

and real-world experiences. Integrating these two approaches allows for a more holistic assessment of VTE management, facilitating targeted interventions and quality improvement strategies.

Ultimately, the goal of this combined approach is to enhance patient safety, reduce VTE incidence, and improve patient outcomes through evidence-based practices and effective implementation at all levels of the healthcare system.

## BACKGROUND

Major abdominal surgery patients are at greater risk of developing VTE.<sup>1</sup> There are two types of prophylaxis for VTE: chemical prophylaxis and mechanical prophylaxis. Traditionally, chemical prophylaxis has been performed by administering low molecular weight heparin (LMWH) as well as mechanical prophylaxis using graduated compression stockings and/or intermittent pneumatic compression devices. Despite this, the risk of VTE should always be assessed first and continually reviewed throughout the surgical journey for a patient.

There have been several randomised controlled trials (RCTs) that have demonstrated the efficacy of thromboprophylaxis in reducing VTE incidence.<sup>2-15</sup> It is paramount to balance the risks associated with excessive bleeding in surgical patients when administering VTE prophylaxis. The Apollo Trial represents one of the most promising studies on surgical patients with VTE prophylaxis.<sup>15</sup> A low rate of major bleeding was observed when chemical prophylaxis was combined with mechanical prophylaxis.

## RESEARCH ARTICLES

The Royal Australasian College of Surgeons recommends that for major abdominal surgery, anticoagulant prophylaxis in the form of heparin or low-molecular-weight heparin (LMWH) should be administered.<sup>6</sup> In addition, mechanical prophylaxis should be used in the form of graduated compression stockings (GCS) and/or intermittent pneumatic compression devices (IPCDs).

The Australian Commission on Safety and Quality in Health Care recent VTE guidelines support nurses requiring an awareness of the importance of VTE risk assessment and prophylaxis.<sup>8</sup> Nurses play a critical role in the prevention and management of venous thromboembolism in hospitalised patients, including those undergoing major abdominal surgery. As frontline healthcare providers, nurses are responsible for identifying patients at risk of VTE and implementing appropriate prophylactic measures. They also monitor patients for signs and symptoms of VTE, assess the effectiveness of prophylactic measures, and provide patient education about VTE prevention and management. Given the high incidence of VTE in hospitalised patients, it is essential that nurses are actively involved in VTE risk assessment and prophylaxis to ensure optimal patient outcomes.

Incorporating nurses' input and feedback through surveys can also help identify areas of improvement and inform the development of effective VTE staff education strategies and prevention strategies. An Australian study demonstrated that VTE compliance within a metropolitan Australian hospital increased dramatically from 27% to 85% over a 5-year period.<sup>16</sup> This was a direct result of evidence-based education sessions aimed at improving nurse knowledge and empowering nurses to take responsibility for undertaking VTE risk assessments.

This hospital audit and survey assessed VTE prophylaxis practices in patients undergoing major abdominal surgery at a tertiary hospital. The audit aimed to evaluate the documentation, risk assessment, and utilisation of VTE prophylaxis practices and compare them to established VTE guidelines. The survey aimed to assess nurses' knowledge, attitudes, and practices regarding VTE prophylaxis. The data from both measures were analysed to identify areas for improvement in VTE prophylaxis practices and to develop targeted interventions aimed at enhancing the quality of care provided to patients.

## METHODS

This study aimed to examine VTE prophylaxis practices in patients undergoing major abdominal surgery at a tertiary referral hospital. Two measures were taken to assess the quality of care provided to these patients: a prospective audit and a nurses' survey from January until August 2023. The hospital audit and nurses survey protocol were approved by the Hunter New England Regional Ethics Review Board (Reference number 2018/ETH00331 and AU202301-07). All

patient data was kept confidential and anonymous. The nurses who participated in the survey did so voluntarily and provided their informed consent.

The prospective audit was conducted on 100 consecutive patients who underwent abdominal surgery at a tertiary referral hospital. Data were collected on VTE prophylaxis documentation, risk assessment, and utilisation and compared to established VTE guidelines. Over a 4-week period, patients aged >40 years undergoing elective major abdominal surgery were screened for eligibility. The audit checklist was completed twice daily, with patient bedside observation and medical record review for the first three postoperative days (Supplementary 1). The checklist included VTE risk assessment documentation, as well as chemical and mechanical prophylaxes prescription and documentation.

In addition to the audit, a nurses' survey was conducted at the hospital to assess current VTE prophylaxis practices (Supplementary 2). All nursing staff on seven surgical wards caring for patients undergoing major abdominal surgery received the survey. The survey questions were designed to gather information on a nurse's knowledge, attitudes, and practices regarding VTE prophylaxis. Data from the audit and the survey were analysed to identify areas for improvement in VTE prophylaxis practices. The findings will be used to inform the development of targeted interventions to improve the quality of care provided to patients undergoing major abdominal surgery.

## RESULTS

The hospital audit revealed that 99% of patients had an incomplete risk assessment form in their medical record. Despite this, 98% of patients received chemical prophylaxis (LMWH for all). There was wide variation between patients regarding combination prophylaxis, with 94% receiving all three modalities (LMWH, GCS, and IPCDs), instead of the 2/3 recommended by the current RACS guidelines.<sup>6</sup> Of this 94%, 94% were ambulant within 24 hours postoperatively (Table 1).

The nurse's survey received a 43% (138/317) response rate, with registered nurses being more likely to respond (Table 2); 11% had VTE education in the past five years, and 14% had read the Hunter New England Local Health District (HNELHD) policy compliance procedure for *Prevention of Venous Thromboembolism (VTE) – Adult PD2019\_057: PCP*<sup>6</sup> (Table 3).

Despite this, most nurses believed that their knowledge about VTE risk assessment was good, which was reflected in their ability to correctly answer questions about risk factors, with an 85% correct response rate. Interestingly, 63% of the respondents believed that nurses were responsible for completing the VTE risk assessment, while 16% thought that both the medical officer and the nurse should do it, and only 9% believed that the pharmacist should be involved. Less than half of the nurses rated their knowledge about

## RESEARCH ARTICLES

TABLE 1. MAJOR ABDOMINAL SURGERY VTE AUDIT BY PROCEDURE TYPE

	Lower GI surgery N	Upper GI surgery N	Gynaecology Surgery N	Urological Surgery N	Combined surgery N
Total in each group	26	17	45	12	100
<b>VTE risk assessment score</b>					
VTE risk assessment completed (Yes)	1	0	0	0	1/100
<b>Prophylaxis in OT</b>					
IPCDs in OT	26	17	42	12	97
GCS in OT	26	17	45	12	100
<b>VTE prophylaxis applied post OT</b>					
IPCDs, LMWH, GCS	24	15	43	12	94
LMWH +GCS	2	1	1	0	4
IPCDs + GCS	0	0	2	0	2
LMWH alone	0	0	0	0	0

GI, gastrointestinal; VTE, venous thromboembolism; OT, operating theatre; GCS, graduated compression stockings; IPCDs, intermittent pneumatic compression devices; LMWH, Low Molecular Weight Heparin

TABLE 2. NURSE DEMOGRAPHICS

Current position	N	Experience	
		No. years	n
Nurse Unit Manager	4	11–12	2
		>20	2
Clinical Nurse Consultant	7	11–12	3
		>20	4
Clinical Nurse Specialist	29	<5	2
		6–10	11
		11–12	8
		>20	8
Clinical Nurse Educator	1	6–10yrs	1
Registered Nurse	91	<5	37
		6–10	22
		11–12	12
		>20	19
Enrolled Nurse	5	<5	2
		6–10	0
		11–12	1
		>20	2
Assistant in Nursing	1	<5	1

TABLE 3. VTE EDUCATION

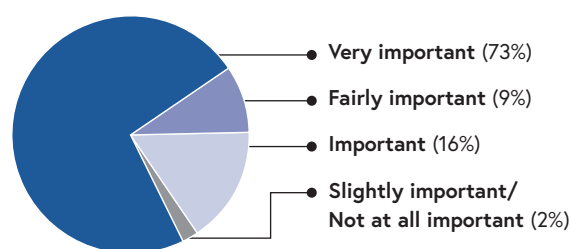
Current position	N	Have had VTE education in the past 5 years	Have read the VTE policy
Nurse Unit Manager	4	1	2
Clinical Nurse Consultant	7	1	3
Clinical Nurse Specialist	29	14	13
Clinical Nurse Educator	1	0	1
Registered Nurse	91	43	25
Enrolled Nurse	5	1	1
Assistant in Nursing	1	0	0

VTE, Venous thromboembolism

## RESEARCH ARTICLES

VTE prevention as good, indicating a potential need for further education and training. Especially when only 14% had training on how to apply graduated compression stockings and 28% knew how to use intermittent pneumatic compression devices. The survey results showed that only 13% of the nurses surveyed provided a correct answer when asked what type of prophylaxis should be prescribed for an ambulant patient following major abdominal surgery, while 65% of the respondents recommended the use of all three forms of prophylaxis (chemical, GCS, and IPCDs). The major concerns for using compression stockings and IPCDs were skin injury, expense, uncomfortable for the patient, the hospital not having all sizes available, and concerns that IPCDs were a falls risk.

VTE risk assessment plays a pivotal role in the comprehensive care of surgical patients, underscoring its crucial importance for nurses. As frontline caregivers, nurses are uniquely positioned to identify and assess patients' risk factors for venous thromboembolism, a potentially life-threatening condition. Surgical nurses were requested to assess the significance of VTE risk assessment. Figure 1 illustrates data from this hospital, indicating that 98 percent of nurses view VTE risk assessment as ranging from important to very important.



**FIGURE 1. NURSES RANKING OF THE IMPORTANCE VTE RISK ASSESSMENT**

Through diligent risk assessment, nurses can tailor VTE prophylaxis strategies to individual patient needs, optimising the balance between preventing thrombotic events and minimising bleeding risks. By actively engaging in risk assessment, nurses contribute to improved patient outcomes, reduced complications, and enhanced patient safety. Furthermore, their involvement ensures a collaborative approach to care, fostering interdisciplinary communication and alignment with evidence-based guidelines. Ultimately, VTE risk assessment empowers nurses to deliver patient-centred care and underscores their integral role in the multidisciplinary effort to prevent and manage thromboembolic complications.

## DISCUSSION

This research highlights several interesting factors regarding VTE prevention following major abdominal surgery. The most striking factor is the limited regard by surgeons and clinical staff for risk stratification based on patient factors.

The second is the uniform use of chemical prophylaxis but limited post-discharge prescription of this. The third is the high rate of dual mechanical prophylaxis and lastly registered nurses do not play a role in VTE risk assessment.

These results provide meaningful clinical relevance about VTE prophylaxis prescribing practices for nurses and surgeons involved in major abdominal surgery. This audit indicated that, overall, all three prophylactic measures are being used, instead of only two of the three. The rate of using all three prophylactic measures suggests a disparity between the process of evaluating risk levels and the subsequent prescription of prophylactic measures. It appears that routine adoption of all three prophylactic measures has become commonplace, despite no research evidence demonstrating additional benefit from using both mechanical methods (GCS and IPCD) over a singular method of mechanical prophylaxis to avoid VTE. The potential for chemical prophylaxis combined with a single form of mechanical prophylaxis to adequately avoid VTE after abdominal surgery is demonstrated by recommendations in state and hospital guidelines.

The audit identified that risk assessment tools are infrequently utilised by nursing or medical staff, despite surgeons being cognisant of the appropriate risk factors for VTE following surgery. In addition, only 1% of the VTE risk assessment forms were completed in the audit. This finding is in stark contrast to The Australian Commission on Safety and Quality in Health Care recommendations for VTE prevention. Their first quality statement suggests that risk assessment is paramount. They recommend that a patient potentially at risk of VTE (as determined by a local hospital/unit policy) receives a timely assessment of VTE risk using a locally endorsed evidence-based tool to determine their need for VTE prevention. The result should be documented at the time of the assessment, in a place that is easily accessible to all clinicians involved in the patient's care.

Interestingly, bedside registered nurses, although a key group for VTE prevention, are not included as part of the VTE risk assessment practice at this tertiary hospital. Nurses are on the frontline of thrombosis prevention and play an important role in reducing the burden of VTE. Nurses are accountable for administering pharmacologic measures including both oral and injectable medications. The nurse also has an active role in the implementation of mechanical prophylaxis methods. They are required to check skin integrity regularly each day when using GCS and IPCDs. Communication between surgeons and nurses has broadened. Nurses take part in daily rounds and have more input on patient care decision-making. Nurses and medical officers need to work together to take responsibility and be accountable for the patient's protection against VTE.

By nurses playing an essential role in VTE risk assessment, applying timely preventive methods, and providing vital education for VTE prevention, skilled nursing intervention



## RESEARCH ARTICLES

can save lives. The NSW Health policy states that nursing staff/midwives are to be aware of VTE risk and assist in ensuring the processes for prevention are implemented. It is important for all nurses, during a patient's hospitalisation and upon discharge, to be aware of guidelines and educate patients and medical staff of the same. Despite this policy emphasis on VTE risk assessment in all hospitalised patients, there remains a gap between current, evidence-based recommendations for VTE prevention and reported nursing practices.

The high rate of using both forms of mechanical prophylaxis is intriguing. The internal audit of surgical practice at our institution (JHH) highlighted this. We found the rate of using all three prophylactic measures to be 94% following major abdominal surgery (n=100). These rates indicate that the routine adoption of all three prophylactic measures has become commonplace, despite no evidence demonstrating additional benefit from employing both mechanical methods (GCS and IPCD) over a singular method of mechanical prophylaxis to avoid VTE.

There is a need for system-wide interventions, such as education, alerts, and multifaceted interventions to effectively improve the prescribing of thromboprophylaxis. It is important for facilities to monitor VTE prevention processes and cases of VTE to improve outcomes. Data collected should be regularly passed on to clinicians and nurses to raise VTE awareness and used to drive change through quality improvement initiatives.

## CONCLUSION

There remains a gap between current, evidence-based recommendations for VTE prevention and reported practices. The hospital audit found that guidelines for major abdominal surgery have not been adopted. It appears that risk assessment tools are rarely used as a guide for VTE prophylaxis. Despite this chemical prophylaxis is uniformly prescribed and the use of both forms of mechanical prophylaxis is routine. Mechanical measures can be nurse initiated but are not. Nurses have the potential to change the culture and improve outcomes for surgical patients.

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