



## **Reducing Venous Thromboembolism**

### **Root Cause Analysis Tools**

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## Introduction

Venous thromboembolism (VTE) is reported to cause the death of up to 25,000 patients who are admitted into hospital each year<sup>1</sup>.

A number of reports, guidelines and initiatives have been published to help increase the number of patients who are risk assessed on admission to hospital<sup>2</sup>, ensuring patients receive appropriate prophylaxis once identified as being at risk and increasing public awareness of VTE<sup>3</sup>.

The momentum to reduce harm and deaths associated with VTE increased in 2010 by linking performance measures with the financial status of NHS organisations in England. The Department of Health framework Commissioning for Quality and Innovations (CQUIN) links the uptake of risk assessment with payments<sup>4</sup>. The NHS standard acute contract<sup>5</sup> also introduced the requirement for a root cause analysis on all confirmed inpatient cases of pulmonary embolism and deep vein thrombosis.

## Using this document

This document will help you take action to reduce avoidable death, disability and chronic ill health from venous thromboembolism (deep vein thrombosis or pulmonary embolism).

Throughout this document venous thromboembolism is referred to as VTE.

This document applies to the care of all patients, including adults and children.

## Root Cause Analysis

Root Cause Analysis is a well established investigation methodology which explores the *how*, the *what* and most importantly the *why* of patient safety incidents. The technique uses a structured process to move beyond identifying what went wrong and helps identify the contributory factors and root causes of patient safety incidents using a number of tools and techniques. The NPSA website<sup>1</sup> has a range of tools and resources that provide an in-depth explanation of Root Cause Analysis <http://www.nrls.npsa.nhs.uk/resources/collections/root-cause-analysis/> .

The basic steps of a **Root Cause Analysis** are outlined in Figure 1.

**Figure 1: Basic steps of a Root Cause Analysis**



Using Root Cause Analysis for VTE events provides a systematic and evidence based method of finding out what factors or events lead to a patient suffering a VTE. The results of the Root Cause Analysis will help organisations to:

- gain a better understanding of the contributory factors and causes associated with VTE events;
- take action to reduce the risk of them occurring in the future.

This document provides specific guidance for VTE events and supplements the information available in the NPSA Root Cause Analysis toolkit.

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<sup>1</sup> Visit [www.nrls.npsa.nhs.uk/resources/collections/root-cause-analysis/](http://www.nrls.npsa.nhs.uk/resources/collections/root-cause-analysis/) for the Root Cause Analysis tools and resources

## Root Cause Analysis for VTE events

Comprehensive Root Cause Analysis can be time and resource intensive. Organisations should establish local triggers to establish which events prompt a Root Cause Analysis investigation (Box 1).

### Box 1. Suggested triggers for Root Cause Analysis

- Patient presenting with a VTE within three months of previous admission
- Inpatients developing a VTE
- Diagnosis of VTE by radiological, ultrasound or other imaging investigations
- Complaints identifying VTE as an issue
- Sudden death of a patient, suspected of suffering a VTE during hospital admission
- Sudden death of a patient within three months of admission, suspected to be related to a VTE
- VTE reported in a post mortem
- Coroner's report highlighting a VTE
- Pregnant women, or women up to six weeks following delivery, presenting with or dying from a VTE

## The Root Cause Analysis investigation team

The investigation team is responsible for the Root Cause Analysis. The investigation team should consist of clinical teams, with the support of risk managers (or someone proficient in Root Cause Analysis techniques) and thrombosis teams.

*The team directly involved in the patient's care should not be responsible for leading the Root Cause analysis as they may not be able to scrutinise the the course of events objectively. The analysis team lead should be independent and involve the team responsible for the patient's care in the investigation.*

There are two levels of investigation:

1. **A 'Single Root Cause Analysis'**. This is for a patient who presented with or died from a VTE (within three months of a hospital admission).
2. **An 'Aggregate Root Cause Analysis' for multiple VTE events**. This is the process of investigating a number of previously un-investigated similar incidents, to determine root causes and develop an action plan to address these issues.

## The investigation process

### *What happened: establishing the timeline*

Writing a timeline of the patient's care is vital when exploring the events which led to the VTE. This timeline should consider the period leading up to the hospital admission (or when a woman became pregnant) and not just the time of admission. This exercise is important as it will highlight the pathway, any gaps in care or any missed opportunities to identify that the patient was at risk of a VTE. Conversely, it could help to recognise good practice or exemplary care

### *How it happened: examining problems*

Root Cause Analysis examines possible problems with the direct care of the patient and/or service delivery. These are known as 'Care Delivery Problems' (CDP) and 'Service Delivery Problems (SDP)'. One method, 'Change Analysis', examines what should have happened to the patient in a normal sequence of events and compare this to what actually happened. Table 1 identifies questions/prompts when using change analysis for VTE Root Cause Analysis.

This tool and the use of brain storming will help provide the investigation team with a list of problems which will be further analysed to establish what the root causes of the event were.

**Table 1. VTE change analysis**

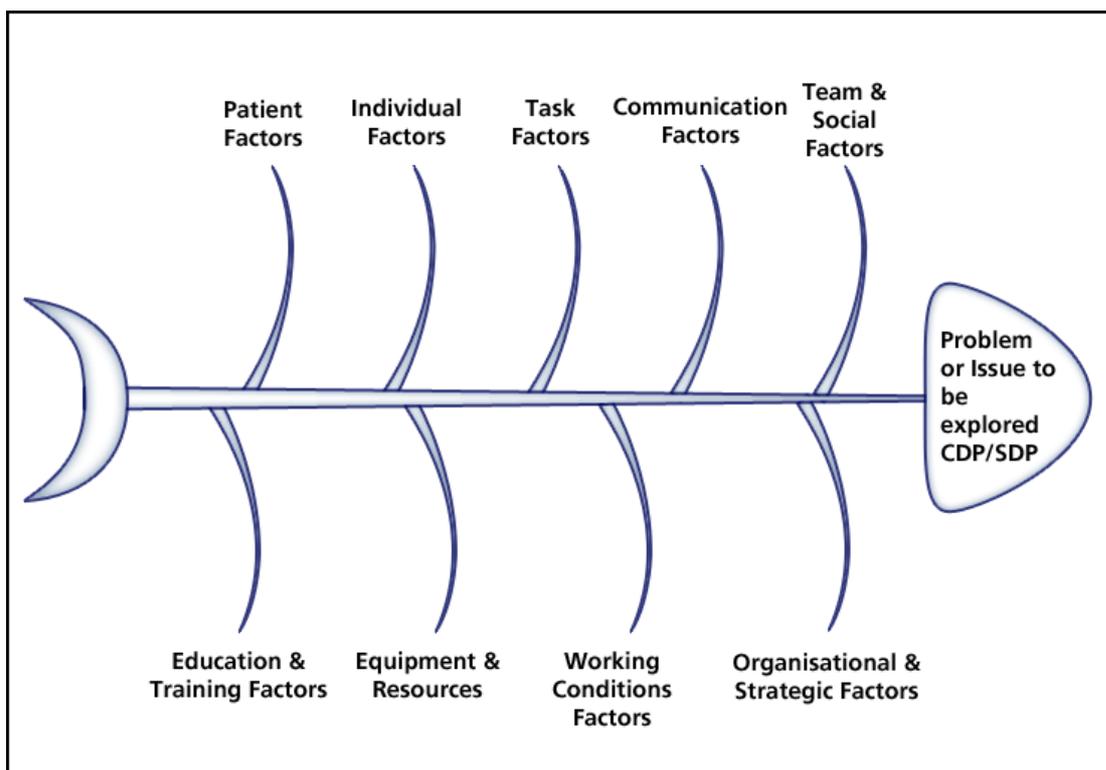
Normal Procedure	Procedure as occurred during Incident	Is a change in process evident?	Did the change cause the problem or influence it?
<i>EXAMPLE: VTE Risk assessment on admission</i>	<i>EXAMPLE: Risk Assessment document was available in admission but not completed by admitting doctor</i>	<i>EXAMPLE: Yes</i>	<i>EXAMPLE: Yes – admission risk assessment not completed and therefore patient was not identified as at risk</i>
<b>VTE Risk assessment on admission</b>			
<b>Prescribing appropriate prophylaxis identified by VTE risk assessment and bleeding risk assessment</b>			
<b>Reassessment of risk within 24 hours of admission and whenever clinical condition changed</b>			
<b>Continuation of prophylactic therapy for appropriate time frame</b>			

Patient discharge planning included prophylaxis			
Patient information/discharge advice provided			
Patients GP advised of VTE prophylaxis (mechanical or pharmacological) at time of discharge			

### Why it happened: scrutinising problems

Each identified problem should be scrutinised individually to establish what factors have contributed to that problem. There are several frameworks available to aid this. The NPSA Root Cause Analysis toolkit suggests the fishbone tool as shown in Figure 2.

Figure 2. Fishbone tool



Each part (or factor) of the fishbone prompts a series of questions (components) about the event. Table 2 is a list of factors with their associated components for consideration when applying the Fishbone tool specifically to a VTE Root Cause Analysis.

**Table 2. Contributory factors**

<b>Patient factors</b>	<b>Component</b>
<b>Clinical condition</b>	<ul style="list-style-type: none"> <li>• Complexity of condition – were co-morbidities considered on admission for risk of VTE? (For example underlying cancer but admission associated with unrelated routine orthopaedic surgery.)</li> <li>• Seriousness of condition</li> <li>• Underlying risk factors</li> </ul>
<b>Speciality Factors</b>	<ul style="list-style-type: none"> <li>• Speciality care required?</li> <li>• Speciality specific issues around VTE prophylaxis?</li> </ul>
<b>Patient Factors</b>	<ul style="list-style-type: none"> <li>• Patient awareness of risks?</li> <li>• Presence of trauma?</li> <li>• Concordance with and adherence to prophylaxis?</li> <li>• Patient's age?</li> </ul>
<b>Interpersonal relationships</b>	<ul style="list-style-type: none"> <li>• Staff to patient and patient to staff?</li> <li>• Patient to patient?</li> </ul>

<b>Individual Staff factors (staff)</b>	<b>Components</b>
<b>Physical issues</b>	<ul style="list-style-type: none"> <li>• Fatigue?</li> </ul>
<b>Psychological issues</b>	<ul style="list-style-type: none"> <li>• Stress? (For example distraction/preoccupation)</li> <li>• Motivation? (For example complacency, low job satisfaction)</li> <li>• Cognitive factors? (For example attention deficit, preoccupation, overload)</li> </ul>
<b>Personality issues</b>	<ul style="list-style-type: none"> <li>• Risk averse/risk taker?</li> <li>• Likes to work with a high degree of autonomy?</li> </ul>

<b>Task factors</b>	<b>Components</b>
<b>Guidelines, procedures and policies</b>	<ul style="list-style-type: none"> <li>• Not up-to-date/not reflecting current best practice?</li> <li>• Not available at appropriate location? (i.e. not accessible when needed)</li> <li>• Unclear/ambiguous?</li> <li>• Not useable or irrelevant/unrealistic?</li> <li>• Not adhered to/not followed?</li> </ul>
<b>Decision-making aids</b>	<ul style="list-style-type: none"> <li>• Availability of aids?( For example risk assessment tool)</li> <li>• Difficulty accessing senior/specialist advice?</li> <li>• Lack of easy-access flow charts and diagrams?</li> <li>• Incomplete information? (For example test results, information, history)</li> </ul>
<b>Procedural or task design</b>	<ul style="list-style-type: none"> <li>• Do staff agree with the 'task/procedure design'?</li> <li>• Are stages of the task designed in such a way that each step can realistically be carried out?(i.e. 'right treatment, first time')</li> </ul>

	<ul style="list-style-type: none"> <li>• Did the patient receive any prophylaxis?</li> <li>• Was there a delay in diagnosis of the VTE?</li> <li>• Was prophylactic treatment appropriate (For example did it continue for the recommended period)</li> </ul>
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<b>Team and social factors</b>	<b>Components</b>
<b>Role congruence</b>	<ul style="list-style-type: none"> <li>• Lack of shared understanding/responsibility for VTE?</li> <li>• Were role definitions understood/not clearly understood?</li> </ul>
<b>Leadership</b>	<ul style="list-style-type: none"> <li>• Was leadership effective? (clinically)</li> <li>• Was leadership effective? – (managerially)</li> <li>• Were leadership responsibilities clear/ understood?</li> </ul>
<b>Support and cultural factors</b>	<ul style="list-style-type: none"> <li>• Lack of support networks for staff?</li> <li>• Team reaction to VTE events</li> <li>• Team perception and attitude to VTE?</li> <li>• Blocks from certain disciplines or managers?</li> </ul>

<b>Communication factors</b>	<b>Components</b>
<b>Verbal communication</b>	<ul style="list-style-type: none"> <li>• Ambiguous verbal commands/directions?</li> <li>• Directed to inappropriate person(s)?</li> <li>• Incorrect communication channels used?</li> <li>• Did handovers cover the risk assessment/administration or application of appropriate prophylaxis?</li> </ul>
<b>Written communication</b>	<ul style="list-style-type: none"> <li>• Was patient information regarding VTE available? (to manage patient expectations and perceptions)</li> <li>• Were communications directed to the wrong person(s)?</li> <li>• Were risk assessment not accessible/included in documentation?</li> <li>• Was the patient formally risk assessed using the national tool? And when?</li> <li>• Was the patient re-assessed at appropriate times? (for example change of condition, 24 hours or transfer of care)</li> </ul>

<b>Education and training</b>	<b>Components</b>
<b>Competence</b>	<ul style="list-style-type: none"> <li>• Lack of knowledge?</li> <li>• Lack of skills?</li> <li>• Length of experience?</li> <li>• Quality of experience?</li> <li>• Task familiarity?</li> </ul>
<b>Supervision</b>	<ul style="list-style-type: none"> <li>• Adequacy of supervision?</li> </ul>
<b>Availability/accessibility</b>	<ul style="list-style-type: none"> <li>• On-the-job training? (unavailable or inaccessible)</li> <li>• Team training?(unavailable or inaccessible)</li> <li>• Awareness/utilisation of e-learning package?</li> <li>• Training on/awareness of VTE policy?</li> </ul>

<b>Equipment and resources factor</b>	<b>Component</b>
<b>Equipment</b>	<ul style="list-style-type: none"> <li>• Lack of availability of thromboprophylactic agent? (for example no LMWH on ward)</li> <li>• Equipment not working? (for example flotron boots etc)</li> <li>• Equipment not purchased or awaiting business case approval? (for example Foot pumps)</li> <li>• Mechanical aids not fit for purpose? (for example anti embolism stockings not efficient)</li> </ul>

<b>Work environment factors</b>	<b>Component</b>
<b>Administrative factors</b>	<ul style="list-style-type: none"> <li>• General efficiency of administrative systems? (for example bed management)</li> <li>• Reliability of administrative support?</li> </ul>
<b>Design of physical environment</b>	<ul style="list-style-type: none"> <li>• Lack of space for mechanical aids?</li> <li>• Location of appropriately skilled personnel and equipment?</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Use of admission wards? (i.e lack of clarity when assessment takes place)</li> <li>• How and where was the patient originally admitted for care?</li> <li>• Were there any transfers/movements after admission?</li> </ul>
<b>Staffing</b>	<ul style="list-style-type: none"> <li>• Skill mix?</li> <li>• Workload/ dependency assessment?</li> </ul>
<b>Workload and hours of work</b>	<ul style="list-style-type: none"> <li>• Type of shift/shift length?</li> <li>• Extraneous tasks?</li> <li>• Capacity issues? (for example higher than normal level of emergencies)</li> </ul>
<b>Time</b>	<ul style="list-style-type: none"> <li>• Delays caused by system failure or design?</li> <li>• Time of day?</li> </ul>

<b>Organisational factors</b>	<b>Components</b>
<b>Organisational structure</b>	<ul style="list-style-type: none"> <li>• Hierarchical structure, not conducive to discussion/problem sharing?</li> <li>• Tight/unclear boundaries for accountability and responsibility?</li> <li>• Managerial versus Clinical model?</li> </ul>
<b>Organisational culture</b>	<ul style="list-style-type: none"> <li>• Quality/safety/efficiency balance?</li> <li>• Leadership example? (for example poor visible evidence of commitment to reducing VTE)</li> <li>• Procrastination due to disputes over VTE prophylaxis acceptance?</li> <li>• Staff not empowered to take local action or escalate if required?</li> </ul>
<b>Priorities</b>	<ul style="list-style-type: none"> <li>• Conflict of targets/priorities? (internal or external)</li> </ul>
<b>Externally imported risks</b>	<ul style="list-style-type: none"> <li>• Associated with locum/agency staff?</li> </ul>
<b>Other factors</b>	<ul style="list-style-type: none"> <li>• Increased length of stay?</li> </ul>

- |  |  |
|--|--|
|  | <ul style="list-style-type: none"><li>• Bed status/occupancy levels?</li></ul> |
|--|--|

Once the contributory factors are established the analysis will then start to identify the 'root causes' of the incident. However, it should be recognised that it is not always possible to reach the root causes.

Root causes are the factors in the incident which, had they not happened, would not have resulted in as much harm to the patient or would not have occurred. An example for a root cause for a VTE death could be an organisation had yet to establish which pharmacological agent they were going to use and the patient received the traditional prophylaxis of aspirin.

## Action planning and monitoring

On completion of the Root Cause analysis an Action Plan should be developed and implemented. Organisations should have established methods to share Root Cause Analysis reports with various committees and staff as well as the patient and/or relatives.

Organisations should also have systems in place to ensure that any action plans that are developed can be monitored for progress and completion.

Action plans should consider the following:

- Agreed action/actions to be implemented
- Date action agreed
- Review date
- Action ownership
- Subsequent evaluation with timescale

## Conclusion

Organisations are required to investigate all inpatient VTE events.

This document highlights points in the Root Cause Analysis methodology where specific questions can be posed which relate to VTE risk assessment, prophylaxis and patient involvement.

This document supports organisations in investigating VTE inpatient events and allows them to actively learn from patient safety incidents, improving patient safety.

## References

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