Preventing Blood Clots in Hospitals

How to carry out a quality improvement project to reduce hospital-acquired VTE

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National Medication Safety Improvement Programme

HSE Quality Improvement Division

Seirbhís Sláinte Níos Fearr á Forbairt | Building a Better Health Service

Step One: Establish the team, governance and support structures

Once the need for a quality improvement project has been identified, the following are required:

- **Sponsor**: A senior management team member with clinical responsibilities must be identified to support and champion the project and to keep the senior management team updated with progress.

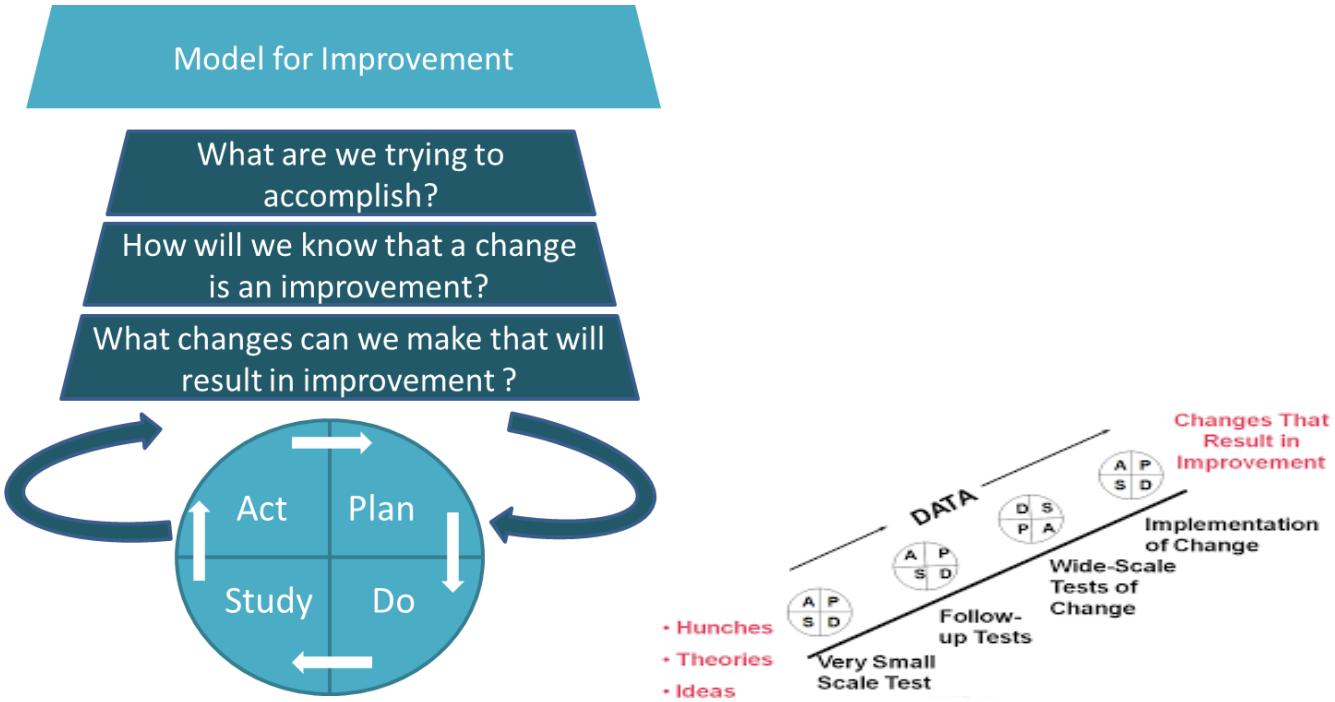
- **Governance**: Local governance and reporting arrangements for the project should be defined, e.g. Thrombosis Committee, Drugs & Therapeutics Committee or other Quality and Safety Committee.

- **Improvement team**: a **multidisciplinary team of three** healthcare professionals (e.g. a doctor, nurse and pharmacist) to carry out improvement and measurement work, with additional people if required. Teams must consist of more than one discipline and having one or more non-consultant hospital doctors involved, on the team or pulled in at particular stages, is recommended. The hospital must put in place arrangements so that each of the team members can dedicate a minimum of a half day per week each for 12-18 months. During an improvement phase, teams achieving substantial improvement spent 500 hours in total (equivalent to 3.5 hours per week for 3 team members for 46 working weeks of the year) and, where a compromise was necessary, prioritised time on improvement activities as opposed to measurement.

- **Wider project support**: The improvement team will need access to subject-matter, process and quality improvement expertise. This may be a formal committee or group, or the individuals may be identified and consulted as required during the project. Involvement of a haematologist or consultant with expertise in VTE prevention is recommended, in particular to inform decisions about the local hospital protocol. Identifying a quality improvement coach, i.e. somebody who has carried out quality improvement projects previously, e.g. somebody who has completed the Diploma in Leadership and Quality in Healthcare with the RCPI/HSE or a quality manager, is recommended. This person may provide structured or informal support, e.g. meeting the project team for coffee every month or being available for queries about the methodology and help with challenges.

The structure of the improvement team and hospital support is devised with reference to factors known to improve the likelihood of success in quality improvement, the Model for Understanding Success in Quality[1].

The Model for Improvement (© Associates for Process Improvement) is the quality improvement methodology used in this collaborative and in other HSE Quality Improvement Division projects.



This model is conceptually simple and ensures that only changes that have been demonstrated to lead to improvement on a smaller scale are scaled up for implementation, and that measurement is tracked over time to check if goals are being reached as improvements are made.

Step Two: What are we trying to accomplish?

Construct a clear aim statement. The aim should be Specific, Measurable, Actionable, Realistic and Time-bound (SMART aim), i.e. what, how much, for which patients, by when. Appropriate thromboprophylaxis is recommended, as it is the best available measure that the optimal blood clot prevention is in place.

The team, with consultation with staff and patients, should decide:

[1] Kaplan H et al. The Model for Understanding Success in Quality (MUSIQ): building a theory of context in healthcare quality improvement. BMJ Qual Saf 2012 Jan;21(1):13-20

- the target for appropriateness (which should be a stretch goal, equating to good or very good performance),
- the patient group (e.g. all in-patients, or one or a combination of medical, surgical non-orthopaedic, orthopaedic, post-partum, maternity in-patients, or a more specific group, e.g. in-patients with cancer),
- the time at which appropriate prophylaxis will be measured. In the collaborative this was 24 hours after the decision to admit. A recent update of NICE guidance states that prophylaxis needs to be first administered within 14 hours of admission, if this is appropriate for the patient
- the end-date of the project or date when the team aims to have achieved the aim

An example of a SMART aim is:

Achieve appropriate prophylaxis (against hospital guidelines) for a median of at least 90% of medical patients by 14 hours after the decision to admit, by end September 2019

Step Three: How will we know that a change is an improvement?

3.a. Defining appropriate thromboprophylaxis

The hospital VTE protocol must be defined in order to measure the appropriateness of thromboprophylaxis. If a protocol is in place in the hospital, appropriateness is measured against this. If there is no defined hospital protocol, the improvement team together with one or more haematologists and other experts, must decide which guidance is being followed and make choices about the detail of the protocol. Measurement can begin once the protocol is agreed for measurement purposes, i.e. the protocol does not need to have been introduced, circulated, staff educated on it etc. The implementation of and education about the protocol can come later, with adjustments made depending on results of testing.

Appendix 1 contains a VTE protocol template which can be referred to in this process. The protocol should include:

VTE risk assessment

There are many VTE risk assessment tools and these are regularly changed and revised in line with the evolving evidence base. Tools differ in their complexity and in the extent to which they have been clinically validated. As many tools were in use in Irish hospitals before the collaborative,

a template was developed referencing risk factors in commonly used tools. Each hospital must decide whether to use one or more specific tools, and whether to use them as is or modify them and may revise the template to meet their needs.

For medical in-patients, the template references a scoring tool, the Padua Prediction Tool, for medical patients. Scoring tools are recommended by the American College of Chest Physicians (ACCP). Padua, Geneva, IMPROVE and other tools are available. The template also references the Department of Health (UK) tool for both surgical and medical patients. This was recommended in older National Institute of Clinical Excellence (NICE) guidance. On updating their guidance in 2018, NICE has recommended the use of a risk assessment tool developed by a professional body in the UK, published in peer reviewed journals, and state the Department of Health tool is the most widely used tool.

For surgical in-patients, the Department of Health (UK) tool is referenced in the template. Risk scoring tools, particularly Caprini, are recommended by ACCP. Caprini is a clinically validated tool and stratifies risk in surgical patients very effectively. It is more complex than the Department of Health tool and may require a separate protocol for medical and surgical patients if Caprini is to be used, as both are unlikely to fit on one protocol.

For post-partum women, the Irish guideline and the Royal College of Obstetrics and Gynaecology guideline, as well as local adaptations are in use in Irish hospitals.

For women who are pregnant and admitted to hospital, the Irish guideline may be used. The Department of Health (UK) guidance includes pregnancy or up to 6 weeks post-partum as a risk factor, with women otherwise assessed as medical patients. Significantly, Padua does not include pregnancy

In orthopaedics, VTE risk assessment may not be formalised as most or all patients are considered at risk. Where a tool is used, the Department of Health (UK) tool or ACCP guidance are in use.

3.b. Measuring appropriate thromboprophylaxis

Once the hospital VTE protocol is agreed for measurement purposes, measurement can begin. If the protocol is subsequently modified, measurement can be against the updated protocol, noting when the change occurred.

Measurement for improvement is different from types of measurement that healthcare professionals and managers are more familiar with, measurement for research and measurement for judgement[2].

	Improvement	Accountability	Research
Aim	Improving care	Comparison, regulation	New knowledge
Observ-ability	Observable	No test	Blinded or controlled
Bias	Consistent	Adjust to reduce	Design to eliminate
Sample size	Just enough, small sequential	100% of relevant data	Just in case data
Hypothesis	Flexible, changes	None	Fixed
Testing	Sequential	None	One large test
Is change improve-ment?	Run or control charts	None	Statistical tests against hypothesis

[Solberg table]

With measurement for improvement, small random samples of patients from the chosen patient group are identified and appropriate prophylaxis measured at the time point agreed in the aim. Small samples mean that a degree of natural variation is expected and no judgement is made on any one or few points. Instead, measurements are plotted as a time series, as run charts or statistical process control (SPC) charts, known also as control charts. Interpretation of the charts is based on a series of rules which determine whether variation is due to common or special causes, i.e. whether the process is in control or not. Interpreting measurement is described further below.

The step-by-step guide to measurement is described below:

1. Select a random sample of 10 patients per fortnight from the census of the patient group(s).
2. Follow the hospital VTE protocol to determine the patient's VTE risk, bleeding risk, appropriate choice and dose of prophylaxis depending on their patient group, weight, renal

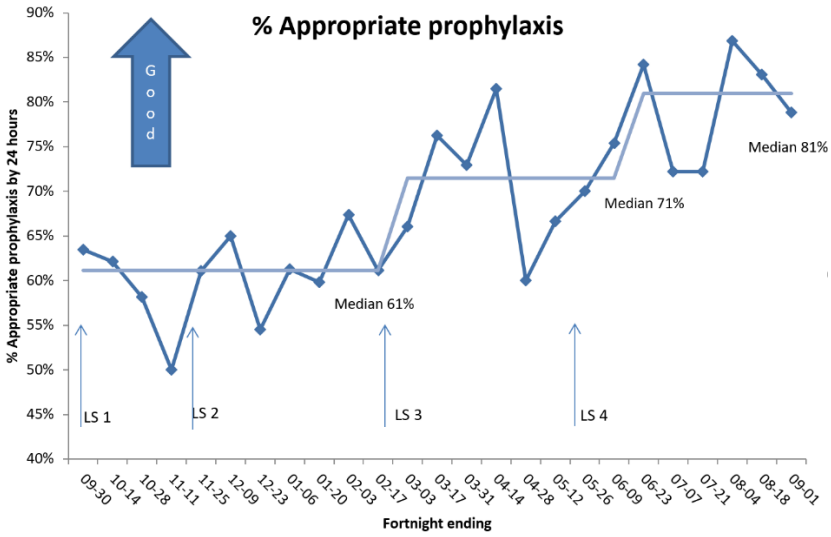
[2] Solberg LI, Mosser G, McDonald S. The three faces of performance measurement: improvement, accountability and research. Jt Comm J Qual Improvement. 1997 Mar;23 (3):135-47

function and contra-indications to pharmacological or mechanical prophylaxis. Conclude what the appropriate prophylaxis for that patient should be.

3. Examine the patient's prophylaxis prescription and administration record to determine what, if any, pharmacological prophylaxis was prescribed and given within the time after the decision to admit that you have picked (e.g. 14 or 24 hours). Ask the patient if they have mechanical compression in place and examine if it is the right size etc.
4. Conclude whether the pharmacological and mechanical prophylaxis are appropriate (as indicated in the hospital guideline). If not appropriate, record the category/ies of inappropriateness (e.g. indicated but not in place; inappropriate dose for patient weight).
5. Enter data onto data collection form, spreadsheet or electronic tool. The collaborative data collection form and spreadsheet are hyperlinked on www.safermeds.ie
6. If using the system developed by the collaborative, load the spreadsheet periodically to Sharefile® and review using QlikView®. Contact safermeds@hse.ie to receive further information and to obtain a QlikView® licence if you wish to use this system.

3.c. Plotting and interpreting measurement

A run chart is a type of time series line chart used to track measurements over time. For more information on run charts and their interpretation, see Perla et al[3].



[3] Perla RJ, Provost LP, Murray SK. The run chart: a simple analytical tool for learning from variation in healthcare processes. BMJ Quality & Safety 2011;20:46-51 http://qualitysafety.bmj.com/content/20/1/46

Step Four: What changes can we make that will result in improvement?

A key element of the success of the Model for Improvement is that ideas for change are collected, from reviewing previous work locally and nationally (including learning described in this report), the literature and engaging with staff and patients involved in the processes and with experts. These are ideas that are thought likely to help achieve the aim. These ideas are then prioritised for testing.

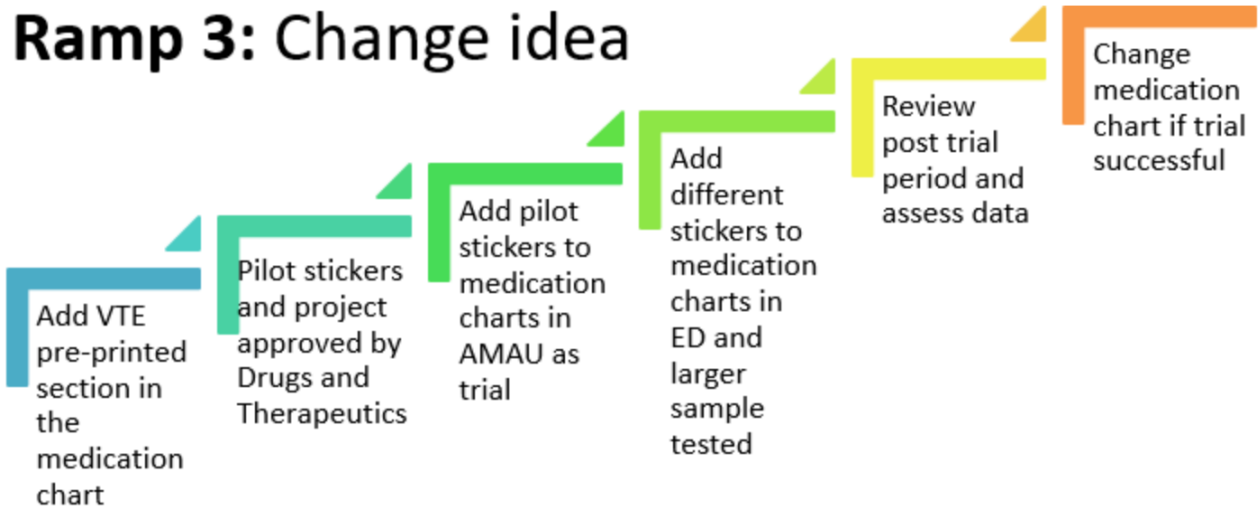
Step Five: Plan-Do-Study-Act Testing

PDSA testing examines whether the prediction that a particular idea for change will lead to improvement is borne out in the context in which it needs to work. The first tests of any idea are very small, with some learning from each test. Successful or promising tests are tested in different circumstances and/or scaled up for further testing. Where multiple tests are carried out on one idea, this is known as a PDSA ramp.

A sample PDSA form is included at the end of this section.

The initial PDSAs should be small enough to be carried out in a short time period, often less than 30 minutes, and may be tested with one patient, one nurse, one doctor etc. As testing scales up, a tool or method may be tested for a week or longer if needed to obtain information. Measurement and/or feedback should inform whether the tool is effective, what needs to be changed etc.

For example, an idea many hospitals tested was having pre-printed prescriptions for VTE prophylaxis in the drug chart. To implement this, the hospital would need to make big changes including working with printers to redesign and print charts and educate and inform staff, particularly prescribers. To test this, many sites created a sticker using pharmacy labels, showed it to doctors, pharmacists and nurses, got feedback and made changes. In further tests, the revised stickers were applied to a small number of charts to see if they were filled in correctly and to get further feedback. Successful tests were piloted on a wider scale. If the tests were still successful, the changes were incorporated into the redesign of the drug chart and implemented, along with education and information for staff. The PDSA ramp below illustrates a series of PDSA tests carried out by one hospital team to develop and test pre-printed prescription stickers.



Step Six: Implementation Plan-Do-Study-Act Cycles

When testing has established that a particular change should be implemented and how that should best be done, the PDSA approach should be continued. This means that the team plan implementation, predict what will happen, look for information and feedback to see whether the implementation is going according to plan or what adjustments need to be made, study this information and act on it. In this way, implementation is a stepwise process too and any unforeseen consequences are picked up early in the process, making room for adjustments.

Step Seven: Control Phase

If the project has achieved its goal, or if this phase of improvement has completed, measurement should continue to monitor whether improvement is sustained and to facilitate early action should this be required. As measuring the % of patients with appropriate prophylaxis can be time-consuming, the frequency of measurements may drop, e.g. to 10 patients every month or every quarter. Reporting to the governance committee should also continue.

The team or a different team may now commence a new project with a further patient group, or focus on a new aspect of preventing harm from VTE, e.g. ensuring patients are informed about the risk by working on the logistics and staff engagement/education aspects of ensuring they get the patient alert cards (appendix 3).