

# Improving DVT prophylaxis using a "Lean" approach: A new solution to an old problem

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- Summary:**
- A "Lean" Quality Improvement approach has been used to identify and address the systemic weaknesses in the reliability of administration of thromboprophylaxis on a surgical ward
  - 4 rapid audit cycles with a structured, multi-disciplinary approach to problem analysis were used to develop and refine the implemented solutions
  - Thromboprophylaxis has been significantly improved from 35% to 87% (P<0.0001). A further check audit confirms that the effect has been sustained beyond 10 months.

## BACKGROUND & AIMS:

The value of thromboprophylaxis in surgical patients is well established, yet delivery is often unreliable. Improvement following traditional audit is frequently short-lived, as insufficient effort is directed at identifying and tackling the underlying causes of failure and sustaining progress. This is particularly so where behavioural solutions such as education are used, since these will degrade over time with staff turnover. Furthermore, any approach which relies on staff remembering to instigate prophylaxis will be at risk of failure when the system comes under strain, such as short-staffing or a particularly busy shift.

Reason's theory of error implies that depending on the "person" is inherently unreliable. A better solution would be to redesign the "system" so that correct delivery of prophylaxis becomes the default normal position. Recently, continuous improvement methods, such as "Lean", have been used in Healthcare to address specific problems in systems of Healthcare provision. This audit aims to evaluate the use of such an approach in improving and sustaining thromboprophylaxis delivery.

The improvement efforts were evaluated within the Plan-Do-Check-Act (PDCA) audit cycle framework. In addition, we measured the sustainability with a follow up audit at 10 months.

## METHODS:

The audit was conducted on a single 38-bed surgical ward in a UK teaching hospital. The unit receives all emergency general surgical admissions to the hospital and a small number of elective admissions (4%). It has a high level of patient turnover.

A baseline audit of 161 patients measured compliance with thromboprophylaxis against local guidelines and found this to be 35%. (This figure represents complete compliance with the correct "package" of care i.e. TEDS & Fragmin where appropriate. Individual components of the pathway were audited to facilitate problem analysis).

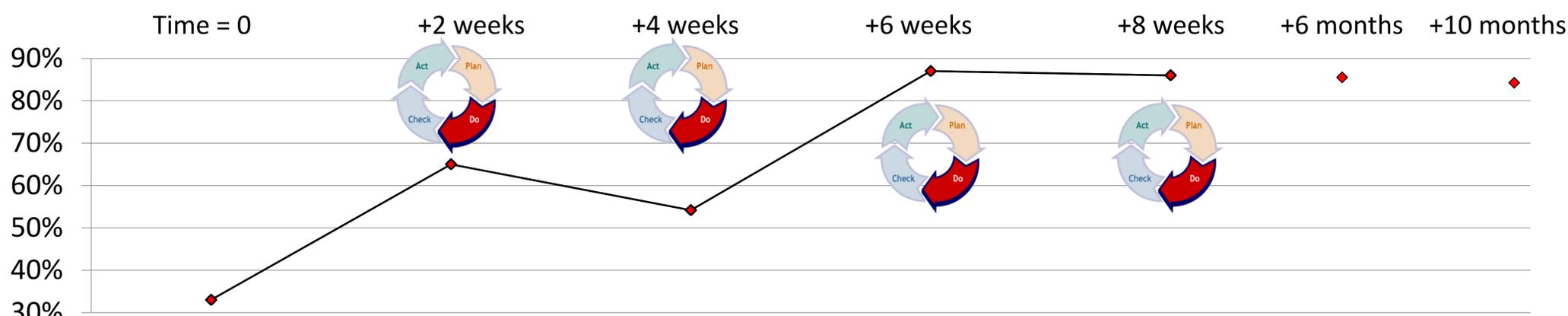
A multidisciplinary group of ward staff, including nurses, doctors and a pharmacist, then used this data to undertake a problem analysis exercise using "Lean" techniques. This comprised a process mapping exercise and a Fishbone analysis exercise. This identified three key areas of weakness:

1. Doctors forgot to prescribe prophylaxis
2. Nurses did not check patients had received prophylaxis
3. Patients did not understand the purpose of prophylaxis and would remove their stockings

In general, it was realised that core roles and responsibilities were not well defined. Solutions were developed to address all of the weaknesses simultaneously.

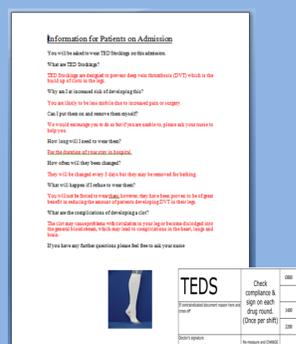
A series of 4 rapid audit cycles followed at fortnightly intervals. Each comprised a mini-audit of about 25 patients, followed by review by the original MDT. The experimental solution was refined with each cycle. A key principal was that changes should require no extra work.

6 months after the intervention, a further large scale audit of 158 patients was undertaken, to statistically evaluate any improvement.



## Baseline Audit N=161 35% Compliance

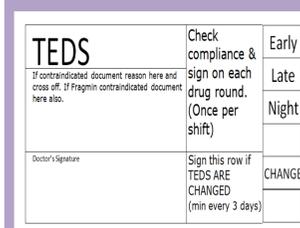
The initial solution involved placing stickers in blank drug charts, so that TEDS were pre-prescribed and doctors simply needed to sign. Nursing staff then had to sign the chart to confirm the patient was wearing TEDS. A patient information leaflet was also produced.



## FIRST RE-AUDIT N=24 65% Compliance

**CHECK:** The sticker system was effective. Nursing staff report that the specific times they are required to sign are too constraining.

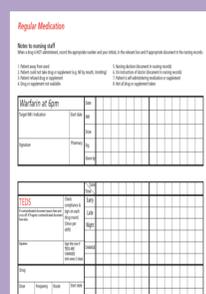
**ACT:** Nursing check boxes changed from specific times to early, late, or night shift to allow more flexibility.



## SECOND RE-AUDIT N=24 54% Compliance

**CHECK:** The TEDS prescription rate has fallen. Partly explained by a fall off in the number of charts with a sticker. Those without stickers were less likely to receive thromboprophylaxis.

**ACT:** The ward commissions its own drug charts to be printed which have the "TEDS sticker" printed directly onto the chart



## THIRD RE-AUDIT N=25 87% Compliance

**CHECK:** Nursing staff are signing more frequently as the system becomes more ingrained.

**ACT:** Nursing staff instigate bedside handovers at each shift change. These comprise a number of checks including thromboprophylaxis.



## FOURTH RE-AUDIT N= 22 86% Compliance

**CHECK:** - All charts are now pre-printed and the nursing staff are familiar with the new system which appears to be in steady state.

**ACT:** To facilitate the early detection of drop-off, the nursing staff have started a daily Thromboprophylaxis audit (5 randomly selected patients a day) to serve as statistical process control and maintain the profile of thromboprophylaxis



## CHECK AUDIT 1 (6 months) N=158 87% Compliance

**Overall improvement from 35% to 87% (P<0.0001)**

## CHECK AUDIT 2 (10 months) N=25 86% Compliance

The default position on the ward now is that patients should be wearing TEDS unless there is a specific contraindication. Even without a doctors signature, the nursing staff are happy to use the shift checking system to ensure their patients receive TEDS. Redundancy has been built into the system through several independent check points. None add significantly to the workload of staff.

## DISCUSSION:

The "Lean" approach facilitated identification of several weaknesses in the care delivery pathway. All were tackled simultaneously. Over the 4 audit cycles, these problems were "designed out" of the system, thus avoiding reliance on training or memory of individuals. By removing these "human factors" and engaging front-line staff, reliable, sustained thromboprophylaxis has been achieved. The longevity of the effect highlights the strength of system redesign through the audit cycle.