How the clinical front-line can improve quality of care with a ruler, a pen and a quick data plot

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John Taylor Hospice is committed to the development of Audit and Research amongst all its staff and this is a routine clinical audit insight involving those who closely manage the patient in the ward. It uses a new tool, SPC, and introduces the concept of ‘competing risks responses’ for a patient: specifically (a) the risk of developing a pressure ulcer; (b) the risk of being in the last hours of their life.

The tool used is that of ‘Statistical Process Control’ which can be easily used after a couple of short sessions of training. It then will readily be seen to be directly applicable to day-to-day nursing; and despite ‘statistics’ appearing in its name, there really isn’t any frightening requirement for statistics or advanced maths!

We advocate this SPC method - which we have called here the “Ruler, Pencil and Two Useful Lines” approach. Here it is applied to pressure ulcers as recorded in the hospice’s electronic Incident Register.

This Poster does not set out to cover the details, BUT rather its aim is to report that with a simple SPC approach all clinical staff can ‘gather around’ the data chart, look at the special causes for concern, and with their experience and wisdom of clinical practice can together come up with explanations and improvements. Our staff did and saw that there was indeed a conflict of responses. Specifically, “Don’t fuss those likely to die soon seeking to manage possible pressure ulcers” was seen to be wrong. On balance there is a greater probability of developing a type 1 or 2 ulcer then of such patients dying within a few days.
Clinical-Presuure Ulcers

The hospice reports pressure sores both on admission, i.e. where a patient is admitted with a pressure ulcer or one develops within 72 hours of admission, ALSO on ulcers developed during their care during the time they are receiving care from the hospice. Our database showed that since May 2013 there had been 35 patients admitted who had a pressure ulcer on admission, see Chart 1. Four of those were assessed as being grade 4, the most severe ulcer, whilst the majority of ulcers were grade 2, see chart 2.

*Chart 1 Pressure Ulcers on Admission per Grade per Month*

*Chart 2 Grades of Pressure Ulcer of Patients admitted with an Ulcer*
There were also 13 reports of patients developing a pressure ulcer on the inpatient unit after 72 hours post admission of which 8 are reported as Grade 2.

Further scrutiny of the descriptive data\(^1\) for these incidents shows that:

- In each of the three instances where the grade is “not stated” actions have been recorded including tissue viability assessment, wound care and preventative care and pressure relieving equipment, and re-positioning.

- Confirmed through discussion with staff, the incident database shows that pressure area assessment and, where required care, is a normal aspect of admission for all patients, both those that do not have an ulcer on admission and those who are admitted with a pressure ulcer.

- It is also reported verbally by nursing and medical clinicians that many of the ulcers developed on the unit actually occur within the very final stages of a person life. Notes on the assessments of those patients indicate the following contributory factors: extreme frailty, poor tissue viability, immobility and difficulty with nutritional intake.

- Appropriate preventative and treatment actions are taken for all patients with a pressure ulcer, sensitively combined with their symptom control or palliative care.

\(^1\) Specifically the descriptive details and actions recorded in the incident database, not the patient’s records.
Analysis of the frequency of key words or phrases as recorded in the database regarding preventative actions taken is shown in Chart 4 below. Multiple keywords - and actions - often apply to individual incidents. Whilst this frequency analysis has limited statistical significance it is helpful when used to support critical reflection and discussion with staff.

**Chart 4 Keyword Analysis of Preventative Actions**

Informing Commissioners

Whilst the incident database shows that appropriate CCG and CQC notifications have been made in relation to pressure ulcers, more detailed work proceeded to review patients notes; not just the database, to re-confirm the source of referral by hospital and ward, or team for all patients who were admitted with a pressure ulcer in order to inform the Commissioners.
Interpretation and Actions

Staff explained that they did not routinely report Grade 1 Ulcers which means that the data does not record in detail the initial presentation or early progression of an ulcer from “zero” to Grade 2 or above. This includes anybody admitted with a Grade 1 ulcer. Therefore:

• Patients who are reported as developing a Grade 2+ ulcer after 72 hours after admission may have been admitted with a pre-existing, unreported Grade 1 ulcer and consequently the data presentation is that of a person rapidly developing a grade 2+ ulcer after 72 hours after admission to the Hospice whereas they may well have had a pre-existing ulcer on admission.

• Changing practice to report Grade 1 ulcers will help in awareness of and evidence based practice for prevention and treatment of progression of pressure ulcers from “zero” grade onwards. It is important to note here that pressure area assessment and, where required care, is a normal aspect of admission for all patients, both those that do not have an ulcer on admission and those who are admitted with a pressure ulcer.

• Of the patient admitted with pressure ulcers, work is still ongoing to confidently identify which clinical service(s) was caring for the patient prior to their admission to John Taylor Hospice given that the CCG may use such data to investigate further and that only a robust report of the care services will be provided by JTH.

Actions Suggested by Staff

The actions for improvements identified by staff included:

• Report all pressure ulcers as incidents from Grade 1 up, whereas previously only Grade 2 + were reported.
• Carry out a root cause analysis on all Grade 2 Ulcers.
• Re-audit and update the inventory on pressure relieving mattresses and mattress covers to ensure that stock is sufficient to supply all beds in the unit and to not be short of equipment due to laundry and repair.
• Investigate, with a view now the purchase of “mattress wedges” as pressure care equipment that requires the minimal movement of those patients who are within the very final stages of life for whom comfort is a high priority. This enables pressure area care to be provided to even the frailest and most sensitive patients who may otherwise find movement-based pressure area care too painful.
So, given that:
1. The evidence base for prevention of pressure ulcers was deemed to show a high probability (>90%) that a high risk patient (e.g. a person with poor mobility, serious illness, over 70 years old,) could develop a pressure ulcer within 2 hours if their position is not changed.
2. It was considered that the accuracy of assessment about whether or not a person has less than 2 hours life remaining is less than the probability of them developing a pressure ulcer if unmoved for 2 hours.

Then:
The balance of these probabilities shows that we can be more confident about a patient’s probability of developing a pressure ulcer within 2 hours if unmoved than about their hours life remaining. Consequently the decision to be made in the best interest of the patient can be changed from “At which time should we avoid the discomfort of moving a patients position to prevent a pressure ulcer?” to “How do we give pressure area care to the most frail patients without having to move them which may cause severe discomfort?”

This re-formulated question, which reflected an explicit review of the probabilistic evidence bases and local data within an existing professional ethical practice, led to two immediate results:
1. The use of mattress wedges that change the area of pressure of a patient in bed, with minimal, or no movement of the patients bodily position, thus providing continual pressure area care with greatly minimised discomfort to even the most frail patients.
2. Care Professionals being able to explicitly articulate their knowledge base and ability to balance probabilities as part of their ethical best-interest decisions and actions.

NHS Conditions:  [http://www.nhs.uk/conditions/pressure-ulcers/Pages/Introduction.aspx](http://www.nhs.uk/conditions/pressure-ulcers/Pages/Introduction.aspx)
NICE guidelines [CG179] Published date: April 2014, Review Date June 2015: [http://www.nice.org.uk/guidance/cg179/chapter/1-recommendations](http://www.nice.org.uk/guidance/cg179/chapter/1-recommendations)
We have SPC as part of our hospice’s Business Intelligence System, but anyone can find access to the same SPC material that we have used – which are also outlined here with references (below).

Temporal datasets of untoward Incidents of all kinds are amenable to SPC, and essentially one needs to produce a run-chart of the counts of events by, say, month and their type, severity or significance – see Chart 5 – then DRAW ON TWO SIMPLE LINES EQUIDISTANT FROM THE MEAN.

• SPC will offer increasingly sophisticated theory of precisely where the line should go – but if the spread of the data is broadly bell-shaped – see Chart 6 – then the lines can with some sophistication be drawn at +2 and -2 times the Standard Deviation.

• IF ONE IS STARTING, THEN DRAW THE LINE THAT CLINICAL EXPERIENCE INDICATES IS WHERE BACKGROUND FLUCTUATION STOPS AND UNUSUAL BEHAVIOUR MIGHT WELL BE STARTING.

We did both in training, refining things with the simple statistical measure for the regular reporting.

http://www.spcforexcel.com/knowledge/control-chart-basics/purpose-control-charts
Chart 5 Typical Run Chart

-2 standard deviations

+2 standard deviations

Count of all Incident Reports

Month

7 / 2014  
8 / 2014  
9 / 2014  
10 / 2014  
11 / 2014  
12 / 2014  
1 / 2015  
2 / 2015

Count

25

20

15

10

5

0

Chart 6 Bell-Shaped Distribution and Control Limits at +/- two SDs

Count of Incidents Reported in a Calendar Month

Reports per Month  
Lower Control Limit (95%)  
Upper Control Limit (95%)
In the hospice we make extensive use of the QPOP Management Intelligence System which comes with a tailored module called “Statistical Process Control for Incident Reporting”. What it contains can be easily and freely replicated by anyone, as follows:

**Basic Statistics**
- Descriptive statistical terms
- Example of datasets
- Chart design and data
- Distribution of data

**Basic Probability**
- Probability of tossing Heads
- Computer Coins tossing simulation
- Expressing our own estimates of probability

**Variation in measured data: it’s always there and always of two kinds Random and Special Cause**
Demarcating the range of variation by a lower and an upper line ‘drawn’ by
- Experience and wisdom
  OR
- At two standard deviations from the mean

**Statistical Process Control – basics with real local data**
- Ways to spot ‘out of control’ data points
- Ways to spot a run of data – due likely to a change in process

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