How to develop an ongoing programme of GP chronic disease management audits using a z-score-based ‘dashboard’
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<tr>
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<td>Terri Roche</td>
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| Contact details      | Health Inequalities National Support Team  
Wellington House  
133–155 Waterloo Road  
London SE1 8UG  
020 7972 3377  
www.dh.gov.uk/hinst |

For recipient's use
How to develop an ongoing programme of GP chronic disease management audits using a z-score-based ‘dashboard’


FOREWORD

The Health Inequalities National Support Team (HINST) has chosen to prioritise this topic as one of its ‘How to’ guides for the following reasons:

• It offers the potential to improve systematically the outcomes from evidence-based treatment of patients with potentially killer conditions, on a scale that could enable the individual patient quality improvements to achieve a population-level change.

• Specifically, within the ‘Christmas tree’ diagnostic the guide addresses the following components:
  – local service effectiveness (2)
  – responsive services (9)
  – balanced service portfolio (12).

• Action in this area of work will contribute to the Quality and Productivity Challenge by:
  – using routine audit to improve the quality of primary care outcomes for key chronic diseases
  – ensuring links are made to capitalise on reducing the use of ‘downstream’ resources, as a result of effective, evidence-based primary care interventions.

• Successful adoption of processes, similar to those outlined here, would demonstrate good use of World Class Commissioning (WCC) competencies:
  – clinical leadership (4)
  – stimulates provision (7)
  – performance management (10).
How to develop an ongoing programme of GP chronic disease management audits using a z-score-based ‘dashboard’

CONTEXT

NHS Connecting for Health has undertaken a pilot on clinical ‘dashboards’ to establish the benefits of their wider use in the NHS. The pilot phase was set up to deliver twenty-four dashboards, extending the reach of clinical ‘dashboards’ to a broader community of clinical teams and specialties across multiple strategic health authorities in England.

The objectives of the pilot programme were:

• to prove clinical ‘dashboards’ are suitable in a large number of different settings
• to define the strategy for any future adoption and implementation of the toolkit, including a metrics repository
• to provide the pilot areas with an ongoing capability, suitable for re-use
• to prove the benefits of this process to inform a business case for wider adoption.

Above all, the objective of the NHS Connecting for Health clinical ‘dashboards’ programme is to improve the quality of care through the provision of high-quality clinical information. Please go to the link below to find out more:
www.connectingforhealth.nhs.uk/systemsandservices/clindash

For a range of Connecting for Health case studies, visit:
www.connectingforhealth.nhs.uk/systemsandservices/clindash/publications

Good quality information can be a driver of performance amongst clinical teams and helps to ensure that the right services are accessible to all, thus leading to an improvement in the quality of patient care.

PCTs should consider involving their equality and diversity leads to explore how dashboards can be localised to reflect information around age, gender, ethnicity and the other equality dimensions. Segmenting the data could provide vital information to ensure actions are specific, targeted and equitably resourced, to achieve equitable health outcomes for all. Segmentation may help to target interventions to those people who are not currently accessing services.

This ‘How to’ guide (based on NHS Rotherham practice) provides an example of a clinical ‘dashboard’ that HINST identified as a model of good practice during one of its Spearhead visits to Rotherham PCT.
EXPERIENCE OF IMPLEMENTING CLINICAL DASHBOARDS IN NHS ROTHERHAM

Context

When the National Service Framework for Coronary Heart Disease1 (NSFCHD) was published in 2000, the general practitioner (GP) registers showed a variation in the level of case finding and the quality of care and treatment that patients received. In accordance with this, NHS Rotherham identified an inequality gap between patients from the most deprived areas (with the highest incidence of coronary heart disease (CHD)) as being the group that were the least likely to receive coronary revascularisation (an example of the ‘inverse care’ law).

Subsequently, Rotherham took a proactive, systematic and structured approach to CHD management at the primary care trust (PCT) population level, through the introduction of CHD equity audits. The audits compared GP practice deprivation with age–sex standardised CHD register size (case finding) and primary care prescribing with secondary and tertiary care activity (out-patient and in-patient activity). This allowed GPs to benchmark their activities (and subsequent secondary care activity) for the first time. It enabled GPs to compare their practice with others in the PCT and allowed targeted interventions with identified GP practices to occur. For example, practices with low prescribing, but high secondary care activity, were prioritised to address any anomalies in the findings.

The equity audit used graphical methods to display the data, displaying all the key information on one page. As a consequence of this process HINST coined the phrase ‘dashboard’: a means of providing key information required to ‘drive’ practice improvements (like the dashboard in a car). The ‘dashboard’ was well received and provided a high-impact, visual method of presenting information to GPs that was easy to understand. It is worth noting that NHS Rotherham included GP practice names in its audits, rather than using the practice number. This transparency helped to foster an environment of ‘open dialogue’ and increased the incentive for ‘outliers’ to examine their practice.

The ‘dashboard’ model is based around graphical data representation and data provision on an individual practice basis, analysing each measure by ‘z-scores’. A ‘z-score’ is a standardised measure that tells us relatively how the practice is doing compared to the average of all practices (further detail on the calculation of ‘z-scores’ can be found in Appendix 1). The dashboard (or ‘z-score’ chart) becomes a method for displaying, on a single chart, a range of practice-level measures relating to a single care pathway, e.g. care for CHD, chronic obstructive pulmonary disease (COPD) or diabetes. In this way, practices are able to see how they compare with other local practices in terms of need, primary care, prescribing, secondary care and tertiary care.
Appendix 1 provides a ‘step-by-step’ guide on how to develop a clinical dashboard.

The dashboard identifies patterns in the relationship between practice-level healthcare need, healthcare provision and quality of care. This enables potential anomalies to be highlighted. The emphasis is on comparing the effect of deprivation on rates of hospital activity, prescribing and mortality by practice and the equity between need and service access.

**CHD equity audit**

This example is of a ‘dashboard’ for a better performing practice (with average to above average need, prescribing levels a little above average, but generally lower hospital presentations for heart failure, acute heart attack and CHD).

**CHD equity audit, 2008**

*Selected measures by ‘z-scores’*  
*Example of a better performing practice*

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**Measure**  
- IMD 2007  
- % aged 75+ years  
- CHD mortality, 2005–2007  
- CHD prevalence  
- CHD register-standard ratio  
- Smokers (QOF)  
- Aspirin  
- Betablocker  
- Statin  
- ACE inhibitor  
- Heart failure, 2003–2008  
- CHD admissions, 2005–2008  
- CHD admissions, 2007–2008

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**Notes:**

- ACE = angiotensin-converting enzyme inhibitor
- CABG = coronary artery bypass graft
- CHD = coronary heart disease
- IMD = Index of Multiple Deprivation
- MI = myocardial infarction
- PTCA = percutaneous transluminal coronary angioplasty
- QOF = Quality Outcomes Framework
This example is of a ‘dashboard’ for a poorer performing practice (with average to very high need, in a practice with a very high proportion of elderly, well below average prescribing of secondary prevention, and well above average levels of acute myocardial infarction (MI), revascularisation and CHD admissions).

ACE = angiotensin-converting enzyme inhibitor
CABG = coronary artery bypass graft
CHD = coronary heart disease
IMD = Index of Multiple Deprivation
MI = myocardial infarction
PTCA = percutaneous transluminal coronary angioplasty
QOF = Quality Outcomes Framework
Diabetes

This example is of a ‘dashboard’ for a poorer performing practice (with well above average need, well below average prescribing of metformin and insulin, above average prescribing of glitazone and HbA1c levels of 7.5 or lower – below average).

**Diabetes equity audit, 2009**
**Selected measures by ‘z-scores’**
**Example of a poorer performing practice**

ADQ = Average Daily Quantities
BP = blood pressure
ePACT = NHS Prescription Services Database
HbA1c = glycated haemoglobin
IMD = Index of Multiple Deprivation
QOF = Quality Outcomes Framework
COPD

This example is of a ‘dashboard’ for a poorer performing practice (with average to well below average need, well below average prevalence and average to above average service use).

COPD equity audit, 2008
Selected measures by ‘z-scores’
Example of a poorer performing practice

In an ideal situation, it would be expected that practices with high indicators of need would have a high achievement for primary care measures, higher usage of prescribing measures and higher rates of secondary and tertiary care activity. Positive scores indicate a practice is above the PCT average for a given measure and vice-versa for a negative score.

Using the ‘dashboard’

Careful study of the ‘dashboards’ may reveal obvious and subtle trends. Specifically, they could expose evidence that suggests that need is not being appropriately met (high need, low provision of care). Alternatively, they may suggest that there is high secondary care usage coupled with low primary care provision. If either situation is highlighted, further investigation and work with practices may be warranted.

COPD = chronic obstructive pulmonary disease
IMD = Index of Multiple Deprivation
QOF = Quality Outcomes Framework
Users of the ‘dashboards’ must be mindful that they only offer a snapshot of the practice and are based on routinely collected data. As there may be issues with some of the data, it is only a means of identifying potential discrepancies, rather than a definitive guide to summative action. The data must be combined with other (softer) sources of information from the PCT and practice before any firm conclusions can be made regarding quality of care.

Implementing change as a result of the analysis

In NHS Rotherham, practices that showed greater inequity of healthcare provision were targeted first. Following the CHD equity audit (‘dashboard’), a CHD nurse and the prescribing team worked with the practices to develop and validate the CHD registers whilst simultaneously addressing any prescribing issues. It is significant that throughout the process, the ‘dashboard’ was not used as a ‘stick’ to berate the practices over their clinical management of people with CHD, but rather to provide a tool to engage practices and facilitate data validation and appropriate action plan development.

As with any audit, it is important that the analysis is only a part of the overall cycle to promote change. The Rotherham CHD audit was repeated two years later (in 2006) and improvements were demonstrated. This provided a boost to GPs in Rotherham when the results were presented at a primary care protected learning time event.

NHS Rotherham updates its ‘dashboards’ annually and they are used by the primary care performance management team on its annual practice visits.
APPENDIX 1: A STEP-BY-STEP-GUIDE TO DEVELOPING A CLINICAL ‘DASHBOARD’

Step 1
Identify the area of concern, e.g. CHD.

Step 2
Identify appropriate personnel who can agree relevant measures to form the basis of the equity audit. This should include the appropriate staff with the knowledge to make an informed decision, e.g. commissioning lead, information manager/analyst, medical advisor, etc. Relevant measures could include:

- practice characteristics (proportion of people aged over 75 years and average socio-economic deprivation)
- Quality Outcomes Framework (QOF) measures (disease prevalence, achievement and exceptions)
- prescribing measures (proportion of patients on drug ‘X’ and proportion of generic prescriptions)
- hospital usage measures (emergency admissions and outpatient appointments)
- measures of expenditure (drug and secondary care expenditure).

Step 3
Obtain practice data for the selected measures. This should include the latest available data to make the output current and relevant. Where measures are included which result in small numbers per practice, e.g. mortality data, it may be necessary to aggregate data over longer periods to produce robust rates.

Step 4
Assemble the data and calculate the ‘z-score’. For each measure a ‘z-score’ is calculated. A ‘z-score’ is a standardised measure that tells us relatively how the practice is doing compared to the average of all practices. It is, for each measure, the number of standard deviations (SD) the practice’s value lies above or below the average for all practices. For example, if the mean Index of Multiple Deprivation (IMD) score for all practices in a PCT was 20, and the SD for practice IMDs was 5, then a practice with an IMD of 25 would lie one SD above the mean.

Data included can be adjusted (e.g. age-standardised to adjust for differences in the age structure between practice populations) or unadjusted (e.g. crude prevalence for diseases across all age groups). Both of these can have merit depending on what the data is being used to identify.

‘Z-scores’ convert the rate/percentage for a given measure into a score (based upon the average and SD of the rate/percentage) and indicate how far and in what direction, that measure deviates from the distribution’s mean, expressed in SD units. Positive scores indicate a practice is above PCT average for a specific measure and vice-versa for a negative score.
**Illustrative example**

Let us assume that we have 30 practices and ten measures. For each of the ten practice-level measures in turn (e.g. CHD crude prevalence, IMD, % population over 75 years…) do the following:

- Calculate the mean of the 30 practice values.
- Calculate the SD of the 30 practice values.
- Calculate the ‘z-score’ for each of the 30 practices as:
  
  \[ \text{‘z-score’} = \frac{\text{practice value} - \text{mean value}}{\text{SD}}. \]

The ‘z-score’ will be positive if the practice value lies above the mean, and negative if the practice value lies below the mean. The sum of the ‘z-scores’ will equal zero and if the distribution is normal, there will be an equal number of values above and below zero.

Once this has been completed for all ten measures, construct 30 charts. Each chart relates to a single practice, and shows the ten ‘z-scores’ for that practice (see Step 5).

**Step 5**

Creating the spreadsheet. In one worksheet (or ‘dashboard’) arrange the data, as suggested, showing the practice in one column and the rate in a column alongside it. Separate the data for each measure by two blank columns to allow the ‘z-score’ to be calculated alongside the rate.

- a. Below the last practice’s rates value calculate the mean of the values using the Excel function AVERAGE, i.e.
  
  \[ \text{"=AVERAGE(first cell reference:last cell reference)".} \]

- b. For example: \[ "=AVERAGE(B6:B35)". \]

- c. Below the mean calculate the SD using the Excel function.

- d. \[ \text{STDEV: i.e. \"=STDEV(first cell reference:last cell reference)\".} \]

- e. For example: \[ "=STDEV(B6:B35)". \]

- g. Alongside the rate for the first practice calculate the ‘z-score’ i.e.

- h. \[ z = \frac{(\text{Rate for practice A} - \text{mean rate})}{\text{SD}}. \]
i. Copy this formula for all practices.

j. Repeat this for all measures.

k. In a new worksheet (label as ‘chartdata’) include the first column as the practice names, then include all the measures in columns to the right of this column. Use references to link to the first worksheet where the ‘z-scores’ were calculated. This allows the workbook to be updated in future years with the charts automatically updated (except for titles, e.g. the period that the data cover).

l. Produce a chart for the first practice. Highlight the title row and data for the first practice. Insert chart as ‘column type’. Format axis to have fixed values from, say, –2 to +2. Format axis labels as ‘low’. Add a border around the chart. Delete the legend. Adjust the title and y-axis label. Make other formatting adjustments as required. Name the worksheet as the practice name. It is important to ensure all formatting is completed before producing charts for the remaining practices.

m. When the chart is satisfactory for the first practice, make a copy of the chart. Click on the columns in the chart and adjust the formula (in the ‘Formula Bar’) to select the next practice. Adjust the title to reflect the new practice.

n. Repeat until all practices are produced.

Step 6
Create the ‘dashboard’. Arrange the information in the following order (this should reflect the care pathway):

- need
- primary care (and prescribing)
- secondary care
- tertiary care.

REFERENCES

AUTHOR AND ACKNOWLEDGEMENTS

Written by:
Terri Roche, Associate Delivery Manager
Health Inequalities National Support Team
hinst@dh.gsi.gov.uk

Acknowledgements:
Jo Abbott, Consultant in Public Health
NHS Rotherham

Marcus Williamson, Senior Public Health Information Analyst
NHS Rotherham

Dr Mark Strong, Clinical Lecturer in Public Health Medicine
School of Health and Related Research
University of Sheffield

If you want more information on the examples contained in this guide please contact
HINST on 0207 972 3377 or email hinst@dh.gsi.gov.uk