Data performance management at University Hospitals Birmingham

Background
The introduction of information technology systems across the NHS has been limited. The National IT Programme suffered significant setbacks, and in 2011 the Public Accounts Committee found that the initiative is a “massive risk and has proved unworkable”. While the NHS creates lots of data on clinical practice and performance, often this is not used effectively to inform decision making or performance management. The failure to implement sophisticated IT systems or for trusts to make necessary investments has frustrated better use of data. Despite failings on the national scene, some leading English healthcare providers have developed and implemented highly successful information systems.

University Hospitals Birmingham (UHB) is one of the country’s leading academic medical centres and the largest in the West Midlands. It has been rated “excellent” for financial management and “excellent” for quality of clinical and non-clinical services by the Healthcare Commission. In 2010 UHB opened the new 1,200 bed Queen Elizabeth Hospital Birmingham, replacing the previous Queen Elizabeth Hospital and Selly Oak Hospital. The Trust employs more than 6,900 staff and provides adult services to more than half a million patients every year. Key to the success of UHB has been a highly sophisticated IT system. In 1997 UHB set itself the objective to be the most technologically advanced provider in the NHS. Rather than waiting for the National Programme for IT in the NHS to bring IT to the Trust, UHB went alone in investing in a purpose built in-house system.

Method
Improving quality and reducing errors are at the heart of UHB’s IT strategy. The metrics used in the purpose built system were focused on patient interests. A Quality Outcomes Research Unit of clinicians was set up to develop metrics and indicators for quality improvement. The Trust’s approach to error management drew lessons from car manufacturing on ensuring consistent quality of production where each stage of the assembly line was measured and analysed. Even when the local BMW factory achieved a 99.9 per cent level of perfection for manufactured cars, the leadership insisted on 100 per cent. Rather than connecting errors to outcomes and focusing on significant mistakes and errors in clinical practice, the Trust took the view that all errors are important. Consequently IT systems were designed to reduce all errors.

Decision support
One of the key programmes that UHB has introduced has been the Prescribing Information and Communication System (PICS), a decision support tool for front line clinicians. The system has over 4,000 registered users, and manages 25,000 new prescriptions and 125,000 drug administration events a week. Clinicians use the tool through 1 of 450 handheld tablets when ordering and administering prescriptions, laboratory requests and results, imaging results and internal referrals. The system works as a point of care decision support “error filter”, supported by constant real time information. 25 per cent of users being level 2 and 3 healthcare assistants. The system has been in use in UHB for over ten years and has covered

2 Department of Health (2012), Information – A report from the NHS Future Forum.
3 Uhb.nhs.uk.
4 Ibid.
7 Institute of Medicine (2000), To Err is Human: Building a Safer Health System.
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all inpatients for five years. It has now been implemented to include outpatients. Each and every decision made by clinicians working in wards is run through an “error filter”, which screens the decision made, such as changing a patient’s therapy, ordering tests or discharging. The system automatically records the decision and either confirms the order, warns the clinician of the potential error, requires the clinician to re-enter their password in the knowledge they take responsibility for the order, or stops the order. Through the data the Trust leadership is able to track outliers who regularly overrule the error filter at the second response and in particular the variation among junior staff. The number of incidents when the system stopped the order or required the clinician to take personal responsibility suggested that each day there were 400 potential errors, equal to 1.8 per cent of user actions.

The system also generates automatic alarms and alerts for staff, and sets minimum information requirements for clinicians to make decisions, with the system differentiating between different grades of staff. As well as alerting staff, the system can also make automatic changes to patient care, such as auto-prescribing of MRSA eradication therapy following a positive skin swab test for a patient. Finally the system creates an audit trail of who took what decision and when.

Performance management

The vast body of data generated by the PICS system has significantly improved the capability of the Trust leadership to manage the organisation. The system of automatically generated emails is used to share accurate, timely, useful and relevant information to staff. Sharing information on clinical performance has resulted in changes to behaviour, such as the use of particular drugs before and during surgery. The system automatically “escalates” the pressure on clinicians to meet quality levels by including more senior members of staff in the emails, eventually leading to the involvement of the chief executive.

Senior managers can assess the performance of the hospital through the clinical dashboards which present real time data on each ward and critical care unit against 34 quality indicators. The dashboards can also show the performance of individual doctors and nurses. Data also allows the hospital management to locate, analyse and address outliers. On one occasion a Trust director used data on medicines management and omitted antibiotics to identify a nurse who had been at the hospital for five years and had never completed his/her cannulation training, was also out of date for his/her infection control training, manual handling and fire training, and had not been appraised for 18 months. One phone call to the Matron for the area quickly resolved the training deficiencies.

The PICS system has been effectively used to meet key quality priorities, such as reducing the number of doses of drugs prescribed but not administered. On average 20 per cent of doses prescribed are not administered and there is a cultural acceptance of drug omissions among administering clinicians. Clinical dashboards were used by the Trust leadership to trace omitted doses and hold clinicians to account. Further progress was made when the Board introduced monthly Care Omissions Root Cause Analysis meetings. Clinical data is used to identify cases of substandard care and required the clinical and managerial team responsible to make a full review to the executive team led by the chief executive.

Patient access

Information and technology have also been used to engage patients with their healthcare. In April 2011, the Trust piloted a unique in-house patient portal called MyHealth@QEHB for

“It has become over the decades culturally acceptable for drugs not to be given to patients, and what we’ve been trying to do here is turn round that culture and say every single dose is important.”

Dr David Rosser, Medical Director, University Hospitals Birmingham NHS Foundation Trust

11 Ibid.
13 Ibid.
14 Ibid.
15 Ibid.
16 Reform visit to UHB, November 2011.
17 Ibid.
patients with liver disease. The system allows long term patients to remotely access test results and letters, medication details, as well as past and future outpatient appointments. Patients are also able to communicate with one another, providing peer support which increased patient satisfaction and improved adherence to therapy. Following the initial success of the pilot the portal is being enhanced and rolled out across other specialties.

**Benchmarking**

The strength of data produced by the systems and the development of a Health Data Evaluation tool has allowed the Trust leadership to benchmark the performance of UHB against other hospitals. As well as benchmarking its performance to other NHS hospitals, the Trust leadership has compared its quality outcomes to those from 152 hospitals in the United States, including the Cleveland Clinic.

The Trust was able to use national death certificate data and Hospital Episode Statistics to trace “pathway mortality”: patient mortality over time from the point of diagnosis. This allowed the hospital to demonstrate issues to its partners in West Midlands, such as the variation in cancer mortality for patients diagnosed at three hospitals, even though all subsequent care was delivered at UHB – suggesting delays in referral by GPs.

**Outcomes**

The use of information and technology has delivered real quality improvements for the Trust. Medication errors were cut by 66 per cent, preventing up to 450 individual errors a day. The number of missed doses has been brought down to 4 per cent, with some wards consistently achieving 2 per cent. The Trust has also reported a 16.9 per cent reduction in 30 day mortality, the equivalent of 100 lives saved per year, and a reduction not seen in the rest of England. Staff satisfaction has improved despite the intense monitoring of performance. Information and strong management have changed the culture of clinical staff. It is no longer acceptable to deliver an inconsistent or incomplete course of therapy. The success of the system has been such that 30 other trusts are interested in purchasing UHB’s system.

Reducing errors and improving the quality of care has improved efficiency. Better understanding of costs also allowed the Trust to meet its Cost Improvement Plans and return a surplus for the past 15 years.

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19 Moore, J. (2012), “A lot more for a lot less”, in N. Seddon (ed.), The next 10 years, Reform.
20 University Hospital Birmingham NHS Foundation Trust (2011), Annual Report and Accounts.
22 Ibid.
23 Ibid.
25 Reform visit to UHB, November 2011.
26 Ibid.