Quality and safety between ward and board: a biography of artefacts study

Justin Keen,[1]* Emma Nicklin,[1] Andrew Long,[2] Rebecca Randell,[2] Nyantara Wickramasekera,[3] Cara Gates,[4] Claire Ginn,[5] Elizabeth McGinnis,[6] Sean Willis[6] and Jackie Whittle[6]

[1]Leeds Institute of Health Sciences, University of Leeds, Leeds, UK
[2]School of Healthcare, University of Leeds, Leeds, UK
[3]School of Health and Related Research, University of Sheffield, Sheffield, UK
[4]School of Health and Community Studies, Leeds Beckett University, Leeds, UK
[5]NHS England, Leeds, UK
[6]Leeds Teaching Hospitals NHS Trust, Leeds, UK

*Corresponding author j.keen@leeds.ac.uk

Declared competing interests of authors: none

Published June 2018
DOI: 10.3310/hsdr06220

Scientific summary

Quality and safety between ward and board

Health Services and Delivery Research 2018; Vol. 6: No. 22
DOI: 10.3310/hsdr06220

NIHR Journals Library www.journalslibrary.nihr.ac.uk

Scientific summary

Background

There have been concerns about the quality and safety of NHS hospital services since the turn of the millennium. A series of government policies and official reports has made a range of recommendations for improving quality and safety. This report focuses on one of the themes running through the policies and reports: the need for more and better data on quality and safety, and for investments in information technology (IT) to manage the data.

Following a difficult period for all NHS trusts in the 2000s under the NHS National Programme for IT, they have made progress in integrating IT systems in the last few years. Increasingly, clinicians can access detailed patient data anywhere within a hospital. However, the second Francis report into the scandal at the Mid Staffordshire NHS Foundation Trust, published in 2013 (The Mid Staffordshire NHS Foundation Trust Public Inquiry. Chaired by Sir Robert Francis QC. *Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry. HC 898*. London: The Stationery Office; 2013), and subsequent reports by Donald Berwick (National Advisory Group on the Safety of Patients in England. *A Promise to Learn – A Commitment to Act*. London: Department of Health and Social Care; 2013) and Sir Bruce Keogh (National Health Service. *Review into the Quality of Care and Treatment Provided by 14 Hospital Trust in England: Overview Report.* London: National Health Service; 2013) highlighted two problem areas. One concerned wards in which – in spite of the investments – nurses did not have IT systems to help them to monitor and manage patients' risks, or to provide data to drive service improvement. The second problem was the oversight of quality and safety in wards and departments. Trust boards and external agencies did not have access to routine data that would allow them to identify the wards and departments that needed to improve. This study investigated the progress that acute NHS trusts made, between 2014 and 2016, in developing and using technology infrastructures to enable them to monitor the quality and safety of services.

Aims and objectives

The research had two aims. The first and principal aim was to establish whether or not ward teams in acute NHS trusts had the information systems they needed to manage their own work and to report on that work to trust boards and other stakeholders. The second aim was to establish the extent to which ward-level dashboards provided a basis for achieving the openness, transparency and candour envisaged by Sir Robert Francis in his second report.

There were four research objectives:

1. assess the extent to which trusts are able to integrate activity, quality, outcome and cost information in dashboards, to enable ward teams to manage their services effectively and to improve services over time
2. evaluate the impact of the use of dashboards on clinical and management practices at ward level
3. assess the extent to which dashboards provide data that are valuable to other local stakeholders, including trust boards, Healthwatch and commissioners
4. identify the barriers to, and facilitators of, the effective redesign and use of dashboards.

Methods

A telephone survey of 15 acute NHS trusts was undertaken in the autumn of 2014, and a review of the content of board papers of all trusts in England was undertaken in January 2015. The telephone survey was undertaken with chief nurses, or senior managers nominated by chief nurses, at acute NHS trusts in

the Yorkshire and the Humber region. The interviews were recorded and transcribed, and the transcripts were analysed using framework analysis. The board papers were analysed by recording the presence or absence of a range of quality and safety indicators, including mortality, incidents, and the measures in the NHS Safety Thermometer (www.safetythermometer.nhs.uk).

The telephone survey was used to identify the sites for the main field study. Site selection was partly pragmatic and partly purposive. It was pragmatic because we could select only from sites that were within reasonable travelling distance of our offices – given the volume of fieldwork that we proposed – and that were willing to participate in the study. It was purposive in that we selected sites that either had real-time ward management systems or had formally agreed on implementation plans to deploy them. We also selected a mix of foundation trusts (FTs) and non-FTs on the basis that they had different governance arrangements and might, therefore, be expected to use different data in different ways.

We then observed the use of information systems in four acute hospital trusts. We collected data over an 18-month period at the four sites, between April 2015 and September 2016, using a combination of methods. One focus was on the direct observation of working practices, on the basis that the evidence of our observation of people at work was more reliable than their accounts of the same work. We also used semistructured interviews and an analysis of site documentation to capture information about practices that we could not observe directly, such as discussions in meetings that we were not able to attend.

The Biography of Artefacts approach was used to analyse the data, making this a science and technology study. The method is suited to the study of large-scale IT systems in organisations, when it is not feasible to study the systems in their entirety. The pragmatic solution is to observe developments at a number of 'key points' at which significant things happen, such as ward nurses using data and IT systems in the course of their work and board committees using data to scrutinise the quality and safety of services.

Furthermore, if we want to understand any IT system in an organisation – that is, understand why it looks the way it does today – we need to understand its history. The method, therefore, involves the development of a number of 'mini-biographies' based on observations made, over time, at each of the key points. A Biography of Artefacts is, then, made up of a number of mini-biographies, or in the case of this study, five narratives of events unfolding over time.

Results

The survey of acute trusts' board papers showed that all trusts received data on the quality and safety of services in January 2015. The telephone survey of 15 trusts in the region revealed that two already had real-time ward management systems and four had firm plans to implement these.

Five mini-biographies were developed focusing on different aspects of hospital data and technology infrastructures: the uses of technologies on wards; the work of information and informatics teams; board committees; directorates (also called clinical business or support units); and national and local agencies. The mini-biographies set out the direction of developments at the four trusts between 2013 and 2016.

The wards that we studied at the trusts had the information systems that they needed to manage the quality and safety of services. The data were an important source, but not the only source, of information for managing the wards; handovers, regular meetings and informal discussions in the course of shifts were all important. The use of IT systems, including electronic whiteboards and tablets, varied between trusts.

Board and board quality committees received an increasing number of data on the quality and safety of services between 2013 and 2016. These data provided board and committee members with assurance about services in wards and departments, and these members were able to use data to identify issues that merited discussion. There were a number of wider developments during the study period, for example the

© Queen's Printer and Controller of HMSO 2018. This work was produced by Keen *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

introduction of meetings during which staff could raise concerns. Taken together, boards had effective oversight, and members felt that 'nasty surprises' were much less likely than they had been 3 or 4 years earlier.

The mini-biographies portray the development of data and technology infrastructures, over a period of years, to support the movement of data from ward to board, and, beyond, to national and local agencies. The overall form of the infrastructures had been substantially determined by national agencies and was geared to data processing: capturing and validating data for submission to national agencies. Trust boards had taken advantage of these data and used them to provide assurance about quality and safety. Less positively, the infrastructures had developed in a piecemeal fashion, with different technologies used to handle different quality and safety data.

The deployment of real-time management systems on wards, including electronic whiteboards and mobile devices, marks an important departure from the centralised data processing model. The systems support the proactive management of clinical risks and are used principally by nurses, who have made substantial contributions to their designs.

These developments have occurred within a broad context, with trusts making concerted efforts to improve the quality and safety of services, and publishing far more data on their performance than they did just 3 years earlier. Trust-level data suggest that quality and safety improved at all four trusts between 2013 and 2016. Our findings indicate that the technology infrastructures contributed to these improvements. There remains considerable scope to rationalise those infrastructures.

Conclusions

NHS organisations face a major strategic choice concerning their data and technology infrastructures. The ward and infrastructure mini-biographies showed that the technology infrastructures within the trusts are only partial amalgams: they are also fragmented. The separate national systems for reporting activity (including mortality), incidents and complaints, and the NHS Safety Thermometer, limit the extent to which trusts have been able to integrate the management of quality and safety data. Fragmentation is mandated by NHS Digital, with its piecemeal arrangements for submission of the different types of data.

One option is to continue with essentially parallel systems: to continue with the current arrangements. A second option is to phase out the current 'data processing model'. Only data captured in the course of clinical work would be stored, and subsets of those data would be submitted to national bodies. This would mark a step change in thinking and practice, moving towards real-time management and data-driven quality improvement. The third option is to move to a comprehensive, centralised – NHS-wide – real-time information system. This would, again, rely on data captured in the course of clinical work, but the data would be made available to external bodies, which would take responsibility for the quality and safety of services. The path taken will have a major impact on the design and use of trust infrastructures for many years to come.

Implications for health care

1. Real-time ward management systems have been developed largely in-house, using agile methods and with ward nurses closely involved. They mark a significant departure in thinking and practice from the NHS's historical reliance on commercially available data processing systems.
2. The trusts are acutely aware of the potential locked in the data sets in their data warehouses, and in their informatics and information teams. Their capacity to exploit the potential is currently very limited, as most of their time is committed to preparing national data submissions. Trusts need to be able to free up staff time if they are to achieve data-driven quality improvements.

3. The development of real-time management systems presents the NHS with a strategic choice. Will sustained and substantive quality and safety improvements be achieved by centralising authority, and hence the flow of data, to boards and to external agencies? Or will they be achieved by the clinical teams caring for patients, supported by real-time management systems? The decision will have a major effect on the future development of these critical infrastructures.

Recommendations for research

1. The growth in the use of mobile technologies on wards for the management of clinical risks, as well as for recording patients' status and treatment, may have effects on the quality and safety of services. These effects need to be established.
2. Similarly, there has been a significant growth in the use of electronic whiteboards on acute wards in the last 3 years. This study raises the question: are these interim technologies that will disappear when mobile devices are ubiquitous, or do they have an important role to play in monitoring the quality and safety of services?
3. National data submissions have developed in piecemeal fashion during the last two decades. A number of reports have drawn attention to the time that clinicians spend recording or searching for data, but this is the first study that has highlighted the opportunity costs, in time and resource use, for national submissions. The overall design of national data submissions, and their costs and value, merit review.
4. Acute trusts now have data warehouses, which appear to have considerable potential to support analyses of current performance and modelling options for service improvements. Trusts' use of, and the scope for wider exploitation of, these data sets need to be evaluated.

Funding

Funding for this study was provided by the Health Services and Delivery Research programme of the National Institute for Health Research.

© Queen's Printer and Controller of HMSO 2018. This work was produced by Keen *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

Health Services and Delivery Research

ISSN 2050-4349 (Print)

ISSN 2050-4357 (Online)

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: journals.library@nihr.ac.uk

The full HS&DR archive is freely available to view online at www.journalslibrary.nihr.ac.uk/hsdr. Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: www.journalslibrary.nihr.ac.uk

Criteria for inclusion in the *Health Services and Delivery Research* journal
Reports are published in *Health Services and Delivery Research* (HS&DR) if (1) they have resulted from work for the HS&DR programme or programmes which preceded the HS&DR programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

HS&DR programme

The Health Services and Delivery Research (HS&DR) programme, part of the National Institute for Health Research (NIHR), was established to fund a broad range of research. It combines the strengths and contributions of two previous NIHR research programmes: the Health Services Research (HSR) programme and the Service Delivery and Organisation (SDO) programme, which were merged in January 2012.

The HS&DR programme aims to produce rigorous and relevant evidence on the quality, access and organisation of health services including costs and outcomes, as well as research on implementation. The programme will enhance the strategic focus on research that matters to the NHS and is keen to support ambitious evaluative research to improve health services.

For more information about the HS&DR programme please visit the website: http://www.nets.nihr.ac.uk/programmes/hsdr

This report

The research reported in this issue of the journal was funded by the HS&DR programme or one of its preceding programmes as project number 13/07/68. The contractual start date was in July 2014. The final report began editorial review in January 2017 and was accepted for publication in June 2017. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HS&DR editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded by the National Institute for Health Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, NETSCC, the HS&DR programme or the Department of Health and Social Care. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, NETSCC, the HS&DR programme or the Department of Health and Social Care.

© Queen's Printer and Controller of HMSO 2018. This work was produced by Keen *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).

NIHR Journals Library Editor-in-Chief

Professor Tom Walley Director, NIHR Evaluation, Trials and Studies and Director of the EME Programme, UK

NIHR Journals Library Editors

Professor Ken Stein Chair of HTA and EME Editorial Board and Professor of Public Health, University of Exeter Medical School, UK

Professor Andrée Le May Chair of NIHR Journals Library Editorial Group (HS&DR, PGfAR, PHR journals)

Dr Martin Ashton-Key Consultant in Public Health Medicine/Consultant Advisor, NETSCC, UK

Professor Matthias Beck Professor of Management, Cork University Business School, Department of Management and Marketing, University College Cork, Ireland

Dr Tessa Crilly Director, Crystal Blue Consulting Ltd, UK

Dr Eugenia Cronin Senior Scientific Advisor, Wessex Institute, UK

Dr Peter Davidson Director of the NIHR Dissemination Centre, University of Southampton, UK

Ms Tara Lamont Scientific Advisor, NETSCC, UK

Dr Catriona McDaid Senior Research Fellow, York Trials Unit, Department of Health Sciences, University of York, UK

Professor William McGuire Professor of Child Health, Hull York Medical School, University of York, UK

Professor Geoffrey Meads Professor of Wellbeing Research, University of Winchester, UK

Professor John Norrie Chair in Medical Statistics, University of Edinburgh, UK

Professor John Powell Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK

Professor James Raftery Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

Dr Rob Riemsma Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

Professor Helen Roberts Professor of Child Health Research, UCL Great Ormond Street Institute of Child Health, UK

Professor Jonathan Ross Professor of Sexual Health and HIV, University Hospital Birmingham, UK

Professor Helen Snooks Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

Professor Jim Thornton Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

Professor Martin Underwood Director, Warwick Clinical Trials Unit, Warwick Medical School, University of Warwick, UK

Please visit the website for a list of editors: www.journalslibrary.nihr.ac.uk/about/editors

Editorial contact: journals.library@nihr.ac.uk