The 9 articles in this mini-journal demonstrate interprofessional working and leadership:
Professionals Article
- nurses 1,3,7
- dentists 2
- doctors 4,5,6,8,9

Students led 4 projects:
- Articles 2,5,6,7
Early Career Professionals led 3 projects:
- Articles 4,8,9

"We could see what great changes we had made to the lives of the patients around us. As a student you don't usually get to do this."

"It was invaluable experience in communication and leadership"

Students

"As a junior doctor, I have found BMJ Quality to be a fantastic resource that allows for simple, straightforward advice and guidance to allow users with even no prior experience to perform a quality improvement project. I have gained a great deal of knowledge and experience through its use, and have also been inspired by other great projects on the site."

Foundation Year doctor

"BMJ Quality provides the opportunity to develop QI skills, report writing skills and receive useful, independent feedback via peer-review. It allows trainees to learn and have projects published at the same time, a win-win."

Consultant and Clinical Lead

Return on Investment
Although the main aim of quality improvement is to improve care for patients, being able to demonstrate that an intervention delivers financial savings shows that it adds value to an organisation in multiple ways

Two teams used the BMJ Cost and Savings Calculator to estimate savings from their improvement
- £8,457 savings per year by reducing contamination of instruments in a paediatric dental clinic (Article 2)
- £37,047 savings per year with an online system for in hospital referrals (Article 8)

Savings from these two projects, led by students and Early Career Professionals, were more than twice the cost of the AHSP organisational subscription

"These improvement reports demonstrate the opportunities students and Early Career Professionals have had in understanding and practising safe, effective and person centred care."

Clinical Governance & Risk Management Team Leader

"The greatest benefit was the speed and support to publication with timely independent peer-review advice. This is particularly useful for trainees, who have a limited time in training posts to pursue research and publication."

Specialist Trainee doctor

Process Mapping
One team used process mapping to identify systems changes that improved the identification of post-operative kidney injury (Article 5)

Process mapping is a powerful tool that should be used by more teams
AHSP BMJ Quality Improvement Reports Volume 1: 2016

Editorial

“Healthcare will not realise its full potential unless change making becomes an intrinsic part of everyone’s job, every day, in all parts of the system” ¹

BMJ Quality was launched in June 2013 to support users to overcome challenges in Quality Improvement projects. Users work through a structured online template which takes them step-by-step through an improvement project whilst helping them to document and share their work. Throughout their subscription users have access to exclusive learning modules, support tools, case examples and an on-call faculty of experts to support their project work. Once a project is complete, it is automatically formatted into a quality improvement report. This can then be submitted to the BMJ Quality Improvement Reports journal at no extra cost. BMJ Quality Reports is an open access journal, which is listed on PubMed (National Library of Medicine ID: 101629512).

AHSP Board and Executive have supported an organisational subscription to BMJ Quality for NHS Tayside staff and University of Dundee students since April 2015. This Mini-Journal includes nine improvements that have been published in BMJ Quality Improvement Reports. The only way to learn about change making is through experience, so we have involved students and Early Career Professionals (ECPs) in the improvement teams. ECPs are those in their first five years since graduation or since a change of career direction (e.g. into Management). The learning outcome for students and Early Career Professionals is that they become change agents by acquiring five improvement habits of mind:²

1. Learning
   - Questioning – Problem finding – Reflective
2. Influencing
   - Empathic – Facilitative – Comfortable with conflict
3. Resilience
   - Optimistic – Calculated risk taking – Tolerating uncertainty
4. Creativity
   - Generating ideas – Critical thinking – Team playing
5. Systems thinking
   - Connection making – Synthesising – Accepting of change

The AHSP Organisational Subscription has enabled 151 staff, students and ECPs to register with BMJ Quality. There are four additional articles under review or about to be submitted and users have completed 201 learning modules. Two of
the articles in this Mini Journal used the BMJ Cost and Savings Calculator to estimate savings from improvement, which were over twofold greater than the cost of the entire AHSP Organisational Subscription. This is a very encouraging start but we need to work on sustainability and spread. Going forward we have inter-professional teams who have committed to using BMJ Quality to build capacity and capability for improvement in seven clinical services and two patient safety priorities:

Clinical Services:
1. Anaesthetics, Surgery and Theatres
2. Dental Hospital
3. Diabetes Medicine
4. Emergency Medicine
5. Mental Health
6. Obstetrics and gynaecology
7. Paediatric

Patient Safety Priorities:
1. Deteriorating patients
2. Medicines safety

We look forward to sharing the results of this work in Volume 2 in 2017. If you are interested in getting involved in using BMJ Quality with your team then please email the Patient Safety Team for details patientsafetynetwork.tayside@nhs.net

Peter Davey
Vicki Tully

<table>
<thead>
<tr>
<th>Title of Article</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development and Implementation of a Catheter Associated Urinary Tract Infection (CAUTI) 'Toolkit'</td>
<td>6</td>
</tr>
<tr>
<td>Improving the inspection and manual cleaning of dental instruments in a dental hospital</td>
<td>26</td>
</tr>
<tr>
<td>Improving multidisciplinary communication at ward board rounds using video enhanced reflective practice</td>
<td>38</td>
</tr>
<tr>
<td>Introduction of a junior doctors' handbook: an essential guide for new doctors</td>
<td>59</td>
</tr>
<tr>
<td>Improving the recognition of post-operative acute kidney injury</td>
<td>67</td>
</tr>
<tr>
<td>Improving Mental Status Questionnaire (MSQ) completion on admission to the Acute Surgical Receiving Unit (ASRU), Ninewells Hospital, Dundee</td>
<td>89</td>
</tr>
<tr>
<td>Improving early recognition of delirium using SQiD (Single Question to identify Delirium): a hospital based quality improvement project</td>
<td>97</td>
</tr>
<tr>
<td>Referral Finder: Saving Time and Improving The Quality of In-hospital Referrals.</td>
<td>104</td>
</tr>
<tr>
<td>Seeking Sepsis in the Emergency Department- Identifying Barriers to Delivery of the Sepsis 6</td>
<td>113</td>
</tr>
</tbody>
</table>
Development and Implementation of a Catheter Associated Urinary Tract Infection (CAUTI) 'Toolkit'

Mandy Tatham, Gill Macfarlane, Morag MacRae, Vicki Tully, Karen Craig
NHS Tayside, Scotland

Abstract

Indwelling urinary catheters are a commonly used invasive medical device within acute and non-acute settings in NHS Scotland. The second National Survey of the Prevalence of Hospital Acquired Infection (HAI) in Scotland 2011 identified that 19.2% of patients surveyed had an indwelling urinary catheter. In this survey, Urinary Tract Infections (UTI) were identified as the most prevalent type of HAI at 22.6% in acute settings and 39% in non-acute settings [1].

In September 2013 the Scottish Government released a Chief Executive Letter (CEL 19) which identified Catheter Associated Urinary Tract Infection (CAUTI) as one of the nine Points of Care Priorities within the Scottish Patient Safety Programme, with the aim of reducing CAUTI by 30% by end of December 2015 measured against a national definition [2].

This quality improvement project saw the development, testing and introduction within NHS Tayside of an evidenced based bundle of care. This was to standardise and drive quality care delivery for the insertion and maintenance of urethral urinary catheters with the intention of reducing catheter associated urinary tract infections in our patients. Data collection tools and data reporting mechanisms were also developed, tested and introduced using a national CAUTI definition to capture data for improvement and local and national reporting of progress.

Problem

Indwelling urinary catheters are a commonly used invasive medical device within acute and non-acute settings in NHS Scotland. The second National Survey of the Prevalence of Hospital Acquired Infection (HAI) in Scotland 2011, identified that 19.2% of patients surveyed had an indwelling urinary catheter. In this survey, Urinary Tract Infections (UTI) were identified as the most prevalent type of HAI at 22.6% in acute settings and 39% in non-acute settings. The same survey also identified UTI as the most common source of secondary Blood Stream Infections (BSI) where the origin could be determined [1]. The Plowman report published in 1999 estimated the cost of treating a healthcare associated UTI was £1327 per case and the annual cost of healthcare associated UTI was approximately £125 million [3].

The impact of a UTI on the individual can vary greatly, depending on age, co-morbidities e.g. heart or lung disease and diabetes, and socio-economic circumstances. Common symptoms include dysuria, urgency, frequency, incontinence, rigors, lower back/suprapubic pain, and new or worsening confusion. Inappropriate and recurrent use of antibiotics to treat UTI, can promote antimicrobial resistance [4].

In September 2013, the Scottish Government released a Chief Executive Letter (CEL 19) which identified Catheter Associated Urinary Tract Infection (CAUTI) as one of the nine Points of Care Priorities within the Scottish Patient Safety Programme (SPSP) [2]. Healthcare Improvement Scotland (HIS) in conjunction with the Scottish Patient Safety Programme produced a 'Prevention of Catheter Associated Urinary Tract Infections Driver Diagram and Change Package'. The aim of this work was to reduce CAUTI by 30% by end of December 2015, measured against a national definition within Scotland [5].

Within a selected number of wards in NHS Tayside, we first set out to establish what urethral urinary catheter related care was being documented as having been delivered and subsequently recorded within the patient’s notes. We then ascertained what previous and current CAUTI related data, if any, was being gathered and/or reported within clinical areas. This was to establish a baseline CAUTI position for NHS Tayside, this showed that no CAUTI related data was being collected and there was a lack of documentation relating to the management of urethral urinary catheters. Both of which are discussed within the baseline measurement.

Background

Having researched the international and national guidance documents relating to the prevention of CAUTI, it became evident there was a wealth of resources available. For example, internationally, ‘On the CUSP: Stop CAUTI Implementation Guide’ (U.S. Department of Health and Human Services) February 2014 [6] and catheterout.org (http://catheterout.org) [7]. Nationally, to name but a few, there are guidelines available from Scottish Intercollegiate Guidelines Network (SIGN) [8], National Institute Clinical Excellence (NICE) [9], EPIC 3 [10], and RCN [11].

Within NHS Tayside, the guidance produced by HIS and SPSP - Prevention of Catheter Associated Urinary Tract Infections (CAUTI) Driver Diagram and Change Package, was utilised [5]. Within this
package two options for measuring CAUTI rate were given, catheter days and occupied bed days. National debate is ongoing regarding the denominator for CAUTI rate with no final decision having been made to date. Following in-depth discussions with SPSP and Infection Control Leads, the decision was made to use occupied bed days as the denominator to measure CAUTI rate within Tayside. This work was undertaken and implemented by two newly appointed HAi Quality Improvement Facilitator (QIF) posts funded by the Scottish Government for a two year secondment period.

**Baseline measurement**

Within NHS Tayside, to help us establish the prevalence of the problem, we carried out baseline measurement scoping exercises which included:

Contacting Senior Charge Nurses (SCN) of in-patient wards / departments to establish whether any data relating to CAUTI was being collected and if so, what. The result showed that no wards / departments were collecting any CAUTI related data (see Baseline CAUTI Data Collection Pie Chart 1 & 2).

A patient record audit was undertaken in Ninewells Hospital Dundee, Royal Victoria Hospital Dundee and Perth Royal Infirmary. A total of forty sets of notes were reviewed for documentation and care related to the insertion and management of a urethral urinary catheter, from this, it became apparent that documentation was variable and limited. Following implementation of the CAUTI ’Toolkit’ within the pilot wards we undertook a repeat documentation review which demonstrated a significant improvement within the pilot areas (see Baseline Documentation & Care Bar Graph 1 & 2).

A urethral urinary catheter count within medical wards in Ninewells Hospital, Royal Victoria Hospital and Perth Royal Infirmary was undertaken. The results of this, highlighted which wards we wanted to approach to be our pilot sites (see Baseline Urethral Urinary Catheter Count Bar Graphs 3 & 4).

We had planned to undertake a local point prevalence survey to establish a baseline CAUTI rate, however, it was decided, due to uncertainty at that time around the national CAUTI definition and our project timescale, not to undertake this piece of work.

Taking into account the national guidance and our findings locally, we wanted to introduce an intervention that would optimise and standardise care delivery and documentation, reduce negative outcomes associated with indwelling urinary catheters, and improve care planning and multiprofessional communication. The ultimate aim of this project is to develop a means to guide and evidence the processes of care and patient outcomes [12].

**Design**

The planned intervention is to develop and implement a CAUTI ‘Toolkit’ consisting of a CAUTI Insertion and Maintenance Bundle with associated data collection tools to track progress within NHS Tayside. The Institute of Health Improvement (IHI) developed the concept of ‘bundles’ to help health care providers more reliably deliver the best possible care for patients undergoing particular treatments with inherent risks. A bundle is a structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices that, when performed collectively and reliably, have been proven to improve patient outcomes [12].

This will be undertaken by:

- Identifying the most appropriate pilot wards by using the baseline data that was obtained from the urethral urinary catheter count. This involved gathering data from a sample of wards from eight hospitals within NHS Tayside and selecting the wards with the highest percentage of urinary catheters that were in-situ on that date.

- Engaging the pilot wards to be involved in the testing phase - this involved setting up an initial meeting with relevant Heads of Nursing (HON) and Senior Charge Nurses to discuss the project and desired outcomes. We explained our rationale for selecting the proposed pilot wards and took the opportunity to advise the HON’s and SCN’s that CAUTI was identified in the CEL 19 (2013) as one of the SPSP nine points of care priorities and the significance of reducing CAUTI not just for the ward’s but for the whole organisation. We advised our ultimate aim was to minimise harm for patient’s from a preventable complication whilst in their clinical area.

- Identifying and engaging with link staff in pilot wards - this initially

---

**BMJ Quality Improvement Reports**

The outcome measures are:-

1. CAUTI count - this measure is a count of the number of new CAUTI developed in the last month
2. CAUTI rate - measured by 1000 occupied bed days
3. CAUTI ‘days between’ - this measure is a count of the number of days that have gone by with no CAUTI being reported

The process measures are:-

1. Urinary catheter insertion bundles are completed for >95% of indwelling urinary catheter insertions
2. Urinary catheter maintenance bundles are completed for >95% of indwelling urinary catheters [5].

See supplementary file: ds6103.docx - “Baseline Measurement”

---

© 2015, Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to http://group.bmj.com/group/rights-licensing/permissions.
involved attending ward meetings/safety briefs to give a summary of what would be expected from staff during the testing phase of the CAUTI project and to ask staff within the pilot wards to identify themselves to us if they wanted to become involved. Following this process, small teams of staff (approximately three members of staff from each pilot ward) were identified to work in conjunction with the QIF’s. Following the assembly of our pilot teams, we spent dedicated time explaining the objectives and priorities of this CAUTI project and discussed the importance of multi-disciplinary team working, effective communication, willingness to help spread this intervention’s, and the engagement of others in the process.

- Identifying and engaging with key stakeholders e.g. Urology Nurse Specialists and Lead Continence Advisor - this was to enhance our own knowledge of this specialist subject. We arranged meetings with various key people to discuss the aims and objectives of the CAUTI project and to ask for support/guidance from these key people if/when we reached a point in the process where we required additional information. We also attended specialist education sessions to establish what was being taught to other healthcare workers within our organisation. Networking with other appointed QIF’s helped us identify strategic people to link with.

- In collaboration with link staff, the development and testing of a CAUTI Insertion and Maintenance Bundle - this process involved all staff in the pilot wards being given a selection of three CAUTI Insertion and Maintenance Bundles to consider and to give us written feedback regarding their opinions of all three Bundles. The outcome of this process left us with no obvious preference, therefore, we took the opportunity to work together to develop our own NHS Tayside CAUTI Insertion and Maintenance Bundle. This was tested using PDSA cycles and following the necessary changes, a final version was agreed for use.

- Development of relevant CAUTI data collection tools to capture both process and outcome measures - the development of these tools was undertaken by the QIF’s, with support from our Patient Safety colleagues. The outcome and process measures were set by HIS/SPSP, these were CAUTI count, CAUTI rate, CAUTI days between and urinary catheter insertion and maintenance bundles being completed for >95% of indwelling urinary catheters. The data collection tools were then shared with the link staff in the pilot wards and tested using PDSA cycles until final versions were agreed for use.

- Developing and delivering a CAUTI education package to the pilot ward staff - this involved researching current national and international CAUTI guidance documents. We then developed a PowerPoint presentation and had a selection of supporting documents to give to staff for further information. We also displayed a collection of CAUTI information, including the insertion and maintenance bundle and data collection tools on an educational board which we left on the pilot wards for a period of time to allow staff to familiarise themselves with the new documentation.

- In collaboration with the Patient Safety Team, the development of a CAUTI data reporting mechanism for NHS Tayside - this involved the creation of an Excel spreadsheet to enable the ward staff to input the data collected on a daily and weekly basis to meet the outcome and process measures set by HIS/SPSP. This data was then emailed to strategic people in the organisation on a monthly basis for monitoring and action/s if required.

As the HAI QIF role incorporates joint working between Infection Prevention and Control and Patient Safety, it was essential to establish links and effective ways of working with colleagues from both specialties. This was achieved by identifying a lead from each area, with whom we would meet on a regular basis to provide progress reports, gain direction, and discuss any issues we encountered during the process.

It is planned that when the CAUTI ‘Toolkit’ is embedded in practice within NHS Tayside, the Infection Control and Management Team will hold responsibility for any future developments or alterations via the Senior Management Team (SMT) forum. However close links will be required between Patient Safety and Infection Prevention and Control to ensure national data reporting requirements are being met and adapted as required.

Planning is also underway to develop and introduce a patient held catheter passport in NHS Tayside with the intention of: i. addressing the need for fluidity of care planning and delivery, ii. improving communication between multiple care providers within the primary and secondary setting, and iii. to enable patients to feel fully informed and in control of planned care interventions. However, this is not included as part of this project.

Strategy

A series of Plan, Do, Study, Act (PDSA) cycles were conducted; within each of these cycles there are multiple interventions. For the purpose of discussion in this paper, these will be categorised as follows: Cycle 1: Engagement; Cycle 2: Education, and Cycle 3: Creation and testing of the CAUTI Bundle and CAUTI Data Collection Tools.

PDSA Cycle 1: Engagement - Heads of Nursing and Senior Charge Nurses/Charge Nurses from the identified pilot wards were approached by QIF’s to seek approval and secure engagement of participation in this work. This was achieved through discussion around the background of this national work, the impact for the patient and project aims. Communication was also made via email to relevant clinical leads and consultants as an introduction to the proposed work to be carried out. Clinical staff within the pilot wards were informed of the proposed CAUTI project work at safety briefings and were asked to advise the QIF if they had a personal/professional interest in becoming a link member of the CAUTI project. Other link members were identified by being
selected by their SCN/CN.

An introductory meeting was held with each of the link members to discuss their role on this quality improvement journey, which included acting as the liaison between the clinical staff and the QIF’s at times where we were not present on the wards, and to assist in the development and testing of relevant documentation. All identified link members of staff were happy to participate, therefore, we progressed onto the next cycle.

PDSA Cycle 2: Education - Using International and National guidance and data, a PowerPoint presentation was developed. Face to face education sessions on CAUTI were delivered by the QIF’s - initially to the link staff within each of the pilot wards followed by six planned face to face sessions in each pilot ward open to all staff members. The planned sessions were promoted by notices displayed within the pilot wards, via link staff and staff allocation by SCN/CN. During the education sessions discussions included the aim of the project, the role of the QIF’s, the impact of CAUTI, best practice in the reduction of CAUTI, development of the CAUTI tools, model for improvement, data for improvement and staff contribution. During the education sessions, the QIF’s also took the opportunity to promote the undertaking of NHS Education for Scotland (NES) LeanPro Aseptic Technique module and Urinary Catheterisation module [13,14] and provided staff with relevant key supporting documents e.g. Scottish Antimicrobial Prescribing Group (SAPG) - CAUTI decision aid [15] and NHST Hospital Adult Empirical Treatment of Infection Guidelines [16].

Despite the planned sessions being open to all staff, numbers were low and mainly attended by both trained and untrained nursing staff. Of those who attended, the verbal feedback received in relation to the session content was all positive, staff indicated it heightened their awareness of risks associated with urinary catheter insertion and subsequent care and they found the supporting documents useful in aiding them to make informed decisions.

PDSA Cycle 3: Creation and testing of the NHS Tayside CAUTI Bundle and CAUTI data collection tools - three CAUTI Insertion and Maintenance Bundles, already utilised within boards in NHS Scotland were displayed within the pilot wards and staff were asked to comment. Feedback was then gathered from clinical staff regarding which elements of the bundles they felt were of most value to guide best practice and how they envisaged the bundle layout to allow for ease of use. Staff felt there was not one bundle in particular they wished to adopt, but preferred to try designing an NHS Tayside CAUTI Bundle. Using the comments and suggestions from the clinical staff, the QIF’s designed Version 1 of the NHS Tayside CAUTI Insertion and Maintenance Bundle, which was then constructed electronically by administration support staff.

Version 1 of the NHS Tayside CAUTI Insertion and Maintenance Bundle was given to link staff members in each of the pilot wards, who initiated the testing of the Insertion and Maintenance Bundle. Staff were asked to complete 1 insertion bundle and subsequent daily maintenance for 1 week (if possible) on one patient who required the insertion of a urethral urinary catheter.

Feedback was then gathered via the link staff, from this, minor alterations to the layout of the insertion bundle were made to incorporate LOT/Batch Number and to allow additional space for documenting, if appropriate a fuller explanation for the rationale for catheter insertion.

Version 2 of the NHS Tayside CAUTI Insertion and Maintenance Bundle was then given to link staff in each of the pilot wards, who were asked to complete 3 insertion bundles with subsequent daily maintenance for 28 days (if possible) on the next 3 patients who required insertion of a urethral urinary catheter.

Feedback was then gathered again via the link staff, from this, an alteration was made to the maintenance section of the bundle to remove the ‘7 day bag change prompt’.

Due to only minor alterations being required following the 2 tests of change, it was decided in conjunction with link staff and SPSP Lead, to stop the testing cycle of the NHS Tayside CAUTI Insertion and Maintenance Bundle.

Based on the SPSP / HIS guidelines for CAUTI [5], the QIF’s also designed two CAUTI data collection tools, a CAUTI data collection tool to capture CAUTI count, CAUTI rate and CAUTI days between and the CAUTI Bundle Compliance Measurement Tool to monitor the reliability of the bundle as a reflection of the care being delivered.

For the data collection tool, for one month, link staff were required to document four figures each day: i. total number of patients in the ward ii. total number of patients with a catheter in situ iii. total number of patients admitted to ward with a diagnosed CAUTI as per national definition and iv. total number of patients diagnosed in ward with a CAUTI as per national definition. Feedback was positive, with staff commenting that the tool was easy to use and understand. No changes were suggested or made to the data collection tool at this stage.

Using the completed Version 2 NHS Tayside CAUTI Insertion and Maintenance Bundles that were tested during PDSA Cycle 3, link staff tested the CAUTI Bundle Insertion and Maintenance Compliance Tool using data collected on one day within one week to establish usability and suitability to gather data required for process measures. Feedback was positive from the staff that tested this tool, commenting that it was easy to use and understand. No changes were suggested or made to the.bundle compliance tool at this stage.

Having tested all three documents roll out of the CAUTI bundle and data collection tools within the pilot wards was undertaken, this involved a week of promotion of all documentation, supporting information and advising of the ‘go live’ date for all of the multi-disciplinary team.

Post-measurement

From the initial pilot work conducted the uptake and feedback received from the link staff was positive. Minimal changes were
required to the care bundle requiring only two PDSA cycles to be conducted during this initial pilot stage. The bundle compliance tool and CAUTI data collection tool were deemed to be fit for purpose as no changes were required to be made.

Pilot wards continued to further test for a two month period the 'CAUTI Toolkit' (Insertion and Maintenance Bundle, Maintenance Continuation Sheet, Data Collection Tool, and Bundle Compliance Tool), including the data reporting process after which, evaluation took place. During this period of further testing, staff continued to engage well with the process, and regular discussions with QIF’s regarding the reported data took place. Where data was below the desired measure support was given (see pilot wards data charts). Within this two month period an issue was identified regarding the insertion compliance auditing process. The issue being, auditing was being carried out as a weekly spot check on one day only, this very much limited the chances of capturing an insertion as they occurred so infrequently within the pilot wards therefore the data was limited for insertion.

Following discussion between QIF’s, Patient Safety, and Infection Prevention and Control Lead Nurse, it was agreed to stop measuring insertion bundle compliance on a weekly basis, but audit up to 5 insertion bundles, using the insertion compliance tool, on a monthly basis looking at all days within the given month, to enrich the quality of the data collected. This process will initially be undertaken by the QIF’s. It was also decided after evaluation to increase the number of days each week that were being audited to encompass 3 consecutive days instead of just one with the intention of enhancing the reliability of the data gathered as a true reflection on the care being delivered.

See supplementary file: ds5375.docx - “Pilot Wards CAUTI Data”

Lessons and limitations

A number of lessons were learned from conducting this project:

Engagement: Staff engagement is essential to allow for timely project actions within the clinical setting and to ensure valuable feedback is received. The overall project outcome and effectiveness can be hugely affected without this. Medical staff engagement and communication was via email, which was not ideal but due to competing clinical demands, face to face interaction was not achieved. In the future, consideration should be given to setting up an initial meeting with medical staff, prior to the project starting. Due to circumstances outside our control, two key link members were unable to participate in the project work due to leaving the pilot wards. This minimised the impact of initial work carried out around engagement and link staff responsibilities. New link members were identified, however, this impacted on the timely progress.

Human Factors: As this CAUTI project meant the introduction of a change to current ways of working, a significant amount of discussion was held during the education sessions with staff, to promote the NHS Tayside CAUTI 'Toolkit' as a positive means of enhancing patient care and a means of evidencing care delivery, not just seen as additional work and viewed as “another piece of paper”.

Communication: Communication with all clinical staff within the pilot wards was difficult to achieve due to shift working, QIF’s availability and competing clinical demands, therefore we relied on the link staff to cascade relevant information. This was not always achieved due to their own workloads, shift patterns, and competing demands. On occasion, email correspondence and ward notices were used in an attempt to improve sharing of information and communication. The effectiveness of this is unknown.

Education: Although six education sessions were delivered in each of the pilot wards, the number of clinical staff who attended was lower than hoped. This was due to staffing pressures and clinical workload demands. We tried to address this by displaying CAUTI information, including the CAUTI 'Toolkit', on an education board within each ward. We issued handouts of the education presentation and supporting documentation within the ward areas. Although we promoted the undertaking of the NES Aseptic Technique and Urinary Catheterisation LearnPro Modules, we do not know the number of staff who completed any of these modules. In the future, we intend to ask the SCN’s of the wards to advise us of how many staff completed any of the modules, following the CAUTI education session.

Tools: Insertion Bundle testing took longer than anticipated in one of the pilot wards; this was due to there being no urethral urinary catheters requiring to be inserted. This impacted upon the planned project timescale. The issues encountered around the insertion bundle auditing may have been overcome in the initial testing period, if the insertion compliance tool had been tested for a longer period of time and not just on bundles that had been initiated at insertion.

Personal: As the HAI QIF role was new, the expectation and work plan was initially not clear. This led to a delay in establishing the focus of work, which impacted on the timescale. Both newly appointed QIF's had dual roles within the Infection Control Team, on occasion this proved challenging due to competing demands. Both QIF’s had limited Quality Improvement experience; therefore, each step of this improvement journey has been a steep but rewarding learning experience.

Ongoing Challenges: At present, there is still not one agreed National CAUTI definition in use. In the future, this could mean that we have to change the definition we are currently working to. This will cause a significant workload. Effective spread within the remaining QIF secondment period will be challenging due to the number of hospitals within our geographic area of Dundee, Perth, and Kinross and Angus.

Conclusion

By developing and introducing a CAUTI Insertion and Maintenance Bundle clinical staff within NHS Tayside have a standardised evidence based tool to be able to provide documented evidence of care delivery and planning which previously was limited and variable, with the intention of reducing catheter associated urinary
tract infections in our patients. Data collection tools and data reporting mechanisms were also introduced using a national CAUTI definition to capture data for improvement and local and national reporting purposes.

Having been tested and implemented within the 3 pilot wards, this work is still at a very early stage, with the data collected to date not sustainable however, we are confident that through robust testing we now have the NHS Tayside CAUTI ‘Toolkit’ (Insertion and Maintenance bundle, data collection tools, education package, and a data recording mechanism for local and national reporting) ready for spread within NHS Tayside. In consultation with The Patient Safety Team and Infection Prevention and Control Lead Nurse, a spread plan has been agreed.

Although we cannot at this stage statistically demonstrate a 30% reduction in CAUTI which was the national aim set by HIS/SPSP. NHS Tayside is now at the point where a CAUTI Bundle is in use to optimise and standardise care delivery and documentation and CAUTI data is being collected using a standard national definition within the 3 pilot wards. By December 2015, it is anticipated that the CAUTI care bundle will be in use and CAUTI data will be reported by over 30 wards, incorporating Community Hospitals in Dundee, Perth, and Kinross and acute hospitals within Perth and Kinross and Angus.

References


BMJ Quality Improvement Reports


Declaration of interests

Nothing to declare

Acknowledgements

Alison Kennedy, Laura Adams, Andrine Roberts, Tracy Waddell, Carol Ritchie, Keith Bell, Dawn Weir, Pamela Davidson, Jennifer Lee, Sharon Birrell, Jennifer Soutar, Pilot Wards staff.

Ethical approval
The work being reported was deemed exempt from ethics review. The work is primarily intended to improve local care, not provide generalisable knowledge in a field of inquiry.
Ward 4 RVH
Current days since last CAUTI
(19/02/15 - 19/05/15)
89
Ward 5 RVH
Current days since last CAUTI
(01/02/15 - 19/05/15)

107
Stroke Unit PRI
Current days since last CAUTI
(01/02/15 - 19/05/15)

107
Urinary Catheter Insertion Bundle Compliance 2015

Percentage

Ward 4, RVH
Ward 5, RVH
Stroke Unit, PRI

Bundle discontinued beginning of March 2015
Urine Catheter Maintenance Bundle Compliance 2015

Percentage

Due to agency staff member non-familiarity with the bundle

Documentation not completed for one day

Due to agency staff member non-familiarity with the bundle

Ward 4, RVH

Ward 5, RVH

Stroke Unit, PRI
Baseline CAUTI Data Collection Pie Chart 1
(Responses from In-Patient Wards Ninewells Hospital and Royal Victoria Hospital)

- % CAUTI Data Collected: 0.0%
- % No CAUTI Data Collected: 68.3%
- % Not Known - no response: 31.7%
Baseline CAUTI Data Collection Pie Chart 2
(Responses from In-Patient Wards Perth and Kinross)

- % CAUTI Data Collected: 0.0%
- % No CAUTI Data Collected: 68.0%
- % Not Known - no response: 32.0%
Baseline Documentation and Care Bar Graph 1
(NHS Tayside, July 2014)

- Reason documented: 55.6%
- Bag change documented: 44.4%
- Bag level below bladder: 100.0%
- Tap in contact with any surface: 97.2%

Bundle element

<table>
<thead>
<tr>
<th>Bundle element</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason documented</td>
<td>55.6%</td>
<td></td>
</tr>
<tr>
<td>Bag change documented</td>
<td>44.4%</td>
<td></td>
</tr>
<tr>
<td>Bag level below bladder</td>
<td>100.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Tap in contact with any surface</td>
<td>97.2%</td>
<td>2.8%</td>
</tr>
</tbody>
</table>
Repeat Audit - Documentation and Care Bar Graph 2
(NHS Tayside, April 2015)

% with / without documentation of catheter bundle element

- Reason documented: 100%
- Bag change documented: 100%
- Bag level below bladder: 100%
- Tap in contact with any any surface: 100%
Baseline Urethral Urinary Catheter Count Bar Graph 3
(% of Patients with Urinary Catheter In-Situ - Acute Medicine, Ninewells Hospital and Royal Victoria Hospital, 25/06/14)

Figures for RVH taken on 09/09/14
Baseline Urethral Urinary Catheter Count Bar Graph 4
(% of Patients with Urinary Catheter In-Situ - Acute Medicine, Perth and Kinross, 25/06/14)

Ward - Perth Royal Infirmary and Community Hospitals Perth and Kinross

<table>
<thead>
<tr>
<th>Ward</th>
<th>% of Patients with Urinary Catheter In-Situ</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRI Stroke Unit</td>
<td>57.1%</td>
</tr>
<tr>
<td>PCH GPU</td>
<td>33.3%</td>
</tr>
<tr>
<td>BCH GPU</td>
<td>30.8%</td>
</tr>
<tr>
<td>PRI 6</td>
<td>24.1%</td>
</tr>
<tr>
<td>PRI 1</td>
<td>21.4%</td>
</tr>
<tr>
<td>CCH 2</td>
<td>17.6%</td>
</tr>
<tr>
<td>SMH</td>
<td>16.7%</td>
</tr>
<tr>
<td>PRI 3</td>
<td>15.4%</td>
</tr>
<tr>
<td>PRI 4</td>
<td>14.3%</td>
</tr>
<tr>
<td>CCH 1</td>
<td>12.5%</td>
</tr>
<tr>
<td>ACH</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Improving the inspection and manual cleaning of dental instruments in a dental hospital

Louise Campbell, Aisling Barton, Rachael Boyle, Vicki Tully
Dundee Dental School, Scotland

Abstract

Within the dental hospital setting, it is a frequent occurrence to find residual cement contaminating instruments in a newly opened kit having undergone the decontamination cycle. Any instrument found to be contaminated then cannot be used, as the area underneath the cement is not sterile. This in itself has several repercussions. These include: cross-contamination, since there is a chance that the cement will be removed and the contaminated instrument used; cost, as each new kit that will be opened due to contaminated instruments will incur decontamination costs; and finally time, which most importantly has an impact on patient experience. Within the paediatric department, 27% of examination kits contained a contaminated instrument, almost one third of all kits used. This quality improvement project utilized a poster and team huddle discussions to raise awareness of the problem and successfully reduced the number of contaminated instrument kits to 7% over a period of four weeks.

Problem

Within the dental hospital setting, it is a frequent occurrence to find residual cement contaminating instruments in a newly opened kit having undergone the decontamination cycle. Any instrument found to be contaminated then cannot be used, as the area underneath the cement is not sterile. This presents a problem as the instrument must be replaced in order to be used on a patient, thus requiring a new kit to be opened. This in itself has several repercussions. These include: cross-contamination, since there is a chance that the cement will be removed and the contaminated instrument used; cost, as each new kit that will be opened due to contaminated instruments will incur decontamination costs; and finally time, which most importantly has an impact on patient experience.

Background

During our time treating patients in the dental school, we noticed that this recurring problem of contaminated instruments with residual cement was found to exist throughout all departments. We decided therefore that this would be a good opportunity to improve the quality of care, whilst also reducing unnecessary costs for the dental hospital.

Approaching our mentor, we discovered that this problem was identified around ten years ago. Since then, attempts have been made to improve this issue, but none with great success or sustainability. Within the contract between the dental hospital and central sterile services department (CSSD), visual inspection is not included, so instruments often go through the decontamination process while contaminated with residual cement. This highlights the need for an intervention within the dental hospital prior to sending the instruments to CSSD. The problem lies with the fact that manual cleaning of instruments at chairside is not occurring prior to sending the instruments for sterilisation. A paper published in the British Dental Journal in 2007 titled “Pre-sterilisation cleaning of re-usable instruments in general dental practice”[1] investigates this claim, proposing that effective cleaning prior to sterilisation is vital in the prevention of cross-infection. It states that “the cleaning of re-usable dental instruments is [also] important to ensure device longevity and functionality, removal of chemical residues and compliance with medico-legal directives.” It then highlights that “effective cleaning is also vital to ensure microbial inactivation since retention of organic or inorganic debris may compromise subsequent disinfection or sterilization processes.” Although this paper investigates the sterilisation of instruments in general practice setting, where decontamination is carried out at a local level as opposed to a centralised sterilisation department as utilized by the dental hospital, it demonstrates that this problem is not limited to our working environment, but has been recognised on a national level.

The Scottish Dental Clinical Effectiveness Programme[2] has released guidance on the cleaning of dental instruments, which was updated in October 2014. These guidelines come as part of the wider guidance on decontamination, and again explain that effective cleaning prior to sterilisation is required for reliable decontamination of instruments. It states that “any organic material or adherent dental materials left on instruments can inhibit these processes [disinfection and sterilisation]. This can also cause corrosion of instruments or impair their function, and might lead to transmission of infection from one patient to another.”

We were able to study existing data collected within the children's department of the dental hospital[3] by Dr Dafydd Evans, showing that 36.7% of all instrument kits opened were not free from cement contamination. The study also showed the instruments most likely to be contaminated with cement. These included: flat plastic, excavator, burnishers, and thymosin probe. However these were
not the only instruments shown to have contamination, therefore there is a risk to all instruments of being contaminated.

From our search we are unaware of any other improvement projects tackling this issue.

See supplementary file: ds4034.pdf - "Audit of Hand Instrument Kits
RESULT"

Baseline measurement

To collect our baseline data, we used the three key phases of baseline measurement: develop, collect, analyse. Our main objective for this project was to investigate whether contamination of instruments is a significant problem, and to what extent. Our first process measure that we assessed was the number of kits that were contaminated on opening. The second process measure was to look at which instruments were affected. The outcome measure was whether the contaminated instruments affected patient care.

In order to collect the data, we had to decide on a universal definition of contamination. We defined a contaminated instrument as one with any amount of visible cement and explained this to our colleagues who assisted in collecting the data, during a clinical session in the children's department of the dental hospital. We decided to collect our data using a short questionnaire (attached below) which was our first PDSA cycle.

PDSA 1 - A Questionnaire to Investigate the Problem

P- Prepare a questionnaire, which would highlight whether contaminated instruments were a problem, and which instruments were commonly affected. The questionnaire should be simple, and not time-consuming, to encourage students and staff to participate in our improvement project.

D- During a clinical session in the children's department of the dental school, every student treating a patient was asked to examine their kit on opening and identify any contaminated instruments. We asked the students to specify which instrument(s) was/were contaminated and if this affected patient care.

S- The students found the questionnaire easy to understand and every student who treated a patient completed a questionnaire. The feedback also highlighted that they were simple and quick to complete which encouraged participation. Of the six kits that were opened on the afternoon clinic, four were free from cement contamination, while two kits were not free from cement. Of these two kits, one had a contaminated flat plastic and treatment was not affected. The other contaminated kit contained a contaminated excavator, which did affect treatment and compromise patient care.

We realized from this first cycle that we did not have all of the information we required. We knew that the contamination affected patient care, but we did not know why.

A- We decided to update the questionnaire to include how the care of the patient was affected, and carry out a second PDSA cycle.

PDSA 2 - A Questionnaire to Assess How our Problem Impacts upon Patient Care

On carrying out our second PDSA cycle with the updated questionnaire, we received nine returned forms, of which two students had reported contaminated instruments, whilst the other seven found no residual cement in their kits. Although we anticipated more detailed results in this second cycle with regards to how the contaminated instruments affected patient care, our responses stated that there was in fact no effect on patient care in this clinical session. The feedback we received from our colleagues regarding this was that the instruments that were contaminated were not required for that particular treatment, therefore had no impact. However, if another procedure was to be carried out that required these instruments, then an impact on patient care would have been reported. In the first case the contaminated instrument was reported as the flat plastic, and in the second case, the excavator was contaminated. This highlights that these instruments are the most commonly affected and that an intervention is required.

The results that we collected during our baseline data collection, demonstrated that our results correlated with the previous data collected within the Paediatric department at 27% of examination kits containing a contaminated instrument, almost one third of all kits used.

See supplementary file: ds3675.docx - "QI Project Tool Version 1"

Design

Our first step in tackling the problem was to assign responsibility to the person using the instrument kit, so that our intervention was targeted to this individual. We had several discussions with our senior clinician, head dental nurse, and patient safety lead to ensure that our intervention would be viable. One suggestion which arose at these meetings was the idea of introducing single use instruments, which would eliminate the problem. However, we were intent on avoiding this approach as we felt that although it was financially viable, the constant disposal of instruments would be detrimental to the environment. Although the single use instruments may seem to be cost effective on the surface, we also anticipated there would be hidden costs involved, such as having to increase the quantity of sharps bins for their safe disposal.

Therefore we came to our second approach, which would be to safely manually clean the instruments that we already have. This raised concerns in terms of sharps injury risk, and risk of damaging the surface of metal instruments. It became clear that we would have to devise a safe procedure for doing so, which involved working closely with the infection control team to gain approval. Taking advice from our senior clinician and our patient safety lead, we concluded that the safest and most cost-effective process would be to utilise detergent wipes and wooden spatulas as required, in order to remove contaminants from instruments prior to sterilisation. This is a process that had not been trialled in NHS Tayside so far; the NHS Tayside Infection Prevention and Control Policy states that the decontamination for dental instruments should take place at
CSSD, or otherwise in an appropriate LDU, no mention of manual cleaning is provided.[4] Once this process had been approved, we deduced that the most effective way to explain this process to our colleagues would be to present it as a poster. Included in our poster, we realised it should have a clear flow diagram as to how the process should be carried out, and also briefly explain the logic behind our intervention. Please see attached poster.

We created a process map tracking an instrument kit's journey following use, to not only explain our intervention to other stakeholders, but also to illustrate where our intervention would fit in on this journey, and have the most effect. Please see attached process map.

On reflecting on previous unsuccessful attempts within the department to tackle this problem, we were aware from our quality improvement knowledge that education alone may not obtain the desired result. Therefore to increase motivation to comply, we devised a method of tracing individual kits back to the user, therefore improving accountability of practice. This method involved recording the date, time, student number/staff name, and the bar code number of the kit used. We decided that this would not be a long term component of our intervention, but a tool to aid us in implementing it and help to establish the process as part of everyday practice.

**Strategy**

Our first step aimed to test the effectiveness of our designed poster, and assess whether it was clear enough to explain the process of manual cleaning effectively. This would be essential to allow us to meet our main aim of every dental student/staff member being compliant with the manual inspection and cleaning of instruments within the paediatric department of the dental school within four weeks.

**PDSA 3 - Designing our Intervention Poster**

Our third PDSA cycle involved testing the poster with one student and asking them for feedback as to how easy the process was to follow. We expected that the student would find the poster informative and self-explanatory. However, the findings of this test showed that some additional verbal information was required. This allowed us to modify how we planned to deliver the intervention, ensuring that the poster was explained verbally at each team huddle at the beginning of clinic, as well as being displayed throughout the clinic to be viewed easily by all students and staff working in the area. This would be the basis of our next test, to assess whether this approach would achieve full understanding.

Another useful outcome of this PDSA cycle, was feedback from the student recommended specific locations in the clinic that they felt would be most noticeable and effective. Through the discussions of this test, we decided that the posters would be placed on the wall over the ‘dirty instrument’ trolley to serve as a reminder, centrally within the clinical area, and within the tutorial room so that it would be easily accessed by students to read up on the process.

**PDSA 4 - Testing our Intervention**

The fourth PDSA cycle was carried out on a morning clinic within the department. At the team huddle at the beginning of clinic (at which all members of the team were present, including students, staff, and nurses) the intervention was described by displaying the poster and supplementing this with verbal information to further explain the problem and our intervention. Feedback from the group highlighted that this was a more effective method, and full understanding of what was expected was demonstrated. We decided that our intervention was now ready to be spread within the department, and PDSA 5 would involve carrying out this process at morning and afternoon clinics for two weeks.

**PDSA 5 - Implementing our Intervention**

PDSA 5 involved utilizing the information we had collected in the previous tests, displaying the poster around the clinic in key areas, explaining the process at the team huddles, and ensuring that all students/staff using examination kits were carrying out inspection and manual cleaning as necessary, before returning the kit to the “dirty” trolley. Accountability of practice was introduced by recording the clinical session, barcode of kit used, and student number/staff name. This meant that when the instrument kits were examined for a second time by a dental nurse before sending to CSSD, if a contaminated instrument was present, this could be traced back to the individual. Please see attached flow diagram which depicts the journey of an examination kit through this process.

See supplementary file: ds5597.docx - “Intervention Poster”

**Post-measurement**

As our intervention was tested, implemented, and spread, we collected data to prove its reliability. After the planned two weeks of implementing our intervention, our results showed that every examination kit had been through the process at least once, and all were free from contaminants. We were able to ensure this using the method of placing a sticker on the outer packaging following delivery of the sterilised kits from CSSD. The method of having the examination kits double-checked before sterilisation and the barcode traceability is what proved that we did not have any contaminated kits, as no bar codes required following up during the two week process. This highlighted that awareness of the problem had increased and staff and students were complying with the inspection and manual cleaning.

In the following two weeks, we used an almost identical data collection method to our baseline data collection. Throughout these two weeks, the recording of bar codes was stopped. This was due to the fact that we felt too much paperwork was causing resentment towards the project, and that at this stage it would be more beneficial to collect physical data as we had during our baseline data collection. This was in the form of a simple questionnaire that asked whether or not any instruments in the newly-opened kit were contaminated, and if so, which instruments and whether this had an impact on patient care. (See attached.)

Our data collection targeted the same group as our baseline collection, which was any member of staff or student who had used...
an examination kit. Over the period of two weeks, we received 28 completed questionnaires. This number was lower than we expected, however this could be due to the fact that we were not present for one of the weeks so were not encouraging or reminding people to fill them out. It may also be down to failed appointments which is a regular occurrence in the paediatric department, therefore reducing the number of patients seen and so the number of kits used. This is especially true as one week coincided with school holidays so less appointments were booked/attended on this week.

However, of the 28 questionnaires we received, only two reported a contaminated instrument. Both of these claimed to have an impact on patient treatment. We found that 7.1% of our kits were contaminated, this being an improvement from our baseline measurement which was 27% of examination kits having a contaminated instrument. Although we have achieved a reduction, it has to be questioned why the number is still at 7%, as in our first two weeks of the intervention, we had reduced it to zero. This puts into question the sustainability of the intervention and what needs to be improved so that we can continue to solve the problem without our presence on clinic being necessary.

See supplementary file: ds6576.pdf - “Exam kit journey & run chart”

Lessons and limitations

There were a few limitations that we encountered when carrying out this project, all of which stem from the fact that dentistry is a demanding course in itself which does not leave much time for carrying out an improvement project on top of studies and clinical practice. Due to our need for gaining experience in all clinical areas, we have only a set amount of time in each specific department. Therefore we could not always be present in the Paediatric department to take part in the running of the intervention due to other clinical commitments. This made organising the intervention more difficult, and also made sustainability more of a challenge. This has made us realise how important team-working is in quality improvement, especially delegating tasks to other members of the team. For example, this project could not have been possible without the input and cooperation of the dental nurses, who allowed the intervention to run in our absence. It is therefore our hope that the intervention will be continued as we move into our final year when our time in the dental school is minimal.

Another limitation was the lack of awareness of quality improvement within the dental school. This is something that will only increase with time and development of more quality improvement projects by the students. We would hope that with increasing awareness, students will realise the impact they can have on improving patient care and engage more fully in the projects of fellow students.

Furthermore, similar to the above limitation of lack of awareness, we also lacked the presence of a clear tutor within the dental school with knowledge of quality improvement to guide us throughout the improvement project. Although we had a great deal of help from the senior clinician in the paediatric department, his retiral occurred before the intervention had begun. However, during the implementation of our intervention we received a great deal of support from the head dental nurse, whose input was invaluable.

Conclusion

As our first experience of quality improvement, we are pleased as to how the project has run, and have learned a great deal from the experience. We are proud of the success we have achieved, not only in terms of reducing the number of contaminated instruments but also raising awareness of the problem. We feel that at this point, the intervention is not sustainable, but as the process becomes habit and new generations of students come through the system, we feel that it has the potential to be. At present, the department are trialling the use of disposable instruments as an alternative to our intervention. This removes the problem of dependency on students and staff carrying out the inspection and manual cleaning process.

We also feel that by piloting the first quality improvement project within the dental school, we have taken the first step in raising awareness of quality improvement itself, both with staff and students.

References


3 Data collected by Daffyd Evans, Honorary Senior Lecturer in Paediatric Dentistry, Dundee Dental Hospital & School.


Declaration of interests

Nothing to declare.

Acknowledgements

Vicki Tully, Wendy Roud, Daffyd Evans, Marilla Hunter

Ethical approval

Ethics not required as this project was undertaken as a service...
Goal

Inspection and Manual Cleaning of Contaminated Dental Instruments

1 = baseline data
2 = 2 weeks into intervention
3 = 4 weeks into intervention
exam kit

Stored on shelf in clinic

Staff/Student

clinic

Opened

Nurse/staff/student

Trolley (Clinic)

Staff/Student

USE

Staff/Student

Trolley (DDH)

Nurse/clinical support worker

CSSD

NO MANUAL CLEANING PROCESS

Stored on clinic
1. Summary

<table>
<thead>
<tr>
<th>Condition of instrument(s)</th>
<th>Number of feedbacks received</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free from cement etc.</td>
<td>88</td>
<td>63.3</td>
</tr>
<tr>
<td>Not free from cement etc. (specified instrument)</td>
<td>47</td>
<td>33.8</td>
</tr>
<tr>
<td>Not free from cement etc. (not specified instrument)</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>TOTAL NUMBER OF FEEDBACKS RECEIVED</td>
<td>139</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Audit of Hand Instrument Kits

- **Free from cement etc.**
- **Not free from cement etc. (specified instrument)**
- **Not free from cement etc. (not specified instrument)**

Condition of Instruments

- Free from cement etc.
- Not free from cement etc. (specified instrument)
- Not free from cement etc. (not specified instrument)
2. Type of Instrument NOT Free From Cement

<table>
<thead>
<tr>
<th>Type of Instrument</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat Plastic</td>
<td>27</td>
<td>42.9</td>
</tr>
<tr>
<td>Excavator (small/large)</td>
<td>12</td>
<td>19.0</td>
</tr>
<tr>
<td>Burnisher</td>
<td>10</td>
<td>15.9</td>
</tr>
<tr>
<td>Thymosin probe</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>Dental mirror</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Crown prep kit</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Briault probe</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Ceramic carver</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Rubber dam clamp</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Plugger</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>63</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Type of Instrument NOT Free From Cement

![Bar chart showing the percentage of each type of instrument that is not free from cement.]
MANUAL CLEANING of INSTRUMENTS

THE PROBLEM

- Kits are being returned to the Dental Hospital with cement still contaminating instruments.
- CSSD do not carry out manual cleaning.

WHY?

- Cross infection risk
- Compromised patient care, and increased costs

WHAT CAN WE DO?

Manually clean our instruments before returning them to the trolley.

IT IS YOUR OWN RESPONSIBILITY TO CARRY THIS OUT.

Ensure you are wearing your personal protective equipment (glasses, mask and gloves).

Inspect all instruments in your kit for contamination after use.

If found, first use a detergent wipe, ensuring the wiping action is in one direction only, away from any part likely to pose a risk of a stick injury.

If cement still present, then hold the instrument so the tip is in contact with the top of the bracket table, then use a wooden spatula to remove the cement.

Wipe again with a detergent wipe, and re-inspect.

If cement cannot be removed by this method, dispose of the instrument in a sharps bin.
Reducing contaminated instruments due to residual cement, and the impact this has on patient care:

1. When you opened your kit, were any of the instruments contaminated with residual cement?
   Yes / No
2. If yes, what instrument(s) was/were contaminated?
3. Did you feel this had an impact on treatment of the patient?
### COST SAVINGS CALCULATOR UNITED KINGDOM

**PATIENTS: undergoing pediatric dental examination in the dental hospital**

<table>
<thead>
<tr>
<th>CONSUMABLES</th>
<th>Cost per lx</th>
<th>No of lx</th>
<th>No of days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reprocessing contaminated kit</td>
<td>£5.45</td>
<td>4</td>
<td>5</td>
<td>£109.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HC PROFESSIONAL</th>
<th>Cost per hour</th>
<th>No of hours</th>
<th>No of days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental trainee</td>
<td>£22.01</td>
<td>0.3</td>
<td>5</td>
<td>£33.02</td>
</tr>
<tr>
<td>Assistant</td>
<td>£13.75</td>
<td>0.3</td>
<td>5</td>
<td>£20.63</td>
</tr>
</tbody>
</table>

Per week £162.64
Per year £8,457.28
Improving multidisciplinary communication at ward board rounds using video enhanced reflective practice

Cyril Hellier, Vicki Tully, Sandra Forrest, Pamela Jaggard, Morag MacRae, Dirk Habicht, Alexandra Greene, Karen Collins
Tayside Patient Safety UK

Abstract

The priority to ensure patient safety and use resources effectively, demands attention and innovation. Video enhanced reflective practice (VERP) provides training based upon analysis of film clips of one’s professional practice to develop practical insight into the processes of communication, so that effective changes can be made to ongoing behaviour and practice.

In this case the focus was on multi-disciplinary communication within daily board rounds on an acute medicine and care of the elderly ward. Baseline assessment and post intervention testing of perceptions of change by both full and core team were undertaken to establish the impact of VERP training. In addition pre and post focus group discussion and film analysis supplemented evaluation.

The findings support the view that after VERP training of a core team, board rounds were seen as consistently easier to participate in, providing improved focus, were more efficient in goal setting and resulting in better care for patients as well as improved pathways to discharge. This suggests benefits to the communication "culture" of a multidisciplinary team resulting in increased benefits for the wider team.

It is concluded that the use of tailored VERP training for personal, professional and team development is relevant, feasible, and worthy of further testing and investigation.

Problem

A board round is a process which should improve communication among the multi-disciplinary team (MDT), enhancing team working and providing a more coordinated approach to discharge planning. In our pilot ward, an acute medical and care of the elderly ward, board rounds had been in place for around three years. For the board round all team members are expected to assemble at 11.10 am each morning in front of the white board at the nurses station. This board contains patient details including planned date of discharge, any risk factors to patient safety and input from physiotherapy, occupational therapy or social work. The board rounds are attended by the nurse in charge, consultant, middle grade and junior doctors, junior and senior nurses, social worker, physiotherapist, occupational therapist and ward clerk among others. There follows a twenty minute discussion of the thirty inpatients in the ward with an emphasis on facilitating early and safe discharge. This process requires efficient communication of all and input from different members of the team depending on the case discussed. An inefficient board round process leads to delays in discharging patients. In our pilot ward it was recognised that board rounds were often not as efficient and useful as they could be.

Rarely was it possible to contain the discussion to its allocated time of twenty minutes, and there were frequent distractions and often not all staff were present. Some improvement work had already been undertaken as part of a breakthrough series improvement collaborative (OPAC) in NHS Tayside which set out to improve the experience of older people in our acute care hospital wards. Several PDSA (Plan, Do, Study, Act) cycles were undertaken to improve the process and included testing moving the board round to the staff room to avoid distractions. However, none of the tests resulted in improvement, so frustration with the process grew.

During board rounds medical staff tended to be dominant without contributing enough relevant information, such as the functional status of a patient and social care needs. Junior nursing staff often did not contribute despite possessing the relevant information on the functional ability of a patient. Due to a lack of the appropriate information available at the board round, conclusions could often not be reached and decisions about patients were often deferred.

In a wider context, the importance of effective communication within MDT’s is recognised. The World Health Organisation [5] highlighted the importance of human factors in patient safety by identifying the key features of communication and teamwork. It is also worth noting the recommendations from the Francis Inquiry [6] which highlighted the importance of communication skills and ward cultures as features of professional quality and performance in delivering health services as “collective care”. Indeed recommendation number 237 states, “There needs to be effective teamwork between all the different disciplines and services that together provide the collective care often required by an elderly patient.”

Background

Without practical tools and concrete exemplars it is hard to know if positive culture and effective teamwork are present as a means to delivering the ends of successful patient experience and outcomes.

Key questions arise as to how we change culture and evidence improvement. Staff collaboration in planning and delivery of patient...
care and treatment depends on individual and collective processes that are fundamentally premised on effective communication. Communication is clearly a central element, but as a non technical skill is not often the direct focus in the training of nursing, support, and medical staff within the NHS.

Without evaluation and detailed analysis (as can be performed easily on a piece of film) it is hard to know if positive culture and effective teamwork are present as a means to delivering the ends of successful patient experience and outcomes.

Developing tailored video enhanced reflective practice (VERP) for multi-disciplinary team (MDT) planning processes within the NHS is untried, yet seems highly relevant to widespread stated needs for improvement. VERP is an empowering and strengths based approach seeking to improve communication, reflections and critical analysis. Application to professional settings and relationships is relatively recent and is at the stage where new contexts will require tailor made input, reflecting on actual work settings. It derives from video interaction guidance (VIG) [8], which has been developed in the past fifteen years, initially introduced to Scotland, and then to the rest of the UK and is now used in many European countries.

Video interaction guidance has built up a significant evidence base to demonstrate relevance to diverse client groups indicating that it is methodologically sound and based upon a solid theory base. Its aim is to develop practical insight into the processes of communication by using short clips of video to help professionals reflect on when communication is going well so that changes can be made to ongoing practice that will assist in positive change and improvement. Insight develops directly from reviewing one’s personal behaviour in the actual situation (on film) in which change is required. Its potential application to improve safety is wide, from parenting through to a host of professional working settings where communication is central to outcomes. Publications [9,10] highlight burgeoning application. Hellier [11] and Greene [12], ‘Integrating VERP into Medical Education, In Video Enhanced Reflective Practice. Professional development through attuned interactions’ (in press April 2015) demonstrates applicability of spreading training to new organisations, including careers advisory services and further education in Scotland.

The aim is to build insights about one’s communication that empower and inform one’s behaviour. How one contributes, facilitates the contribution of others, or ensures full discussion in agreeing decisions (eg about patient treatment plans or discharge) becomes the focus for discussion within training, which is conducted in a constructive and positive way throughout. Training can be undertaken by an individual or small group/team, something that is negotiated at the outset. In this pilot it was anticipated that core team-building would be a by-product of training together, along with shared problem-solving of issues arising during board rounds.

The team first heard about video interactive guidance during a learning session for the older people in acute care collaborative (OPAC) and became interested in the concept. Multidisciplinary team communication was a key workstream of the collaborative and a presentation was delivered by Dr Alexandra Greene, senior research fellow in medical anthropology at Dundee University focusing on effective communication and “tribal” behaviour within the NHS. It was agreed to support a test of change using VERP within this one ward supported by the NHS Tayside patient safety team.

**Baseline measurement**

A baseline survey questionnaire was constructed and administered prior to the intervention with the purpose of sampling the views of the multidisciplinary team participants in the daily board round meetings. This had to be a sample, given the nature of the team; a large and changing membership, dependent on timing (turnover of eg junior doctors), and time of day (changing shifts of nursing staff).

Questions aimed to establish the role of the professional within the team and length of time having participated at board rounds, their views of its accessibility, and its contribution to improving patient outcomes. Views were also sought as to the strengths and needs for further development of the board round process. In addition there was a baseline element focused upon personal communication skills in professional communication and perceived needs for development. A solution focus and appreciative inquiry approach underpinned the construction of the survey tool. The initial survey completed in May/June 2014 was necessary to build a picture of the wider context in which the VERP training of the core team was to take place.

Additionally a pre-intervention focus group with the core team was held in June 2014 to discuss responses to the questions in the initial survey in more detail. The initial survey was useful to build a picture of the wider context in which the VERP training of four core team members was to take place.

In addition, three focus groups were organised: the pre-intervention focus group was held with the core team in June 2014 to discuss the aims for the pilot, as well as providing an opportunity to gather in-depth responses to the questions in the initial survey; a post-focus group with the core team gathered data of the teams experiences of having completed the VERP sessions, and a post-focus group with the wider multidisciplinary team explored attitudes towards the board round process pre-and post intervention.

**Design**

Video enhanced reflective practice (VERP) training was undertaken with four members of the MDT (a lead consultant, senior charge nurse, occupational therapist, and physiotherapist) of our test ward, this formed the core team. This involved the delivery of six sessions in July and August 2014, each based upon analysis of a new film of a board round. Aims included to: 

- Promote a more co-ordinated and timely approach to a patient’s hospital journey
although this does not neatly fit with the traditional PDSA cycles we have used our data and learning to inform the improvement process.

Each video analysis session provided the core team members with new communication and leadership skills that were then applied in the daily board rounds.

PDSA cycle 1: The pilot set out to address key questions, including: can "culture" and "teamwork" be made accessible to training and development in the context of delivering safe care? Would it be possible to improve teamwork through focus on communication at daily board rounds, with the aim of making patient planning more effective? Having identified VERP as a potentially relevant methodology for reflection and analysis, could a pilot study be developed to demonstrate its accessibility and feasibility with its aim to improve professional collaboration? Given that staff would find it difficult to take significant time away from direct working with patients, would training based in the working environment prove effective and be acceptable?

Data collection: what information could be gathered that draws on the perceptions of team members and allows baseline and post training feedback? Given the extremely busy nature of such work it was decided to supplement any questionnaire findings with pre and post focus group interviews to allow more in depth discussion. The use of film analysis for training was anticipated to provide another source of information as an indicator of positive change. Impact on both the trained core team and the non trained wider team would allow a degree of cross checking; also asking new team members about the ease of participation and value of board rounds would provide different subgroups of respondents.

If successful, the training was anticipated to team-build within the core team, impacting positively on the process of managing board rounds and be seen by them to add value to planning and treatment of patients, ultimately contributing to a more streamlined discharge pathway. Ideally any movement in these directions would need to be recognised within the wider team.

PDSA cycle 2: Training was developed for the core team and was originally envisaged to last for six hourly sessions, but in the event that it coincided with a core team member's holiday period, another session was provided for catch up purposes. In addition, core members were offered one extra personal session for those wishing to focus on individual communication styles, and this was taken up by two members of the core team. In practice, most sessions had originally envisaged to last for six hourly sessions, but in the event that it coincided with a core team member's holiday period, another session was provided for catch up purposes. In addition, core members were offered one extra personal session for those wishing to focus on individual communication styles, and this was taken up by two members of the core team. In practice, most sessions had all four core team members present and it was possible to use peer reflection to support individual and group learning.

Each session focused upon the most recent board round that had been filmed and was usually within a week to ten days of the filming. This ensured that participants could remember details of each particular board round.

PDSA cycle 3: The training, based upon use of the attunement principles as a framework, clearly helped the core team to see repeated patterns in participation and responses of team members in board rounds. It led to lively discussion as to how to correct a

- Encourage members of the MDT to contribute to the board rounds
- Support multidisciplinary goals to be set for on-going patient care
- Consider the long-term sustainability of this intervention in a resource-limited environment, ultimately determining its suitability for further use in other units in the NHS.

What was innovative was the filming and analysis of board rounds by team members, facilitated by a psychologist and VIG-trainer allowing for the consideration of individual contributions as well as effectiveness as a team. It also offered training and development in situ on the ward, requiring relatively little time away from delivery of patient care and from direct working in a MDT. It was conducted as action research, allowing for the evaluation of impact on team members. Filming board round meetings over a two month period allowed participants to consider their choices in communication and purposes of the board round process. In effect it made clear the language, aspects of sharing information as well as sophisticated interaction. It was necessary to adapt the blocks with questions specific to the NHS context.

This application of attunement principles has worked well in, for example, improving parenting skills, parent-child relationships, or teaching skills and student-teacher relationships. These principles are organised into four blocks to ease access and application, each providing a structure to consider features of individual and group interaction. It was necessary to adapt the blocks with questions specific to the NHS context.

This structure allowed reflection on examples and patterns of body language, aspects of sharing information as well as sophisticated aspects of co-operation and collaboration, all relative to the goals and purposes of the board round process. In effect it made clear the communication processes that underlie the "culture" of a group and allowed participants to consider their choices in communication behaviour in the future.

To enhance sustainability, a periodic review of team working through incidental filming and analysis of ongoing board rounds (perhaps every six months) was raised as a way of ensuring adherence to the attunement principles and continuous improvement in team communication.

**Strategy**

The VERP pilot was structured on "action research" principles and although this does not neatly fit with the traditional PDSA cycles we

- Encourage members of the MDT to contribute to the board rounds
- Support multidisciplinary goals to be set for on-going patient care
- Consider the long-term sustainability of this intervention in a resource-limited environment, ultimately determining its suitability for further use in other units in the NHS.

What was innovative was the filming and analysis of board rounds by team members, facilitated by a psychologist and VIG-trainer allowing for the consideration of individual contributions as well as effectiveness as a team. It also offered training and development in situ on the ward, requiring relatively little time away from delivery of patient care and from direct working in a MDT. It was conducted as action research, allowing for the evaluation of impact on team members. Filming board round meetings over a two month period allowed participants to consider their choices in communication and purposes of the board round process. In effect it made clear the language, aspects of sharing information as well as sophisticated interaction. It was necessary to adapt the blocks with questions specific to the NHS context.

This application of attunement principles has worked well in, for example, improving parenting skills, parent-child relationships, or teaching skills and student-teacher relationships. These principles are organised into four blocks to ease access and application, each providing a structure to consider features of individual and group interaction. It was necessary to adapt the blocks with questions specific to the NHS context.

This structure allowed reflection on examples and patterns of body language, aspects of sharing information as well as sophisticated aspects of co-operation and collaboration, all relative to the goals and purposes of the board round process. In effect it made clear the communication processes that underlie the "culture" of a group and allowed participants to consider their choices in communication behaviour in the future.

To enhance sustainability, a periodic review of team working through incidental filming and analysis of ongoing board rounds (perhaps every six months) was raised as a way of ensuring adherence to the attunement principles and continuous improvement in team communication.

**Strategy**

The VERP pilot was structured on "action research" principles and although this does not neatly fit with the traditional PDSA cycles we
perceived imbalance in participation, for example the relative domination by medical staff and a relative dearth of nursing input in initial sessions. Positive alliances, eg between physio and occupational therapy were evident, as was the value of particular questions to promote discussion, build consensus, and be clear on agreed outcomes. The value of being prepared for board round discussion, having the relevant breadth of expertise and keeping to time were seen as critical to a successful board round.

The training process of working on individual communication within a shared board round, building the core team as a collegiate group, allowed for peer support through identification and reinforcement of successful strategies. Also the use of self and peer modelling of communication behaviours, eg active listening to colleagues or use of humour to share group responses to an issue.

PDSA cycle 4: Following evaluation of the VERP training which was tailored to suit the context of team planning for patients, it was apparent that the group process adopted was suitable to delivery of personal and core team development. This methodology is now available to streamline and adapt to other team settings within Tayside. Key learning points include improved understanding of how members of a core team can actively facilitate full team participation and ensure efficient decision making at board rounds. One example to illustrate this is the realisation that well formed questions are critical to summarising, checking for shared understanding and achieving consensus around decisions regarding treatment and discharge date for a particular patient. A review of all filmed sessions will allow for categorisation and collation of examples of different questions for the development of future training materials. Furthermore, the selection of good examples of recorded (filmed) interaction, such as an information exchange between medical, nursing, therapeutic, or social work representatives, will be possible for future sharing of practice across teams.

It is intended to further refine the training process building on the test experience. Assessment results suggested that the six sessions were adequate for the stated aims, although due to holiday leave and offers of 'catch up' training to individuals, it was apparent the opportunity to have an offer of one personal session could well be built into future refinement of a training model.

See supplementary file: ds4575.doc - “PDSA cycles”

Post-measurement

Pre-training: Qualitative data was collected (questionnaires) and returns from the initial full team survey were completed in June/July 2014 by seventeen respondents. These covered a wide range of roles including consultant, junior doctor, senior charge nurse, charge nurse, student nurse, physiotherapist, occupational therapist, psychiatric nurse, patient flow coordinator, dietician, and social worker. The majority reported that ease of participation was relatively high. A third of comments on participation focused upon the confidence that respondents felt when taking part eg, "I feel confident in my role and it is a good forum to participate." The way the board rounds operated was seen to facilitate participation, "Each member of the MDT has time to give their update on each patient."

When asked about the most successful aspects of board rounds, the responses highlighted the value of the process as well as their impact on planning. They were clearly appreciated as providing a guaranteed opportunity to discuss patients that was managed and frequent. The coordinating aspect for MDT working was a repeated theme, emphasising the development of professional relationships. Significant benefits for patients were identified, and these included the facilitation of decision making in a complex environment where many different services are required to collaborate. The benefits to the planning process were seen to include the engagement of a wide range of professions and the maximisation of resources.

Continuing challenges included ensuring that all relevant team members were prepared and did attend on time for discussion, and that board rounds were well managed and used limited time effectively. There was also a need to get all players on board and participating well and to improve record keeping arising from discussion and agreement at board rounds. How to ensure follow up action was identified as an ongoing issue.

Post-training questions focused on the impact of VERP on personal and core team communication knowledge and skills, and on any perceived changes in MDT functioning, ultimately to impact on patient experience. This questionnaire was completed in August 2014.

Following the VERP training sessions, an evaluation of impact reported by the core team was extremely positive. At the outset each participant identified individual goals in undertaking communication training; all four core team members reported positive gains in these as a result of VERP for both personal goals in improving communication skills as well as working effectively as a team. With regard to communication, all four core team participants rated themselves relatively highly at the outset on communication in board rounds prior to training, but still reported an increase in professional communication skills after training (from an average of 8.3 to 9.5 on a ten point scale). An increased confidence and self awareness of strengths in communication was evident for each member of the core team, albeit different aspects being acknowledged. Greater self awareness of communication (including body language) in fulfilling a role, eg leading discussion, asserting a point, summarising, and engaging colleagues in discussion were cited, all helping to build the shared responsibility as a core team to maximise board rounds. Knowledge gained included a more sophisticated understanding of communication strategies, as well as the use of a new focus on the dynamic of a complex group process.

Each core team member reported an impact on the functioning of the MDT as a result of their personal developments. Improvements in the atmosphere of the team and increases in relevance of information shared were reported. Specific groups who were originally of concern, eg nursing staff were now seen to be "more freely contributing and being asked to contribute", or junior doctors who were subsequently "giving more appropriate information in
response to more specific questions." There was also a consistent view reported that there were improvements in supporting MDT goal setting for ongoing patient care, a topic that frequently arose during video reflection and consequent discussion in the training. For example, "with the improved input of information from more members of the wider team we have more accurate and realistic discharge plans."

On the subject of contribution to a more co-ordinated and timely patient experience, core team members recognised the complexities involved in isolating this key outcome, but all saw VERP training as adding value in this respect. The improved focus and better facilitation of discussion were highlighted as key factors; one possible explanation was, "The patient plan is now the main focus." As a result there was seen to be an improved focus on forward goals that, "are more co-ordinated and timely as the whole team is aware of what we are trying to achieve for each individual patient."

Changes reported by the core team were supported by feedback from members of the wider MDT who had been involved in board rounds long enough to confirm either way, but whom had received no direct training. Thirteen of them completed a follow up questionnaire. This "longstanding group" was an exceptionally well experienced group (averaging 2.5 years in this MDT), comprised mainly of nursing staff of all grades (included were a patient flow co-ordinator, a psychiatry liaison nurse, one consultant, and one ward assistant). The consultant and therapy members of the core team did not complete this questionnaire having already undertaken separate evaluation (focus group). In addition, responses were gained from a further six members who had recently joined the team and were unable to comment on changes over time. Their average length of experience was six weeks, with a range of one week to two months; this illustrates the degree of turnover in, and the wide range of, staff. Four of this subgroup were junior doctors (FY1s) and two were nursing staff (including one student). The feedback from this "new members group" provided an additional perspective on the culture and experience of board rounds on this particular ward.

The vast majority (92%) of the longstanding group reported noticing some positive changes in the board rounds in the previous three months. These could be grouped into features relating to the management process, the time taken and the perceived efficiency of the meetings. Having an improved structure, whereby medical staff usually led discussion on each patient, was seen to be positive by one third of respondents. Most reported improvements in the speed and efficiency in which board rounds were managed, "more focused", "more efficient", "nurses leading the rounds are more timely". In addition, half reported improvements in attendance, participation, and the range of input to MDT discussion, "the whole team now participates."

The majority (69%) of the longstanding group reported changes that were seen to have a positive impact on outcomes for patients. Some of these related to the perceived operational improvement reported above, eg the fact that participation of the full team contributed to improved patient outcomes. One noted that discussion was "more patient centred" and two others highlighted the value for patient continuity now that medical staff were better co-ordinated, "co-ordination of patients overseen by ward doctors not just, say the care team." Most identified improvements in specificity and effectiveness of discharge planning for patients resulting from improved communication and collaboration, "quicker medical plan therefore quicker discharge date." One third highlighted changes in ensuring that different agencies, including therapies, nursing and social work were tasked and engaged.

Overall the full team follow up findings supported those of the baseline survey about the perceived value of board rounds to provide an opportunity to share information and prioritise clinical workload, to the benefit of patients. Findings were positive and supported the views of core team members that post VERP training; board rounds were seen as consistently easier to participate in, providing improved focus and efficiency, resulting in better care for patients as well as improved pathways to discharge.

Film analysis pre and post intervention (VERP) allowed identification of both total length of time taken to contribute by each member as well as how many times they spoke (number of "turns"). Initially the medical contribution represented nearly half the total time (44%), taking over one quarter of all turns (26%); this reduced significantly by nearly half to approximately one quarter of total time (26%), also taking less turns (22%). The data suggest that medical contributions shifted to become more concise with average length of turns reducing from 8.6 seconds to 6.7 seconds.

Nursing contribution showed a corresponding improvement initially making up only 5% of total input and taking less than one in ten turns (9%); at follow up this had shifted significantly by a factor of four (19% of total time) and taking one third more turns (12% of total turns). The data suggests that nurses were taking significantly longer turns, more than doubling their average length of turn from three to seven seconds. Post VERP training, their average length of turn equated with that of medical participants, evidencing an empowerment of these members of the MDT.

In addition the total time of the post intervention board round in comparison to the baseline, had reduced by over three minutes (13%) from 25 minutes 18 seconds to 21 minutes 54 seconds, suggesting a more efficient process.

Finally, a post focus group comprising mainly nursing staff provided further details in supporting the findings that improvements were noted by wider team members who had not been trained.

See supplementary file: ds4576.doc - "Questionnaire results"

Lessons and limitations

With regard to acceptability, the question arises as to how VERP fits with previous training and experience. NHS colleagues do not necessarily get direct training in such "non technical skills" as communication and make little, if any, use of video for review of personal behaviour and working in a team. For example, parallel work in Tayside using VERP support with medical students
highlighted anxiety for some when having to make one recording of communication with a patient where they had to impart difficult news regarding a diagnosis.

Individual predisposition to training that involves video recording will include uncertainty as to what is expected of them, with some initial anxiety about being filmed and/or a degree of scepticism. To some extent this normal reaction was the case for all those trained in this pilot, but all adjusted quickly (by session two) to seeing the potential value of such personal scrutiny in a working context and all concluded that the new experience of self review was extremely powerful.

With regard to feasibility, the challenge of taking time away from direct working was always present, but in this pilot the use of six one hour sessions over lunchtime worked well in practice. There were two occasions when a bleep was briefly responded to, but in the main the participants were able to focus and work well both as individual learners and as a group. The group methodology was seen to add value both by way of reinforcing personal learning, witnessed in parallel with colleagues, but also by building core team identity through shared learning and shared focus on joint problem solving of issues arising.

The issue of seeking individual written permissions for video recording of large groups (up to twenty) in each board round did represent an administrative burden. This initially required the chasing up of those who had not completed a form, when they were to be on film for the first time. However, this was eventually streamlined using a standardised group form (consistent with Tayside policy on filming) adapted for the purpose.

As for evaluation, more thought on harder data, evaluating impact on wider variables of patient outcome is required; one will have to be realistic about the contribution of one input (VERP) to a chain of causal variables that will all impact on outcomes. Future consideration about the evaluation of hard data including complaints and patient satisfaction and average length of stay is required to reinforce such findings. Certainly VERP does contribute to essential aspects of communication, culture, and teamwork.

Considering the relevance of further dissemination of VERP training to colleagues in other multi disciplinary settings, there was a shared view that it is well suited to a range of settings and adding value, helping to identify areas for improvement as well as charting positive changes.

At this stage of innovating a new and creative solution to the challenges faced in delivering patient safety, VERP training does require highly trained / skilled trainer(s) well versed in VIG / VERP. Working on individual communication skills in a small group setting requires negotiation at the outset and awareness of sensitivities potentially involved. It also requires flexibility in adapting to a new context. Ideally the aim is to build a sustainable model of in-house training that will be fed by ongoing training and developments and use local examples of good practice for illustration. Use of the Tayside patient safety network will ensure that practice is shared and compared.

Conclusion

Given the flexibility of VERP as a methodology, the decision to focus in this instance on training the core team with the aim to impact on the fuller team, does appear to be justified by the results. Any MDT in such circumstances comprises a wide range and a large number of professional staff, who are subject to high levels of turnover, with junior doctors changing frequently and nursing staff changing shifts regularly. Adding the impact of such changes within professional disciplines and the factor of holiday leave makes it hard to see how one could ever train all members of a team. This pilot evidences the value of training a relatively stable core team that can co-work to facilitate and manage change over time. However, there was a risk in that there was no guarantee that any perceived improvement by those directly trained, would be acknowledged by others who were indirectly involved. In light of the results, it seems appropriate to consider any future training using this model and to continue evaluation to fine-tune delivery.

The Tayside experience of using board rounds to co-ordinate MDT planning for patients was clearly seen as beneficial throughout this study, even in baseline evaluation. This is perhaps not surprising as the team involved, was in some ways self selected in pursuit of building on good practice. However, the input of six hours specialised training in video enhanced reflective practice to the core team, was seen to have significant positive effects on personal learning and shared practice as facilitators of the wider team at board rounds. As a result, discernible benefits to the process and outcomes of the MDT were reported by both core and full team members, in the interests of patient safety.

The methodology, which was tailored to this NHS context using a facilitated group experience and context specific questions, appears to suit a MDT setting well and to have been positively received. In addition, the training stimulated thinking about practice change in management of participation as well as recording outcomes of board round discussion, with greater emphasis on accountability and follow up of proposed action. External confirmation that the board round was working effectively was provided by an unannounced inspection by Health Improvement Scotland [13], who identified it as an example of good practice near the end of the training period.

These findings represent the MDT’s perceptions of the VERP sessions and their effect on the board round process, with participants believing that board rounds were consistently easier to participate in (also supported by new members), provided improved focus, were more efficient, and resulted in better care for patients, as well as providing improved pathways to discharge. Applying VERP to the complexities of MDT working appears to have definite relevance to important quality issues relating to communication, collaboration, and culture, all with the common aims of improving continuity and outcomes for patients. This shared view on the benefits to co-operation and co-working in one NHS setting, appeared to be present across team members / different disciplines. Further research and development is required to explore the effects these board round changes have on patient outcomes.
It is concluded that the use of VERP for individual and team development is worthy of testing and investigation while giving consideration of its long-term sustainability as an intervention in a resource-limited environment. It is further concluded that development of a measure of team interaction and effective communication derived from video analysis should be further developed to apply in any future training. The value of such input needs to be viewed in the context of an imperative to maximise precious resources that impact on patient safety, at a time when achieving best value is paramount.

References


1. Culture of Care Barometer Kings College London. Available at: http://www.kcl.ac.uk/nursing/research/ (accessed on 04.11.2014).


Declaration of interests

Nothing to declare.
PDSA Cycle 1

Aim: what are you trying to accomplish?
To ascertain the views of the core multidisciplinary team (MDT) and the wider multidisciplinary team through the use of questionnaires regarding the functioning of the daily ward board rounds.

Plan: what will your test be?
Construct a baseline questionnaire for the purpose of sampling the views of the MDT participants in the daily board round. Questions will cover: participant's role, experience, views on the process, contribution to improving patient outcomes and ideas for improvement of process.

Prediction: what do you think will happen as a result of your test?
The information gathered will allow us to plan how the video enhanced reflective (VERP) training will take place within the core team and develop a tailored approach to a previously untried intervention within this context in the NHS.

Do: what happened when you carried out your test?
Returns were completed in June and July 2014 and in all there 17 respondents; these covered a wide range of roles including consultant, junior doctor, senior charge nurse, charge nurse, student nurse, physiotherapist, occupational therapist, psychiatric nurse, patient flow coordinator, dietician and social worker.
The questionnaire explored the MDT members experiences of the board round prior to the VERP intervention and identified potential benefits, disadvantages and barriers that may be associated with the board rounds process and filming the board round process.

Study: how did the results of your test compare with predictions?
Responses to this survey will be useful for reflection on the distance travelled in developing board rounds and on their current state of evolution.
Challenges that require continuing thought and innovation include:
- all board round team members being well prepared for appropriate discussion and planning
- all relevant team members attending, on time and for all relevant discussion
- board rounds continuing to be well managed and ensuring that time is used effectively
- ensuring that the best possible environment is available for board rounds
- thought being given to improving record keeping arising from discussion and agreement at board rounds
- follow up action from board rounds being undertaken and unnecessary repeated activity is minimised
- thought being given to patient and family involvement in the process of planning.

The use of film analysis for training was anticipated to provide a source of information as an indicator of positive change of the above.
If successful, the training was anticipated to team-build within the core team, to impact positively on the process of managing board rounds and to be seen by them to add value to planning and treatment of patients, ultimately contributing to a more streamlined discharge pathway. Ideally this would then be recognized and have a positive impact on the wider team.
**Act:** how will you change your previous test in light of what you have learned?

<table>
<thead>
<tr>
<th>PDSA Cycle 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim:</strong> what are you trying to accomplish?</td>
</tr>
<tr>
<td>Development of a tailor made VERP training package for the core team based on video interactive guidance principles.</td>
</tr>
</tbody>
</table>

| Plan: what will your test be? |
| Training of the team based on attunement principles and filming of board rounds for analysis by core team members which will allow consideration of individual contributions as well as effectiveness as a team. |

| Prediction: what do you think will happen as a result of your test? |
| This approach will be effective as it is done in situ on the ward and will require little time away from direct patient care. It will allow the core team to develop expertise built on a shared understanding of the principles of attunement. |

| Do: what happened when you carried out your test? |
| Training was developed for the core team and in practice, most sessions had all four core team members present and it was possible to use peer reflection to support individual and group learning. Each session focused upon the most recent board round that had been filmed and was usually within a week to ten days of the filming. This ensured that participants could remember details of each particular board round. |

| Study: how did the results of your test compare with predictions? |
| The training process of working on individual communication and building the core team as a collegiate group allowed for peer support through identification and reinforcement of successful strategies. It was also found that the use of self and peer modelling of communication behaviours active listening to colleagues or use of humour to share group responses to an issue were positive. The core team reported it was essential that this work was undertaken in situ to prevent them from being taken away from direct patient care. |
**Act:** how will you change your previous test in light of what you have learned?

The training was originally envisaged to last for six hourly sessions, but in the event that it coincided with a holiday period, another session was provided for catch up purposes. In addition, core members were offered one extra personal session, for those wishing to focus on individual communication styles, which was taken up by two members of the core team.
Post Reflection Questionnaire on Video Enhanced Reflective Practice (VERP). Evaluation of impact on Full Team

Patient Safety Team: The Centre for Organisational Effectiveness

Cyril Hellier      October 2014

Summary
This evaluation report should be read in conjunction with previous reports of the Pre and Post PRI Focus Group (Alex Green) as well as the Board Round Meetings Survey Questionnaire Feedback Report and the Evaluation of Impact on the Core Team Report (Cyril Hellier).

VERP training was delivered within an action research methodology, aiming to explore its feasibility and its acceptability to Board Round Meetings (BRMs) as a means of encouraging participation of team members, promoting a more co-ordinated and timely approach to patients’ hospital journeys, ultimately to support multidisciplinary goal setting and improving their discharge pathways.

In addition to the evaluation of VERP training of the core team on PRI Ward six, it was decided to access the views of the wider team to see if the training of the core team had any discernable impact on wider team behaviour and outcomes. A brief questionnaire was designed for this purpose (Appendix 1) and it was administered to BR team members over the course of one week in September 2014, within a month of VERP training being finalised and evaluated.

Findings from the full team were positive and supported the views of core team members that post VERP training BRMs are consistently easier to participate in; they provide improved focus and are more efficient, resulting in better care for patients as well as improved pathways to discharge.

Reported Impact of VERP by the Core Team
Key findings of the evaluation of impact of VERP training, reported by the core team, can be considered under the following headings:

- on core team functioning
In evaluation of VERP the core team reported significantly improvements for them which in turn had impacted on wider team functioning, this in the context in which other BRM team members are subject to constant change. VERP training was reported to have:
  - brought together the core team
  - dramatically improved the atmosphere of MDTs
  - increased awareness of own actions and strengths and the impact these have on the other members of the team
  - improved or elevated the core team’s appreciation of each member’s role in the running of the board round
  - reinforced the goals of the board round to help focus on them
  - helped the core team influence the correct board round process.
- on multi-disciplinary team functioning
All core team members believed that VERP training had consequently had a knock on effect on the behaviour of wider team members, increasing confidence and participation, as a result of being better facilitated (by the core team). Evaluation feedback from the core team identified positive effects on team engagement:

- nursing staff contribute important information that they didn’t do as much before the training process
- the whole team now contributes and ... are more confident in participating to board round work
- nursing staff are more freely contributing and being asked to contribute
- junior doctors are giving more appropriate information in response to more specific questions.

- on supporting MDT goal setting
There was also a consistent view reported that there were improvements in supporting MDT goal setting for ongoing patient care, a topic that frequently arose during video reflection and consequent discussion in the training:

- with the improved input of information from more members of the wider team we have more accurate and realistic discharge plans
- clearer goals and plans for the patients in our care because of improved communication and MDT involvement
- goals are more commonly being named (made explicit) which aids in these becoming common goals
- direct questioning helps to facilitate more concise MDT goal setting, along with increased communication by the wider team members.

- on contributing to a more positive patient experience
On the subject of contribution to a more coordinated and timely patient experience, core team members recognised the complexities involved in isolating this key outcome but all saw VERP as adding value in this respect. The improved focus and better facilitation of discussion were highlighted as key factors:

- plans are more coordinated and timely as the whole team is aware of what we are trying to achieve for each individual patient
- patient plan is now the main concern instead of patient story – as a result there is improved focus on forward goals
- planned dates of discharge appear to be more realistic; however I’m not sure how this can be measured. Decision making appears to be more concise
- I would hope this translates into a more timely discharge for a patient; however there are many other factors outwith our control that influence the timing of a discharge.

- on increased consistency in board rounds
Finally, participants saw that BRMs were more consistently successful as a result of positive changes in facilitation brought about by VERP training:

- less frequent occurrence of poor board rounds and where these do occur better focus so as not to allow the momentum to be lost; all due to improved leadership from core team
- the majority of board rounds now take approx 20 minutes; this in itself would indicate that despite more of the team communicating, the core team,
particularly the SCN is able to influence and facilitate effective and timely board rounds.

Putting Core Team findings to the test

It was realised by core team members that many changes were ‘subtle’ and there was uncertainty as to whether any of the wider MDT would acknowledge them. Given the relatively subjective (but consistent) nature of these findings, it was decided to administer a further questionnaire to wider team members. Each member present at a BR was encouraged to complete a single page covering the main issues, with the aim of seeing if there was any awareness of the positive findings reported by the core team. It was realised at the outset that individual MDT members would not necessarily have the same overall perspective on participation in BRs as core team members, however it was hoped to seek any evidence to support findings on improved process of managing BRs, including greater efficiency, also on supporting goal setting and positive patient outcomes.

It was further decided to undertake one additional filming of a Board Round to see if any discernable changes were evident in comparison with earlier filming for VERP sessions. If recorded, any such changes could help to illustrate the positive changes reported.

Findings

- number and range of respondents
Thirteen members of the MDT, whom had been in the team prior to the start of filming for and delivery of VERP training, to the core team, completed the questionnaire. Average length of experience was 2 years 5 months, ranging from 7 months to 3.5 years (when the BRMs started) – this captured an exceptionally well experienced group, comprised mainly of nursing staff of all grades (included were a patient Flow Co-ordinator, a Psychiatry liaison nurse, one CT1 medic and one ward assistant). The consultant and therapy members of the core team did not complete this questionnaire having already undertaken separate evaluation. This will be referred to as the ‘longstanding group’.

In addition, responses were gained from a further 6 members who had recently joined the team and were unable to comment on changes over time; their average length of experience was 6 weeks, with a range of 1 week to 2 months – this helps to illustrate the degree of turnover in, and the wide range of, BRM membership. Four of this subgroup were junior doctors (FY1s) and two were nursing staff (including one student). The feedback from this ‘new members group’ is referred to in this report for an additional perspective on the experience of working in the BRMs, on this particular ward.

- ratings on ease of participation in BRMS
The average rating given by the longstanding group was 8 with a range of 6 to 10; comments on individual ratings acknowledged the challenge of time management with many competing demands:

  • I often have nursing duties to carry out
can be difficult for time as this is a busy ward.

However all comments, consistent with the overall high rating, reflected the feeling that BRMs were straightforward to participate in:

- everyone happy to listen to a plan
- if my input required then I will speak
- I feel part of team and it is easy to participate
- I feel confident in BRs and addressing specific questions
- I have no issues or concerns with participation in BRMs
- easy to input if required.

Some comments highlighted the nursing roles relative to medical staff:

- Medics now lead BR and nursing staff usually fill in gaps when medical team have not reviewed
- nursing input is around continuing care and social issues

Finally the issue of how much participation was raised by some;

- depends how well you know the patient
- levels of participation vary.

The new members group gave a similar rating, averaging 8 with a range of 6 to 8. Comments reflected those of the longstanding group, with recognition that preparation eg seeing the patient before discussion, as well as role differences influenced the degree and nature of participation:

- seems polite enough group
- I feel that I can chip in anytime - a lot of the discussion is about social issues which I cannot help with
- straightforward to get point across
- usually very easy – occasional difficulties if have not seen patient before meeting
- still quite new to me – I feel that I improve the more I attend them.

These comments provided reassurance that the culture of BRMs was open and amenable to develop a positive professional relationship supporting participation. In addition this was seen to benefit diagnosis and action planning by specific agencies:

- clearly indicated what area of input is required eg medical team/ nursing team/PT/OT.

The original BRM survey report (August 2014) asked the same question about ease of participation of all members; it resulted in a wider range of ratings with a lower basal score. The results of this follow up questionnaire included a narrower spread and a higher basal score in the range, albeit with a similar mean rating of 8. it is notable that there were no responses in the follow up that implied any members were being left out of discussion, nor failing to contribute. The implication is that post VERP there was greater consensus in findings on ease of participation.
- changes noticed in the past 3 months in the way BRMs operate
Overall 12 of the 13 members (92%) of the longstanding group reported noticing some positive changes in BRM operation in the previous three months. These can be grouped into features relating to the management process, the time taken and the perceived efficiency of the meetings. Having an improved structure, whereby medical staff usually led discussion on each patient was seen to be positive by 33%:

- more structured – medical input then PT/OT/SW input
- better being medical led
- more medical based
- medical team now leads.

(However the converse was noted by two respondents who pointed out that if the patient was not seen by medical staff, prior to the meeting, then this could have an adverse effect, as it disrupted the process).

58% reported improvements in the speed and efficiency in which Board Round Meetings were managed:

- quicker
- it has got a bit quicker, more fluent
- improved in time taken
- increased focus
- more focused
- more efficient
- nurses leading the Rounds are more timely.

In addition 50% reported improvements in attendance, participation and the range of input to discussion:

- increased MDT attendance
- all MD team attends
- the whole team is included
- whole team in discussion and input on BRs
- more multi-team participation
- nursing input increased.

- changes noticed in BRMs in the past 3 months that add value to outcomes for patients:

9 (69%) members of the longstanding group reported changes that were seen to have a positive impact on outcomes for patients. Some of these related to the perceived operational improvement reported above ie the fact that participation of the full team contributed to improved patient outcomes. One noted that discussion was ‘more patient centred’ and two (17%) others highlighted the value for patient continuity now that medical staff were better co-ordinated:

- coordination of patients overseen by ward doctors not just, say the Care Team
• if senior doctors do handover, continuity for patient moves on more quickly.

The majority (61%) identified improvements in discharge planning for patients resulting from improved communication and collaboration:

• quicker medical plan therefore quicker discharge date
• clearer discharge plans
• more effective discharge planning
• most patients can have a clearer pathway to discharge planning
• discharge planning more specific.

A minority (33%) highlighted changes in ensuring that different agencies were tasked and engaged:

• clarification of physio / therapy / needs or SW input
• PT/OT input
• nursing input
• SW are pushed due to having EDD.

Finally one member described how discussion supported the identification of patients with ‘delirium or high SE scores’.

- value of BRMs

Two comments serve to summarise the majority of feedback about the value of BRMs

• I find BRMs extremely useful
• the MDT communication provides an opportunity to share information and prioritise clinical workload.

This supports the findings of the original survey about the perceived value of BRMs and the view that they could not be replaced. Further final comments were made by several respondents that supported views reported in the original BRM survey write up, on the need for continuous improvement and further fine tuning.

**Conclusions on Findings**

The point of this action research was to establish if any evidence of consistent views across team members was available, to support contentions of the core team on positive changes post VERP training.

Changes reported by the core team are supported by feedback from members of the MDT who had been involved in BRMs long enough to confirm either way. Whilst these findings represent soft rather than hard outcome measures of patient experience, there is clearly support for the view that post VERP training of the core team, BRMs are seen as consistently easier to participate in, (also supported by new members), providing improved focus, are more efficient and result in better care for patients as well as improved pathways to discharge. This shared view on the benefits to co-operation and co-working in one OPAC setting within the NHS, appears to be present across team members and as a result is worthy of further investigation.
Having confirmed the views of the core team by cross referring to members of the wider team, video enhanced reflective practice training definitely appears to contribute to communication, collaboration (shared decision making) and continuity, three of the seven C’s in the Healthcare and Quality Strategy (2010). The positive working of this particular team was also identified as an area of good practice in the recent HIS report (July 2014) on older people in acute hospitals unannounced inspection; the use of multidisciplinary team board rounds ensuring that patients are receiving the appropriate care, was highlighted.
APPENDIX: 1  As you know your Board Rounds have been filmed over the past three months – this has been used for reflection on effective communication by the core team. This brief questionnaire seeks to determine if BRM members have noticed any changes in the process of daily planning meetings and outcomes for patients, as a result.

Name:………………………… Position…………………………
Date:………

1. What is your role in BRMs?........................................................................................................

2. How long have you participated in BRMs?
........................................................................................................................................

3. How easy is it to participate in BRMs?

1 2 3 4 5 6 7 8 9 10
very difficult Very easy

Please comment on why you have chosen this rating:

4. Have you noticed any changes in the way BRMs operate in the past three months? Please give details:

4. Have you noticed any changes in BRMs that add value to outcomes for patients?

5. Please use this space to add any further comments on your views of BRMS:
1. What is your role in BRMs?

2. How long have you participated in BRMs?

3. On a scale of 1 to 10, how valuable is your attendance at BRMs?

4. How do you see BRMs adding value to outcomes for patients?

5. How easy is it to participate in BRMs?

6. Can you identify 3 of the most successful aspects of BRMs?
6. Can you identify 3 of the least successful aspects of BRMs?
   A. 
   B. 
   C. 

7. In what ways might BRMs be improved so that the less successful aspects are addressed?
   A. 
   B. 
   C. 

8. If BRMs did not take place, can you suggest other ways to achieve effective communication between multi-disciplinary team members?
Communication

1. What strengths in communication do you bring to your role as part of the multi disciplinary team?

2. On a scale of 1 to 10 where would you rate your professional communication skills at the moment:

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

   very basic                       very well developed

3. What skills do you need to develop in order to move up one point on the scale

   A. 
   B. 
   C. 
   D. 

4. What would your colleagues, or others, notice that was different in your behaviour if you achieved this movement (please give more than one behaviour)

5. If you undertook 6 sessions of Video Enhanced Reflection Training, what would you hope be doing differently to show that you have genuinely improved your communication skills?
Introduction of a junior doctors’ handbook: an essential guide for new doctors

Daniella Ross, Claire Petrie, Vicki Tully
NHS Tayside

Abstract

The transition period for new junior doctors is a daunting and challenging time, as vast amounts of information specific to each hospital, ward, and job must be learnt while maintaining patient care standards.[1] In NHS Tayside, Scotland, tips and guidance for each job are informally handed over from previous junior doctors to the next, resulting in an unreliable and unsustainable handover of information. Time must then be spent by new doctors learning the intricacies and practicalities of their new job, rather than spending time focusing on patient care.

Our aim was to improve this transition period for new junior doctors to NHS Tayside through the creation and implementation of a junior doctors’ handbook, which would provide information and practical advice on day to day life as a junior doctor. We hoped to implement this project by August 2015 to coincide with the arrival of these new doctors to NHS Tayside. Through repeat PDSA cycles we created a sustainable and reliable junior doctors’ handbook, containing a centralised hub of information for doctors that was accessible through our health board’s website. The junior doctors’ handbook has been a highly beneficial resource that has been praised for its detailed information on all aspects of day to day life for doctors in NHS Tayside. Feedback also demonstrated that doctors felt the junior doctors’ handbook had improved their efficiency. Our hope is that this project can continue to be developed within our hospital, but also to be used as an idea outside our health board to improve the transition period for new doctors on a wider scale.

Problem

Each year in August, hospitals throughout the UK see the arrival of recently graduated new junior doctors arriving on the wards. They must almost instantly slip into the position of their predecessors by becoming familiar with their role, the job, and the ward itself. This transition period is well known to be a challenging and daunting time for new doctors, as vast amounts of information specific to each hospital, ward, and job must be learnt while patient care standards are maintained.[1]

Prior to even stepping foot onto a ward, new doctors must first familiarise themselves with their new environment: the practicalities of finding their new hospital, using staff car parks, looking up bus routes, and locating their ward. Their task is then to become familiar with the new ward itself: the daily routines of ward rounds, the introduction to all team members, the location of equipment, and then the use of computer programs to request and review investigations. Alongside this comes the challenge of managing unwell patients, prescribing medications, sourcing guidelines or senior help, finding contact numbers for different departments, admitting and discharging patients, contacting rota organisers to request annual leave, as well as the completion of mandatory requirements for portfolio development.

In NHS Tayside, Scotland, there is a shadowing period for new foundation year (FY) doctors, and an introductory period for other junior doctors prior to starting work. This allows the transfer of more general information from a variety of staff, an overview to working in the hospital and of the IT services, as well as an opportunity to spend time on the ward familiarising themselves with their new role and environment. Information specific to the working life of a junior doctor in NHS Tayside, alongside tips and guidance for each new job, is informally passed to new junior doctors through word of mouth from outgoing doctors. This unfortunately results in an unreliable and unsustainable handover allowing for key items of information to be missed, which ultimately leads to the compromise of patient care.[2]

Our aim was to improve the transition period for new junior doctors to NHS Tayside through the creation and implementation of a junior doctors’ handbook by August 2015, to coincide with the arrival of new junior doctors. The junior doctors’ handbook would provide information and practical advice on day to day life as a junior doctor working in NHS Tayside.

Background

Since 2007 and the introduction of Modernising Medical Careers,[3] the majority of doctors in training change rotation during the first week of August. “Black Wednesday,” as it has been unfortunately named, sees an increase in patient morbidity and mortality.[4] Communication within medicine is paramount, and an effective handover of information is essential to maintain high standards of patient care during this transition period.[1, 2, 5] New FY doctors receive an induction week prior to starting work, which contains teaching, advice from various healthcare professionals, and the shadowing of previous FYs. Due to the vast amounts of information delivered, coupled with nerves and potential fears about starting work, this information can be difficult to retain.[5]

The idea of a handbook stemmed from the East of Scotland’s
Junior Doctor’s Forum as a project to improve the junior doctor induction period, and thereby improve patient care. Handbooks for new doctors are commonly used in other NHS trusts and are given out during induction weeks; however, printed information quickly becomes outdated and is then difficult to update.[5] Alongside this, the information provided is rarely produced by junior doctors, and therefore doesn't include integral information that can only be learnt from working on the wards.[5] This includes information regarding hospital layout, documentation, ordering investigations, making referrals, on call information, prescribing, guidelines, IT systems, and contact numbers.

By creating an easily accessible online handbook, written by junior doctors for junior doctors, the aim was to end the recurring problem of an unreliable handover of information to new doctors. Patient care could therefore be maintained during this transition period, as information regarding practical advice and information specific to our health board could be accessed through the handbook.

Baseline measurement

A retrospective study was undertaken using foundation year one (FY1) doctors working within NHS Tayside, who began their training prior to the implementation of the junior doctors’ handbook. Baseline data was collected through an online questionnaire which was sent to the 93 doctors fulfilling these criteria, of which thirty completed the survey. The questionnaire asked questions regarding how prepared junior doctors felt on starting work, which areas they felt most unprepared with, and what information they would have wanted to know prior to starting work. The questionnaire also allowed for free text feedback on what junior doctors felt would be useful to have in a handbook.

Twelve of the 30 FY1s (40%) completing the survey felt they were unprepared on starting work, despite their induction week. Eight FY1s (26%) felt out of their depth on a daily basis when starting their new jobs. The majority of doctors felt prepared with regards to management of acutely unwell patients, clinical knowledge, prescribing, and practical procedures. However, they felt they were unprepared in utilising computer programs, performing administrative tasks, handing over information at formalised handover, and making referrals.

Nearly all participants (29 out of 30 respondents) felt that a handbook containing key information for their new job would have eased their transition period for starting work, and would be a useful resource to continue to use throughout the year. The most useful information highlighted from the survey to be included in a handbook. Ninety seven percent (29 out of 30 respondents) felt most unprepared with, and what information they would have wanted to know prior to starting work. The questionnaire also allowed for free text feedback on what junior doctors felt would be useful to have in a handbook.

- Useful contact numbers
- Information on hospital at night and handover
- Information on utilising computer programs specific to NHS Tayside
- Making referrals

Free text feedback highlighted the need for the handbook to be easily accessible, preferably as an online handbook, and for it to contain information specific to NHS Tayside that was written by junior doctors, and therefore relevant and reliable.

Design

Our intervention took the form of a junior doctors’ handbook created prior to the arrival of the new doctors in August 2015, which would be an online resource available on both computers and smartphones. The purpose of the handbook was to have an easily accessible, centralised hub of information that would contain relevant information for junior doctors in a clear and concise format, so that it could be utilised by new doctors starting work within NHS Tayside.

The information contained within the handbook aimed to be divided into four main sections, as highlighted by our feedback from our initial questionnaire. These sections were day to day life on the wards, information on NHS Tayside and its hospitals, how to access guidelines, and a list of useful contact numbers. The site was designed to be easily accessible and sustainable, to have information in a clear and concise format and layout, as well as also being user focused and user friendly.

Information was to be collated for the handbook through personal experience as well as through feedback from a variety of relevant senior clinicians, and through feedback from junior doctors via a focus group. The concept of the handbook is highly sustainable, as after setting up the site there are limited maintenance costs, and the site can continue to be used and updated as appropriate. The website was initially launched on external website platform Wix (www.wix.com); however, we hoped to incorporate the junior doctors’ handbook into the NHS Tayside website, therefore allowing for an easily updateable resource for years to come. With approval through IT services the sites were incorporated in August 2015, and the handbook could therefore be more easily accessed by users, and could also be updated with amendments through IT services.

Overall, we hoped to design and create a user friendly website that was easily accessible and updateable, that would be sustainable, reliable, and would continue to be used by NHS Tayside for years to come.

Strategy

A total of three PDSA cycles were conducted, and more detailed evidence of these can be found in appendix 1.

PDSA cycle 1

We surveyed junior doctors prior to the implementation of the handbook to establish what information they wished they had known prior to starting work, and what information they would like to see included in a handbook. Ninety seven percent (29 out of 30
respondents) felt a handbook would have been useful, and wanted to see information and practicalities of working as a junior doctor in NHS Tayside included. We aimed to therefore create the first version of the junior doctors' handbook through external website platform Wix before gaining feedback on its use.

PDSA cycle 2

We gained formal feedback on the content, usability, accessibility, and layout of the junior doctors' handbook after its creation on the external website, through a junior doctor focus group and feedback from senior clinicians. Feedback regarding content was highly complimentary, and numerous suggestions for development were made. A noted criticism was the poor usability of the site on NHS Tayside's intranet. We planned to incorporate the junior doctors' handbook into NHS Tayside's intranet, and amend content as highlighted through feedback prior to the launch of the site in August 2015.

PDSA cycle 3

We formally evaluated the junior doctors' handbook after its incorporation to the NHS Tayside site and its launch in August 2015. We gained feedback on how it had eased the transition for new doctors to NHS Tayside, as well as feedback on user satisfaction, site layout, accessibility, sustainability, and usability.

We also collated usage data on the site. Feedback demonstrated the site had been accessed 1055 times during August 2015. That FY doctors felt it had improved their efficiency on the wards, and that it was a highly beneficial resource. The junior doctors' handbook was praised on its sustainability, usability, layout, and accessibility.

Challenges with access to the site on smartphones were highlighted, as well as difficulty in accessing the guidelines offline. Feedback from users demonstrates the junior doctors' handbook has been a highly successful intervention, and it has vast scope to be expanded within and outside of NHS Tayside. Our future aim is to improve accessibility through smartphones via the creation of an app, and to develop this resource to being specialty specific.

See supplementary file: ds6598.docx - "Appendix 1. PDSA cycles - junior doctors' handbook"

Post-measurement

We designed, created, and implemented the junior doctors' handbook, which can be accessed at www.nhstjuniordoctorshandbook.scol.nhs.uk. Post intervention measurement was comprised initially of the collection of usage data from the site, before a survey was sent to new FY1 doctors from the August 2015 intake, gaining feedback specifically on user satisfaction, usability, accessibility, layout, and sustainability.

Usage data was collected for the month of August 2015, which showed that the junior doctors' handbook had been accessed 1055 times. The majority (831 out of 1055) of these visits had been on the "Day to Day" subheading of the site, which includes practical information for day to day life of the wards, including information on handover, ward rounds, discharging patients, e-portfolio, and the utilisation of computer systems.

Alongside this, post intervention measurement took the form of a survey which was sent to all FY1 doctors from the August 2015 intake, after the junior doctors' handbook had been launched during their induction week. Twenty three out of 96 FY1 doctors completed the survey. Twenty two out of 23 respondents (96%) felt the junior doctors' handbook was beneficial to have on starting their new job, and the majority (16 out of 23; 70%) stated that it improved their efficiency as a doctor. Twenty two percent of respondents stated they used the handbook on a daily basis, and 70% used it on a weekly basis. Ninety six percent found the handbook easily accessible from a computer, however only 55% found it accessible from a smartphone. Free text feedback highlighted that this was as due to the site being inaccessible without internet.

Data relating to user satisfaction was collated through qualitative feedback from the survey sent to junior doctors. There were many positive comments given, and this data demonstrated evidence of self reported improvements after utilising the junior doctors' handbook. Qualitative feedback was as follows:

- "Invaluable resource for starting work in a trust where I had never worked previously. It answered every possible question I could have had. I would have been lost without it."

- "Very helpful and relevant information, very grateful to have had it as it made the first few days of work so much better."

- "Lots of good information I wished I’d known sooner."

- "I am utterly shocked at how the online handbook covers every situation I could imagine could become a problem. I am gobsmacked at how extensive it is and it will be incredibly valuable."

There were a number of criticisms highlighted from our feedback; these were felt to not have been previously demonstrated, as the junior doctors surveyed in our post intervention measurement had not worked without the junior doctors' handbook in place. Previous feedback had been collated with the launch of the handbook, and hence was more positive. The main criticism with the junior doctors' handbook was its offline use on smartphones. A number of suggestions were made to create an app that could be downloaded and updated as appropriate, to prevent the need for Wi-Fi access. There were also many areas that were highlighted as potential areas for development; these included creating an area on the site for specific specialities, to improve the unreliable handover given between each four month job rotation; creating an area to "ask a junior doctor" questions; and also an area with more practical advice for starting work (eg with regards to team working, and challenging colleagues).

Lessons and limitations

Overall, there were limited setbacks to the project. There was good engagement from stakeholders, as it was clear this project was going to be an invaluable and sustainable resource that would benefit NHS Tayside for years to come.
The main challenge for the junior doctors’ handbook came with accessibility of the site. The site was initially inaccessible through NHS Tayside internet when hosted on the external website. The challenge came from the transition of moving the website from the external host on to the NHS Tayside website. The initial aim was to have the website based within the Tayside intranet “Staffnet” site, to therefore allow open access to the intranet guidelines also hosted within the Staffnet site; however, this unfortunately became too challenging and hence a decision was made for it to be hosted on NHS Tayside’s external website. There was immense time pressure to have the handbook incorporated into the site prior to the arrival of the new junior doctors to NHS Tayside, and with excellent support from the Medical Education Directorate and the IT staff this was completed. The site in its current form hosted on NHS Tayside’s external website has ongoing problems with accessibility to guidelines, as these are solely accessed through NHS Tayside’s desktop computers or its Wi-Fi. Guidelines are therefore inaccessible through smartphones or personal computers, and hence we aim to create a smartphone application to allow secure access to these guidelines. Our eventual aim is to incorporate this handbook into the Staffnet site, in order to finally solve these accessibility issues.

Another challenge faced was the vast amount of work needed to create the content for the handbook, as this was taken from personal experiences working within NHS Tayside. This information was collated and then reviewed by more senior clinicians; it therefore relied heavily on feedback, which was a timely process. In hindsight it would have been easier to develop and collate information using a variety of both junior and senior staff, along with a wider quality improvement team to create and implement the project. The aim is to continue to develop the junior doctors’ handbook by incorporating experiences from a variety of staff including senior clinicians, specialist nurses, and pharmacists, in order to create a resource that isn’t solely limited to use by junior doctors, but that could be used for doctors of all levels of seniority.

This project was also our junior doctors’ first quality improvement project, and hence there were a number of changes that in hindsight we would have implemented from the beginning. We hoped to improve junior doctor efficiency, allowing them to spend more time with patients rather than learning the intricacies and practicalities of the job. We have received extremely positive qualitative feedback, however we have limited quantitative feedback on the impact of the handbook. In retrospect we would have improved our quantitative measures through calculation of the time saved for junior doctors through the creation of our handbook, as well as measures relating to improvements in patient safety.

We had also underestimated the impact this project would have within NHS Tayside. Initially we had aimed to create this solely for foundation year doctors, however this was quickly expanded to include all junior doctors. It has been used, and continues to be used by junior doctors of all levels of seniority after its launch in August 2015, during their transition periods prior to starting work. Teaching sessions were delivered on the site and its use at both of these inductions. As well as this, the site has been introduced into the fourth and fifth year medical student curriculum at the University of Dundee.

Feedback highlights that the junior doctors’ handbook is continuing to be used by the majority of junior doctors on a minimum of a weekly basis; with support from NHS Tayside it is hoped that we can continue to expand and develop this invaluable resource. With regards to sustainability of the junior doctors’ handbook, in the short term we plan to continue to lead this project to address the issues raised regarding accessibility and usability offline, by developing this resource into a smartphone app as earlier discussed. We also hope to develop the handbook into being specific for each job rotation, to further expand the use of this resource. In the long term we plan to see our team expanded through the incorporation of more junior doctors; however, the ultimate responsibility for the maintenance, development, and upkeep of the junior doctors’ handbook will be taken by the East of Scotland Junior Doctor’s Forum, alongside support from NHS Tayside’s Quality Assurance Officer and IT departments. There is vast scope for further development of the junior doctors’ handbook within NHS Tayside, and this format also has the potential to be implemented further afield to other hospitals outside our health board.

Conclusion

Our aim was to improve the August transition period for new junior doctors to NHS Tayside through creation and implementation of a junior doctors’ handbook, which would provide information and practical advice on day to day life as a junior doctor. Through quality improvement and a number of PDSA cycles, we have created an easily accessible, sustainable, reliable, and updateable resource that most importantly has excellent user satisfaction. This resource has undoubtedly been a success and has potentially improved the efficiency of junior doctors, allowing them to spend more time on patient care rather than learning and relearning the intricacies and practicalities of their new job from scratch. There was a clear need for there to be a centralised hub of information, and the junior doctors’ handbook has become an invaluable resource for the new junior doctors in NHS Tayside. There is vast scope for this project to be expanded, and we hope to see this resource developed within and outside our health board in the future.

References

5. Davies M, Panchal S, Misra N. The Handbook: an end to ‘I wish I had known that before I started’. BMJ Qual Improv
Declaration of interests

We have read and understood BMJ policy on declaration of interests and declare that we have no competing interests.

Acknowledgements

Craig Butler, Jordan Napier, Karen Lambie, Dr Emily Ward, Tayside’s IT Services, Dr Neil McGuchan and the East of Scotland Junior Doctor’s Forum, and all colleagues who provided feedback and completed questionnaires.

Ethical approval

The work being reported was deemed exempt from ethics review according to local policy.
Junior Doctor's Handbook : PDSA Cycle 1

Aim: What are you trying to accomplish?

- To improve the transition period for new junior doctors to NHS Tayside through creation of a Junior Doctor’s Handbook to provide information and practical advice on day to day life as a junior doctor, and to implement this by August 2015.
- To survey junior doctors prior to the implementation of the handbook to establish what information they wished they had known prior to starting work and what information they would like to see included in a handbook.

Plan: What will your test be?

- To send a questionnaire to Foundation Year 1 (FY1) doctors prior to the launch of the Junior Doctor’s Handbook to assess what information they wished they had known prior to starting work, and also what information they would like to see included in a handbook.

Prediction: What do you think will happen as a result of your test?

- Information and practicalities specific to working as a junior doctor in NHS Tayside will be highlighted as information that is essential to be included in a handbook.
- Those completing the survey will agree that a Junior Doctor’s Handbook would be an invaluable resource for them and for new doctors arriving to NHS Tayside.

Do: What happened when you carried out your test?

- All Foundation Year 1 doctors who started working in NHS Tayside from August 2014 were invited to partake in an online questionnaire regarding how prepared they felt on starting work, which areas they felt unprepared with and what information they would have liked to know prior to starting work.
- 97% of those surveyed felt that a handbook would have been useful for starting work. Participants felt they were unprepared in utilizing computer programmes, performing administrative tasks, handing over information and making referrals.
- Numerous suggestions for information to be included in the handbook were given.

Study: How did the results of your test compare with predictions?

- Our results were in keeping with what was predicted in that nearly all of those surveyed felt that a handbook containing key information topics relating to their new job would be essential to have prior to starting work as new doctors.
- Improving induction to NHS Tayside in the form of a Junior Doctor’s Handbook would therefore improve patient safety.

Act: How will you change your previous test in light of what you have learned?

- We aimed to create and develop an easily accessible, sustainable and reliable Junior Doctor’s Handbook as online resource through an external website server “www.wix.com”.
- We then aimed to gain feedback from a focus group of junior doctors and from other medical colleagues regarding the handbook before launching the finalised site in August 2015 for the arrival of new junior doctors.

Junior Doctor’s Handbook : PDSA Cycle 2
Aim: What are you trying to accomplish?

- To gain feedback from both junior and senior doctors regarding the introduction of the Junior Doctor’s Handbook on external website host wix.com regarding its content, usability, accessibility and layout.

Plan: What will your test be?

- To hold a junior doctor focus group for feedback with 6 Foundation Year 1 doctors from the August 2014 intake.
- To send an email with the website link to relevant clinicians, staff involved in the induction week teaching and relevant senior clinicians in each specialty asking for feedback on the site.

Prediction: What do you think will happen as a result of your test?

- We hoped that doctors would find this an invaluable resource containing useful information relevant to starting work and to working in NHS Tayside. Given that it had been designed by fellow junior doctors with the aim of creating a sustainable and accessible centralized hub of information specific for new doctors, we hoped this would be reflected in the feedback.

Do: What happened when you carried out your test?

- Numerous clinicians provided feedback on the site, and feedback was gained from the FY focus group.
- Their responses were extremely positive, and they all stated that the handbook would have been an invaluable resource to have prior to starting work. Criticism came with its usability and accessibility on NHS computers.

Study: How did the results of your test compare with predictions?

- The feedback was again in keeping with our predictions however demonstrated that the Junior Doctor’s Handbook had been more successful than we had anticipated. Feedback regarding its content was highly complementary. Numerous suggestions from junior doctors and from senior clinicians were advised.
- Feedback regarding its usability on NHS computers is not something we had initially anticipated as a problem, however highlighted that the external website host “wix.com” was incompatible with NHS Tayside’s intranet.

Act: How will you change your previous test in light of what you have learned?

- Our positive feedback highlighted a need for our intervention to be implemented and also highlighted a number of suggestions to improve its content prior to its launch in August 2015.
- Feedback also demonstrated the need to incorporate the Junior Doctor’s Handbook content into NHS Tayside’s own website as the site was difficult to access in its current format using NHS Tayside internet, and there was also no access to guidelines using the external website host.

Junior Doctor’s Handbook : PDSA Cycle 3
Aim: What are you trying to accomplish?

- To assess how our intervention in the form of the Junior Doctor’s Handbook has eased the transition period for new junior doctors arriving to NHS Tayside, to gain feedback on the site after its incorporation into the NHS Tayside site on user satisfaction, site layout, accessibility, sustainability and usability.

Plan: What will your test be?

- To launch the Junior Doctor’s Handbook during the induction periods for new junior doctors in August 2015 in NHS Tayside and to deliver a teaching session on its use to the Foundation Year doctors.
- To send a survey to new FY1’s to assess what impact the Junior Doctor’s Handbook has had on their transition to starting work in NHS Tayside.

Prediction: What do you think will happen as a result of your test?

- Our predictions were similar to previous, the aim was that the Junior Doctor’s Handbook would be an invaluable resource for junior doctors starting work in NHS Tayside, allowing them to focus time on patient care rather than spending time
- We also predicted that in its new format, being incorporated to the NHS Tayside website that it would be more accessible than previous.

Do: What happened when you carried out your test?

- All new FY1 doctors from the August 2015 intake were invited to participate in an online survey asking for their feedback on the Junior Doctor’s Handbook including how the handbook had benefitted them, what they found useful, and what was not useful. This also offered feedback on areas for expansion on the site.
- The response was highly complementary, with 96% of FY1’s stating the handbook was beneficial to them starting on the ward. Again numerous suggestions for improvements were given. The handbook was praised on its accessibility from NHS computers however feedback was given regarding having available in non-Wi-Fi areas.
- We also collected usage data that demonstrated that the site had been accessed 1055 times during August 2015.

Study: How did the results of your test compare with predictions?

- Our results were in line with our predictions, with the majority of doctors stating that the Junior Doctor’s Handbook was beneficial. Most were using the handbook on a weekly basis (minimum), and stated they would continue to do so.
- The content, layout and accessibility was praised, however most stated accessibility was challenging from a smartphone.
- The Junior Doctor’s Handbook has improved the efficiency of junior doctors, is beneficial, and allows them to spend time focusing on patient care rather than intricacies of the job.

Act: How will you change your previous test in light of what you have learned?

- Feedback on the Junior Doctor’s Handbook demonstrates that it has been a highly successful intervention. There is vast scope for it to be expanded within and out with NHS Tayside.
- Our future aim is to see the Junior Doctor’s Handbook becoming specialty specific, to be developed into an accessible app for smartphones, and also to see its role within our trust expanded.
Improving the recognition of post-operative acute kidney injury

Nicola Trotter, Cal Doherty, Vicki Tully, Peter Davey, Samira Bell
NHS Tayside, Scotland

Abstract

The National Institute for Health and Care Excellence (NICE) state that acute kidney injury (AKI) is seen in 13-18% of all people being admitted to hospital and that other patients will further go on to develop AKI during their time in hospital, with around 30-40% being in the operative setting. AKI has an estimated inpatient mortality of 20-30% in the UK and can lead to long-term morbidities like chronic kidney disease.[2]

AKI is under-recognised and badly managed despite its prevalence and seriousness, with NCEPOD report stating that only 50% of patients with AKI received good care, that there was poor assessment of risk factors for AKI, and there was an unacceptable delay in recognising post-admission AKI in 43% of patients.[4]

Baseline data collected on the urology ward in Ninewells Hospital, showed that only five of 22 (23%) patients undergoing urological surgery had post-operative creatinine measured on the ward within 48 hours (the primary method for detecting AKI). Excluding patients who were discharged the same day 5/16 (31%) received the blood test.

The aim of the project was to increase the number of patients returning to ward 9 post-surgery who receive a serum creatinine measurement within two days of their urological surgery, excluding daycases. Specifically, we wanted the reliability of this measurement to be 95% or over in ward 9 by 30 July 2014.

This was to be done by raising awareness around AKI on ward 9 and changing protocol so that every patient staying on ward 9 beyond their day of surgery should receive a post-operative creatinine. This would be tested for a set amount of time to see if patients with AKI were being missed.

Despite not being able to implement a set protocol, the percentage of patients receiving post-operative creatinine measurements on ward 9 after a urological surgery still increased significantly. By interacting with the urology team and presenting our data, the knowledge and comprehension of the problem was altered. This lead to a change in culture and a significant increase in the number of post-operative creatinine measurements being taken. Through building relationships on the ward and sharing our data and knowledge there was an increase from 27% of patients receiving post-op creatinine in our first week of collecting data, to 87% in our last week on ward 9. However, without a set tool or change in protocol this change appears to have not been sustainable as the percentage dropped to 42% two weeks later.

Problem

Acute kidney injury (AKI) is a serious health condition and is associated with an increased hospital stay, higher risk of hospital mortality, and an increased risk of progression to chronic kidney disease (CKD).[1] Patients undergoing surgery can go on to develop AKI post-operatively, particularly if additional risk factors are present.[2]

Postoperative AKI can be detected, by comparing pre-operative and post-operative creatinine levels, as well as closely monitoring urine output.[2] An early and effective management plan can then be implemented to improve recovery and reduce short and long term complications.[2]

A study in the Tayside area, supported by Scottish Government's HAI Task Force, investigated the possibility that changes in gentamicin prescription had the unintended consequence of increasing postoperative acute kidney injury (AKI).[3] The study unveiled that a significant proportion of patients were developing AKI: >10% of patients undergoing gastrointestinal, orthopaedic, vascular, and urology procedures. It also found that patients were developing AKI after their operation, regardless of gentamicin prescription, and that this was not identified due to gaps in postoperative creatinine measurement. One observation of this study was that only around 55% (n=360) of patients undergoing urological surgery received a post-operative creatinine measurement. This is seen to be unacceptable by the renal team who say that the majority of these patients should receive a routine post-operative creatinine measurement as their urological surgery puts them at risk of developing AKI. The majority of these patients will receive prophylactic gentamicin, may be fluid restricted and may have prolonged urinary obstruction further increasing their risk of developing AKI.

Background

A 2009 report by the UK National Confidential Enquiry into Patient
Outcome and Death (NCEPOD) reported that only 50% of patients with AKI received good medical care, that there was poor assessment of risk factors for AKI, and there was an unacceptable delay in recognising post-admission AKI in 43% of patients.

In light of this report, the National Institute for Health and Care Excellence (NICE) produced guidelines on AKI in 2013. They stated that AKI is seen in 13-18% of all people being admitted to hospital and other patients will go on to develop AKI during their time in hospital, with around 30-40% being in the operative setting.

Despite this welcome increase in research and awareness of AKI, knowledge and understanding on wards still seems to be suboptimal and this may be leading to inadequate recognition and treatment of AKI. Quality improvement projects published via BMJ Quality Improvement Reports, namely 'Acute Kidney Injury: It's as easy as ABCDE', and ‘Improving the management of Acute Kidney Injury in a District General Hospital: Introduction of the DONUT bundle', both demonstrate and promote the effectiveness of increased awareness and education of staff to improve the prevention, detection and management of AKI.[5,6]

Although this a summer project which will be working primarily with patients undergoing urological surgical procedures, it is part of a greater initiative undertaken at Ninewells Hospital and nationally to improve care around AKI, including improvements to the E-Alert system and the development of Tayside AKI guidelines.

Baseline measurement

Measures in the pre-operative and post-operative setting were considered. The first measure was the number of patients, who were undergoing urological surgical procedures, who had had their preoperative creatinine checked within three months of their surgery. Three months is considered valid, when comparing with post-operative creatinine.[2]

The second measure was the number of patients that were undergoing urological surgical procedures who had had their postoperative creatinine measured within 48 hours, as per the recommended time frame.[2] This second measure was divided into patients who returned to ward 9 (urology ward) and remained in hospital for only their day of surgery, one day after their day of surgery, and two or more days after their day of surgery. Patients who returned to the day surgery unit or to other wards were also included in these measures.

These measures were collected by using the online collecting and reporting system ICE and clinical portal. The baseline data was collected for one week. Twenty-four patients were scheduled to have urological surgery during this week. Two patients surgeries were postponed, and data was collected from the remaining 22.

All bar two patients received a pre-operative creatinine measurement. Sixteen of 20 (80%) patients had their pre-operative creatinine measured within three months of their operation.

Post-operatively only 5/22 (23%) had their creatinine measured within 48 hours. Of the 15/22 patients who returned to ward 9 only 4/15 (27%) patients had post-operative creatinine measured on the ward within 48 hours. All patients that received the blood test stayed two or more days after their surgery. However, still only 4/8 (50%) of patients who stayed more than two days received the blood test. Zero out of seven patients that were discharged the same day (n=4) or the following day (n=3) had their serum creatinine measured. Two additional patients received the blood test within seven days, however this was in primary care and was not related to the urological surgery.

This data indicated that there may be problems in both the preoperative and postoperative systems. Furthermore these shortfalls may be leading to reduced recognition of AKI.

See supplementary file: ds4337.pptx - “Attachment 1- Baseline Data and Process Maps.”

Design

The aim of our intervention is to increase the number of patients returning to ward 9 for over one day post-surgery who receive a serum creatinine measurement within two days of their urological surgery. Specifically, we want the reliability of this measurement to be 95% or over.

The first intervention was to engage with key stakeholders and staff to explain the project and increase their awareness of the problem. This would be conducted through arranging meetings with key staff members and talking to staff on the ward. The aim of this would be to gain approval and cooperation to implement a change in protocol and ensure that a change is sustainable.

A change in protocol on the ward would then be implemented so that all patients who stay beyond their day of surgery receive a serum creatinine measurement. This would be implemented for a set amount of time (four to six weeks) as a test for change, to observe whether there was an increase in creatinine measurements and an increase in recognition of AKI.

Possible changes to phlebotomy and to ward 9’s discharge system would also be considered; this would be to ensure that patient’s discharge was not unnecessarily delayed and to minimise the potential strain that this change could have on the system as a whole. These include:

1. Improving the use of the pneumatic tube pipelines present on ward 9 that can transport vacutainers straight to blood sciences for analysis by increasing the number of capsules available to ward 9. Presently, vacutainers are sent to blood sciences once the phlebotomist has finished the run, delaying when blood results can be returned
2. Revising the run order the phlebotomy service take when moving from ward to ward. Presently the run order starts in ward 7 and then 8, 9, and 10. Ward 7 is the acute surgical receiving ward and would have to remain first, however if ward 9 were to follow this would mean blood would be obtained sooner
3. Changing the discharge protocol on ward 9 whereby patients who are expected to be discharged that day remain in hospital until blood results return.

A management plan is set for the patient if AKI is found, depending on the stage. They are still discharged if at stage 1 and the patient is fit, and receive a repeat blood test in primary care. If stage 2 or 3 the patient must remain in hospital for further observation and the renal team should be notified (process map 5).

Data collection will be continued to assess whether there has been any improvement and to increase our evidence base in each category of patients.

Strategy

The first PDSA cycle's aim was to collect data surrounding patients undergoing urological surgery for one week and develop a tool to easily collect the data. This data will show how many patients receive a post-operative creatinine after their urological operation and when this blood test occurs. The process for collecting data was improved and the amount of time needed to collect a weeks worth of data was reduced, mainly through the use of online systems like ICE and clinical portal (process map 6). The predicted conclusion that not enough patients were getting their post-operative creatinine measured was proven through the data collected. This allowed us to begin creating possible interventions to improve this.

The second PDSA cycle's aim was to raise awareness of the problem, identified by the data collected among key stakeholders and members of staff. This included increasing knowledge of AKI on the ward and gaining approval and cooperation to implement a change in protocol. Inclusion of enthusiastic members of staff who could play an active role in the project was an additional aim. This was achieved by arranging meetings with key individuals who were able to implement a change in protocol and spread awareness throughout their team.

Engaging and raising awareness among staff on ward 9 was successful, particularly among junior doctors and specific nurses, because we were present on ward 9 and so working relationships developed. However, we endured a great deal of resistance when we tried to engage other key stakeholders, such as the urological consultants. They put in place several barriers such as requesting ethical consent and it was challenging to arrange a meeting with them.

However, a stark increase in the number of postoperative creatinine measurements occurred which we believe was due to the Hawthorne Effect. Our presence on ward 9 and the awareness raised seemed to result in staff trying to improve the system themselves and hence a much greater improvement occurred than expected. There was an increase of postoperative creatinine measurements, from 38% in the baseline to an average of 98% over the four week period in patients who stayed two or more days beyond their day of surgery. Patients who were discharged the day after their day of surgery also showed an improvement; from 0% to an average of 40%.

In order to ensure this change was sustainable, our next PDSA cycle's plan was to change the protocol surrounding post-operative creatinine measurements in patients undergoing urological surgical procedures who stay in hospital for more than one day after their day of surgery. Despite the approval and agreement from key stakeholders for the intervention, further delays in the organisation of multidisciplinary meetings meant there was no time left to implement a formal change as backing from key stakeholders was necessary.

Therefore, the original change in postoperative creatinine observed began to decrease as our presence on ward 9 decreased. There was also a change in junior doctor staffing which would also explain this reduction. However, by returning to the ward and explaining our project to new staff, the percentage of patients who stayed over two days post-operative and who received a post-operative creatinine, rose to 100% again. We hope by continuing to meet with key stakeholders and by passing the project on to other members of the team that we have engaged with, the percentage of patients receiving a postoperative creatinine will once again rise.

See supplementary file: ds4338.docx - “Attachment 2- PDSA Cycle Summary.”

Post-measurement

Seven weeks of data was collected, including the first week's baseline measurement. The data collected was the number of patients that were undergoing urological surgical procedures who had had their post-operative creatinine measured within 48 hours of surgery. It was collected using the data collection tool devised, using online clinical systems like ICE and clinical portal.

This was then analysed. Firstly all together (run chart 1) excluding day-case patients, then split into patients who were discharged the day after their surgery (run chart 2) and patients who stayed two or more days after their surgery (run chart 3). Due to fluctuating patient numbers per day, this data was analysed per week.

The data was then organised into run charts and changes were noted and improvements or regressions were explained.

See supplementary file: ds4340.docx - “Attachment 3- Runcharts”

Lessons and limitations

A multidisciplinary team approach to improving the number of patients who receive a post-operative creatinine may have improved the success of the project. We formed a strong relationship with the staff on the urology ward but did not spend a lot of time engaging with other stakeholders. In hindsight, engaging all the stakeholders at the beginning may have reduced several barriers we faced. Instead of focusing simply on the team on the ward that we were in contact with on a daily basis, it is important to identify the full team and engage all members early on in the project. 
and organise multidisciplinary team meetings and discussions so everyone is in agreement.

Moreover, tackling a large project and then trying to scale the problem down in order to focus on a specific area is challenging as it is difficult to know which route to follow and there is a sense of feeling that you should be tackling all areas needing improved (i.e pre-assessment clinic, day surgery unit, ward 9). Therefore, understanding the problem and defining a focused goal at the beginning of the project would be beneficial.

**Conclusion**

There are many factors that contribute to the low percentage of patients receiving post-operative creatinine measurements. By interacting with the urology team and presenting our data, the knowledge and comprehension of the problem was altered. This lead to a change in culture and a significant increase in the number of post-operative creatinine measurements being taken. However, without a set tool or change in protocol it is unclear whether this change will be sustained. It is difficult to know whether the provision of real-time feedback and constant monitoring may be the main driver of this change.

**References**


**Declaration of interests**

NHS Tayside Added Costs of Teaching (ACT) funding each for a six week vacational scholarship.

**Acknowledgements**

Mr Andrew Martindale, Ms Morag MacRae.
Run Chart 1 (all patients – excluding day-case patients);

<table>
<thead>
<tr>
<th>Week of Surgery</th>
<th>Number of Patients who stayed 1 or more Days Post-op.</th>
<th>Number of these patients who received a SrCr in 2 days.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/5</td>
<td>11</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>16/6</td>
<td>10</td>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>23/6</td>
<td>14</td>
<td>9</td>
<td>64</td>
</tr>
<tr>
<td>30/6</td>
<td>7</td>
<td>6</td>
<td>86</td>
</tr>
<tr>
<td>7/7</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>14/7</td>
<td>12</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>21/7</td>
<td>9</td>
<td>4</td>
<td>44</td>
</tr>
</tbody>
</table>
Run Chart 2;

<table>
<thead>
<tr>
<th>Week of Surgery</th>
<th>Number of Patients who stayed 1 Day Post-op.</th>
<th>Number of these patients who received a SrCr</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/5</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16/6</td>
<td>5</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>23/6</td>
<td>5</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>30/6</td>
<td>2</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>7/7</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>14/7</td>
<td>10</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>21/7</td>
<td>6</td>
<td>1</td>
<td>16</td>
</tr>
</tbody>
</table>
Run Chart 3;

<table>
<thead>
<tr>
<th>Week of Surgery</th>
<th>Number of Patients who stayed 2 or more Days Post-op.</th>
<th>Number of these patients who received a SrCr in 2 days.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/5</td>
<td>8</td>
<td>3</td>
<td>38</td>
</tr>
<tr>
<td>16/6</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>23/6</td>
<td>9</td>
<td>8</td>
<td>89</td>
</tr>
<tr>
<td>30/6</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>7/7</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>14/7</td>
<td>2</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>21/7</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>
**PDSA Cycle 1**

**Aim:** what are you trying to accomplish?

The aim is to collect data around patients undergoing urological surgeries from Monday to Friday of the week beginning 12/5/2014. This data will show how many patients receive a post-operative creatinine after their urological operation and when this blood test occurs.

**Plan:** what will your test be?

In order to collect this data a table has been devised which will be filled in with the correct information. Data will be collected on a daily basis so it can be reviewed at the end of each day to assess whether the data collection tool worked effectively.

**Prediction:** what do you think will happen as a result of your test?

1. The majority of patients will receive a pre-operative serum creatinine.
2. Only a minority of patients will receive a post-operative serum creatinine.
3. The majority of patients will not receive gentamicin prophylaxis due to risk of renal failure.
4. The data required will all be stored in the patient's notes.

**Do:** what happened when you carried out your test?

Post-operative creatinine does not occur routinely and is not recorded in patients' notes. In order to find out whether this measurement has been taken, we needed to access the ICE data base to search for blood results using the patient's CHI number. The original plan was time consuming and did not allow for us to collect the data we needed. Firstly, as stated above the patients' notes did not contain all the information we needed so we had to start using ICE. Furthermore, following each patient and finding their notes was very time consuming. To increase our efficiency we attended the anaesthetic meetings in the morning to find out what antibiotic prophylaxis the patients were on. More over, we discovered we could use clinical portal to access the pre-assessment form and so did not need to obtain this from the patient's notes either.
**Study:** how did the results of your test compare with predictions?

The majority of patients did receive a pre-operative serum creatinine, however a great disparity over the length of time before patients’ operations and when they last received a creatinine measurement was noted. Only a minority of patients received a post-operative serum creatinine. After analyzing the results distinct correlations between the percentage of patients receiving a creatinine measurements with how long they remained in hospital for was observed. The majority of patients did receive gentamicin prophylaxis. A previous study carried out in NHS Tayside had shown gentamicin did not show an associated increased risk of acute kidney injury but it also raised concerns about background risk of acute kidney injury and its lack of recognition in Ninewells Hospital. This was echoed in our results as no correlation could be made between gentamicin and AKI as there was not enough post-operative serum creatinine measurements being carried out. Hence it was decided to focus on increasing the awareness of postoperative acute kidney injury and to increase the number of postoperative serum creatinine measurements carried out instead of focusing on gentamicin use. We found that results and forms are not reliably stored in patients' paper records and results such as blood tests are stored more reliably on the ICE computer system and this is the most efficient way to access these results. This realisation increased our time efficiency as well as result accuracy and is a lesson that will be very useful in the future.

**Act:** how will you change your previous test in light of what you have learned?

It was clear there is a major problem with patients receiving a post-operative creatinine measurement. Therefore, several changes need to occur. We would like to raise awareness of post-operative AKI in order to increase clinicians knowledge and culture surrounding this condition as this will provide an increase in U+Es being carried out. Moreover, in order to maintain a sustained increase in postoperative creatinine measurements we are going to work with the team to create a new protocol outlining which patients should be receiving a postoperative creatinine. In order to do this we will need cooperation from all members of the team; blood scientists, phlebotomists, urological consultants, FYs and the charge nurse etc.

Continued data collection should also continue, to note any changes from the first week of data as well as having data from a larger group of patients to further prove our prediction and increase our evidence base.
PDSA Cycle 2

Aim: what are you trying to accomplish?

The aim is to raise awareness of the problem, identified by the data collected, amongst key stakeholders and members of staffs. To increase knowledge of AKI on the ward and gain approval and cooperation to implement a change in protocol. Inclusion of enthusiastic members of staff who could play an active role in the project, is an additional aim. Due to the limited time frame, this should be achieved in one week.

Plan: what will your test be?

The findings of the project will be explained and the call for a change in protocol suggested to specific individuals whose cooperation would be vital in implementing a change. This includes key members of the urology, phlebotomy and blood science team. This would be done through arranging meetings with these individuals. The project and its findings so far will also be explained on the ward, to raise awareness of the problem and identify enthusiastic members of staff.

Prediction: what do you think will happen as a result of your test?

1. There will be a varying response and enthusiasm from staff member, which will include some resistance to change.
2. Members of staff will be identified, on ward 9, who could play an active role in implementing further change
3. Cooperation and approval will be achieved from key stakeholders
4. This will be achieved in a short amount of time
**Do:** what happened when you carried out your test?

Engaging and raising awareness with staff on ward 9 was successful. Particularly amongst the junior doctors and specific nurses. Due to our presence on ward 9, we were able to build relationships with the staff, which made it easier and more effective to discuss our project with them.

Unfortunately we faced a lot more resistance from key stakeholders than expected. Although there was understanding of the problem, several barriers were raised to implementing a change in protocol.

Although agreement was eventually reached, the process of contacting individual and arranging meetings was much more difficult and took a lot more time than expected, around 4-5 weeks.

Through this time, however, a significant change was noted from our data collected. There was a huge increase of patients receiving a post-operative creatinine within 48 hours, in patients who discharged the day after their surgery as well as patients who remained in hospital for more than the day after their day of surgery.

**Study:** how did the results of your test compare with predictions?

An increase of postoperative creatinine measurements, from 38% in the baseline to an average of 98% over the 4 week period, was observed in patients who stayed 2 or more days beyond their day of surgery. Patients who were discharged the day after their day of surgery also showed an improvement; from 0% to an average of 40%. We believe this is due to the “Hawthorn Effect”. Our presence on ward 9 and the staff being aware of what were doing, meant that they tried to improve the system themselves. This is a much greater improvement than we imagined when planning the test.

The unpredicted difficulty in both getting in contact and arranging discussions with stakeholders as well as gaining approval and cooperation had a significant impact on the project as a whole. Although agreement and cooperation was eventually substantial enough to move the project on, successful implementation became less likely as we were coming to an end of the projects allocated time.

This unexpected setback also had an effect on being able to include enthusiastic team members in the project. Although junior doctors, were identified, who seemed willing to play an active role, their placement on urology was also coming to an end and therefore would not be able to assist in the implementation of the change in protocol.
**Act:** how will you change your previous test in light of what you have learned?

Our next test is to attempt to implement a change in protocol with the time available. Successive junior doctors will be engaged. Data will continue to be analysed to test whether the improvement has been sustainable.
**PDSA Cycle 3**

**Aim:** what are you trying to accomplish?

Increase the percentage of patients who return to ward 9 for one or more days after a urological surgery who receive a postoperative creatinine measurement. Specifically, we want the reliability of this measurement to be 95% by the end of our project 14 July 2014.

**Plan:** what will your test be?

A change in protocol will be implemented that all patients undergoing urological surgical procedures who stay in hospital for more than 1 day after their day of surgery receive a post-operative creatinine measurement. This will be implemented for 4-6 weeks to test whether an increased number of patients are found to have developed AKI.

**Prediction:** what do you think will happen as a result of your test?

5. AKI will be found in a greater percentage of patients.
6. Some pressure may be put on the systems affected which will require additional changes.
7. The intervention may be delayed and/or passed on, as the project came to a close.

**Do:** what happened when you carried out your test?

Despite the approval and agreement from key stakeholders for the intervention, further delay in organisation of multidisciplinary meetings and mutual understanding was not achieved. This led to it not being possible in the time left to implement a formal change in protocol on ward 9.

During this time, the improvement originally observed in the number of patients receiving a post-operative creatinine measurement decreased.
**Study:** how did the results of your test compare with predictions?

During the last 2 weeks of the project not only was our presence on ward 9 less, but there was also a change in junior doctors on the ward. This most likely explains the reduction in percentage patients receiving post-operative creatinine measurements. Unfortunately the improvement we made through raising awareness was not sustainable.

The time taken to engage with all important groups and individuals was underestimated, possibly due to resistance but also other commitments.

**Act:** how will you change your previous test in light of what you have learned?

Our assessment of patients undergoing urological surgical procedures in the pre-operative and post-operative setting will be taken up by various members we brought together in a hope to do the test for change in ward 9 and if it works attempt it on other wards where there may be a problem with AKI. There will also be continued advice provided on the test for change.
# Improving the Recognition of Post-operative Acute Kidney Injury.

## Baseline Data: Data Collected for patients undergoing urological surgical procedures from 12th - 16/5/2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Procedure</th>
<th>Date of PAC</th>
<th>Date of pre-op Scr</th>
<th>Pre-op Scr</th>
<th>Surgery</th>
<th>Discharge</th>
<th>Ward</th>
<th>Date of post-op Scr</th>
<th>Post-op Scr</th>
<th>AKI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TURBT +/- MMC</td>
<td>22/4/14</td>
<td>2/4/14</td>
<td>98</td>
<td>12/5/14</td>
<td>19/5/2014</td>
<td>9</td>
<td>15/5</td>
<td>90</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>Right extraperitoneal nephrectomy</td>
<td>No result</td>
<td>12/5/14</td>
<td>244</td>
<td>12/5/14</td>
<td>Ward 31</td>
<td>9</td>
<td>13/5</td>
<td>341</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>GA Cytoscopy + biopsies</td>
<td>4/11/13</td>
<td>4/11/13</td>
<td>65</td>
<td>12/5/14</td>
<td>12/5/14</td>
<td>DSU</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>TURBT</td>
<td>9/4/14</td>
<td>29/3/14</td>
<td>64</td>
<td>12/5/14</td>
<td>13/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Circumcision + HoLEP</td>
<td>16/01/14</td>
<td>16/01/14</td>
<td>111</td>
<td>13/5/14</td>
<td>15/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>PDD Check cystoscopy</td>
<td>postponed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>BNI/HoLEP</td>
<td>20/03/14</td>
<td>17/03/14</td>
<td>99</td>
<td>13/5/14</td>
<td>14/5/14</td>
<td>9</td>
<td>19/5 (GP)</td>
<td>101</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>HoLEP</td>
<td>28/4/14</td>
<td>28/4/12</td>
<td>68</td>
<td>13/5/14</td>
<td>14/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Left FURSL</td>
<td>2/04/14</td>
<td>4/03/14</td>
<td>None</td>
<td>13/5/14</td>
<td>14/5/14</td>
<td>DSU</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Rigid cystoscopy + EUA</td>
<td>12/05/14</td>
<td>9/04/14</td>
<td>61</td>
<td>14/5/14</td>
<td>14/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>GA endoscopy + balloon dilatation of conduit diversion stoma.</td>
<td>7/05/14</td>
<td>5/02/14</td>
<td>116</td>
<td>14/5/14</td>
<td>14/5/14</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>TURBT</td>
<td>30/04/14</td>
<td>14/03/14</td>
<td>66</td>
<td>14/5/14</td>
<td>15/5/14</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>TURBT</td>
<td>25/04/14</td>
<td>12/03/14</td>
<td>82</td>
<td>14/5/14</td>
<td>15/5/14</td>
<td>17</td>
<td>20/5 (GP)</td>
<td>74</td>
<td>N</td>
</tr>
<tr>
<td>14</td>
<td>Change left ureteric stent</td>
<td>12/03/14</td>
<td>21/02/14</td>
<td>187</td>
<td>14/5/14</td>
<td>14/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Circumcision</td>
<td>25/02/14</td>
<td>13/11/13</td>
<td>62</td>
<td>14/5/14</td>
<td>14/5/14</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>16</td>
<td>Right FURSL</td>
<td>2/04/14</td>
<td>2/04/14</td>
<td>61</td>
<td>14/5/14</td>
<td>15/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>17</td>
<td>Exchange of bilateral sten + cystoscopy/Bx +/- TURBT</td>
<td>2/05/14</td>
<td>2/05/14</td>
<td>140</td>
<td>15/5/14</td>
<td>19/5/14</td>
<td>9</td>
<td>16/5</td>
<td>139</td>
<td>N</td>
</tr>
<tr>
<td>18</td>
<td>Diagnostic Rt FURS +/- Bx +/- Lithotripsy TCI</td>
<td>No result</td>
<td>14/5</td>
<td>56 (14/5)</td>
<td>15/5/14</td>
<td>Transfer to RV</td>
<td>DSU</td>
<td>17/5</td>
<td>86</td>
<td>Y</td>
</tr>
<tr>
<td>19</td>
<td>Lt FUR +/- Endoyelotomy +/- exchange of stent - TCI</td>
<td>10/03/14</td>
<td>10/03/14</td>
<td>80</td>
<td>15/5/14</td>
<td>15/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>Postponed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>21</td>
<td>Ureteroscopic Stone Extraction</td>
<td>7/02/14</td>
<td>6/02/14</td>
<td>51</td>
<td>16/5/14</td>
<td>19/5/14</td>
<td>9</td>
<td>16/5</td>
<td>No result</td>
<td>-</td>
</tr>
<tr>
<td>22</td>
<td>Left ureteroscopy + lasertripsy</td>
<td>7/04/14</td>
<td>7/04/14</td>
<td>182</td>
<td>16/5/14</td>
<td>19/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>23</td>
<td>TURBT</td>
<td>18/04/14</td>
<td>18/04/14</td>
<td>63</td>
<td>16/5/14</td>
<td>19/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>24</td>
<td>GA cystoscopy + biopsy</td>
<td>4/02/14</td>
<td>23/01/14</td>
<td>223</td>
<td>16/5/14</td>
<td>19/5/14</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Pre-assessment Clinic; seen by nurse and pre-assessment form filled out – includes questions, examinations and investigations where indicated.

Traffic light system.

Anesthetist/FY/nurse

Surgery is agreed between the surgeon and patient. Initial section of pre-assessment form is filled out as well as a consent and waiting list form. Patient sent to pre-assessment clinic.

Start Time – Clock starts for 12 week target to surgery.

Pre-assessment reviewed by anesthetist.

Assessment of Renal Function;
- Criteria for U&E’s
  - >60
  - Diabetic
  - Antihypertensive medication
  - History of fluid loss
  - ASA 3 or more
  - Renal obstruction
  - Obstructive urological surgery
  - Major surgery
  - Clinical signs of dehydration
- 12 week old U&E results can be used
- eGFR - <30 = red, 30-60 = amber
- Chronic kidney disease is highlighted
- AKI risk is highlighted

Form valid for 6 months

Admitted for surgery; DSU/Ward 9

GREEN: Can be signed off by nurse

AMBER: reviewed by FY doctor

RED: Reviewed by anesthetist

Pre-assessment Clinic; seen by nurse and pre-assessment form filled out – includes questions, examinations and investigations where indicated. 12 week old Blood results can be used.

Urgent/drop-in/Booked appointment

Drop-in (no appointment)

Booked Appointment; Seen within 10 days

0-10 days
Process Map 2 - Simplified Pre-Surgery Process Map
Highlighting potential time lapse between pre-op Scr - Surgery

18 Weeks

From pre-op Scr to surgery;

Upto 12 weeks + 3 months = ~6 months
(this does not include periods of unavailability where the 12 week clock can be stopped)
Due to form being valid for 6 months, bloods could potentially be used upto 9 months ago
Process Map 3 - Urology Ward 9 Post-Surgery

1. DSU:
   - Nurse led-ward
   - Routine post-op obs.
   - Follow recommendations from surgeon and anesthetist
   - Same day discharge
   - No routine post-operative U&E’s

2. Ward 9:
   - Routine post-op obs.
   - Follow recommendations from surgeon and anesthetist
   - Same day
   - No routine post-operative U&E’s

3. Ward 9:
   - Routine post-op obs.
   - Follow recommendations from surgeon and anesthetist
   - Same next day discharge
   - No routine post-operative U&E’s

4. Ward 9:
   - Routine post-op obs.
   - Follow recommendations from surgeon and anesthetist
   - Routine U&E’s;
     - Major surgery
     - TURP
Process Map 4 - Phlebotomist Service on Ward 9

FY requests patients’ bloods to be taken the night before

Labels are printed for these blood requests for each ward

Phlebotomist has a set run of wards 7-10. Starts 8 a.m.

Phlebotomist collects labels from ward 9 (begins between 10am-12am)

Phlebotomist checks which bay the patients are in or if discharged

Portal System/Porter/end of run

Phlebotomist carries out a sweep of the ward to pick up any patients missed

If urgent Phlebotomist sends for Porter to bring bloods to lab

Phlebotomist sends bloods to lab via the ward portal system

Phlebotomist waits till the end of the run and sends bloods to lab

Phlebotomist takes bloods of patients who are in their beds

Phlebotomist moves onto next ward

Results return within 2-3 hours
Fish Bone Diagram 1 - Factors of Discharge Time on Ward 9

**Pharmacy**
- Pharmacist agreeing on discharge
- Medication available
- Time for pharmacist to collect medication

**Catheter (TURBT + TURP)**
- Removal 6 a.m
- Patient passes urine
- U.S. scan of bladder

**Transport**
- Time when ward assistant calls
- Ambulance waiting times
- Relative available

**Bed Availability**
- Moved to day room
- Number of discharges vs. new patients
- Busy ward

**DISCHARGE**
Process Map 5 - AKI guidelines for post-op AKI

Compare pre and post-op Scr Levels

- Stage 1
- Stage 2 or 3

Stage 1

Repeat sample in 2 - 3 days to ensure it has returned to baseline.

Stage 2 or 3

Discussed with renal registrar on call and refer to AKI guidance.
Process Map 6 - Collecting data

Request, from the ward assistant that an extra surgical list for the following day is printed off

Start – day 0

Retrieve surgical list from folder after its printed

After 3pm

Access ICE and Clinical Portal to access relevant information (see table). More specific information on data collection in word document

5mins per patient

Retrieve any missing data the following few days (e.g. Discharge date, post-op Scr). Day of discharge can either be accessed via clinical portal or the discharge book on ward 9.

<5mins per patient

Data input into table

2mins per patient
Improving Mental Status Questionnaire (MSQ) completion on admission to the Acute Surgical Receiving Unit (ASRU), Ninewells Hospital, Dundee

Sylvia Okwemba, Lauren Copeland
NHS Tayside

Abstract

Delirium is common yet poorly identified in the UK. Early recognition is a key prognostic factor; delay here being associated with: increased mortality, increased morbidity, prolonged hospital stay, long term disability, and increased risk of developing dementia. Improvement in the diagnosis and management of delirium has scope to improve patient care, clinical outcomes, and ultimately an improved patient experience. As patients aged ≥75 years are at an increased risk of developing delirium, we focused the improvement project to this age group.

The baseline data demonstrated that the average ≥75 year-old patient admitted to the Acute Surgical Receiving Unit (ASRU) at Ninewells Hospital had 5.4 out of 12 predisposing and precipitating risk factors for delirium; thus there was great potential for delirium to develop in these patients. During the analysis of the baseline data it became clear that we could not go ahead and implement the initial proposed improvement as the completion of the mental status questionnaire (MSQ) was inconsistent and low at 14.99%. Completion of the MSQ is vital in establishing any cognitive deficit at admission, and for providing a baseline for the continuing admission. As a consequence of this, we had to shift the main aim of the improvement project from improving the identification, diagnosis, and management of delirium, to improving the completion rate of the MSQ in our target age group.

Consultations with members of the admission team were held to determine ways of improving the MSQ completion rate. It became clear that the completion of the MSQ relied on clinical staff remembering all 10 questions that constitute the test. The main intervention to facilitate improvement involved affixing a sticker with all 10 questions of the MSQ within the admissions document. The main aim was to increase the percentage of cognitive screening by the Mental State Questionnaire (MSQ) to 95% in patients aged ≥75 on admission to ASRU at Ninewells Hospital by 11th July 2013.

We achieved our main aim with 100% compliance on two days. Our average compliance over six days was however 81.33%, whilst not reaching our target this is still a substantial improvement. The introduction of the sticker detailing the 10 MSQ questions within the ASRU admissions document was well received by the admissions team. It has simplified the process as members of staff do not need to rely on their memory to remember the questions, and the sticker also acts as a prompt for them to consider further cognitive screening.

Problem

Delirium is common yet poorly identified in the UK (1) with NHS Scotland making the identification and management of patients with delirium a national priority. Healthcare Improvement Scotland via “Improving Care for Older People in Acute Care” has been involved in running educational work within NHS Scotland to try and address the burden associated with the poor recognition, investigation, and management of delirium. Early recognition is a key prognostic factor; delay here being associated with: increased mortality, increased morbidity, prolonged hospital stay, long term disability, and increased risk of developing dementia (2-5). Ninewells Hospital is based in the outskirts of Dundee in the East of Scotland, and caters for a wide number of areas in Angus. It is an acute care tertiary centre and contains 862 staffed beds with a full range of healthcare specialties.

Baseline measurement

Prior to the collection of baseline data, a data collection tool was created to enable us to capture sufficient information to understand current clinical practice in ASRU. Our inclusion criteria for the collection of baseline data included: patients aged 75 years or over and patients admitted within a specified 24 hour period. The exclusion criteria included: patients <75 years of age, patients who are discharged or transferred to another hospital, and patients who died during their admission. The admission notes of 39 patients ≥75 years of age during a 10 day period were examined to elicit: the presence of common predisposing and precipitating factors of delirium, their mental status by documentation of the Mental Status...
The objective of our first PDSA cycle was to develop a tool to enable the collection of baseline data demonstrating the current identification, diagnosis, and management of delirium. We aimed to test the efficiency, usability, relevance, and reliability of the data collection tool within ASRU at Ninewells Hospital, Dundee. Due to limited access to patient notes, we needed to ensure that the tool could be completed accurately in good time (<10 minutes). The usability and reliability of the tool was important as it could be used in the future as a measure of improvement and it should be accessible to all members of staff regardless of training. The test would be performed on one patient initially; with the number of patients involved gradually being increased until we were satisfied that the tool fulfilled the parameters stated above.

The information we wanted to collect during this PDSA cycle included: the amount of time it took to fill in the tool, whether the tool could be filled in by any member of staff without prior training, whether the tool was sensitive enough to pick up the major precipitating and contributory factors, clinical features, diagnosis and management of delirium and whether different team members arrived at the same conclusion when filling the form in independently.

Whilst trialling our data collection tool, we observed that the clinical presentation for potential patients with delirium was often described in colloquial terms e.g. “off their legs”. We also observed that some of the major precipitating/contributory factors and clinical features recurred in patients but were missing from the tool (e.g. metabolic disturbance and hearing/visual impairment). The wording in certain sections of the first draft of the tool was ambiguous and compromised the usability of the form. We then had to tweak the original tool and develop multiple new drafts to overcome our observations. Initially, the completion of the tool took 22 minutes. We improved the general flow of the tool to compliment the layout of the patient notes; this dramatically improved the ease of obtaining relevant data. We removed the ambiguity of the language and also implemented a “tick box” format to reduce the writing load. This reduced the total time required to fill in the tool to 3.5 minutes.

Upon analysing literature around the subject, we decided to include a more exhaustive list of the precipitating/contributory factors for delirium in the tool. We also forwarded drafts of the tool to our clinical contacts with expertise on the topic to obtain more advice on the content of the tool. Initially, the diagnosis and management sections of the tool were integrated, but we later separated the two sections to enable us to collect more data on the management of delirium whilst maintaining clarity. Separating the diagnosis and management of delirium sections also enabled us to disregard the management section if the diagnosis of delirium was not made, increasing the relevance of the information collected. By the time we had a tool that ticked all the parameters we had set out, we had drafted a total of 11 tools. Using our completed tool, we were then able to collect baseline data on the identification, diagnosis and management of delirium in ASRU.

PDSA 2

When considering the underlying cause of this problem, it became clear that the completion of the MSQ score on the admissions document was inconsistent and low at 14.99%. To further explore this issue, we assessed the MSQ score for the patients included in the baseline data. Most of the scores fell between a score of 5-10 out a total of 10. According to local clinical guidelines, patients with an MSQ score of 7 or less require prompt re-evaluation by a senior clinician.

The plan was to initially introduce a sticker detailing the 10 MSQ questions to one member of the admissions team with the aim of allowing them to give feedback on its usability. Based on this feedback we had planned to then expand our test of change via inclusion of the sticker within the clerking document to be used by all members of the admission team on our target patient group. The main aim was to increase the percentage of cognitive screening by the Mental State Questionnaire (MSQ) to 95% in patients aged ≥75 on admission to the Acute Surgical Admissions Unit at Ninewells Hospital by 11th July 2013.

Strategy

See supplementary file: ds3425.docx - “Version 11 - Data Collection Tool”

Design

During the analysis of the baseline data, it became clear that we could not go ahead and implement a change to facilitate the identification of delirium as the MSQ completion rate was inconsistent and low at 14.99%. To further explore this issue, we assessed the MSQ score for the patients included in the baseline data. Most of the scores fell between a score of 5-10 out a total of 10. According to local clinical guidelines, patients with an MSQ score of 7 or less require prompt re-evaluation by a senior clinician.

The plan was to initially introduce a sticker detailing the 10 MSQ questions to one member of the admissions team with the aim of allowing them to give feedback on its usability. Based on this feedback we had planned to then expand our test of change via inclusion of the sticker within the clerking document to be used by all members of the admission team on our target patient group. The main aim was to increase the percentage of cognitive screening by the Mental State Questionnaire (MSQ) to 95% in patients aged ≥75 on admission to the Acute Surgical Admissions Unit at Ninewells Hospital by 11th July 2013.
The baseline data obtained from the first PDSA cycle clearly demonstrated that there was poor compliance amongst staff with completion of cognitive screening (MSQ) on patients aged 75 years and over on admission despite this being part of the admission documentation. During the first five day period of data collection, completion of the MSQ in the above age-group was 16.6% and in the second five day period, this dipped further to 13.3%. From this data, it was evident that there was no consistent practice in place to facilitate identification of cognitive impairment upon admission and as such, without the baseline information on a patient’s cognitive state, we decided that it would be unrealistic to introduce a screening tool to identify delirium at this stage.

The main objective of the second PDSA cycle was therefore to improve the percentage of MSQ assessments completed for the target patient group. Before we could identify a change to implement, we wanted to gain a greater understanding of reasons for the low compliance rate amongst the admissions staff team (junior doctors and advanced nurse practitioners - ANPs). We created a questionnaire and used this in the ward environment to capture data to answer the above question. Furthermore, we looked to other ward environments within Ninewells Hospital for inspiration. Using this qualitative data, we were able to identify an area for change. The feedback from staff centered around a lack of knowledge of the questions to use as these themselves were not included within the admissions document.

This PDSA cycle was focused on testing the addition of the MSQ questions as a sticker within the admissions document. The hope was that the sticker detailing the 10 questions would act as a prompt or aide-memoire to address the apparent knowledge deficit on the 10 MSQ questions. The sticker was first introduced to one member of the admissions team and with the aim of them providing feedback on its usability. Based on this feedback we hoped to expand our test of change via inclusion of the sticker within the admissions document to be used by all members of the admission team on our target patient group. Once that was done, we would continuously monitor the process utilising the data collection tool we developed in PDSA #1.

The information we aimed to collect included: the number of MSQs completed for patients aged 75 years and over on admission and qualitative data utilising a questionnaire to determine the number of staff trained on performing the MSQ, general awareness of the rationale behind the MSQ and how this relates to delirium. We also wanted to collect staff feedback on: the time it takes to complete the MSQ, whether completing the MSQ affected other aspects of the admission process and general staff satisfaction relating to this change.

When we initially implemented the change, we found that it was difficult to engage all staff involved in the admissions process due to the rapid turnover of staff, especially junior doctors who rotated around other surgical wards on a weekly basis. The ANPs were the most consistent team members of the admissions team and therefore we encouraged them to advise new junior doctors of the change at each new shift rotation. We also e-mailed all the junior doctors to advise them of the work we were doing to ensure that they were fully aware of what was happening.

Our first prediction was that the inclusion of the sticker would improve percentage compliance of completion of the MSQ on admission in our target group. Overall, this prediction was accurate as compliance with MSQ completion increased following the introduction of the measure. The average MSQ completion rate was 13.3% during our baseline collection period. During the 10 day period, the completion of the MSQ was random and not consistently performed with some 0% points. Once we introduced the sticker, we audited the process over a period of 6 days. We did this to ensure that we captured data during the weekend as this is known to be a problematic period for numerous reasons e.g. fewer nursing and medical staff cover. The average MSQ completion rate after the introduction of the MSQ stickers was 81.33%. This is a good improvement as we have a shift with most of our data points being above the median line.

Feedback from the admissions staff informed us that the time taken to complete the admissions process was generally not adversely affected due to the brevity of the MSQ test. In addition, other aspects of the admissions process e.g. examination of the patient and sufficient history taking were not compromised.

We had predicted that due to frequent medical staff rotations and no clear medical leadership in the ward environment, change may be slow to develop. This prediction was accurate. On the first day of data collection after inclusion of the MSQ stickers, 3 July 2013, the compliance was 40%. Whilst we recognise this as an improvement, it was not as significant as we had initially hoped for. At this point we had an informal discussion with the admissions team and it became obvious that not all relevant people were aware of the change implemented due to recent staff rotation. On the 5th of July 2013, we achieved 100% compliance with the MSQ and we attribute this success to clear signage within the admissions bay and input from senior nursing team members who acted to disperse the message and remind staff. Unfortunately, the compliance was then observed to dip over the weekend, 6th & 7th July 2013, and we realised that awareness may still be a problem amongst the weekend staff. Such frequent staff rotations make improvement difficult to sustain and ultimately in order to tackle this, it may be prudent to introduce the work being done around the MSQ during a staff member’s induction to the surgical ward to ensure this is at the forefront of their mind. Our target was 95% completion of the MSQ on all new admissions in our target group, we achieved this with 100% compliance on two days. Our average compliance was 81.33%, whilst not reaching our target this is still a substantial improvement.

Results

Overall, the introduction of the MSQ sticker to the clerking document resulted in a significant improvement in the percentage of MSQs that are completed on patients aged 75 and older upon admission to the Acute Surgical Receiving Unit (ASRU). Previously, the compliance with the MSQ was inconsistent with several 0% points as well as astronomical points as illustrated on the run chart. A run of 5 points above the median can be seen since the
implementation of the sticker indicating that improvement has occurred. We initially introduced the sticker to one member of staff and then by affixing this to the clerking document, rolled the change out to all members of the admissions team - advanced nurse practitioners and junior doctors. A high turnover of junior medical staff meant it was challenging to ensure everyone was aware of the change. We feel this could be addressed via information given at a ward induction for new members of staff.

We had predicted that the implementation of the MSQ sticker would allow us to reach our goal of 95% compliance with completing the MSQ on all new admissions in the target age group. We achieved this with 100% compliance on two days. Our average compliance rate was 81.33% in comparison to 14.99% from the previous 10 day period during which we collected our baseline data. Whilst not reaching our target, this is still a substantial improvement. There is a noticeable difference in compliance levels over the weekend and by further investigating reasons for this - most likely, a lack of awareness coupled with lower staffing levels - the average compliance could feasibly improve further. Furthermore, having the MSQ questions permanently affixed to the document could sustain an increase in compliance in the long-term as the stickers used currently may allude to a temporary change.

The introduction of the MSQ stickers has resulted in an improvement within the ASRU on cognitive screening on admission in our target group. We strongly feel that continuously speaking to the admissions team and junior doctors about the project has definitely increased awareness on cognitive screening. These improvements are encouraging as they bring ASRU in line with similar acute clinical environments within Ninewells Hospital i.e. the Acute Medical Admissions Unit (AMU) who already had the MSQ questions within their clerking document and are achieving similar levels of completion.

See supplementary file: ds3672.pdf - “ASRU Run Chart Demonstrating the Impact of Improvement Interventions”

Lessons and limitations

On reflection, the success of the project is largely attributed to the willingness of the admissions team to take on the aims of the project. In particular, the compliance of the advanced nurse practitioners who are the most permanent of the staff has provided a strong backbone to the improvement process. They have encouraged the junior medical staff and thus helped address the issues surrounding frequent staff rotation. Furthermore, in maintaining contact with the staff and making them aware of the re-audit process throughout, we feel it has been easier to keep the project at the forefront of people’s minds.

One of the main limitations of this project is the lack of additional data to demonstrate whether the improvement that was achieved during this project has been maintained by ASRU. The effect of the intervention could only be measured over a 6-day period and therefore additional data points are currently not available. However, as the project was part of a much bigger project, we feel that the work we did significantly informed further work that the Old People in Acute Care Collaborative subsequently carried out.

Teamwork has been an important theme of the project both in the sense of teamwork between ourselves, the learners in order to drive the improvement process and also as discussed above, amongst the admission staff. In addition, the support we have received from academic staff and those with clinical expertise has been invaluable. Without this, we feel the project would almost certainly not have been as successful. Barriers to success were: the constant rotation of junior staff, no point of contact/ leadership from senior medical staff and the lack of clarity regarding a clinical management pathway for those with low MSQ scores. We have learnt that behavior change is a multi-factorial process and whilst we have seen success in the short-term with our project, in order for this change to be sustainable in the future it will be important to consider the barriers mentioned and further address improvement within the “system” of ASRU at different levels.

Conclusion

The introduction of the sticker detailing the 10 MSQ questions within the ASRU admissions document was well received by the admissions team and has led to significant improvement without adding a step into their current admissions process. It has simplified this process as members of staff do not need to rely on their memory to remember the questions and the sticker also acts as a prompt for them to consider cognitive screening.

As this project is part of the larger Older People in Acute Care Collaborative (OPACC), we feel that the work we have done can be added upon to achieve sustainability in the long term. The training of all members of staff of the admissions team on the MSQ and its relevance in respect to cognitive impairment will further support the intervention we accomplished during this project. Buy in from senior clinical physicians is vital as they can provide valuable input into the clinical management pathway for patients with clinically relevant MSQ scores. We aim to provide feedback to the ASRU admissions team on the improvement that has occurred so far and will advise them to constantly re-audit the process to ensure compliance is maintained.

References


Declaration of interests

None

Acknowledgements

Junior Doctors, Nurses & Allied Health Professionals of Ward 7 (ASRU)

Prof P. Davey, Medical School Lead for Clinical Quality Improvement, University of Dundee.

Vicki Tully, Teaching Lead for Patient Safety, University of Dundee - Medical School.

Marie Hanlin, Older Peoples’ Collaborative

Morag McRae, Patient Safety Development Manager

Alison Davie, NHS Tayside Improvement Advisor - Patient Safety

Student Improvement Team - Yvedzo Ntuli, Kirsty McNeil, Jane Vennard-Balmer, Claire Pollington & Avril Anderson
Meeting with ANP in charge of the morning shift. They will ensure all members of the admissions team are aware of the introduction of the stickers.

The introduction of a clearer sign at the admissions

Informal discussion with the junior doctors to make them aware of the improvement project

Introduction of MSQ stickers to the ASRU admission document. Not all members of the admissions team were aware of the changes due to new staff rotations.

Weekend dates: Possible issues with staffing numbers/awareness levels
Date: _____________________  Ward: ___________________
Name & Grade of Data Collector: _____________________________________________________

### Patient Information
- **Patient Age:**
- **Sex:**
- **Date & Time of Admission:** / / : 

### Medical History
- **Presenting Complaint:**
- **Admission Diagnosis:**

### Delirium Assessment
- **Was an MSQ test performed?** □ Yes □ No Score ______
- **Was delirium documented?** □ Yes □ No □ RULED OUT

### Cognitive Changes
- **Is there any evidence of recent cognitive change?**
  - □ Normal
  - □ Agitation
  - □ Drowsiness
  - □ Confusion
  - □ Inattention
  - □ Other descriptors e.g. “off the legs” etc. ____________________________

### Precipitating Factors

<table>
<thead>
<tr>
<th>COMMON PRECIPITATING FACTORS IN DELIRIUM</th>
<th>FACTORS THAT INCREASE RISK OF DEVELOPING DELIRIUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ INFECTION</td>
<td>□ AGE ≥ 75</td>
</tr>
<tr>
<td>State source: __________________________</td>
<td>□ PRE-EXISTING COGNITIVE IMPAIRMENT OR DEMENTIA</td>
</tr>
<tr>
<td></td>
<td>□ HEARING OR VISUAL IMPAIRMENT</td>
</tr>
<tr>
<td>□ RECENT MEDICATION CHANGE</td>
<td>□ POLYPHARMACY (≥4 DRUGS)</td>
</tr>
<tr>
<td>(new drugs/drugs stopped/ dose change)</td>
<td>NB especially opiates, benzodiazepines, anticholinergic, steroids</td>
</tr>
<tr>
<td></td>
<td>□ PHYSICAL RESTRAINT</td>
</tr>
<tr>
<td></td>
<td>IV line or catheters</td>
</tr>
<tr>
<td>□ METABOLIC DISTURBANCE</td>
<td>□ MULTIPLE CHRONIC ILLNESS</td>
</tr>
<tr>
<td>Electrolyte change, hypoxia, uraemia etc.</td>
<td>State which</td>
</tr>
<tr>
<td>□ CARDIAC DISEASE</td>
<td></td>
</tr>
<tr>
<td>MI, AF etc</td>
<td></td>
</tr>
<tr>
<td>□ GASTROINTESTINAL PROBLEMS</td>
<td></td>
</tr>
<tr>
<td>Gi bleed, constipation etc.</td>
<td></td>
</tr>
<tr>
<td>□ TRAUMA</td>
<td></td>
</tr>
<tr>
<td>Head Injury, hip fracture etc.</td>
<td></td>
</tr>
<tr>
<td>□ DRUG/ALCOHOL HISTORY</td>
<td></td>
</tr>
<tr>
<td>Excess (&gt;21 units/week for males and &gt;14 units a week for females), intoxication or withdrawal</td>
<td></td>
</tr>
<tr>
<td>□ GENITOURINARY PROBLEMS</td>
<td></td>
</tr>
<tr>
<td>Urine retention etc.</td>
<td></td>
</tr>
</tbody>
</table>

**4AT SCORE: ________**

---

**ONLY CONTINUE IF DELIRIUM IS DIAGNOSED**
When was a diagnosis of delirium made: ________________________

Is there a delirium management plan now in place?    □ Yes    □ No

Have any additional measures been carried out? E.g. “patient moved to a side room” or “drugs reviewed” etc. Please give details below.

<table>
<thead>
<tr>
<th>BLOOD TESTS</th>
<th>Tick if done</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBC&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>U&amp;E&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>LFT&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>CRP</td>
<td></td>
</tr>
<tr>
<td>TFT</td>
<td></td>
</tr>
<tr>
<td>Lab Glucose</td>
<td>Specify Level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have the following interventions been performed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEWS</td>
</tr>
<tr>
<td>PR exam</td>
</tr>
<tr>
<td>Bowel opening history</td>
</tr>
<tr>
<td>Fluid Balance Chart</td>
</tr>
<tr>
<td>Sedation given</td>
</tr>
</tbody>
</table>

If yes give details (type, dose & frequency of administration)

<table>
<thead>
<tr>
<th>Have the following interventions been planned?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CXR</td>
</tr>
<tr>
<td>CT of Brain</td>
</tr>
<tr>
<td>Bladder Scan</td>
</tr>
<tr>
<td>ECG</td>
</tr>
<tr>
<td>EEG</td>
</tr>
</tbody>
</table>

---

<sup>1</sup> To exclude any RBC/WCC related abnormalities
<sup>2</sup> To exclude any sodium, potassium, creatinine, calcium, phosphate and urea abnormalities.
<sup>3</sup> To exclude any albumin and liver enzymes abnormalities.
Improving early recognition of delirium using SQiD (Single Question to identify Delirium): a hospital based quality improvement project

Elaine McCleary, Pamela Cumming
School of Nursing & Midwifery, University of Dundee

Abstract

Delirium is a serious condition associated with poor outcomes which can be prevented and treated if recognised early. Older people and people with dementia or severe illness are more at risk of delirium. SQiD is a simple prompt question which asks, "Is this patient more confused than before?" Focusing specifically on patients aged 75 and over, this project aimed to increase awareness and usage of SQiD to help improve early recognition of delirium, in accordance with the Healthcare Improvement Scotland national initiative. This project was carried out by two student nurses during an eight week clinical placement in the acute surgical receiving unit (ASRU) of Ninewells Hospital, Dundee, Scotland.

Qualitative and quantitative methodology was used to establish baseline data which revealed that only 35% of the multidisciplinary team (MDT) were aware of SQiD, with only 15% using SQiD. Initial activities involved raising awareness of SQiD by means of information cards and posters. Once awareness was raised, the usage of the SQiD question by nurses was tested. Finally, the SQiD question was incorporated into the nursing care round forms and usage recorded. Following these awareness raising activities we noted an increase of 83% awareness and 20% use of SQiD. Incorporating the SQiD question into the hourly care round forms increased awareness to 100% and usage to 50%.

Although this small scale project could be viewed as a success, the requirements for sustainability depend upon further implementation and spreading of the change. Sustained improvement is also dependent upon the implementation of the care rounds.

As nursing students, undertaking this improvement project has provided valuable lessons in both quality improvement science and personal learning. The improved knowledge and understanding of effective communication and the intricacies of team working is transferrable and can be applied to future nursing practice.

Problem

Older people and people with dementia, severe illness, or a hip fracture are more at risk of delirium. People who develop delirium may spend longer in hospital and therefore have increased risk of hospital acquired complications such as infection, falls, and pressure sores. They also have increased risk of developing dementia, are more likely to require long-term care and are more likely to die.[1] A local audit of medical notes revealed that recognition of delirium required improvement within the acute surgical receiving unit (ASRU) of Ninewells Hospital, Dundee, Scotland.

Background

Understanding of delirium is poor yet it is reported to affect up to 56% of hospital inpatients.[2] In association with the Older People in Acute Care Collaborative (OPACC), Healthcare Improvement Scotland (HIS) aims to improve the identification and immediate management of delirium in people aged 75 and over in acute care. Ultimately, early recognition improves patient safety and reduces the burden on hospital resources.[1]

Single question to identify delirium (SQiD) is a simple prompt question which asks, "Is this patient more confused than before?" and was first introduced to multi disciplinary staff during delirium training sessions. Asking the SQiD question on a regular basis can identify changes in a patient's condition, which could potentially be delirium. Recognising that a person is more confused than before should trigger escalation to medical staff and initiation of 4AT rapid assessment test for delirium. A previous study compared the efficacy of SQiD with delirium assessments such as the confusion assessment method (CAM) and has suggested the simplicity of SQiD as a single item tool makes it more likely to be used by staff and incorporated in to history taking practice.[3] Its simplicity was appealing as this project was initially aimed at the multi-disciplinary team (MDT) which is comprised of non clinical staff.

Baseline measurement

Care round forms are a means of documenting basic care such as comfort, environment, plan and elimination needs of patients and are designed to be completed by nursing staff each hour during the day and two hourly overnight. With the recent introduction of the care rounds to the ASRU, an opportunity presented itself to incorporate SQiD into the care round forms that provided staff with an opportunity to identify changes in patients cognitive function and subsequently recognise delirium earlier.
A questionnaire, designed to gather qualitative and quantitative data, was distributed to the MDT to establish current awareness and use of SQiD within ASRU. The MDT consisted of medical, nursing, ancillary, clerical, and allied health professionals, with 20 completed questionnaires (45%) being returned within a two week period. This revealed a baseline of 35% staff awareness with 15% using SQiD. Subsequently, it was decided to narrow the scope of the project to focus specifically on nursing staff due to the limited eight week timescale of the clinical placement.

In an effort to improve the questionnaire response rate, a face to face questionnaire was carried out with nursing staff only. This method provided instant data, revealing 12.5% awareness and use of SQiD on that particular test day. Consequently it was felt that awareness raising was necessary before proceeding with the initial plan to test the incorporation of SQiD into the care round form.

See supplementary file: ds4130.docx - "PDSA 1 Graph"

Design

It was predicted that awareness of SQiD would be approximately 80% since this was the proportion of nursing staff that had attended training on the early recognition and management of delirium, in which SQiD was promoted. However, data revealed only 12.5% awareness and use of SQiD. At this stage (week four of the eight week project) it was decided to postpone the original plan of incorporating SQiD into the care rounds as it was apparent further awareness raising was necessary. Therefore it was agreed, after discussion with ward staff, that a tangible prompt such as a poster or card would be tested to determine if awareness increased. Using the information and design promoted in the delirium training session, a poster as a visual prompt and a small business style card were created. A benefit of these interventions is that they remain in place beyond the duration of the project.

Design of the final intervention, incorporation of the SQiD question into the care round form, was achieved simply by including the information and design promoted in the delirium training form, was achieved simply by including the information and design promoted in the delirium training form.

Strategy

Adopting the Model for Improvement,[4] changes were tested using PDSA cycles (Plan, Do, Study, Act). Within each cycle three key questions are considered:

- "What are we trying to accomplish?" - this focuses on the aim of the test
- "How will we know that a change is an improvement?" - this focuses on measurement and finally
- "What changes can we make that will result in improvement?" - this focuses on the changes necessary to improve results.

Measurement was important to determine if a change was an improvement. The outcome measure of this project was an increase in the percentage of patients over 75 upon which SQiD was used. Applying process measures (an increase in the percentages of staff who are aware of SQiD, the percentage of nurses using SQiD, and the percentage of times SQiD is documented as being asked on care round) was necessary to achieve the outcome measure.

Balancing measures were necessary to ensure that a change did not have a detrimental effect on any other area. In this case it was important to ensure that a change did not increase the perceived paperwork burden for staff. This could be done by making the change as simple as possible and incorporating it into current practice.

PDSA 1: Establish baseline of the awareness and current use of SQiD within ASRU. This involved development of a questionnaire which was distributed to 44 members of the MDT. Due to the response rate of our questionnaires (45%), the unexpectedly low figures (predicted awareness 80% - actual 35%) and the limit of an eight week timescale for the project, it was decided to reduce the scale and scope of the project by limiting the questionnaire to the nursing team only, instead of the MDT.

PDSA 2: Measure the percentage of nursing staff's awareness and use of SQiD. In an effort to improve the reliability and speed of gathering baseline awareness data, a face to face questionnaire was considered more effective. Applying this method provided instant results compared to the previous questionnaire, which took three weeks in total. Analysis of this data revealed 12.5% awareness and use of SQiD, highlighting the need for an additional prompt or reminder of SQiD to promote awareness. A small information card and poster was developed, which provided pertinent information as to the definition of SQiD, the question itself ("Is this person more confused than before?") and the predisposing factors of delirium in acronym form. It was planned to distribute these cards to nursing team members and display posters around the ward to increase awareness.

PDSA 3: Measure the effectiveness of tangible prompts for nursing staff to increase awareness and use of SQiD. The concept was introduced to nursing staff at the early morning handover one day, explaining the reasons for the effort. Each nurse was then provided with a SQiD information card. Posters were displayed on each nursing bay and at key positions around the ward. Data were gathered at the end of shift to determine if the card had improved awareness of SQiD and if SQiD had been used in practice that day. Analysis of the data revealed feedback was received from only six of the nine staff due to the busy ward environment that day. Of the six staff involved, awareness had increased to 83% and use to 20% during this test. With nursing awareness at a sufficient level it was decided to test the SQiD question incorporated into the care round form in the next PDSA cycle.

PDSA 4: Test if incorporating SQiD into the care round form increases the awareness and use of SQiD. This was tested on a nurse caring for one over 75 year old patient for the duration of one shift. It was anticipated that the care round form would act as a prompt to apply SQiD to practice and a document from which to
measure results. The staff member reported that the SQiD question was simple to use and that having it as a prompt on the care round form ensured its use throughout the shift. Study of the data indicated 100% awareness and 100% use. It was agreed that the scale of the test would be increased to three nursing staff members for the final PDSA cycle.

PDSA 5: Test if incorporating SQiD into the care round form increases the awareness and use of SQiD. Although the test sample was increased to three, on the day of the test one nurse was unable to carry out the test due to the burden of work. Study of the data indicated 100% awareness and 50% use during this test cycle.

This was the final cycle in our project as we considered the next step to be implementing the change by incorporating SQiD into the care round form for the whole ward which involved input from management.

Results

Baseline data revealed awareness of SQiD within the MDT as 35% and use of SQiD as 15%. Due to the recent delivery of delirium awareness training, this figure was predicted to be much higher. It was apparent, due to limitations of timescale and experience, that the scale and scope of the project should narrow and focus particularly on nursing staff. Once again, analysis of the data revealed a lesser than predicted awareness and use of SQiD (12.5% awareness and use) despite 80% of nursing staff have attended delirium training at which SQiD was briefly introduced.

Following awareness raising activities, which included introduction of SQiD at nursing staff handover meeting, card distribution and poster display, a face to face survey indicated an increase to 83% awareness and 20% usage of SQiD. Although 100% awareness and use was anticipated at this stage, the busy ward environment prevented 33% of nursing staff responding during the test.

PDSA 4 and 5 involved the incorporation the SQiD question into the care rounds which resulted in 100% awareness and 50% use during the test. This shows an increase in both awareness and use however it was a small scale test. Sustainability of this improvement required further implementation of the newly introduced care rounds.

A face to face survey was used to measure how easy SQiD was for the staff to use. Both quantitative and qualitative data suggested SQiD was easily incorporated into practice. A further measure for consideration was the potential for a percentage of patients to falsely screen positive when SQiD was applied. This was not reported during our test.

See supplementary file: ds4069.docx - "% staff awareness/use run charts"

Lessons and limitations

Despite delirium awareness training being delivered to the majority of staff the link between SQiD and delirium did not appear to be clear. Our data revealed that awareness was not at the anticipated level of 80%. This indicates that training does not always ensure knowledge and understanding, and certainly not implementation.

Due to the short timescale, the benefit of using data collection methods that provided instant data was recognised early on in the project. Additionally, recognising the importance of gathering the correct data was key learning. In selecting a questionnaire to collate baseline data that could be used pre and post intervention, the skill required in its development was perhaps underestimated. Care was required to ensure that the questions elicited the type of answer that could be counted quantitatively or qualitatively. Several drafts were made and tested with a willing member of staff before general distribution. Response was poorer and took much longer than expected, leading us to review our strategy for data collection during the project. The initial questionnaire yielded a 45% response rate whilst face to face surveys provided instant and higher response rates.

There were many reflective learning points associated with this project, including the importance of investing in staff engagement and the need for frequent project reports to maintain enthusiasm and momentum for the project. Designation of an identified leader from the clinical team may have encouraged more general staff engagement, resulting in the project progressing further in the allocated time.

The project focus was a national priority and because of this it was assumed that this project would be adopted more readily by staff. However, the introduction of another new initiative in the workplace made it difficult to engage staff initially. On reflection, it was felt that staff could have engaged with the work more readily if they had been consulted on what they would like to improve.

As nursing students undertaking an improvement project during an eight week clinical placement, it was challenging to ensure the project work was not detrimental to placement learning objectives. However, a factor which promoted success in this area was the support provided by faculty and healthcare sponsor team.

Utilising Deming’s lens of profound knowledge would have been a useful tool to have used for this project, to enable understanding and appreciation of the system that we worked within, and the psychology behind staff thinking.[4] This tool will be used to inform future improvement projects, which should ensure greater success.

Resilience and self-efficacy are important personal factors which have developed throughout this improvement project journey. Additionally, understanding and appreciating the importance effective communication has in the success of improvement work has been key learning.

Conclusion

Following awareness raising activities, the awareness and use of SQiD increased from 12.5% to 83% and 20% respectively.
Incorporating the SQiD question into the care round form delivered 100% awareness and 50% use during testing. Although this small scale project could be viewed as a success, the requirements for sustainability depend upon further implementation and spreading of the change. Sustained improvement is also dependent upon the successful implementation of the care round forms which were only recently adopted.

Undertaking this improvement project has provided valuable learning in both quality improvement science and personal learning. The improved knowledge and understanding of effective communication and the intricacies of team working is transferrable and will benefit future nursing practice.

References


Declaration of interests

Nothing to declare.

Acknowledgements

Dr Eloise Pearson, Dr Sandra Hainey, Marie Hanlin, and Tayside Centre for Organisational Effectiveness QI team, Ward 7 ASRU staff, Ninewells Hospital.
% MDT staff aware of SQiD

- Aware: 35%
- Not Aware: 65%

% MDT staff using SQiD

- Yes: 15%
- No: 85%
Referral Finder: Saving Time and Improving The Quality of In-hospital Referrals

Jennifer Cathcart, Neil Cowan, Vicki Tully
Ninewells Hospital, Dundee, Scotland

Abstract

Making referrals to other hospital specialties is one of the key duties of the foundation doctor, which can be difficult and time consuming. In Ninewells hospital, Scotland, in our experience the effectiveness of referrals is limited by contact details not being readily accessible and foundation doctors not knowing what information is relevant to each specialty.

We surveyed foundation doctors on their experience of the existing referral process to identify where we needed to focus to improve the process. The doctors reported significant delays in obtaining contact details from the operator, and found they did not know the specific information needed in each referral.

To increase the information available to foundation doctors, we set up a page on the staff intranet called 'Referral Finder'. This page includes contact details, guidelines for referral, and links to relevant protocols for each specialty. By making this information readily accessible our objective was to increase the speed and quality of referrals.

When surveyed two months after the web page was established, foundation doctors reported a reduction in calls to operator from baseline and reported achieving more effective referrals. When asked to comment, many doctors asked if the page could include details for other hospitals in our health board and provide more specialty specific information.

This feedback prompted us to extend the scope of the page to include the district general hospital in our region, and update many of the existing details. Doctors were then surveyed after the updates, 100% agreed that the website saved time and there was a 49.3% reduction in doctors who reported not knowing the specific information needed for a referral.

Having adequate information improved referrals and resulted in time saved. This would allow more time for patient care. The quality improvement project was praised among doctors as a useful, innovative and replicable project.

Problem

In Ninewells hospital, Dundee, Scotland, foundation doctors spent considerable time accessing referral contact details via the operator. This resulted in significant delays which impacted on other ward jobs and patient care. After obtaining the contact details from the operator, more time was spent accumulating patient information by the doctor to make the referral. Despite this, referrals were often lacking specific information resulting in inadequate referrals.

Ninewells is a large teaching hospital with 26 specialties where the referral process, and the specific information required for referral, varies between each specialty. Existing paper records of referral contact details in the wards were incomplete and were not kept updated. In addition, there was no guidance on what to include in the referral for any specialty. As two foundation doctors, we had encountered frustration at wasted time, incomplete referrals, and patient safety issues caused by the lack of available referral information. We felt a simple online page where referral information was kept would mean the information could be accessed universally throughout the hospital. The aim of the project was to improve the speed and quality of referrals.

Background

Making referrals to other specialties is a regular part of the foundation doctor workload.[1] The foundation programme curriculum, which is set by the General Medical Council (GMC)[2] lists making an appropriate referral within the hospital as a core competency. One audit in the emergency department identified that the majority of its doctors, of whom most were equivalent grades of doctor to foundation year two doctors, found referrals to be problematic. Two of the reasons given was their own lack of knowledge of the subject and lack of protocols for referral.[3]

Referrals form part of a foundation doctor's potentially extensive workload,[4-6] which can lead to stress and fatigue[6] and then to sub-optimal patient care.[7]

The aim of our project was to tackle both these issues; reduce the time to complete referrals and to improve the quality of referrals between hospital specialties, in order to improve patient care. The latter point is reinforced by several studies which show that poor communication can compromise patient safety.[8-11] One study looking at referrals from the emergency department to the medical floor found that variations in the clinical information required
between the specialties was one of the main factors that attributed to the difficulty in negotiating patient transfers.[12] It was also noted within this study that the timeliness of the referral also impacted on its success.

There are limited reported projects trying to solve this problem. One similar project is reported in the British Medical Journal (BMJ) Quality Improvement journal in which a website was used to disseminate contact information regarding referrals.[13] A positive outcome resulted, and junior doctors contacted their senior less for information on how to refer as a result. However, the project gave only contact methods to refer while our project extends beyond access to correct contact details by giving guidelines for specific supporting information needed in a referral. Furthermore, they used a password protected external site whereas our approach used the National Health Service (NHS) intranet to host the site. Password protection introduces more clicks and increases time to access, which can affect access as shown by a project in Bristol, which showed that a simple re-organisation of the intranet sites to reduce the number of clicks meant more doctors could find the correct guidelines.[14]

**Baseline measurement**

Before implementation of the intranet page, we collected baseline data via a questionnaire put to foundation doctors. We distributed this at a foundation teaching session in electronic form, via email and via the foundation doctor social media page. We asked all foundation doctors, even those not based in Ninewells at present, as all doctors rotate though Ninewells hospital. We collected four key baseline measurements for this project which were used in the subsequent questionnaires to directly compare the results to baseline. These were:

1. Number of calls to the operator
2. Time gathering information for a referral
3. Number of doctors who report times not having information requested to hand when referring
4. Number of doctors who report not knowing the specific information required by each specialty

The questionnaire had multiple choice answers. In addition to the above measures, doctors were asked how many times and for what reason they phone the operator. We also gauged issues with patient care by asking the group how far they agreed that there were times where their patient’s treatment has been delayed whilst awaiting referral details from the operator.

75 foundation doctors replied to the questionnaire out of 187. This found that 94% of foundation doctors used the operator to get contact details for a referral to a specialty and 79% called the operator three times or more per day. 47% of doctors surveyed reported that calls took 2-3 minutes to be answered when they called the operator with 25.8% reporting that calls took more than five minutes to be answered. 73.9% of doctors felt that the time taken on the phone to the operator at times leads to patients’ treatment being delayed. 73.8% of doctors spent more than five minutes gathering information to make a referral. 83.1% of doctors agreed that there were times they did not have information requested by the specialist to hand. 57.8% felt they did not know the specific details each specialty requires for referral. 97% of doctors considered the creation of a referral finder page to be a helpful idea.

**Design**

We designed a page to be placed on our hospital intranet; staffnet. We felt an intranet page would easy to use, easy to update, and cost-effective. This provided several advantages over paper lists which are easily lost and cost more to reproduce. We sought informal verbal advice from colleges on the design of the intranet page which includes the following for each specialty:

- Preferred contact method
- Contact details
- Best time to refer
- Details required for effective referral
- Guidelines to be aware of
- Other helpful information

The page was created as a HTML document with a list of specialties at the top, each of which linked to specific guidelines when clicked on. The page was titled “Referral Finder”. This document was then uploaded to a section of the intranet which is easily accessible to foundation doctors. It is reviewed and updated every four months by an annually elected foundation doctor group. Referral Finder will continue to be used in Ninewells hospital as long as it deemed useful as determined by an annual questionnaire whose results will be analysed by the foundation doctor group.

**Strategy**

PDSA Cycle 1: Baseline data showed that foundation doctors agreed that an intranet page with guidance on information to include in a referral and contact numbers would be helpful. The Referral Finder page was created and initially shown to couple of foundation doctors. They gave verbal feedback that the page was easy to use and felt the information supplied by each specialty was sufficient. After using it, they agreed that they were able to phone the operator less and make better referrals. No formal data was collected at this stage.

PDSA Cycle 2: The Referral Finder was then distributed among the
foundation doctors within Ninewells hospital. It was launched at a teaching session and an email was sent to those not able to attend the teaching session. After two months of the page being available for use, a questionnaire was issued. The results showed a significant improvement from baseline. Doctors reported saving time and making better referrals. The foundation doctors asked for the page to include more specialties such as nurse-led specialties.

PDSA Cycle 3: The Referral Finder was updated with more referral specialties added to include specialist nurses. Spelling errors were corrected as requested by user feedback from the questionnaires, two of which were in emails used for referrals. Informal user feedback via email to ourselves was positive about the updates. Due to its popularity, Referral Finder, in addition to being on Staffnet was added to the new junior doctor handbook launched in August. It was then further updated as requested in the questionnaire to include a neighbouring hospital Perth Royal Infirmary. A further questionnaire was sent out after the updates. This was sent out via email, on Facebook, and on the Staffnet, as well as handed out at a foundation teaching event. Again the positive results proved Referral Finder to be a useful intervention that saved time. It especially showed significant improvement in doctors reporting knowledge of specific information needed to refer. In addition, the results showed that after the updates, doctors rated the site more useful. Feedback pointed out some missing contact information in the Perth section which we are working on at present.

Results

In May 2015, after two months of Referral Finder being live on the intranet, we distributed the PDSA cycle 2 questionnaire via email; 33 foundation doctors completed this questionnaire. A PDSA cycle 3 questionnaire was sent out via email, posted on a Dundee foundation trainee social media page and distributed at a foundation trainee teaching session eight months later. This was distributed after updating the website and 61 foundation trainees responded. Both PDSA cycle 2 and cycle 3 questionnaires were completed only by those who used the Referral Finder page. We were unable to measure how many individual foundation doctors were using the website therefore we cannot comment on the response rate of either questionnaire.

Overall the project showed an improvement from baseline and has shown improvement from one cycle to the next. In the PDSA cycle 2 questionnaire, 73.5% of doctors report using the intranet page at least every week with 23.5% of doctors reporting using it every day. In PDSA cycle 3 questionnaire, weekly use had increased to 91.8% and daily use had increased from 23.5% to 47.5%. In the PDSA cycle 2 questionnaire 90.9% doctors rated the usefulness at least 7/10 and in the PSDA cycle 3 questionnaire 100% rated Referral Finder at least 7/10.

The intranet page use has reduced the number of calls to the operator. These calls were reported by foundation doctors in the baseline questionnaire to be time-costly and a delay to patients' treatment. 79% of foundation doctors initially made more than three calls a day compared to 50.8% in the PSDA cycle 3 questionnaire. 37.5% called the operator more than three times a day in the PSDA cycle 2 questionnaire but this number may be likely due to the lower uptake of the questionnaire and not reflective of the true population. Regardless, an improvement from baseline is seen. Referral Finder on the other hand is shown to be quick to access and to save time as reported by foundation doctors. In both questionnaires the majority of doctors report that referral finder takes less than a minute to access (51.5% and then 61.7% respectively). In PDSA cycle 2 questionnaire, 88% of foundation doctors agreed that Referral Finder saved time and this increased to 100%, in PSDA cycle 3, after updating the website. The time to gather information for a referral stayed roughly the same however with 72.1% reporting to take more than five minutes in the PSDA cycle 3 questionnaire compared to 73.8% at baseline.

With regards to the quality of referrals, there was a reported improvement in the knowledge of information required by each specialty with the use of Referral Finder. 57.8% of doctors at baseline reported a lack of knowledge of specific information required by each specialty, this improved to only 32.2% in the PDSA cycle 2 questionnaire, and just 8.5% in the PSDA cycle 3 questionnaire. 83.1% of doctors at baseline reported there were times they didn't have information requested to hand when referring, however following the introduction of the website, this has reduced to 63.3% in the PDSA cycle 3 questionnaire.

Data was collected on how much the page was viewed per month, as shown in the attached graph. The website has had a steady increase in number of views from 374 in it's first month, March 2015 to 1,783 in February 2016. This illustrates its overall popularity and points towards how helpful the foundation doctors find the site. The attachment also contains a table of the four measurements taken across the three questionnaire for comparison.

See supplementary file: ds7495.docx - “ReferralFinderResults”

Lessons and limitations

One of the limitations of the project was the lack of uptake of all the questionnaires for numerous reasons. This could have some influence on the results of the project as it may not be a true reflection of the whole population of foundation doctors. We learnt from this project that foundation doctors do not always engage with projects via emails. We had more uptake of the questionnaire when we posted it to our foundation year social media page and when we collected the questionnaire at a teaching session in person. There were doctors who had not heard of the site, they would have not been able to complete the PDSA cycle 2 or 3 questionnaires. These doctors could have missed the earlier teaching session and not read their emails. More could have been done to raise the awareness of the project early on, perhaps by creating posters placed round the hospital. We were able to see the number of views of the page, however it would have been useful to measure how many of the foundation doctors were using the Referral Finder page so we could gauge the response rates to PDSA cycle 2 and 3 questionnaires. This would have allowed for better interpretation of the results.

In hindsight we should have done more formal small scale testing
i.e. within a ward setting before distributing it across the hospital. This may have allowed us to identify some of the missing contact information and spelling errors before it was widely distributed. We were able to correct minor errors after comments from users such as errors in email addresses after the second questionnaire but this may have been avoided.

We did not survey the registrars receiving the referral within this project though they also stood to gain from the project. The improvement of the quality of referrals may have reduced their time taking the referral and added to their ability to make decisions. In addition easier access to the guidelines by the foundation doctor could have reduced the number of calls needed to the specialist. Another measurement which would be beneficial to measure would be the impact of saving time on patient care. Saving time allows more time for patient care and faster availability of referral information allows for a quicker response and advice from the registrar to help with patient care. These could be looked at in similar future projects.

Conclusion

Our baseline questionnaire highlighted that there was a lack of knowledge in information needed in a referral by foundation doctors and the task was time consuming causing delays to patient care. Our results showed that having referral information available as an intranet page is quicker to access than the operator, and the foundation doctors universally reported that they saved time by using it. This time saved allows more time for other tasks reducing large workloads which can lead to sub-optimal patient care.[7] This project reflects the success of a similar project giving online contact information for referrals.[13] However by also adding in guidance this project sought to improve the quality of referrals. The quality was improved with less foundation doctors lacking the information requested when making a referral. More doctors reported an improvement in knowledge of specific information needed for the referral when using Referral Finder. Better communication though better referrals reduces medical error.[8-11] As one of the key duties of the Foundation Doctor, it is likely that those in other hospitals have similar problems with referrals, as noted in studies.[3,12] Referral finder is a highly replicable project with low running and setting up cost with benefit to both patients and doctors. It is easily sustainable, this project will be maintained by a group of annually appointed foundation trainees who will update the guidance every four months. It has proven to improve the speed and quality of referrals.

References


2 GMC. The UK foundation programme curriculum. 2012. updated for August 2015. URL:


12 Lawrence S, Spencer L, Sinnott M, and Eley R. It Takes Two to Tango: Improving Patient Referrals from the Emergency Department to Inpatient Clinicians. J Ochsner. 2015. 15(2);149-153


Declaration of interests

None declared.
Acknowledgements

To the foundation doctors of Tayside, thank you. Special mention to Nick Heath.

Ethical approval

This project was deemed an improvement study and not a study on human subjects. Local policy meant that ethical approval was not required.
Referral Finder Views per Month

Number of views

Month

Direct Comparison of Referral Finder Results.

<table>
<thead>
<tr>
<th>Title</th>
<th>Baseline Questionnaire</th>
<th>PSDA cycle 2 Questionnaire</th>
<th>PSDA cycle 3 Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calls to operator &gt; 3 times per day</td>
<td>79%</td>
<td>37.5%</td>
<td>50.8%</td>
</tr>
<tr>
<td>% of doctors that report they don’t know the specific information needed for a referral</td>
<td>57.8%</td>
<td>32.2%</td>
<td>8.5%</td>
</tr>
<tr>
<td>% of Doctors that agree there are times they do not have information requested to hand when making a referral</td>
<td>83.1%</td>
<td>25.8%</td>
<td>63.3%</td>
</tr>
<tr>
<td>Time spent gathering information for referral &gt;5 minutes</td>
<td>73.8%</td>
<td>45.4%</td>
<td>72.1%</td>
</tr>
</tbody>
</table>
Baseline data

79% doctors called the operator 3 or more times per day
Assume only 2 calls per doctor per day

47% of calls took 2-3 minutes to be answered   Assume remaining 27% calls took 1 minute
26% of calls took 5 minutes to be answered
Average minutes per call = 0.27x1 + 0.47x2.5 + 0.26 x 5 = 3 minutes

Intervention data

61 doctors responded and regularly used referral finder.

It took 1 minute to make a referral, saving 2 minutes per referral

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily time saving for 61 doctors</td>
<td>(2x2x61)/60 4.1</td>
</tr>
<tr>
<td>Telephonist time, 1 minute per referral</td>
<td>61/60 1</td>
</tr>
</tbody>
</table>

**COST SAVINGS CALCULATOR UNITED KINGDOM**

Assumes no referrals at the weekend

**DOCTOR**

<table>
<thead>
<tr>
<th>TIME</th>
<th>Cost per hour</th>
<th>No of hours</th>
<th>No of days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Year 1</td>
<td>£30.81</td>
<td>4</td>
<td>5</td>
<td>£616.20</td>
</tr>
</tbody>
</table>

**HC PROFESSIONAL (any healthcare professional other than a doctor)**

<table>
<thead>
<tr>
<th>TIME</th>
<th>Cost per hour</th>
<th>No of hours</th>
<th>No of days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone operator</td>
<td>£19.25</td>
<td>1</td>
<td>5</td>
<td>£96.25</td>
</tr>
</tbody>
</table>

**TOTAL SAVING**

<table>
<thead>
<tr>
<th></th>
<th>Per week</th>
<th>Per year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£712.45</td>
<td>£37,047.40</td>
</tr>
</tbody>
</table>
Referral Finder: Saving Time and Improving The Quality of In-hospital Referrals

Jennifer Cathcart, Neil Cowan and Vicki Tully

BMJ Qual Improv Report 2016 5:
doi: 10.1136/bmjquality.u209356.w3951

Updated information and services can be found at:
http://qir.bmj.com/content/5/1/u209356.w3951

These include:

References

This article cites 10 articles, 3 of which you can access for free at:
http://qir.bmj.com/content/5/1/u209356.w3951#BIBL

Open Access

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits use, distribution, and reproduction in any medium, provided the original work is properly cited, the use is non-commercial and is otherwise in compliance with the license. See: http://creativecommons.org/licenses/by-nc/2.0/

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections

Articles on similar topics can be found in the following collections

Open access (24)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/
Seeking Sepsis in the Emergency Department- Identifying Barriers to Delivery of the Sepsis 6

James Bentley, Susan Henderson, Shobhan Thakore, Michael Donald, Weijie Wang
NHS Tayside

Abstract

The Sepsis 6 is an internationally accepted management bundle that, when initiated within one hour of identifying sepsis, can reduce morbidity and mortality. This management bundle was advocated by the Scottish Patient Safety Programme as part of its Acute Adult campaign launched in 2008 and adopted by NHS Tayside in 2012. Despite this, the Emergency Department (ED) of Ninewells Hospital, a tertiary referral centre and major teaching hospital in Scotland, was displaying poor success in the Sepsis 6.

We therefore set out to improve compliance by evaluating the application of all aspects of the NHS Tayside Sepsis 6 bundle within one hour of ED triage time, to identify what human factors may influence achieving the one hour The Sepsis 6 bundle. This allowed us to tailor a number of specific interventions including educational sessions, regular audit and personal feedback and check list Sepsis 6 sticker. These interventions promoted a steady increase in compliance from an initial rate of 51.0% to 74.3%.

The project highlighted that undifferentiated patients create a challenge in initiating the Sepsis 6. Pyrexia is a key human factor-trigger for recognising sepsis with initial nursing assessment being vital in recognition and identifying the best area (resus) of the department to manage severely septic patients. EDs need to recognise these challenges and develop educational and feedback plans for staff and utilise available resources to maximise the Sepsis 6 compliance.

Problem

The Sepsis 6 has facilitated Emergency Departments (EDs) to commence timely treatment and facilitate early patient transfer to inpatient departments for ongoing monitoring and management.[1-3] There still, however, may be a number of factors present in the ED which delay achieving these goals.

Background

Sepsis is a medical emergency where failure to initiate and continue effective management can proceed to acute organ dysfunction with hypotension resulting in death with mortality up to 50% in certain populations.[2,4-6] The Surviving Sepsis Campaign (SSC), initiated in 2002, has been performing ongoing reviews of sepsis management based on the benefit of early goal-directed therapy (EGDT) defined by Rivers et al.[7] Using the available evidence and relevant research they published advice in the form of guidelines and management bundles in 2004, 2008 and, 2013.[2] The evidence base supporting the SSC has been questioned and recent randomised controlled trials have shown no benefit to patient mortality with EGDT compared to standard care.[8-11] These compared EGDT dictated by parameters suggested by Rivers et al. with intervention at clinicians’ discretion and do not account for the possibility that standard care may be more aggressive now than in the original Rivers et al. trial as a result of the large SSC. A recent meta-analyses of all goal-directed therapy (GDT) strategies for sepsis management compared to standard care concluded that any form of GDT reduced mortality and morbidity especially if initiated early.[12] Daniels et al. evaluated six interventions based on the SCC that when initiated within an hour of identifying sepsis reduced mortality and morbidity.[3] These elements are: administer high flow oxygen; take blood cultures; give broad spectrum antibiotics; give intravenous fluid challenges; measure serum lactate and haemoglobin; measure accurate hourly urine output. Completing this bundle allows the practitioner to make interventions to support early aggressive sepsis management either using GDT or non-protocolised care.

In 2008 the Scottish Patient Safety Programme (SPSP) launched its Acute Adult campaign which included the aim of reducing mortality and harm from sepsis, defined as a patient displaying two or more aspects of the Systemic Inflammatory Response Syndrome (SIRS) and a presumed infection. As part of this group, and in conjunction with the Scottish Antimicrobial Management Group, NHS Tayside adopted the Sepsis 6 bundle in January 2012 to attempt to reduce mortality in sepsis by 5% by December 2012 and by 10% by December 2014. Ninewells ED is a university-affiliated teaching hospital in Dundee, Scotland, which sees around 50,000 undifferentiated cases per annum with up to 40 patients admitted with sepsis per month. The department operates with 24-hour ‘shop-floor’ senior doctor (ST4 to Consultant) supervision and is split into three clinical areas comprising a minors area; majors area and a resuscitation area (resus) for the critically injured or unwell. Patients are triaged on arrival and streamed into one of the three areas. As first responders to undifferentiated patients, the ED plays a crucial role in the early identification and initiation of management for many of the septic patients admitted to hospital. The familiarity with time-critical management strategies for other disease processes places...
emergency physicians in an optimal position to initiate quick and effective interventions.[13] Studies have suggested a positive influence on the mortality in sepsis with structured clinical management approaches adopted by EDs.[3,14,15] Consistent management, however, was lacking in our department.

Baseline measurement

Data were collected retrospectively by searching the Symphony (EMISHealth, Leeds) patient information system from mid-April 2012 to the end of October 2012. This was approved by local Caldicott Guardian. For each week of the study period a list of all patients for whom ‘Sepsis/SIRS2 criteria’ had been selected as an admission category when released from the system, had their local identifying numbers (CHI) extracted to Microsoft® Excel. From each list five patients were selected using the Microsoft® Excel random number generator and recruited to the study. This followed guidance from the SPSP Sepsis Collaborative to audit 20 cases of sepsis per month. These patients had their ED Assessment Cards reviewed and the following information was collected; arrival time in ED; area of ED initially managed; time of first medical assessment (any doctor FY1 grade or above); time of first senior clinician involvement (ST4 and above); SIRS criteria present at triage; Scottish Early Warning Score (SEWS) at triage; element of the Sepsis 6 completed with timings.

Compliance was defined as all aspects of the Sepsis 6 completed within one hour of triage. The use of indwelling urinary catheters in septic patients is not routine in Tayside but only when oliguria has occurred despite fluid resuscitation, a patient is displaying severe sepsis or septic shock or there is another factor preventing the patient from easily passing urine. Prompt transfer to admitting wards often occurs locally before the patient has needed to pass urine and so the lack of urine output can be misleading. For this reason ‘initiating a fluid bolus’ and ‘measure accurate hourly urine output’ were combined as a single output measure. The time to completion of each individual element was recorded for analysis. Compliance was then analysed against factors stated previously. Arrival time was categorised as ‘In-hours’ (08.00hrs-18.00hrs Monday–Friday) and ‘out-of-hours’ (18.01-07:59hrs Monday–Friday and all weekend) and the area of the ED in which the patient was managed as: treatment bay; resus; treatment bay patients who were transferred to resus (treatment bay to resus).

STATISTICAL METHODS

SPSS version 21 (SPSS Inc., Chicago IL) was used to analyse data. Chi-squared test was used to compare the percentages between groups and the Mann-Whitney test used to compare the non-normally distributed data. Binary multivariate regression was used to determine the most influential factors on compliance.

RESULTS

A total of 155 patients were included in the survey with demographic data shown in Table 1 (Results Supplement). The main factors associated with compliance along with the mean and median times for medical assessment and SEWS scores are summarised in Table 2 (Results Supplement). There was no significant difference in overall compliance with the Sepsis 6. The bundle was achieved for 79 (51.0%) participants and in the remaining 76 (49.0%) patients at least one element was not delivered within one hour or at all (non-compliant). There was no difference in the compliance in-hours compared with out-of-hours. The area of the department in which the patient was managed, the presence of pyrexia and the time to first medical and senior assessment had significant influences on compliance. Regression analysis suggested that the time to 1st medical and senior doctor assessment and the presence of pyrexia had the greatest influence on compliance.

Initial management in resus was associated with increased compliance (p=0.009). Most patients (113, 72.9%) were managed initially in resus with 66 (58.4%) compliant. 31 (20.0%) were transferred to resus during their management. Management was compliant for 75 (52.1%) of patients ultimately managed in resus but only nine (29.0%) of the patients transferred during assessment were compliant. 11 patients (7.1%) were not managed in resus with four (36.4%) compliant. In the presence of pyrexia (temperature 38°C or over) 75 patients (57.7%) were compliant. Only four patients with (temperature less than 38°C (16.0%) were compliant. In the compliant group the mean time from triage to 1st medical assessment was 2.7 minutes, senior involvement 7.0 minutes compared with 16.6 minutes and 25 minutes respectively in the non-compliant group.

Almost twice as many patients involved (101 patients, 65.1%) had three SIRS criteria present rather than two (the minimum required for inclusion): with 56 patients (55.4%) compliant and 23 patients (42.6%) compliant with three and two SIRS present respectively. The median SEWS score was six for the compliant patients and five for the non-compliant.

Table 3 (Results Supplement) shows how often each element of the bundle was achieved. Administering antibiotics was the poorest achieved aspect of the Sepsis 6 bundle occurring in 103 patients (66.5%) and 24 (31.6%) of the non-compliant. Oxygen was administered in 148 patients (95.5%) and in 69 (90.8%) of the non-compliant.

Design

The following aim was created in order to address the problem: Ninewells ED will have 75% compliance with the Sepsis 6 management bundle, for patients displaying two or more SIRS criteria and a presumed infection, by the end of December 2014.

When creating this aim the local team considered a number of sources. The SPSP campaign had set a target of 95% compliance with the Sepsis 6 in order to achieve a 10% reduction in mortality. It was felt that achieving this target initially would be unrealistic and so a lower compliance rate should be considered. College of Emergency Medicine [since given Royal Charter] set clinical standard for EDs to have all Sepsis 6 aspects achieved before ED discharge but only set a target for antibiotics and fluid bolus initiation within one hour (50% and 75% respectively).[16] On the
basis of this an initial target of 75% compliance with the complete Sepsis 6 bundle was set.

When considering how to address the problem, there appeared to be two main aspects to address: correct placement of the patient in the department and commencing early interventions to maximise the first hour after triage. The two main groups who could affect these were the initial assessment nurse who triages the patient to the most appropriate area of the department and the junior doctors who, most commonly, make the first medical assessment and initiate management under the guidance of the senior clinicians. Raising awareness of the clinical need for rapid assessment and completion of the Sepsis 6, in particular administering antibiotics and IV fluid, was essential to improve compliance. The most obvious system was through departmental education and target-driven clinical care. This was supported with ongoing audit of compliance with regular feedback to the clinical team.

The QI team comprised of a ST3 doctor, a Clinical Audit Facilitator, and two Emergency Medicine Consultants.

**Strategy**

In order to improve compliance with the Sepsis 6 bundle a series of Plan, Do, Study, Act (PDSA) cycles were conducted with 20 random cases per month reviewed to measure monthly compliance in accordance with the SPSP campaign. This gave continuous feedback as to the benefit of various interventions. The interventions have been grouped into the following general themes: engagement (PDSA 1-3); education (PDSA 4-5); surveillance and feedback (PDSA 6-7).

PDSA 1: Initial discussions occurred at senior staff meetings surrounding the evidence of EGDT in sepsis management, our compliance against the national target and the potential impact on patient care and department flow. This concluded with agreement that improving compliance with the Sepsis 6 bundle was important, would improve patient care and would not adversely affect patient flow through the department. This enrolment of senior clinical staff was essential to support further interventions by directing and supporting junior staff and emphasise the importance of early management and decision making in patients with signs of sepsis.

PDSA 2: Senior staff agreed that managing potential septic patients should be directed to resus for early aggressive management. This would prompt early medical assessment, senior involvement and decision making, and facilitate performing interventions as Level II or III (2:1 or 1:1) nursing care would be provided.

PDSA 3: This led to a department protocol being drawn up (Figure 1, Supplementary Material) and a lead sepsis consultant being appointed to oversee department education, compliance and dissemination of information.

PDSA 4: All junior doctors rotating through the department attended a mandatory induction course (held every four months). For this a short lecture, delivered by the lead sepsis consultant, was created to educate staff. This involved defining SIRS criteria and sepsis, explaining the diagnostic criteria for increasing levels of sepsis. The background evidence for EGDT was summarised, then the local aims for sepsis management which introduced the agreed local sepsis management protocol (Figure 1 Supplementary Material). The lecture also stressed the importance of early senior doctor involvement to aid early decision making.

PDSA 5: Morning drop-in educational sessions were organised for nursing and existing medical staff where the Induction Lecture was presented and informal discussions about the proposed project occurred. Information about these sessions as well as basic information about the local objectives in sepsis management was communicated at shift handovers and safety huddles.

PDSA 6: Continuing survey on sepsis compliance was undertaken, selecting 20 random cases each month for review by the lead sepsis clinician each month. This process involved case note review, discussion with the clinicians involved in non-compliant patients to clarify information surrounding the case and identifying any difficulties. This gave an opportunity to clinicians to reflect and feedback any factors they felt hindered sepsis management as well as to identify areas of improvement in their own practice.

PDSA 7: The results of the initial survey into Sepsis 6 compliance were displayed on a dedicated noticeboard in the central staff base of the department. This display was updated with the monthly compliance rates. This information was also disseminated to all staff through email detailing the proportion of patients compliant with the Sepsis 6 and the proportions achieved for each element. The email also highlighted any recurrent issues giving potential strategy.

PDSA 8: These processes led to the creation of a Sepsis 6 checklist sticker (Figure 2, Supplementary Material) to act as a prompt for both nurses and doctors for inclusion in the patient’s notes. This was created at triage when clinical history and initial observation suggested the presence of sepsis.

See supplementary file: ds7774.docx - “Supplementary Material”

**Results**

Audit data were evaluated from 1st June to 31st December 2014 after interventions were put in place to assess any change to the Sepsis 6 compliance. A total of 140 patients were recruited to the follow-up survey through the same methods as the initial survey. Demographic data shown in Table 1 (Results Supplement).

Post-interventions there was a significant increase (p<0.001) in overall compliance with more patients (104, 74.3%, p<0.01) compliant with the Sepsis 6 bundle (Table 2, Results Supplement). This demonstrated a 45.7% improvement in compliance. Compliance improved across all factors measured in the primary survey. As with the initial survey earlier, 1st medical and senior doctor involvement were associated with increased compliance. The mean and median time to senior involvement, however, did not reduce post-intervention.
Table 3 (Results Supplement) shows the percentage change in the proportion of patients receiving each element of the Sepsis 6 bundle. There was increase in the number of patients receiving each element of the Sepsis 6 bundle. In the non-compliant group fluid administration and blood culture collection were not achieved for a greater proportion of non-compliant patients. However, more patients received these interventions within the Sepsis 6 hour than had in the initial survey. Overall 40 (13.1%) of patients: 27, (17.4%) baseline survey; 13, (8.2%) post-intervention survey, had at least one element not performed in the ED.

See supplementary file: ds7622.docx - “Results Supplement”

Lessons and limitations

Our initial survey showed that there was room for improvement with Sepsis 6 compliance with and sepsis management in our ED. We rely on junior staff to perform the majority of initial medical assessments. A difficulty in improving and maintaining performance is the constant (every four months) change in junior staff who, depending on clinical experience and previous areas of work, may not approach patient assessment in the prompt manner required in Emergency Medicine. Without prompt senior involvement uncertainty in management decisions can cause delay in Sepsis 6 actions. Utilising the induction programme to educate and reinforce this swift approach and provide a standardised knowledge base empowered junior doctors to seek senior guidance and act promptly. Providing this standardised knowledge to nurses, through the drop in sessions, encouraged them to place the patient in the correct area of the department and involve the appropriate level of staff early. Managing patients in resus, which provides high level monitoring with 2:1 or 1:1 (level II or level III) nursing care, allows fast and effective intervention. Patients being managed in resus also alerts senior clinicians who can anticipate and push decision making when required. The educational sessions gave nurses the knowledge to identify and pre-empt interventions and encouraged them to prompt doctors in decision-making. Nurses could prepare fluid and antibiotics without delay which could be administered as soon as venous access was obtained. Although time to medical involvement did not improve, managing patients in resus along with the education encouraged decisions to be made earlier and acted upon without delay.

We also learned that this approach needed to be partnered with improvement methods that give continuous feedback to staff and identify knowledge gaps and system issues that might threaten compliance. This also allowed us to reinforce good clinical management.

In both surveys oxygen administration was well performed compared to other elements (Table 3, Results Supplement). This is a simple intervention which we found all members of the clinical team comfortable to perform. Also a large proportion of patients arrived already receiving oxygen administered by the ambulance service. Blood sampling and peripheral cannulation are performed by medical staff in our department so any delay in doctors’ involvement would reduce the length of time available to comply with this element. Fluid and antibiotic administration is dependent on venous access and so it is understandable that more people did not receive timely fluids and antibiotics than blood sampling. One way to address this issue would be to train nurses in venepuncture and cannulation. This is the case in other EDs. Doing this would have involved a large change in local policy and training for nursing staff. We believe it is important to have medical assessment and input early in these potentially critically unwell patients in order to provide other timely decision making and so we used education to ensure septic patients, who needed timely management, were managed in the appropriate area of the department.

Documentation led to some difficulties measuring Sepsis 6 performance with the timings or application of interventions or factors not always clearly stated in the notes. For most aspects this information could be gathered from other sources, such as: electronic records, laboratory requesting system, associated patient charts. Time to senior involvement could not, and so when it was not documented patients were omitted when calculating mean times to senior involvement and are likely to be too few to influence results significantly. Some information may only be recorded on a separate document such as a fluid and SEWS chart. If this chart goes missing it may not be possible to determine from the notes when the fluids were commenced, resulting in failure of that part of the bundle. For some patients alternative target oxygen saturations are assumed (such as COPD sufferers). If this alternative target or co-morbidities are not clearly documented then this patient group may have been recorded as non-compliant during data collection. The timings for the blood samples were taken from the hospital’s electronic test requesting system, and therefore relate to the time labels are printed for the sample bottles, which may have been taken earlier, or may even have been printed prior to obtaining the samples thus creating potential inaccuracies in these results. Recording urine output was not a specific measure in this study as the time in the department often prevents an accurate measurement. The time for initiating hourly urine output was recorded as the same time as when intravenous fluid was initiated and so failure in this element could not be differentiated, nor separated, for analysis. This element is now identified by the placement of a urinary catheter or signing the fluid balance chart acknowledging the desire for hourly urine output monitoring. We learned that using a quick prompt can empower the staff to act early and to alert others who are essential in this timely management. This, as well as attempting to address the documentation issues, led to the creation of the Sepsis 6 sticker which allowed us to record compliance more easily and acted as a prompt for both timely management and accurate documentation of these aspects in the notes.

During the QI period researchers from the SPSP Sepsis VTE Collaborative made two visits the department to observe practice and interview staff on sepsis management. Feedback suggested that ‘on the ground’ workforce engagement had occurred with increased awareness and understanding of the importance of sepsis management which was reflected in the improvement in compliance.(O'Donnel B, et al., 2014, Sepsis VTE Collaborative Evaluation: Feedback to participants)

Conclusion
Despite falling short of our target this project shows a promising initial step in sepsis management. There was, however, a significant improvement in compliance in comparison with the Sepsis 6 bundle. This is greater than compliance rates and improvements evidenced by other projects,[17-19] These introduced similar educational interventions and addressed local management issues but did not provide the individual case-review and individual feedback or promote the need for managing patients in level II/III environment which triggers early assessment and senior involvement. Over this project time period Scotland saw a 19.9% reduction in mortality from sepsis with an 18.6% reduction in Ninewells. (SPSP 2015, Sepsis collaborative flash report) The improvements in sepsis management in our ED, as a result of this project, will have contributed to this impressive result which surpassed the SPSP target of a 10% reduction in mortality which prompted this project.

It is important to emphasise the need for a quick initial assessment by clinical staff that identifies deranged physiology and presence of infection and SIRS criteria. Undifferentiated patients and those with multiple co-morbidities present significant challenges with the absence of pyrexia being an important factor in our failure to identify sepsis at this early stage. Data showed a strong association between compliance with the sepsis protocol and being managed entirely in resus and so early triage by nursing staff to place the patient in the relevant area of the department is paramount. Early senior doctor involvement increased our compliance rate and is a key part of the management of sepsis as this increased experience allows more timely decision making maximising time to instigate management. The experience of senior clinicians is invaluable when assessing such patients in order to avoid pitfalls that hinder our ability to provide the sepsis bundle in an appropriate time frame. A rolling departmental educational programme focussing on pathophysiology, bundle awareness and the need for early senior clinician involvement supplemented by regular monthly audit on sepsis compliance has helped identify and reinforce these points. A Sepsis 6 check-list sticker aids data collection and acts as a prompt for clinicians. All these initiatives along with ongoing surveillance for areas of improvement have allowed us to improve sepsis management in our department.

Locally we have the challenge to continue to improve sepsis compliance and since the addition of the Sepsis 6 check-list sticker an element of competition within the department has developed with medical and nursing teams showing a desire to have a high personal compliance. Ongoing surveillance will continue to facilitate further interventions which may benefit compliance with the Sepsis 6. This project has also acted as a stepping stone to another QI project into blood culture contamination, where improving contamination rates will not only benefit patient care but also help support the overall importance of the appropriate, timely and high-quality management of septic patients. Although there has been recent controversy in the benefit of EGDT, in the form suggested by the SSC (on which the Sepsis 6 is based) this is still the management advocated by the RCEM with GDT being of overall benefit.[9-12,16] This means most UK EDs are likely to be targeting and managing sepsis in a similar way with these factors likely to be apparent. As most will have similar a set-up with clinical area division, triage system and regular rotation of medical staff our simple, replicable interventions could be rolled out to other UK EDs and potentially improve compliance with the Sepsis 6 and decrease sepsis mortality.

References


Declaration of interests

Nothing to declare.

Acknowledgements

Brodie Paterson for creating the sepsis stickers.

All ED staff for their contribution to sepsis management.

Ethical approval

Data collection and analysis was approved by local Caldicott Guardian.
Seeking Sepsis in the Emergency Department- Identifying Barriers to Delivery of the Sepsis 6
James Bentley, Susan Henderson, Shobhan Thakore, Michael Donald and Weijie Wang

BMJ Qual Improv Report 2016 5:
doi: 10.1136/bmjquality.u206760.w3983

Updated information and services can be found at:
http://qir.bmj.com/content/5/1/u206760.w3983

These include:

References
This article cites 15 articles, 1 of which you can access for free at:
http://qir.bmj.com/content/5/1/u206760.w3983#BIBL

Open Access
This is an open-access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits use, distribution, and reproduction in any medium, provided the original work is properly cited, the use is non commercial and is otherwise in compliance with the license. See: http://creativecommons.org/licenses/by-nc/2.0/
http://creativecommons.org/licenses/by-nc/2.0/legalcode

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections
Emergency medicine / Urgent Care (22)
Open access (24)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/
Table 1 – Demographics of patients included in baseline and post-QI studies

<table>
<thead>
<tr>
<th></th>
<th>Number in baseline survey</th>
<th>Number on post QI survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(p=0.709)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>83 (53.5%)</td>
<td>78 (55.7%)</td>
</tr>
<tr>
<td>female</td>
<td>72 (46.5%)</td>
<td>62 (44.3%)</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p=0.879</td>
<td></td>
<td></td>
</tr>
<tr>
<td>range</td>
<td>15-97</td>
<td>14-97</td>
</tr>
<tr>
<td>mean</td>
<td>67</td>
<td>64</td>
</tr>
<tr>
<td>median</td>
<td>71</td>
<td>68</td>
</tr>
</tbody>
</table>
### Table 2 – Sepsis 6 compliance in baseline and post-QI survey with percentage improvement in compliance, assessment times and SEWS scores

<table>
<thead>
<tr>
<th></th>
<th>Baseline Survey (n=155)</th>
<th>Post QI Survey (n=140)</th>
<th>Percentage improvement in compliance</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (% study population)</td>
<td>Compliant (% Factor population)</td>
<td>Non-compliant (% Factor population)</td>
<td>p value</td>
</tr>
<tr>
<td>ALL PATIENTS</td>
<td>155 (100%)</td>
<td>79 (51.0%)</td>
<td>76 (49.0%)</td>
<td>p=0.810</td>
</tr>
<tr>
<td>Factor Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-hours</td>
<td>49 (31.6%)</td>
<td>22 (44.9%)</td>
<td>27 (55.1%)</td>
<td>p=0.304</td>
</tr>
<tr>
<td>Out-of-hours</td>
<td>106 (68.4%)</td>
<td>57 (53.8%)</td>
<td>49 (46.2%)</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td></td>
<td></td>
<td></td>
<td>p=0.009**</td>
</tr>
<tr>
<td>Resus</td>
<td>113 (72.9%)</td>
<td>66 (58.4%)</td>
<td>47 (41.6%)</td>
<td></td>
</tr>
<tr>
<td>Treatment bay</td>
<td>11 (7.1%)</td>
<td>4 (36.4%)</td>
<td>7 (63.6%)</td>
<td></td>
</tr>
<tr>
<td>Treatment bay to Resus</td>
<td>31 (20.0%)</td>
<td>9 (29.0%)</td>
<td>22 (71.0%)</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td>p&lt;0.001**</td>
</tr>
<tr>
<td>38°C or over</td>
<td>130 (83.9%)</td>
<td>75 (57.7%)</td>
<td>55 (42.3%)</td>
<td></td>
</tr>
<tr>
<td>Less than 38°C</td>
<td>25 (16.1%)</td>
<td>4 (16.0%)</td>
<td>21 (84.0%)</td>
<td></td>
</tr>
<tr>
<td>SIRS Score</td>
<td></td>
<td></td>
<td></td>
<td>p=0.127</td>
</tr>
<tr>
<td>SIRS 2</td>
<td>54 (34.8%)</td>
<td>23 (42.6%)</td>
<td>31 (57.4%)</td>
<td></td>
</tr>
<tr>
<td>SIRS 3</td>
<td>101 (65.1%)</td>
<td>56 (55.4%)</td>
<td>45 (44.6%)</td>
<td></td>
</tr>
<tr>
<td>Times to assessment (minutes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>first medical (mean)</td>
<td>9.5</td>
<td>2.7</td>
<td>16.6</td>
<td>p&lt;0.001**</td>
</tr>
<tr>
<td>first medical (median)</td>
<td>6.0</td>
<td>3.0</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Senior (mean)</td>
<td>15.3</td>
<td>7.0</td>
<td>25.6</td>
<td>p&lt;0.001**</td>
</tr>
<tr>
<td>Senior (median)</td>
<td>7.0</td>
<td>0.0</td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>SEWS score</td>
<td>Mean SEWS score</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Median SEWS Score</td>
<td></td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

p values are adjusted for multiple comparisons unless otherwise noted.
### Table 3 – The number of patients and proportions who achieved each bundle element in baseline and post-QI surveys

<table>
<thead>
<tr>
<th>Bundle element</th>
<th>Baseline survey</th>
<th>Post-QI survey</th>
<th>Percentage change for all patients</th>
<th>Percentage change for non-compliant patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All patients</td>
<td>Non-compliant patients</td>
<td>All patients</td>
<td>Non-compliant patients</td>
</tr>
<tr>
<td>Oxygen</td>
<td>148 (95.5%)</td>
<td>69 (90.8%)</td>
<td>140 (100%)</td>
<td>36 (100%)</td>
</tr>
<tr>
<td>Fluid</td>
<td>120 (77.4%)</td>
<td>41 (53.9%)</td>
<td>120 (86.4%)</td>
<td>17 (47.2%)</td>
</tr>
<tr>
<td>Cultures</td>
<td>127 (81.9%)</td>
<td>48 (63.2%)</td>
<td>125 (89.3%)</td>
<td>21 (58.3%)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>103 (66.5%)</td>
<td>24 (31.6%)</td>
<td>120 (85.7%)</td>
<td>16 (44.4%)</td>
</tr>
<tr>
<td>Lactate</td>
<td>128 (82.6%)</td>
<td>49 (64.5%)</td>
<td>130 (92.9%)</td>
<td>26 (72.2%)</td>
</tr>
<tr>
<td></td>
<td>All patients</td>
<td>Non-compliant patients</td>
<td>All patients</td>
<td>Non-compliant patients</td>
</tr>
<tr>
<td>Oxygen</td>
<td>148 (95.5%)</td>
<td>69 (90.8%)</td>
<td>140 (100%)</td>
<td>36 (100%)</td>
</tr>
<tr>
<td>Fluid</td>
<td>120 (77.4%)</td>
<td>41 (53.9%)</td>
<td>120 (86.4%)</td>
<td>17 (47.2%)</td>
</tr>
<tr>
<td>Cultures</td>
<td>127 (81.9%)</td>
<td>48 (63.2%)</td>
<td>125 (89.3%)</td>
<td>21 (58.3%)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>103 (66.5%)</td>
<td>24 (31.6%)</td>
<td>120 (85.7%)</td>
<td>16 (44.4%)</td>
</tr>
<tr>
<td>Lactate</td>
<td>128 (82.6%)</td>
<td>49 (64.5%)</td>
<td>130 (92.9%)</td>
<td>26 (72.2%)</td>
</tr>
</tbody>
</table>

- **p** values indicate statistical significance: 
  - `p=0.002**` indicates a significant change.
  - `p=0.074` indicates a trend towards significance.
  - `p=0.097` indicates a trend towards significance.
  - `p=0.008**` indicates a significant change.
  - `p=0.001**` indicates a highly significant change.

*Note: All percentages reflect improvements in adherence to bundle elements post-QI intervention.*
Figure 1 – Sepsis management protocol

**Ninewells Emergency Department Sepsis Protocol**

1. **Possible septic focus**
   - Triage calculation of clinical SIRS score

2. **Clinical SIRS (1 pt each)**
   - Temp >38°C < 36°C
   - HR > 90bpm
   - Tachypnoea >20rpm

3. **SIRS (0)**
   - Continue Standard ED assessment

4. **SIRS (1)**
   - Triage Yellow
   - Nurse on Trolley with full set obs. S/B stream 2 doctor
   - Early ED Senior r/v
   - Consider WCC + SIRS recalculation

5. **Inadequate response**
   - BP – Sys ≤ 90, MAP ≤ 65
   - Lactate ≥ 4

   - HDU notification (ICU if >1 organ dysfunction) –
     - Immediate bed available.
     - No
     - Yes
     - T/F HDU

   - CVL, Art Line, IDC
     - Initiate EGDT as per Tayside Sepsis Guideline

6. **SIRS (>1)**
   - ED Senior involved
     - FBC, UEC, Lactate*, ABG, BCs, G+H
     - Monitoring – ECG, SaO2, BP (Sys + MAP)
   - IV Antibiotics as per sepsis guidelines
   - Consider 20ml/kg 0.9% NS bolus over 30 mins + UO monitor
   - * Grey tube, no ice required

7. **Adequate response**
   - BP – Sys > 90, MAP >65
   - Lactate < 4

   - Medical admissions Unit
     - Med Reg aware
Figure 2 – Sepsis sticker

NHS Tayside Emergency Departments Sepsis Six Bundle

Name printed here  CHI  triage time

Initial obs;  T 39.4°C  HR 137  BP 101/76  RR 36  SIRS 3  SEWS

Target time  display triage time plus 59 mins

Tick  time or info initials

1. Oxygen (if req. to apple SpO2)
2. IV saline
3. Sepsis bloods as per ICE
4. Blood cultures
5. IV antibiotics (first dose)
6. Fluid chart signed
7. Move to resuscitation room
8. Reviewed by senior doctor

If this patient is septic, treatment should start before a definitive diagnosis is made.
Making healthcare improvement simple

**FIVE WAYS BMJ QUALITY SUPPORTS HEALTHCARE IMPROVEMENT AND PUBLICATION:**

1. The online workbook helps users to develop an idea, log and implement it and then submit their work for publication.
2. We offer support via 20+ hours of exclusive BMJ Learning modules, tools and regular webinars.
3. Users have the option to work collaboratively and to add a mentor.
4. We facilitate the connection and interaction with the international improvement community through our webinars, social media and forum.
5. Completed workbooks can be automatically converted to a journal article format and submitted for publication in BMJ Quality Improvement Reports journal with a single click. We accept over 90% of submissions.

[quality.bmj.com](http://quality.bmj.com)