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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 delivery of care, by implementing a CAUTI Insertion and Maintenance Bundle and data collection tools which will capture ward based CAUTI data for improvement and reporting of progress. This article will discuss the initial designing, testing and implementation of the CAUTI bundle and data collection tools within 3 pilot wards.

For this project, three outcome measures, using a national CAUTI definition, and two process measures, all set by HIS/SPSP will be used. The current CAUTI definition we are adopting is - Urinary Catheter in situ or removed within previous 48 hours AND diagnosis of CAUTI documented in the medical notes AND an antibiotic has been prescribed on the medicine chart to treat a CAUTI. Exclusions - patients with suprapubic catheters.

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”

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

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 our link staff in the pilot wards and tested using PDSA cyles 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.

- QIF's to utilise networking opportunities at planned national events - we have taken the opportunity to attend face to face learning event sessions, teleconferences and WebEx's throughout our secondment. These have proved to be invaluable. The sharing of experiences and ideas and discussing the challenges that we have all faced has helped support each of us at different stages of this journey.

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 care 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 on the insertion bundle was 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 Angus and acute hospitals within Perth and Kinross and Angus.

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Declaration of interests

Nothing to declare

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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.