

Reducing catheter-associated urinary tract infections: standardising practice

Amy Cartwright

ABSTRACT

Inspired by innovations in catheter practice from the USA, in 2014 Nottingham University Hospitals NHS Trust introduced catheterisation standardisation across the Trust's two acute sites. Standardisation was achieved by the introduction of an all-in one catheterisation tray (Bard® Tray), which included all the necessary equipment required for catheterisation, coupled with a training programme. The introduction of the tray was followed by a clinically significant 80% reduction in the CAUTI rate from 2014 to 2016. This reduction in CAUTI rate provided the Trust with a considerable reduction on annual expenditure (nearly £160 000 less in 2016 compared with 2014). The introduction of the tray has additionally improved practice with nursing staff now less likely to forget the necessary equipment before commencing catheterisation as all the components are provided in one place.

Key words: Catheterisation ■ Healthcare-associated infection ■ Quality improvement ■ Cost reduction

In 2008, the Centers for Medicare & Medicaid Services (CMS) in the USA introduced a financial provision based on the Deficit Reduction Act, the aim of which was to change the criteria for reimbursement in hospitals across a range of specific hospital-acquired conditions (HAC). The introduction of this provision meant that hospitals would no longer receive additional payment for cases in which a selected condition occurred during hospitalisation if this condition was not present on admission (CMS, 2016). Catheter-associated urinary tract infections (CAUTIs) were defined as one of these hospital-acquired conditions. These changes to reimbursement policy had a significant effect on the provision of health care throughout the USA and reductions in the rates of CAUTIs were noted following the introduction of the HAC list (Waters et al, 2015).

The introduction of this 'no payment for errors' list contrasted with the procedural and reimbursement policies in the UK at that time following the introduction of the 2006 Health Act and the promotion of the urinary catheter care bundle (one of the identified high impact actions for healthcare-associated infection).

Amy Cartwright, Clinical Procurement Specialist, previously Continence Team Lead, Nottingham University Hospitals NHS Trust, Amy.Cartwright@nuh.nhs.uk

Accepted for publication: November 2017

Despite moving towards greater procedural accountability, there were no such stringent financial constrictions in the UK at that time (Department of Health, 2010). With the aim of gaining a greater insight into the protocols and procedures used across US hospitals in response to changes in payment structure to the HAC list, Nottingham University Hospitals NHS Trust's continence team lead visited several hospitals in the USA as part of a Winston Churchill Memorial Trust Fellowship. During this examination of US catheter protocols and procedures, several variations were noted between US and UK practice. The major differences observed in the USA were the use of daily electronic prompts to ascertain ongoing catheter requirement, the demarcation of catheterisation as a wholly nursing, and not medical, decision, the annual testing of nurses' catheterisation insertion competence and the consistent use of a catheterisation pack containing all required catheterisation equipment.

Considering the practice innovations that were observed, the Trust attempted to improve clinical practice across the board by implementing certain procedures that had been shown to be effective in the USA. At that time, it was known that throughout the two acute sites of the Trust (Queen's Medical Centre and City Hospital), several different urinary catheters were used by clinicians with no standardised practice in place. It was also known that the CAUTI rate at that point (101 CAUTIs from April to December 2013) was also elevated compared with NHS Safety Thermometer benchmark data. Therefore, the decision was taken by the continence team lead, in tandem with the clinical procurement matron, to investigate the available options for urinary catheter standardisation across the Trust. This approach involved the introduction of catheterisation packs to improve and standardise practice and reduce the incidence of CAUTIs.

This article documents the process of the introduction of catheterisation packs to the Nottingham University Hospitals NHS Trust and the benefits that the implementation of these packs brought to the Trust. The aim of this project was to standardise urinary catheter insertion practice and choice of catheter across the two acute sites of the Nottingham University Hospitals NHS Trust and, with the standardisation of practice, to bring about a reduction in the incidence of CAUTIs.

Methods

Planning and execution

As part of due diligence at the commencement of the project in early 2014, the clinical procurement matron and

the continence team lead assessed the market to determine which catheterisation packs were available in the UK. Following a thorough market assessment via NHS Supply Chain, two different products were identified (Bard® Tray (CR Bard Inc) and Cath-It (Richardson Healthcare)). The two catheterisation packs were discussed and examined internally and the companies responsible for creating the trays were invited to present the benefits of their products to the Nottingham University Hospitals Continence Formulary Group. The two catheterisation trays were subsequently trialled for one month in defined locations across the Trust to gain a perspective on how the trays would function in day-to-day use. These locations included the accident and emergency department, the acute theatres and two high-use surgical wards. In conjunction with this, the continence team lead reviewed the available clinical evidence in relation to urinary catheterisation packs. The results of the clinical evaluation and analysis of the current available evidence established that the ideal catheterisation pack should include as many components for catheterisation as possible and this should promote a fully closed system wherever possible (Loveday et al, 2014). It was therefore decided that, based on the available data, the Trust would use the Bard catheterisation tray for urinary catheterisations across both sites (with the exception of urology wards, which would retain prior protocols owing to the potential variety of catheterisations required). The contents of the tray are shown in *Figure 1* and *Box 1*.

Once this decision was taken, the company that manufactured the tray (CR Bard Inc) provided the Trust with onsite training to assist staff in product recognition awareness training to enable correct use of the tray in an aseptic manner to minimise the risk of CAUTIs. Along with company staff, the continence team lead visited all areas of the Trust to ensure staff were aware of the product change and to talk through the contents of the pack. This training also allowed Trust staff to ask questions about the tray or its contents of the company staff or the continence team lead. The implementation process began in September 2014 and the catheterisation tray was fully implemented across the Trust by January 2015.

Assessment of change in CAUTI rates

Changes in rates of CAUTIs following the introduction of the catheterisation tray would be compared with baseline data for the period before the introduction of the tray from the NHS Safety Thermometer.



Figure 1. The Bard Tray

Box 1. Contents of the Bard Tray

- One empty 10 ml syringe to deflate the balloon during re-catheterisation
- One pre-filled 10 ml syringe of sterile water to inflate the newly inserted catheter balloon
- Foley catheter pre-connected to choice of collection system (leg bag, night bag or urine meter)
- Protective waterproof sheet and fenestrated drape
- Two pairs of latex-free gloves
- Two pre-filled 10 ml syringes of sterile water for cleansing meatus and five gauze squares
- Apron for the health professional
- Statlock® Foley Stabilisation Device
- One pre-filled 10 ml syringe of lubricating gel
- One pair of latex-free leg bag straps (with leg bag option of the tray only)

Results

Clinical outcomes

Since 2015 when the use of the tray was introduced there has been a significant reduction in the rate of CAUTIs across the Trust. In 2014 (prior to the introduction of the tray) there were 102 CAUTIs across the Trust. After the introduction of the tray in 2015 there was a reduction in CAUTI incidence to 54 with a further reduction to 21 in 2016 (*Figure 1*). As of June 2017, there had been 13 CAUTIs across the Trust. The introduction of the Bard Tray has therefore most likely led to a clinically significant 80% reduction in the CAUTI rate from

Table 1. CAUTI rates across the Trust between 2014 and 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	10	12	5	11	8	8	8	8	9	9	7	10	102
2015	8	8	2	7	4	1	5	3	5	4	6	1	54
2016	4	1	2	4	1	3	2	1	1	1	0	1	21
2017	2	0	2	4	2	3							13

Source: Data collected locally for NHS Safety Thermometer monitoring. Available year-to-date figures are provided for 2017. The catheterisation tray was fully introduced across the Trust by January 2015

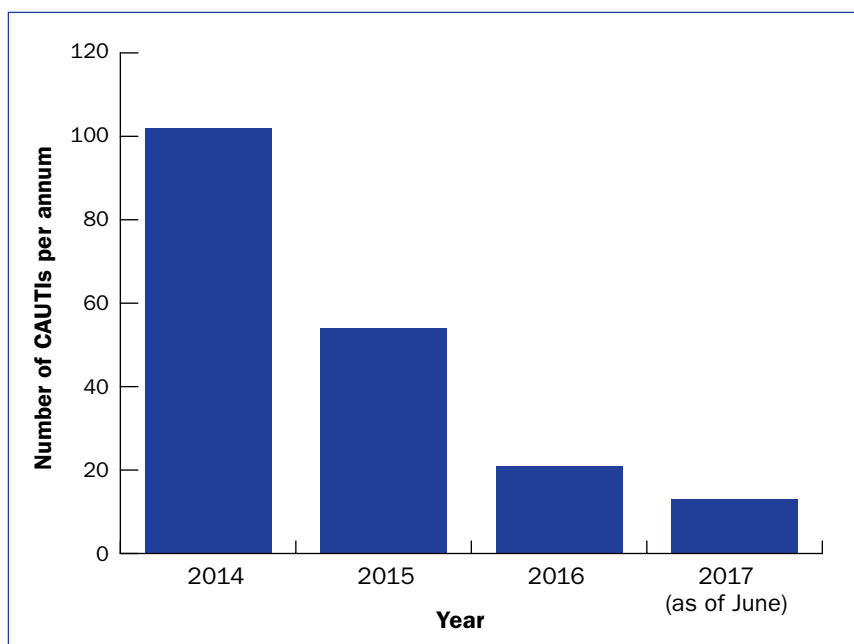


Figure 1. Change in CAUTI incidence over time

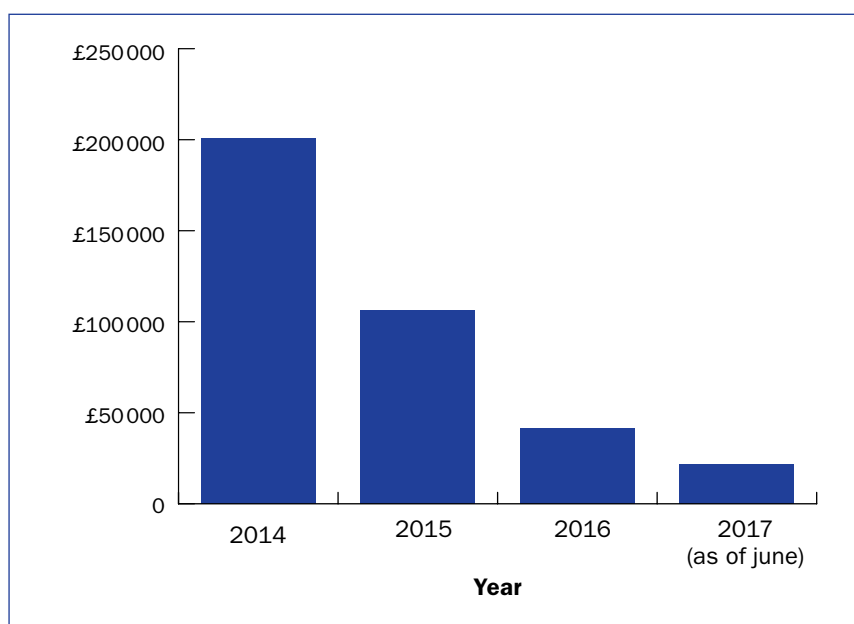


Figure 2. Change in expenditure for CAUTI over time

2014 to 2016. The monthly data on CAUTI numbers across the Trust, as indicated by NHS Safety Thermometer data, are shown in *Table 1*.

Financial impact

The introduction of the tray has led to a significant cost saving for the Trust. These financial benefits were attributable to many factors. The purchase of the tray was estimated, considering the different types of catheters and different types of drainage bags available, to produce a saving of approximately £1.00 per tray compared with the purchase of the individual components of catheterisation. This led to a purchasing saving of approximately £40 000 in 2015 in comparison with 2014 (this saving was based

on the number of trays purchased in 2015 compared with the costs of purchasing the products/components used before the switch).

Using an estimated cost of an individual CAUTI of £1968 (Loveday et al, 2014), CAUTIs in 2014 cost the Trust approximately £200 700 to treat, in 2015 they cost the Trust approximately £106 300 to treat and in 2016 they cost the Trust approximately £41 300 to treat. Current expenditure on CAUTIs from January to June 2017 is estimated to be £25 600. Based on these figures, the Trust saved approximately £159 000 in 2016 from reductions in CAUTIs and associated outlay compared with expenditure on CAUTIs in 2014 following the introduction of the Bard Tray.

The estimated change in annual expenditure across the Trust on CAUTIs is shown in *Figure 2*.

Patient care and organisational impact

Anecdotal reports from staff who used the new tray noted improvements in overall practice with regard to catheter insertion. Following the change to the tray and the associated catheter training, staff were more aware of the procedure of catheter insertion and how to perform it correctly. Concurrently, staff also spent more time in establishing and confirming the requirements for urinary catheters in patients. The use of the tray has also led to anecdotal reports of improvements in available nursing time. The entire kit for the catheterisation procedure is now contained in an all-in-one sterile pack and obtainable from one location as opposed to the need to gather multiple items from multiple store rooms—this situation now allows staff more direct time with patients.

Discussion

The introduction of standardisation in catheterisation practice has provided significant improvements in patient care across the Nottingham University Hospitals NHS Trust. Primarily, the introduction of catheterisation standardisation, as brought about by the introduction of the catheterisation tray, has most likely led to an 80% reduction in the incidence of CAUTIs across the Trust from 2014 to 2016. This is highly significant for the Trust as CAUTIs have a considerable impact on both patient wellbeing and healthcare resources. Developing a CAUTI can lead to an extended period in hospital (extending the hospital stay by 6 days) and can be life threatening (13–30% mortality rate for CAUTI bacteraemia) (All Party Parliamentary Group for Continence Care, 2011; Loveday et al, 2014). It is estimated that approximately 3.5% of patients with a CAUTI develop a life-threatening infection such as bacteraemia or sepsis (Loveday et al, 2014). From a resource perspective, reducing the CAUTI rate reduces pressure on beds, frees up nursing time and reduces the requirement for antibiotic use, an extremely pertinent issue at present, and is also positive from a patient perspective from discomfort through to mortality (Centers for Disease Control and Prevention, 2017).

The components of the tray and the nature of the packaging mean that there is now no requirement to gather equipment from multiple locations. By introducing the tray, aseptic catheterisation technique has been improved. Staff admitted that when using the old system of catheterisation, they would

occasionally forget to take certain products/equipment with them when going to carry out the procedure and would then have to leave the patient to collect the remaining items. This is no longer an issue as all the materials for catheterisation are contained within the sterile tray. One specific component of the tray particularly aids in performing aseptic catheterisation: the pre-connected system between the catheter and drainage bag ensures a closed system between catheter and bag, minimising the opportunity for infection.

There is another advantage to the pre-connect system between catheter and drainage bag. With the equipment previously used, the drainage systems could only remain in place for 7 days. With the pre-connected bag, the drainage system can remain in place for up to 14 days. As a result, there has been a reduction in the outlay on individual drainage systems and the Trust spend on this is approximately 20% of previous levels.

An additional component of the Bard Tray is the Statlock stabilisation device. Since the introduction of the tray, the anecdotal opinion of staff on this has been positive and confidence in this device has grown. However, all clinical areas also stock a strap device and staff are advised to use their clinical judgement as to which would best suit the patient. Following implementation of the tray, use of catheter fixation devices has grown.

From a sustainability perspective, the tray offers the Trust a reduction in packaging in comparison with historical practice. Previously each item needed to perform this procedure was packaged individually, generating waste packaging for every item used. With the introduction of the tray the Trust has seen a reduction in waste. Additionally, through the inclusion of all the items required for catheterisation in one pack, less time is needed by the materials management team to replenish stock levels on the wards and less space is required for storage of catheterisation stock. This reduction in required space for catheterisation stock was also attributable to the standardisation of the trays to two sizes and only PTFE catheters and a partial reorganisation of storage rooms on the introduction of the tray.

Alongside the benefits, the introduction of the tray brought with it a number of challenges. On introduction of the tray and at the initial training session, some members of staff raised the issue of the lack of anaesthetic gel within the tray components. It was pointed out by the continence team lead that current guidelines (Royal College of Nursing, 2012) largely leave this clinical decision to the practitioner and highlighted that the use of any anaesthetic gel would require a specific period of time between application and effect. Furthermore, the change to the

KEY POINTS

- Nottingham University Hospitals NHS Trust introduced a pre-packaged catheterisation tray to standardise catheterisation practice across the Trust
- From an annual number of CAUTIs of 102 across the Trust in 2014, the introduction of the tray was followed by a reduction in CAUTI incidence to 54 in 2015 with a further reduction to 21 in 2016
- The reduction in CAUTI rate provided the Trust with considerable reduction in annual expenditure (estimated £159 000 saving in 2016 compared with 2014)
- Standardisation of practice to an all-in-one kit removed the potential for staff to forget to obtain any of the components for catheterisation prior to beginning a procedure with the patient

tray from the prior catheterisation components necessitated a readjustment in the Trust's store rooms. However, with support from stores managers and the materials management team this was carried out quite easily.

Following the success of the introduction of the catheterisation tray, and as part of the ongoing approach to reduce the incidence of CAUTIs, the Trust has also introduced bladder scanners (Bardscan® IIs Real-Time Bladder Scanner) to non-invasively assess and manage urinary retention. The scanners, of which 42 have been purchased, provide real-time assessment of the bladder, which ensures that the user can be confident that it is the bladder being scanned (as opposed to a potential cyst or urinary stone). The introduction of bladder scanners is aligned with current guidance as advocated by both epic3 (Loveday et al, 2014) and the National Institute for Health and Care Excellence (2013). Data on the use of bladder scanners are limited; however, a meta-analysis by Palese et al (2010), which included three studies and 4442 participants, indicated that ultrasound bladder scanning was effective in reducing CAUTIs (odds ratio 0.27; 95% confidence interval 0.16 to 0.47). Anecdotal reports regarding the use of bladder scanners within the Trust have so far been encouraging in terms of reducing catheterisation levels—and therefore the possibility of developing a CAUTI—and the findings of ongoing data collection on catheterisation and CAUTI rates are awaited with interest.

Conclusion

The introduction of catheterisation standardisation to the Nottingham University Hospitals NHS Trust has been highly successful. By introducing a pre-packaged catheterisation tray

CPD reflective questions

- What are the benefits for patients and for the healthcare organisation of reducing the incidence of catheter-associated urinary tract infections (CAUTIs)?
- Considering the guidance on infection prevention, how might consistent practice help to reduce CAUTIs?
- Are you aware of variations in practice and nursing procedure between different nursing areas in your Trust? Is there potential to standardise any of these? How?

including all required materials for catheterisation, the Trust has reduced its CAUTI rate considerably alongside a reduction in healthcare expenditure. Across the Trust, there is a continual focus to improve catheterisation practice as evidenced by the introduction of standardisation and the recent introduction of bladder scanners. Looking to the future, the Trust aims to continue improving to provide the best possible catheter care and CAUTI avoidance for patients. **BJN**

Declaration of interest: CR Bard Inc has reviewed this article for accuracy. The author has received speaker fees/honoraria from CR Bard Inc for presenting at symposia and conferences. The author has not received reimbursement for writing this article.

All Party Parliamentary Group for Continence Care. Cost effective commissioning for continence care report. 2011. <http://tinyurl.com/m97c3t8> (accessed 16 November 2017)

Centers for Disease Control and Prevention. Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated

urinary tract infection [UTI]) and other urinary system infection [USI] events. National Healthcare Safety Network patient safety component manual, chapter 7. 2017. <http://tinyurl.com/yavtq56s> (accessed 16 November 2017)

Centers for Medicare & Medicaid Services. Hospital-acquired conditions (present on admission indicator). 2016. <http://tinyurl.com/yaro2lmt> (accessed 16 November 2017)

Department of Health. High impact intervention: urinary catheter care bundle. (archived). 2010. <http://tinyurl.com/y7ppwkm4> (accessed 16 November 2017)

Loveday HP, Wilson JA, Pratt RJ et al. epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hospital Infect.* 2014; 86(suppl 1):S1–S70. [https://doi.org/10.1016/S0195-6701\(13\)60012-2](https://doi.org/10.1016/S0195-6701(13)60012-2)

National Institute for Health and Care Excellence. Urinary incontinence in women: management. Clinical guideline 171. 2013. <https://www.nice.org.uk/guidance/cg171> (accessed 16 November 2017)

Palese A, Buchini S, Deroma L, Barbone F. The effectiveness of the ultrasound bladder scanner in reducing urinary tract infections: a meta-analysis. *J Clin Nurs.* 2010;19(21-22):2970–2979. <https://doi.org/10.1111/j.1365-2702.2010.03281.x>

Royal College of Nursing. Catheter care: RCN guidance for nurses. 2012. <http://tinyurl.com/pcqpoh4> (accessed 16 November 2017)

Waters TM, Daniels MJ, Bazzoli GJ et al. Effect of Medicare's nonpayment for hospital-acquired conditions: lessons for future policy. *JAMA Intern Med.* 2015;175(3):347–354. <https://doi.org/10.1001/jamainternmed.2014.5486>

BARD® TRAY

FOLEY CATHETERISATION TRAY

THINK INSIDE CATHETERISATION BOX



**YOU'RE PREPARING TO CATHETERISE AND
CAN'T FIND ALL THE ESSENTIAL ITEMS**
Why take the risk when there is a better way?



The **BARD® Tray** contains everything required to either catheterise or re-catheterise, in one handy pack.

- Encourages best practice
- Provides a sterile environment
- Reduces risk of infection in a true closed system¹
- Everything required in one convenient tray
- Less waste
- Available with long or short term catheters pre-connected to either a Leg Bag, Bed Bag or Urinometer

IMPROVING QUALITY OF CARE

Available through NHS Supply Chain.

References: 1. Madeo M, Roodhouse AJ. (2009) Reducing the risks associated with urinary catheters. Nursing Standard. 23, 47-55.

Please consult product labels and inserts for any indication, contraindications, hazards, warnings, cautions and directions for use.

Bard is a registered trademark of C. R. Bard, Inc., or an affiliate.

© 2016 C. R. Bard, Inc. All Rights Reserved. 1616/4926 16/043



BARD | MEDICAL