

Showcase Hospitals Local Technology Review Report number 2

Cuff-Guard®

The Lewisham Hospital 
NHS Trust

The Healthcare Associated Infections (HCAI) Technology Innovation Programme

The basic ways of preventing and reducing healthcare associated infections (HCAIs) are largely unchanging. The principal strategies for combating HCAIs are those associated with hand hygiene/aseptic techniques, prudent antibiotic prescribing and good clinical practice. However, new technologies and equipment can support these strategies by helping get things done differently, more swiftly or more reliably.

As part of the strategy set out in *Clean, Safe Care*¹ the Department of Health is funding the HCAI Technology Innovation Programme². The Programme aims to:

- Speed up the development and adoption of technologies to further help combat HCAIs
- Identify which new technologies provide the best value and will have the most impact

The Showcase Hospitals Programme

As part of the HCAI Technology Innovation Programme, Showcase Hospitals are undertaking local technology reviews of infection related products or technologies in which they have a specific interest. These are service evaluations, as defined by the National Patient Safety Agency's National Research Ethics Service, and do not therefore require Research Ethics Committee review.³ This service evaluation was undertaken by The Lewisham Hospital NHS Trust.

¹ Clean, safe care: Reducing infections and saving lives. Department of Health, 9 January 2008.

² For further information on the Programme see <http://www.clean-safe-care.nhs.uk/index.php?pid=28>

³ See leaflet on defining research at <http://www.nres.npsa.nhs.uk/news-and-publications/publications/nres-research-leaflets/>

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Executive summary

As part of the Department of Health's Healthcare Associated Infections (HCAI) Technology Innovation Programme, Showcase Hospitals are undertaking local technology reviews of infection related products or technologies in which they have a specific interest with the objective of helping Directors of Infection Prevention and Control and other stakeholders to decide whether they should consider any of these products or technologies as part of their trust's strategy to reduce healthcare associated infections.

The Lewisham Hospital NHS Trust decided to review Cuff-Guard[®] which is a protective cover for blood pressure cuffs made from a soft, white spun plastic with an inner impervious plastic coating.

Blood pressure cuffs are among the commonest reusable medical equipments used in hospitals. They can become a reservoir for pathogens because of ineffective or no decontamination.

Cuff-Guard[®] was evaluated on 21 adult in-patient wards for 8 weeks to:

- Determine level of contamination on conventional blood pressure cuffs using ATP detection device and conventional microbiological testing
- Determine staff and patients attitudes regarding Cuff-Guard[®] use
- Evaluate and identify adoption related issues for Cuff-Guard[®]

1 out of 111 blood pressure cuffs was contaminated with *S. aureus*.

A majority of staff would continue to use Cuff-Guard[®] given the choice with just over half thinking that all hospitals should adopt Cuff-Guard.

Around 80% of patients expressed positive views of Cuff-Guard[®].

The main adoption issues identified related to the importance of effective training before Cuff-Guard[®] is adopted and the possibility of supply difficulties, given that Cuff-Guard[®] has to be ordered from the United States.

The study was not designed to demonstrate cost-effectiveness, but Cuff-Guard[®] would be cost-effective if it prevented one infection in around every 3,000 patients with whom it was used.

Keywords: blood pressure cuff decontamination, implementing change, nosocomial transmission

Introduction

This report sets out the findings from an evaluation in The Lewisham Hospital NHS Trust, one of eight Showcase Hospitals, of the in-use and economic features and adoption characteristics of Cuff-Guard®.

The objective of this document is to help Directors of Infection Prevention and Control and other stakeholders to decide whether they should consider Cuff-Guard® as part of their Trust's strategy to reduce healthcare associated infections.

The problem

Cross-contamination from blood pressure cuffs

In the UK, it is estimated that around 3% of in-patients acquire an HCAI⁴. These infections are acquired directly from healthcare workers or indirectly from the environment (including medical equipment). Equipment such as blood pressure cuffs which are used on a number of patients, are frequently contaminated with skin flora and occasionally with pathogens and may contribute to an increased risk of HCAI.^{[1][2]}

Blood pressure cuffs should be cleaned in accordance with the manufacturer's instructions. Many healthcare workers presume that blood pressure cuffs are decontaminated and safe for patient use based upon visual inspection^[3]. The risk of HCAI may be present without obvious visual contamination.

The risk of cross-contamination and possible HCAI could be decreased by disposable single-patient use products, such as a protective cover for sphygmomanometer cuffs. Single-patient sphygmomanometer covers do not replace the need for blood pressure cuffs to be cleaned in accordance with the manufacturer's instructions.

The product

Cuff-Guard®

Cuff-Guard® manufactured by Bowen Medical Services Inc. (see Figure 1) is a protective cover for blood pressure cuffs. It is made from a soft, white spun plastic with an inner impervious plastic coating. This material, made by Tyvex® is said by the manufacturer to provide a bacterial barrier and is latex free.

The product is made in paediatric and adult sizes and can be attached to any sphygmomanometer cuff. It does not require any disassembly of the apparatus.

⁴ Hospital Episode Statistics for 2008-09 (available at www.hesonline.nhs.uk) record just over 11 million ordinary admissions. The best estimate of the number of HCAs per year is 300,000 (Reducing Healthcare Associated Infections in Hospitals in England. Report by the Comptroller and Auditor General. HC 560 Session 2008-2009. 12 June 2009).



Figure 1 – Cuff-Guard®

The knowledge base

What was known before this evaluation

Blood pressure measurements are one of the most performed procedures. Many healthcare workers presume that blood pressure cuffs are clean based upon visual inspection.^[3]

The literature on pathogen transmission from blood pressure cuffs has recently been reviewed in an online article that concluded that blood pressure cuffs have been found to be a major source of cross-contamination between patients.^[2]

Beard et al in 1969 investigated blood pressure cuffs as a reservoir for pathogenic bacteria and concluded that there was clear “implication of the direct transfer of microorganisms from cuff to patient and staff”. It was acknowledged by this study that the blood pressure cuff was one of the most commonly used equipment that was not disinfected adequately.^[1]

Blood contamination among infants and has also been documented. Myers reported the use of blood pressure cuffs for nursery infants to be associated with an increased rate of infection. The author tells of 46 infants infected and 8 deaths associated to an infected, reused blood pressure cuff. The issue of use of contaminated BP cuffs is also addressed.^[4]

In a study by Sternlicht and Poznak^[5] it was shown that within certain settings the bacterial colonisation of the blood pressure cuffs were significant. 99% of the cuffs tested were contaminated. They discuss the attitude by employees and need to take precautions with contaminated cuffs.

Base-Smith cultured presumed “clean” blood pressure cuffs. The results indicated frequent bacterial colonisation and soiling with organic and inorganic substances. Although risk of disease transmission was not measured, the need for better sanitation and disinfection of the cuffs between patient use became evident.^[6]

Another study found blood pressure cuffs to be contaminated with *C. difficile* with levels similar to that of bedside commodes.^[7]

In a further study, MRSA was demonstrated to be present on 9% of blood pressure cuffs prior to barrier application, however no MRSA was found to be detected after use of a barrier.^[8]

Walker et al reminded all that “hands are not the only fomites to go from patient to patient on hospital wards, and that measures should be taken to reduce the risks posed by blood pressure cuffs”.^[3]

A study by Gialluly and Morange of bacterial contamination on blood pressure cuffs highlighted the importance of recognising blood pressure cuffs as potential vectors of pathogenic bacteria among patients.^[9]

McCaughey suggested “The blood pressure cuffs that nurses wrap around patients bare arms frequently carry live bacteria, including MRSA....77 % of blood pressure cuffs wheeled from room to room were contaminated”.^[10]

The evaluation

How the evaluation was done

The evaluation involved a combination of sampling the levels of contaminants on the surface of blood pressure cuffs in the designated ward/unit and collection of staff and patients’ view on the product.

Over an eight-week period, 111 mobile and stationary blood pressure cuffs were sampled for levels of contaminants on 21 adult in-patient wards in a 450-bedded district general hospital. Three surfaces were randomly sampled: hooks, loops (Velcro fasteners) and inner side (surface that comes in contact with the patient’s skin). From each of the above sites, duplicate swabs were obtained from a 10cm² area. One of the swabs was used to determine the amount of ATP (expressed as Relative Light Units)⁵ and the other was subjected to microbiological testing⁶.

Each adult admitted to the hospital was issued with a Cuff-Guard[®]. Patients and staff were given self-administered questionnaires to determine attitudes and views of the use of Cuff-Guard[®].

⁵ ATP- Bioluminescent testing system measures the amount of ATP as a surrogate marker of contamination. Rapid detection ATP- Bioluminescent sampling was conducted on the ward/unit. Results were recorded in Relative Lights Units (RLU). High RLU readings indicated high levels of contamination.

⁶ Swabs were vortexed in saline and serial dilutions were cultured on blood agar and incubated at 37°C in air for 24 hours. The colony count was expressed as cfu/ml.

Training in the use of Cuff-Guard® was provided by Trust staff. 73% of staff who completed a questionnaire indicated that training was provided. 65% of staff thought that the training provided was useful, with only 9% disagreeing.

Results of Microbiological Testing

333 samples were collected from 111 blood pressure cuffs for ATP bioluminescence and culture. There was no growth in 72% of the samples. *S. aureus* and *S. epidermidis* were isolated from one sample (from a loop). The remaining 27.6% of samples yielded skin flora (*S. epidermidis*, *Micrococcus* sp or diphtheroids) or environmental contaminants (*Bacillus* sp. in one sample). When comparing the three sample sites cultured, the inner side sample area had the highest number of bacteria (Mean: 4 cfu/ml range: 0-504 cfu/ml). Hooks and loops had similar number of colony forming units (Hooks - Mean 1.4cfu/ml; range: 0-58; Loops: Mean: <1 cfu/ml, range 0-113 cfu/ml).

The amount of ATP (RLU) from the samples was generally low and there was no correlation between the number of colony forming units and RLU.

How acceptable was the product to staff?

186 staff members completed self-administered questionnaires, of which 52% were nurses, 15% healthcare assistants, 10% student nurses, 4% midwives and 1% doctors (17% of respondents did not indicate their role.)

65% of staff who expressed a view found the product easy to use, but some found it a bit fiddly to use. 57% would continue to use Cuff-Guard® given a choice and 53% thought that all hospitals should use Cuff-Guard®.

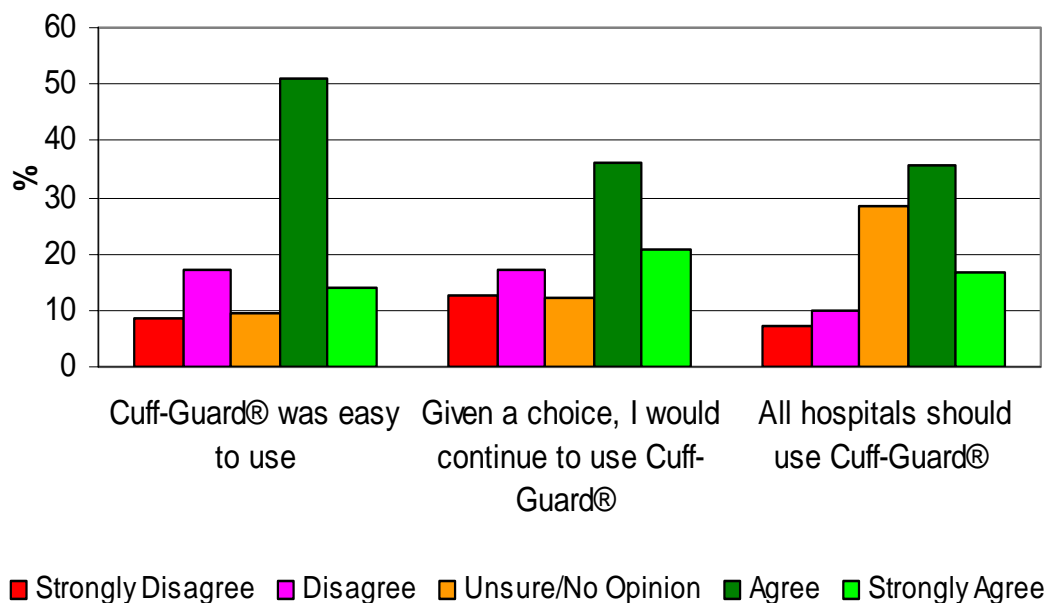


Figure 2 – Staff Opinions of Cuff-Guard®

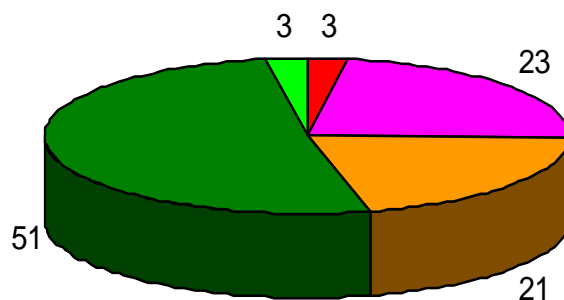
How acceptable was the product to patients?

820 patients responded to the questionnaire on 21 in-patient wards, of who 801 said that they had been given their own Cuff-Guard[®]. 40% of patients who responded to the questionnaire had received an explanation of why the Trust was using Cuff-Guard[®]. Only 12% had asked staff about the use of Cuff-Guard[®].

74% of patients reported that the Cuff-Guard[®] was used each time that they had a blood pressure reading.

Patients were asked whether they would remind staff if they did not use the Cuff-Guard[®] when taking their blood pressure. 54% of those who expressed an opinion were prepared to do this, with 26% apparently not being prepared to do so, though comments suggest that in some cases this response was given when it had been unnecessary to remind staff because they always used Cuff-Guard[®] (see figure 3).

If staff did not use Cuff-Guard when taking my blood pressure, I would remind them



■ Strongly Disagree ■ Disagree ■ Unsure/No Opinion ■ Agree ■ Strongly Agree ■

Figure 3 – Patient Would Request of Use of Cuff-Guard[®]

Patient opinions of Cuff-Guard[®] were very favourable. 79% of patients who expressed an opinion liked the Cuff-Guard[®]. 77% felt safe because staff used Cuff-Guard[®]. 79% would recommend that the trust purchase Cuff-Guard[®]. 82% thought that it should be used in outpatient areas.

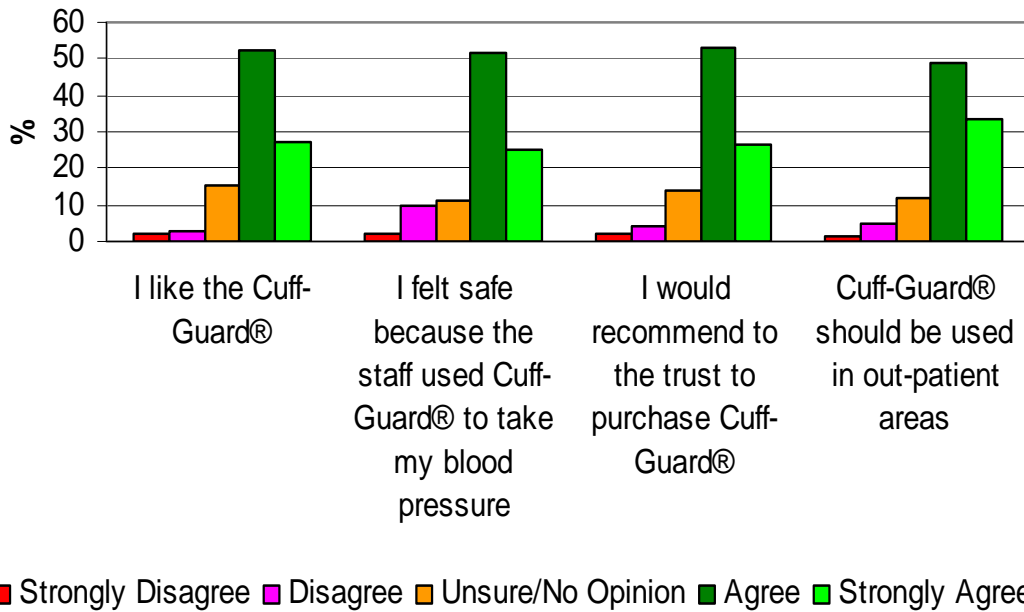


Figure 4 – Patient Opinions of Cuff-Guard[®]

What issues arose in relation to implementation and adoption?

Cuff-Guards[®] were tested on both mobile and stationary blood pressure cuffs prior to the evaluation. The following safety issues were raised:

- Inaccurate blood pressure reading
- Improper fit

In order for the blood pressure reading to be accurate, it is important for the staff member to choose the right size of cuff and Cuff-Guard[®].

Cuff-Guard[®] is packaged in clear polythene without an external label. Instead, the label (16 cm x 8cm) is enclosed within the polythene packaging. Once the packaging was removed staff had to rely on the Cuff-Guard[®] label for size verification, and the only way of knowing the size of the Cuff-Guard[®] is from the colour of the label (see figure 5)

Colour Identification Label	
Standard Adult	Blue
Ex-Large Adult	Brown
Small (visibly smaller)	Brownish Red

Figure 5: Cuff-Guard[®] Colour Identification

It was determined that staff were selecting the incorrect Cuff-Guard[®] size and/or using the incorrect blood cuff size. Staff members were re-trained on the proper use of the Cuff-Guard[®]. The Trust's Training Coordinator was notified of training deficits regarding staff selection of blood pressure cuffs and Cuff-Guard[®]. Some staff were re-trained.

The staff and patient questionnaires included an opportunity for comments to be made. The nature of the comments suggests that most patients are not clear how HCAI are transmitted within hospitals. There is clearly a need for the Trust to provide clear information concerning acquiring HCAI. However, the comments do suggest that both staff and patients are aware that HCAI cannot just be solved by using barriers and that the patient environment and hand hygiene plays a major role.

Advice and tools for Trusts considering introducing Cuff-Guard[®]

Important points to consider

Cuff-Guard[®] is available in paediatric and adult **sizes**. To determine sufficient stock level the ward can use the following:

$$X \text{ Beds} \times Y \text{ ward turnover per week} \times 4 = \text{Total number of Cuff-Guard}^{\text{®}} \text{ per month}$$

If implementing Cuff-Guard[®], various methods of training would be required to ensure that staff members are confident and efficient in using it. Impromptu rather than scheduled training sessions may prove beneficial and meet the

training needs of each ward/unit. Demonstration and return demonstration is an effective way of training staff.

Training Time for Individual and Group Sessions	
One to One session	~10 – 15 minutes
Group Session (3 -5 member)	~15 – 25 minutes

2 dedicated trainers and ward based Infection Prevention and Control Link nurses were used to train staff on 21 wards/units. Training was completed over two weeks.

Prior to deploying Cuff-Guard[®], trainers used the following materials in training sessions

Material	Rationale
Blood pressure Cuff	To demonstrate how to apply Cuff-Guard [®] to standard blood pressure cuff used within the Trust
Cuff-Guard [®]	To demonstrate device and demonstrate how to apply Cuff-Guard [®] to standard blood pressure cuff
Information Sheet	Provided protocol information and rationale for using Cuff-Guard [®] in combating HCAI potential from blood pressure cuffs
Labelling	Demonstrated how patients labels will be used to assign Cuff-Guard [®] to each patient
Location Signs	Signage identified where Cuff-Guard [®] would be stored on ward/unit. Included: information how to re-order, contact information for trainers and helpline
Posters	Reminding staff to use Cuff-Guard [®] on patients (see Appendix)
Log Sheets	Recorded training sessions participants

In addition, **social marketing techniques** may prove beneficial when deploying new technology as well as improving medical equipment cleanliness in hospitals. Social marketing uses marketing principles to influence human behaviour in order improve health or change behaviour. The principle involves four basic principles: Product, Price, Place and Promotion.^[11]

Costs and Benefits

Cuff-Guard[®] is not available through the NHS Supply Chain catalogue and for this trial was purchased from the supplier (Standard Medical Ltd) who directly orders from the USA manufacturer. The cost per unit (exclusive of VAT) was £1.44 for the standard size, £2.50 for the extra large size and 89p for the small size. The shipping costs were £10.00 per order. As we placed 5 orders, the total shipping cost for this investigation was £50.

This trial was not designed to assess the value of Cuff-Guard[®] in preventing healthcare associated infections, and it is not possible, therefore, to draw up a cost benefit analysis based on this trial. Each avoidable healthcare associated infection is estimated to cost the NHS £5,000. This equates to the cost of around 3,000 Cuff-Guards[®].

Appendix - Poster



**THINK...
DOES MY
PATIENT
HAVE A CUFF-
GUARD?**

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