Showcase Hospitals Local Technology Review Report number 5

3M™ Tegaderm™ CHG Chlorhexidine Gluconate IV Securement Dressing

Imperial College Healthcare NHS
NHS Trust

The Healthcare Associated Infections (HCAI) Technology Innovation Programme

The basic ways of preventing and reducing healthcare associated infections (HCAIs) are largely unchanged. New technologies and equipment can support HCAI prevention strategies by helping get things done differently, more swiftly or more reliably.

The Department of Health has funded the HCAI Technology Innovation Programme[1]. 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 undertook local technology reviews of infection related products or technologies in which they have a specific interest. These are service evaluations, as defined by the Health Research Authority's National Research Ethics Service, and do not therefore require Research Ethics Committee review.[2] This service evaluation was undertaken in Imperial College Healthcare NHS Trust.

[1] For further information on the Programme see http://www.hcai.dh.gov.uk
[2] See leaflet on defining research at http://www.nres.nhs.uk/news-and-publications/publications/general-publications/

Acknowledgements

We would like to acknowledge the support of Imperial College Healthcare NHS Trust's staff in implementing and evaluating the 3M™ Tegaderm™ CHG Chlorhexidine Gluconate IV Securement Dressing.

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Executive summary

As part of the Department of Health's Healthcare Associated Infections (HCAI) Technology Innovation Programme, Showcase Hospitals undertook local technology reviews of infection related products or technologies in which they have a specific interest. The objective is to help 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.

Imperial College Healthcare NHS Trust decided to review the 3M™ Tegaderm™ CHG Chlorhexidine Gluconate IV Securement Dressing which is a transparent adhesive dressing with an integrated gel pad containing chlorhexidine gluconate (CHG). Bloodstream infections associated with the insertion and maintenance of central venous access devices (CVADs) are a major cause of morbidity. The use of alcoholic CHG solution for cutaneous antisepsis (except in patients with chlorhexidine sensitivity) prior to the insertion of a central venous access device is recommended. The 3M™ Tegaderm™ CHG Dressing is used in addition to skin antisepsis delivering CHG over a seven day period to the skin around the CVAD insertion site, thus reducing the risk of microbial colonisation leading to catheter related bloodstream infections, whilst absorbing exudate and covering the wound(CHG), a well-known antiseptic agent.

3M™ Tegaderm™ CHG Dressing was evaluated over a four month period from January to April 2011 on an Intensive Care Unit (ITU), a haematology ward and within an Outpatient Antibiotic Therapy (OPAT) service. It was used as a dressing for central venous catheters, pulmonary artery catheters, temporary haemodialysis catheters and peripherally inserted central catheters. It was evaluated by nurses.

The overall response to the 3M™ Tegaderm™ CHG Dressing was mixed within the three evaluation areas, with ITU and haematology staff rating it more positively than OPAT service staff. The main concerns in the evaluation were local skin reactions at the insertion site with certain types of line within the haematology and the OPAT patient groups.

Whilst the introduction of 3M™ Tegaderm™ CHG Dressing would introduce an extra cost, the patient groups where 3M™ Tegaderm™ CHG Dressing was used in this evaluation tended to be more vulnerable groups by the nature of their requirement for a CVAD. The cost of 1000 3M™ Tegaderm™ CHG dressings equates to a single avoidable healthcare associated infection which is estimated to cost the NHS £7,000. The cost of treating a bloodstream infection is likely to be higher as length of stay is much longer.

Keywords: 3M™ Tegaderm™ CHG Dressing antimicrobial dressing, chlorhexidine impregnated dressing, catheter related blood stream infections, (CRBSI)

Introduction

This report sets out the findings from an evaluation in Imperial College Healthcare NHS Trust, one of eight Showcase Hospitals, of the in-use and economic features and adoption characteristics of the 3M™ Tegaderm™ CHG Dressing.

The objective of this document is to help Directors of Infection Prevention and Control and other stakeholders to decide whether they should consider 3M™ Tegaderm™ CHG Dressing as part of their trust's strategy to reduce healthcare associated infections.

The problem

Catheter related bloodstream infections (CRBSIs)

Around 3 patients out of every thousand admitted to UK hospitals develop a bloodstream infection[1]. Bloodstream infections associated with the insertion and maintenance of central venous access devices (CVADs) are common, occurring with a frequency of up to 1.3 infections per 1000 catheter days[2] and are a major cause of morbidity with 41% of bloodstream infections related to central lines[3].

Microorganisms that colonise catheter hubs and the skin surrounding the central venous access device insertion site are the cause of most CRBSIs. These contaminate the catheter during insertion and migrate along the catheter track. The risk of infection increases with the density of microorganisms around the insertion site. Skin cleansing/antisepsis of the insertion site is therefore one of the most important measures for preventing catheter related infection[1].

Following a review of the scientific evidence, epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England[1] recommended the use of alcoholic chlorhexidine gluconate (CHG) solution (preferably 2% CHG in 70% isopropyl alcohol) for cutaneous antisepsis (except in patients with chlorhexidine sensitivity) prior to the insertion of a central venous access device and to clean the catheter insertion site during dressing changes (except where the manufacturer's recommendations prohibit the use of alcohol with their product, when an aqueous solution of CHG should be used).

The product

The 3M™ Tegaderm™ CHG Dressing

The 3M™ Tegaderm™ CHG Dressing consists of a transparent adhesive dressing with an integrated gel pad containing chlorhexidine gluconate (CHG), a well-known antiseptic agent. The Tegaderm™ CHG Dressing is used to absorb exudates and to cover a wound that is caused by the insertion and use of vascular and non-vascular percutaneous medical devices such as IV catheters, central venous lines, arterial catheters, dialysis catheters,

peripherally inserted central catheters, mid-line catheters, drains, chest tubes, externally placed orthopaedic pins and epidural catheters although a less extensive list was evaluated in this instance as indicated below.
It is also intended to reduce local infections, CRBSIs and skin colonisation with microorganisms commonly related to CRBSI in patients with central venous or arterial catheters. This product can deliver CHG over a seven day period to the skin around the CVAD insertion site, thus reducing the risk of microbial colonisation leading to CRBSIs.

The product is available as

- 7cm x 8.5cm CHG Chlorhexidine Gluconate IV Securement Dressing
- 8.5cm x 11.5cm CHG Chlorhexidine Gluconate IV Securement Dressing
- 10cm x 15.5cm CHG Chlorhexidine Gluconate IV Securement Dressing

For the product evaluation the 10cm x 15,5cm CHG Chlorhexidine Gluconate IV Securement Dressing was used.

Figure 1: The 3M™ Tegaderm™ CHG Dressing

The knowledge base

What was known before this evaluation?

A significant number of studies have assessed CHG Dressings favourably in terms of their impact on bacterial colonisation of the insertion site and, in some cases, on CRBSIs but few have looked a the 3M™ Tegaderm™ CHG Dressing.

In a study comparing the 3M™ Tegaderm™ CHG Dressing with a standard non-antimicrobial Tegaderm™ dressing[4], the 3M™ Tegaderm™ CHG Dressing was found to be as easy to use as the standard dressing.

The evaluation

How the evaluation was done

The aim of the evaluation was to look at the in-use features and adoption characteristics of the 3M™ Tegaderm™ CHG Dressing.

Nursing staff who maintain central venous catheters, pulmonary artery (Swan-Ganz) catheters, temporary haemodialysis catheters and specialist nurses who insert and maintain peripherally inserted central catheters received training provided by the supplying company '3M Health Care' on the safe and effective use of the 3M™ Tegaderm™ CHG Dressing. Training was cascaded on a train the trainer basis. For the trial sites, the 10cm x 15,5cm dressing was used.

Nursing and medical staff applied the 3M™ Tegaderm™ CHG Dressing when indicated following insertion of a CVAD and at subsequent dressing changes. The dressings were made available for use for four months (January – April 2011) in the following areas due to the high use of CVADs within these patient populations, all sites being part of Imperial College Healthcare NHS Trust.

- Outpatient Parenteral Antibiotic Therapy service (OPAT) at St Mary's Hospital (SMH),
- Dacie ward (a haematology ward) at Hammersmith Hospital (HH))
- Intensive Care Unit (ITU) at the Charing Cross Hospital site (CXH)

During the evaluation, non-participating wards were used as a comparator, with all wards completing weekly observations of insertion and continuing care of CVADs recording details such as local signs of redness, exudates or swelling. A High Impact Intervention Audit tool Number 1 (HIIN01) was used to capture these observations (Appendix 1). The non-trial wards were ITU at SMH, OPAT at CXH and Weston Ward (haematology) at HH.

3M™ Tegaderm™ CHG Dressing was evaluated on adult patients only. Those patients with a known sensitivity to CHG were contraindicated. 3M™ Tegaderm™ CHG Dressing was used in conjunction with Trust policies and guidelines concerning hand hygiene, aseptic technique and insertion and maintenance of intravascular devices.

How acceptable was the product to staff?

In the final month of the placement nursing staff on the evaluation wards were administered questionnaires (Appendix 2) to assess the usability and suitability of the 3M™ Tegaderm™ CHG Dressing. Each staff member who had used the dressing was asked to complete the questionnaire only once. A total of 54 questionnaires were returned from a requested twenty completed evaluations from each evaluation site - a return rate of 90%.

Figure 2 shows that Haematology and ITU rated the overall performance of the dressing as 'better' than the previously used dressing/dressings.

Outpatient antibiotic therapy service services (OPAT) rated the dressing ‘same as’ to ‘worse/much worse’.

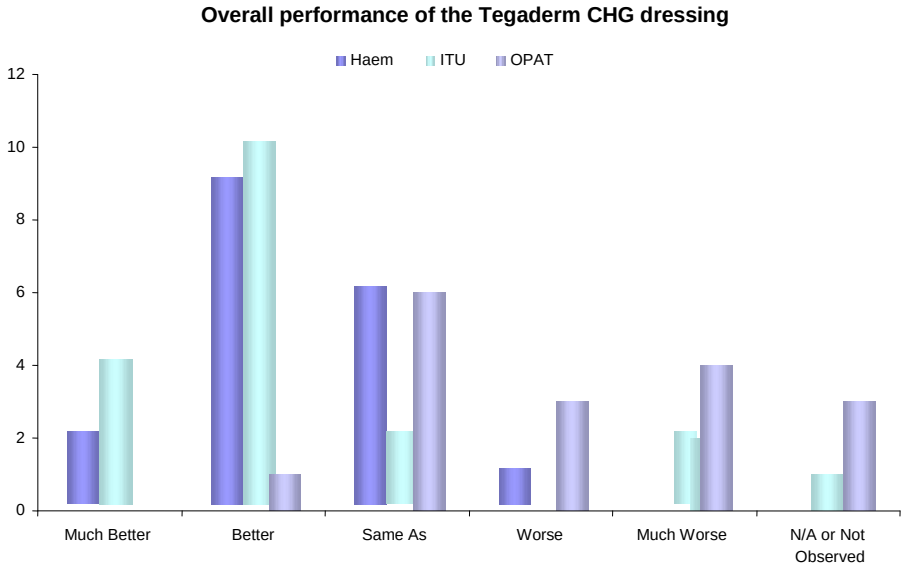

Figure 2: Overall performance of the Tegaderm CHG dressing

OPAT services found dressing adherence and wear time to be much the same as previous dressings with the other evaluation areas, Haematology and ITU, finding this aspect of the dressing as ‘better’ and ‘much better’ (figure 3).

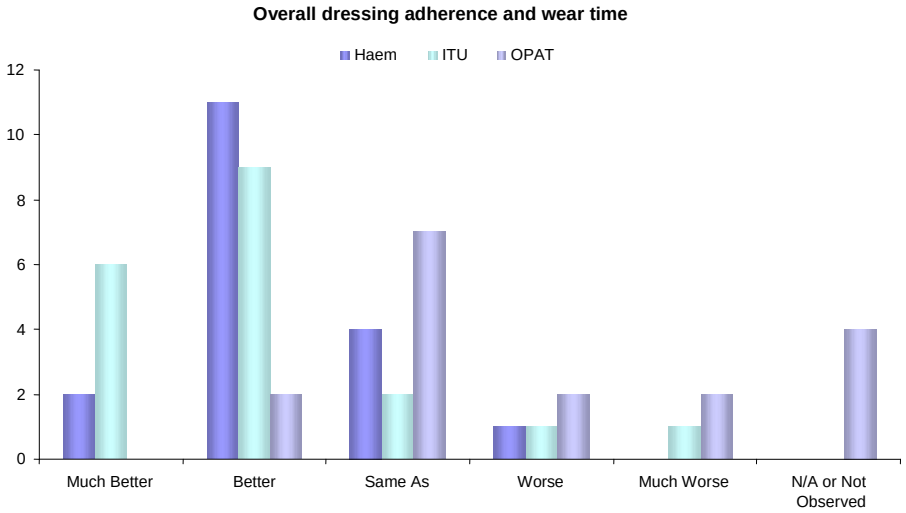

Figure 3: Overall dressing adherence and wear time

The ease of applying the dressing was rated much the same for all evaluation wards with a tendency towards ‘better’ than previously used dressings (figure 4). Most users within the evaluation had previously used a similar Tagaderm dressing minus the integrated gel pad containing chlorhexidine gluconate.

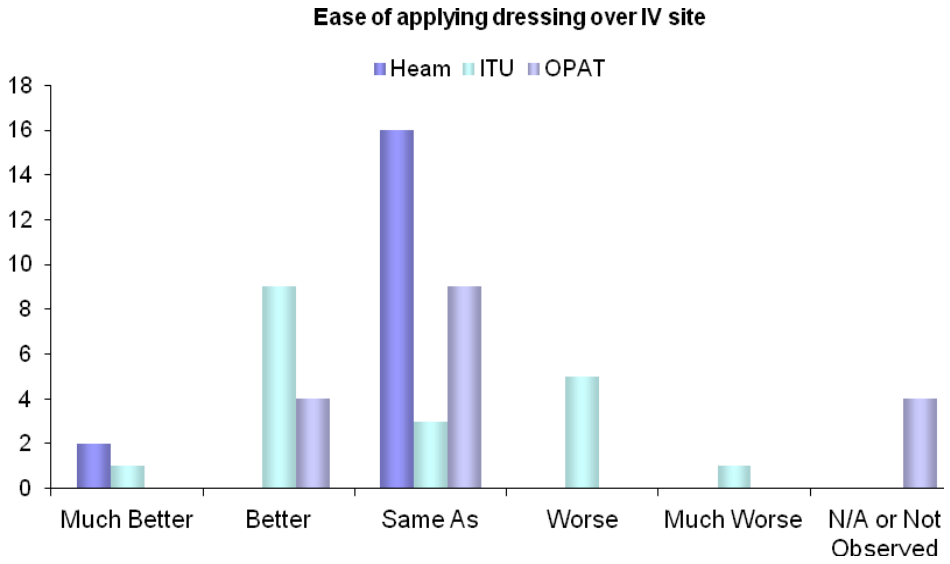

Figure 4: Ease of applying dressing over the Insertion site

The intuitive use of the dressing was rated as being better in two evaluation areas, ITU and Haematology. OPAT services found it to be generally much the same as existing dressings.

Visualization of the site was considered to be a main attribute of the dressing and this was positively rated by most users in all evaluation areas (figure 5).

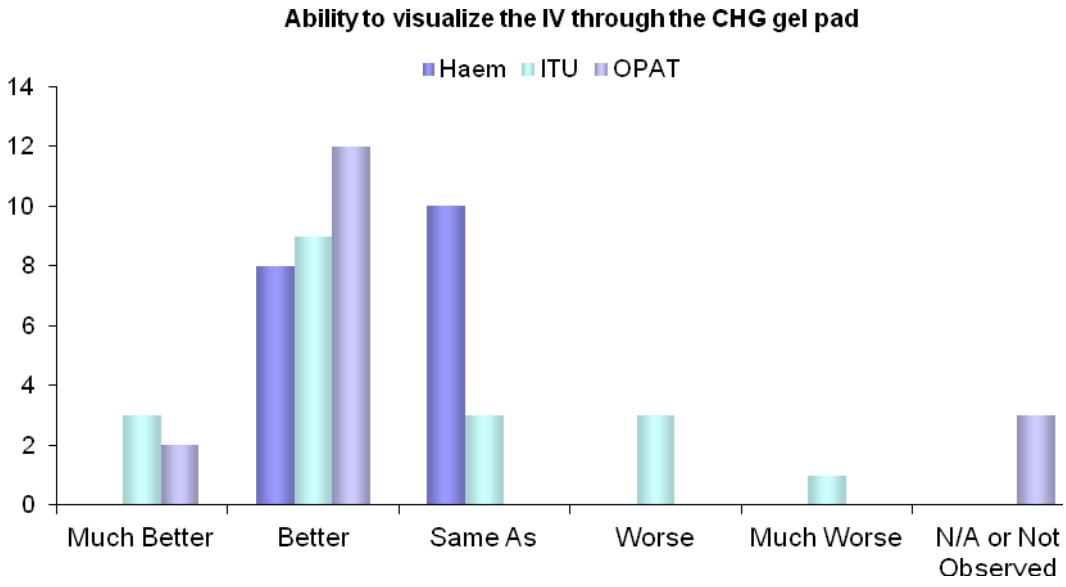

Figure 5: Ability to visualize the intra venous site through the dressing

Clinical areas which had many changes of dressing such as ITU and Haematology had the opportunity to observe the absorption ability of the

dressing and rated the dressing as ‘better’ to ‘much better’ (figure 6). This aspect of the evaluation was not observed by OPTA services given that most of the dressing applications used by this speciality were at the time of insertion and not continuing care when the absorption ability would be noted. Overall the absorption ability was commended.

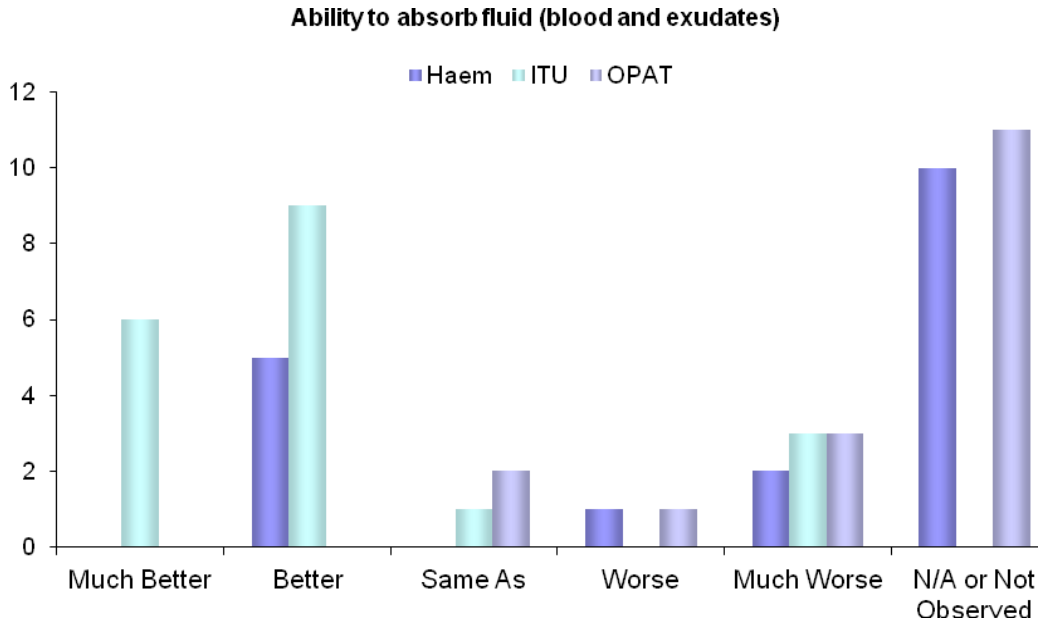

Figure 6: Ability to absorb fluid and exudates

30% of the ITU respondents considered that the ability of the gel pad to mould and conform to the insertion site was ‘much better’. Generally, however, this ability was rated ‘same as’ the existing dressing (figure 7).

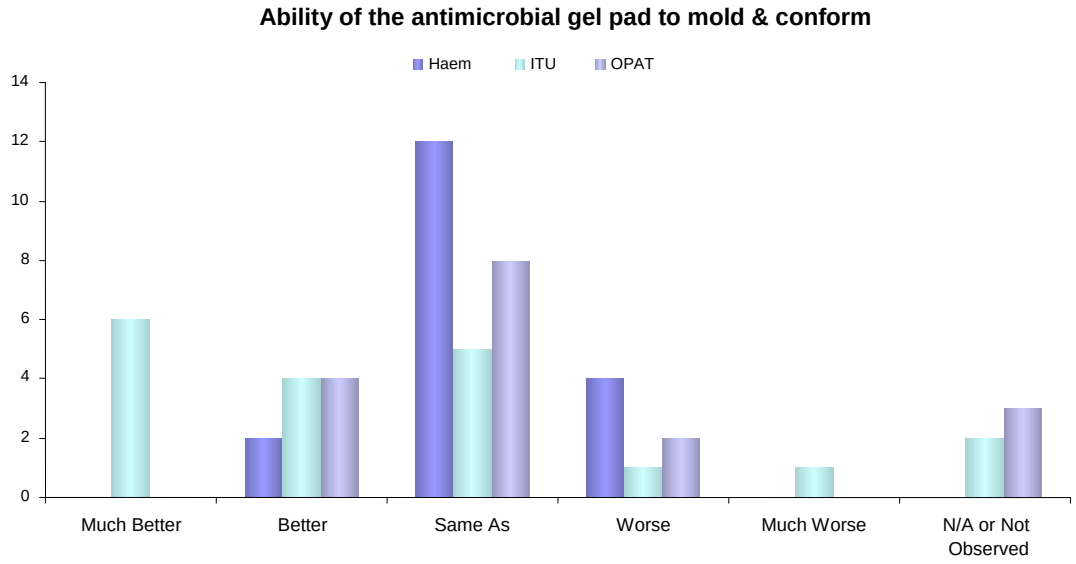

Figure 7: The ability of the gel pad to mould and conform to the insertion site

Removal of the dressing was the single worst performance factor of the dressing evaluation with the majority of evaluations rating this as worse than existing dressing (figure 8).

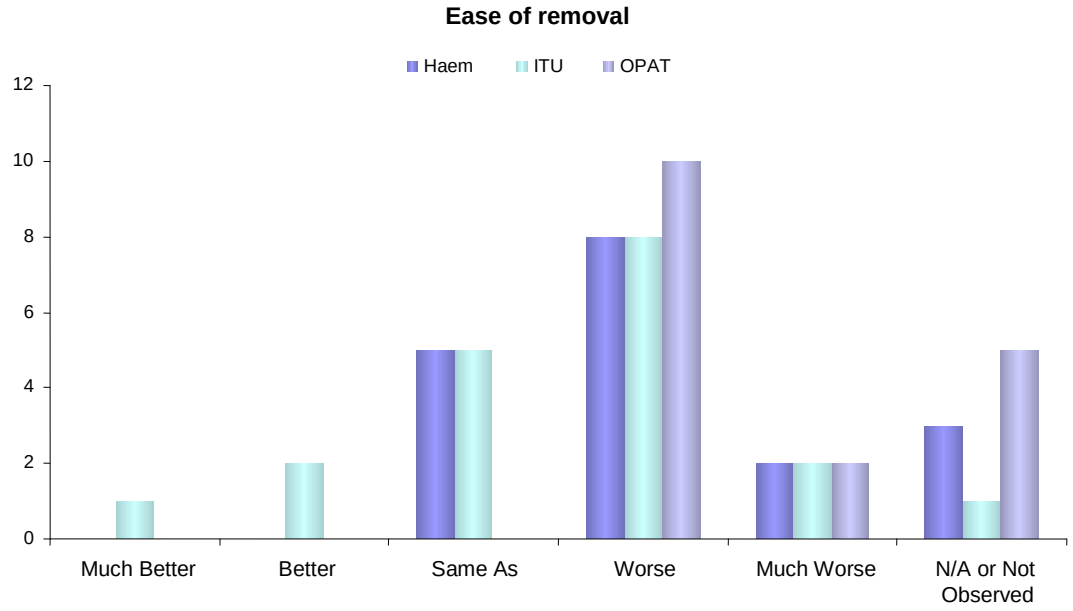

Figure 8: Ease of removal

A 'train the trainer' scheme was utilised to cascade training from a core group of staff in each evaluation areas to all user within their area. This core group received training from the suppliers. However, apart from in OPTA services, where the training was considered adequate, most staff said that they had not received any training (figure 9).

Figure 9: Training for dressing use

Did the product reduce local signs of infection?

The second part of the evaluation was the comparison of observable elements of care for the insertion and ongoing care of CVADs in both the evaluation wards and those wards chosen as a comparator ward. The elements observed are contained within the Central vascular access device-continuing care chart (Appendix 1). Of those elements specific to the line site, local signs of infection and dressing used there was no significant difference in redness, exudates or swelling.

What issues arose in relation to implementation and adoption?

As noted there were issues relating to difficulty in removal of the dressing and the level of cascaded training, the latter being later considered an internal site specific consideration. In addition adding there were two potential issues, one in the haematology population and the other in the OPAT group of patients.

The first potential problem arose in the haematology population in those patients with skin tunnelled lines. Within the first three weeks of the evaluation there were concerns regarding the dressing with a patient experiencing an extensive reaction to either the dressing or the antiseptic gel pad. A second patient after four days use showed localised maceration at the insertion site. The dressings were removed and discontinued for both these patients. Nether of these patients had known chlorhexidine allergy or sensitivities. Given the high risk of possible infection in this patient population and the fact that the introduction of the 3M™ Tegaderm™ CHG Dressing was the only interventional change, the use of the Dressing for skin tunnelled lines was ceased for patients with these lines (effective from 7th February 20011). The use of the Dressing continued for peripherally inserted central catheter (PICC) lines and their post insertion care within this group until the end of the evaluation period.

The second potential problem arose in the OPAT services with patients with PICC lines. During the second month of product evaluation the OPAT team at SMH noticed maceration of the skin at the insertion site of vascular lines in four patients. The exudate looked like pus at the insertion site, but was negative for bacteriology upon investigation (normal skin flora isolated). All of these patients had a PICC line in situ; three patients were receiving antimicrobial therapy in the outpatient setting – such patients normally have a very low rate of infection. One was an inpatient receiving parenteral nutrition and antimicrobial therapy which carries an increased risk of infection. None of these patients was known to be chlorhexidine allergic or sensitive. Internal Trust information shows that, within the OPAT PICC patient population the infection rate in these patients in 2008/09 was 0.8 per 1000 catheter days. Therefore when the fourth patient presented with similar skin breakdown which looked like an insertion site infection the product evaluation was discontinued on 14th February on the St Marys' Hospital (SMH) site within the

OPAT service as the only change in interventions in these four patients was the use of the 3M™ Tegaderm™ CHG Dressing.

Advice and tools for trusts considering introducing the 3M™ Tegaderm™ CHG Dressing

Important points to consider

This evaluation only included the use of the 3M™ Tegaderm™ CHG Dressing on a limited range of devices. Other Trusts may consider using it for other vascular and nonvascular medical devices involving patients at high risk of infection.

It is important to engage staff in the implementation procedure and for the company to support training needs and the introduction of the product. This will resolve concerns about the placement of the dressing so that easy removal is ensured and it will enable doctors to consider the placement of the 3M™ Tegaderm™ CHG Dressing when inserting lines and devices so that the line is stitched in at the best position.

Some staff may regard the 3M™ Tegaderm™ CHG Dressing as a simple product that does not require training. It is important to engage these staff so they have a thorough knowledge of the product including an understanding of the 7 day slow release of CHG from the product to reduce the risk of infection and the ability of the product to absorb exudate which enables dressings to stay on longer, thus reducing the costs of frequent dressing changes. A record of those who had received training would allow targeting of those still requiring training.

Costs and Benefits

All sizes of 3M™ Tegaderm™ CHG Dressing are available through the NHS Supply Chain catalogue -7cm x 8.5cm,£5.51each, the 8.5cm x 11.5cm £5.92 each and the 10cm x 15.5 cm £6.85 each.

Whilst the use of the 3M™ Tegaderm™ CHG Dressing would introduce an extra cost, the patient groups where the 3M™ Tegaderm™ CHG Dressing was used in this evaluation tended to be more vulnerable groups by the nature of their requirement for a CVAD. Bloodstream infections associated with the insertion and maintenance of CVADs are a major cause of morbidity with 41% of bloodstream infections in England related to central lines [3]. Each avoidable healthcare associated infection is estimated to cost the NHS £7,000 and the cost of treating a bloodstream infection is likely to be higher as length of stay is much longer the cost over that of a 1,000 3M™ Tegaderm™ CHG Dressings.

Appendix 1: Central Vascular Access Device-Continuing Care chart

Imperial College Healthcare NHS Trust

Central vascular access device – continuing care

Patient's name:

Date of birth:

Hospital number:

NHS number:

Consultant:

Ward:

CVAD continuing care record (please enter Y or N)

Criteria	Day / Date:	1	2	3	4	5	6	7	8	9	10
Are there **no** signs of systemic infection (tachycardial, pyrexia etc)?											
Are there **no** local signs of redness, exudate or swelling?											
Is there a continuing clinical indication for CVAD?											
Hand hygiene performed for all manipulations											
Appropriate PPE worn for all manipulations											
Semi-permeable transparent dressing used (if appropriate)?											
2% Chlorhexidine and 70% alcohol used:											
Aseptic non-touch technique used for all line access?											
Unused ports are flushed or heparinised as per Trust policy?											
Administration sets labelled with and changed in accordance with Trust guidelines?											
Drug infusions identified with appropriate colour-coded label on syringe?											
Drug infusions identified with appropriate colour-coded label on line?											
Is the device sutured or statlocked in place?											

Date removed: / / Reason for removal:

Tip of line sent for C&S: ☐ Yes ☐ No

Has this information been submitted electronically? ☐ Yes

Appendix 2 Staff questionnaire

Evaluation Form

Name **Title** **Ward/Clinical area** **Date**

Using the chart below, rate the performance of the Tegaderm CHG dressing compared to your current I.V. dressing or Biopatch with your current dressing

Tegaderm CHG Dressing Performance Factors compared to your Current Dressing	Much Worse	Worse	Same As	Better	Much Better	NA or Not Observed
Overall performance of the Tegaderm CHG dressing	☐	☐	☐	☐	☐	☐
Overall dressing adherence and wear time	☐	☐	☐	☐	☐	☐
Ease of applying dressing over IV site	☐	☐	☐	☐	☐	☐
Intuitive to use to ensure correct [illegible]	☐	☐	☐	☐	☐	☐
Time required to apply dressing	☐	☐	☐	☐	☐	☐
Ability to visualize the IV site through the CHG gel pad	☐	☐	☐	☐	☐	☐
Ability to absorb fluid (blood and [illegible]	☐	☐	☐	☐	☐	☐
Ability of the antimicrobial gel pad to mold & conform around the catheter	☐	☐	☐	☐	☐	☐
Ease of removal	☐	☐	☐	☐	☐	☐

1. Did you receive training for the dressing: Yes ☐ No☐

2. Was the training:…. Poor ☐: Adequate ☐ Good ☐ Excellent ☐

3. What did you LIKE about the Tegaderm™ CHG dressing?

4. What concerns did you have about the Tegaderm™ CHG dressing?

5. Would you recommend the Tegaderm™ CHG dressing to replace your current dressing or Biopatch with your current dressing? Yes ☐ No ☐

Because_____
_____

Document source www.3M.com/healthcare
PLEASE RETURN YOUR COMPLETED EVALUATION TO YOUR EVALUATION COORDINATOR

References

1. epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England. Journal of Hospital Infection (2007) 65S, S1–S64

2 . Maki DG, Kluger DM, Crnich CJ. The risk of bloodstream infection in adults with different intravascular devices: a systematic review of 200 published prospective studies. Mayo Clin Proc. 2006;81(9):1159-1171).

3. Smyth E T M, McIlvenny G, Enstone J E, Emmerson A M, Humphreys H, Fitzpatrick F, Davies E, Newcombe R G, Spencer R C. Four Country Healthcare Associated Infection Prevalence Survey 2006: Overview of the results. Journal of Hospital Infection (2008) 69, 230-248

4 . Clinical performance of a new transparent Chlorhexidine Gluconate Central Venous Catheter Dressing. Carol Olson, RN-BC and the Vascular Access Team of Abbott Northwestern Hospital and James M. Heolman, BS The journal of the Association for Vascular Access Volume 13 number 1 Spring 2008