# Retrospective comparative audit of two peripheral IV securement dressings

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## Abstract

**Reliable securement of peripheral venous cannulae (PVC) is an important factor in their maintenance. This audit in a district general hospital compares the occurrence of PVC restarts between a 3-month period in 2010 and the same 3 months in 2011. The only difference in the PVC care bundle between these dates was the implementation of an advanced securement dressing for cannulae in 2011. Results show a significant increase in cannulae attaining the maximum local protocol duration of 72 hours during 2011. Also, restarts owing to dressing-influenced factors (dislodgement, infiltration and leakage) were significantly lower in 2011 when the new dressing was used. The total number of PVC restarts during the comparative audit periods was 9% lower in 2011 compared with 2010. This data suggests that better PVC securement is leading to an overall reduction in PVC insertions but further evidence is required to support this conclusion.**

**Key words:** Intravenous IV ■ Securement ■ Peripheral vascular cannula ■ Dressing ■ Dislodgement

The image of vascular access and infusion therapy has historically been one of indifference. Authors have found that peripheral IV care standards can be poor; the reasons offered being forgetfulness, carelessness, mistakes, no one to take responsibility, bad routines and stress (Lundgren and Ek, 1996). Approaches to care may not be standardized and little ownership exists over the care provided (Jackson, 2003). Recent changes have brought a new insight into vascular access and infusion therapy. The alternative approach is based on evidence, standardization, and a paradigm shift away from problem acceptance to a culture of problem prevention, staff development and improved patient safety outcomes (DePalo et al, 2010; Cherry et al, 2011). The most prolific example of these new approaches to IV care is that of bundle implementation associated with central venous catheter infection prevention. Historical pre-bundle central line-associated blood stream infections (CLABSIs) rates are suggested to be in the region of three to five infections per thousand catheter days (Memish et al, 2003). In contrast, a review of post bundle introduction has produced CLABSI rates close to zero (Boland-Reardon et al, 2011).

Working within a medium-sized district general hospital in England, the author was able to review current infusion standards, implement change and review associated outcomes. One particular aspect of care that required attention was the issue of peripheral cannula dislodgement. An internal review of 6500 peripheral cannula outcomes suggested that around 36% failed as a result of dislodgement. Further analysis demonstrated that premature device failure as a result of dislodgement was evident throughout the literature. Smith (2006) suggests that as little as 8% of short-term peripheral cannulae actually reach the expected dwell time. In a literature review by Frey and Schears (2006), dislodgement rates were identified as being as low as 2% or as high as 41.8%. This information prompted a review of an alternative intravenous dressing within an acute clinical setting. This article describes the results of a retrospective audit measuring the effect of two methods of peripheral intravenous (IV) securement on the longevity of cannulae (measured by those reaching 72 hours placement) and any differences in unplanned restarts caused by failures associated with PVC securement. The audit aims to determine if an alternative intravenous dressing significantly improved the securement of cannulae. Additionally, clinician opinion was sought on a newly introduced advanced cannula securement dressing.

Ethical approval was not sought as care delivered to both study groups includes recognized ways of securing PVC and no extra patient interventions were required as part of the audit.

## IV dressings

Intravenous dressings usually have a number of qualities that broadly ensure adequate securement of the device and a barrier to extraluminal device infection. It is acknowledged that the dressing must be sterile, easy to apply (and remove), ensure secure fixation of the device, enable visualization of the insertion site and prevent moisture building beneath the dressing (Kiernan, 1997). Many of the polyurethane intravenous dressings supplied by different manufacturers have a number of similarities (Campbell and Carrington, 1999). At a basic level these similarities include sterility, transparency and it usually extends to the inclusion of fixation and date strips. The two dressings evaluated in this audit had these fundamental similarities. However, differences in application and adhesive between the two dressings warranted further review.

## Method

The audit was based in a medium-sized foundation Trust

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*Accepted for publication: January 2012*

and compared audit data collected from patients receiving peripheral IV therapy during a 3-month period (August–October) in the years 2010 and 2011. Audit data was compiled by the Trust's dedicated vascular access team which consists of a team of two registered nurses and five clinical support workers whose role within the Trust is insertion, care and maintenance of PVC across the hospital departments but excluding routine attendance to critical care, operating theatres and paediatrics. In an average year, the team inserts 12 000 cannulae and routinely advises on PVC complications. Peripheral intravenous standards reflect those recommended in existing high impact interventions (Department of Health (DH), 2010).

The vascular access team regularly collect a variety of PVC outcome data that includes data associated with cannula replacements that were owing to premature device failure. For the purpose of this audit, dislodgement, leakage and infiltration were deemed to be directly influenced by the cannula dressing. Therefore, these three outcomes were aggregated for data analysis. Cannula care protocols and supplied vascular-access-related consumables were consistent between the 2010 and 2011 data sets with the securement dressing being the only variation in practice. Before and during the audit period in 2010, a high permeability film dressing was used (IV3000 1-Hand Moisture Responsive Cannula Fixation Dressing, Smith & Nephew) and during the 2011 audit period, a newly introduced advanced securement dressing was used (3M Tegaderm IV Advanced Securement Dressing, 3M Health Care). Clinical standards in 2010 were well established with all clinicians competent in the use of the high permeability dressing, it being in routine use for a number of years. To ensure a suitable level of competency with the advanced securement dressing, an introductory training programme was undertaken across the Trust at the beginning of April 2011. Following a further period of familiarization, the audit data was collected for 3 months.

During data collection, clinician opinion surveys were undertaken to measure user satisfaction with the change of cannula dressing. Opinions were obtained on a voluntary basis using a five-point Likert scale survey with the objective of obtaining data comparing the usability of the two cannula dressings. The questionnaire addressed a number of factors around cannula securement, these being: decrease in manipulation of catheter, helps reduce catheter movement, conforms to and adheres around catheter, and adheres well throughout expected wear time.

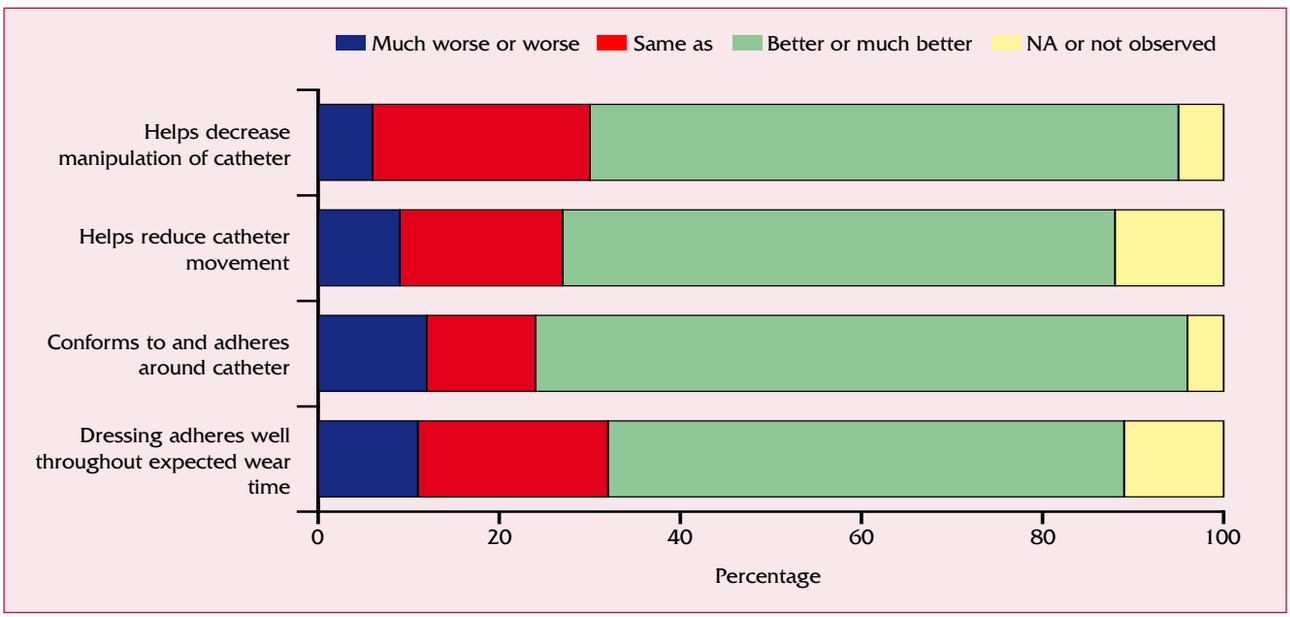
## Results

Seventy seven clinicians completed the survey on the evaluation of the advanced securement dressing. Results of the clinician opinion survey showed 69% of the clinicians rated the 2011 dressings better or much better on all four securement factors, with 73% of clinicians rating the 2011 dressing better or much better at helping to reduce catheter movement, dislodgement and fallouts (*Figure 1*).

The complete database of collected audit data routinely documents the reason for the replacement of cannulae, but also includes documentation of new PVC starts. This 'new start' insertion data, while important to the vascular access team, was not required to address the aims of this study and was, therefore, excluded from the subsequent data analysis. The data was collected over three calendar months in 2010 and 2011. This data was aggregated for analysis as a total for the 3 months for each year. Hence the statistical approach compared total data for the months August to October in 2010 within the same period in 2011. The filtered audit data was analysed using Chi square test analysis on a number of differing factors. During the two 3-month study periods of August–October in 2010 and 2011, 1725 and 1571 cannula replacements were made, respectively.

Government guidelines suggest that the optimal time for replacement of PVCs is 72–96hours (DH, 2010). Statistical analysis showed that during the period of use of the Tegaderm advanced securement dressing, the number of cannula reaching

***Figure 1. Results of 2011 clinician survey regarding aspects of cannula securement v 2010 dressing***



72 hours increased by a factor of 2.94 (95% CI 2.07;4.16, odds ratio 2.94, p<0.0001) (*Figure 2*) compared to the period when the high permeability dressing was used.

Regarding the primary aim of the audit, there was a significant increase in the number of cannulae attaining 72 hours in the 2011 group (advanced securement dressing). It was interesting to note that the 2011 audit group also showed a reduction in the overall number of recorded cannula restarts (*Figure 3*). While this data set was not statistically significant, it is an interesting observation, the significance of which could be better understood with data on bed numbers and bed occupancy (unavailable at the time of data collection).

Findings related to cannulae that were replaced prior to 72 hours found that the majority of these restarts was owing to securement influenced parameters (dislodgement, leakage and infiltration) with in addition around 4% owing to occlusions and 5–7.5% owing to pain. There was a significant reduction in the number of occluded cannulae during the study period 2011 compared to 2010. The data analysis showed a small but statistically significant increase in the number of cannula being resited because of pain (p<0.05, 95% CI 1.14;2.01, odds ratio 1.51) between 2010 and 2011.

When comparing the audit parameters influenced by dressings, the three individual factors (dislodgement, leakage and infiltration) showed reductions in the 2011 study period when compared to 2010, although these were not all individually statistically significant (*Figure 4*). However, overall when aggregating replacements owing to the three factors combined; dislodged, infiltrated and leaking, there was a statistically significant reduction, p<0.0001 (95% CI 0.59;0.83, odds ratio 0.70) in 2011 PVC securement related restarts where the cannula was dressed with the advanced securement dressing (*Figure 4*).

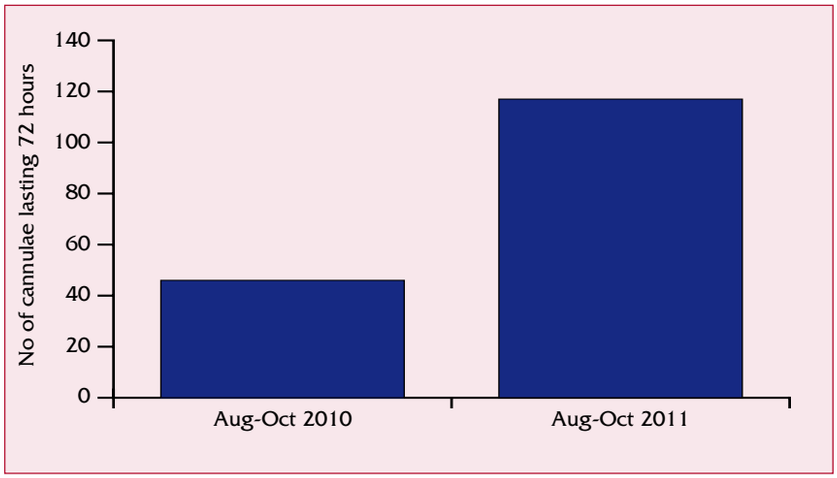



***Figure 2. Number. of cannulae lasting 72 hours during 3-month study period in 2010 v 2011 (advanced securement dressing), p<0.0001***

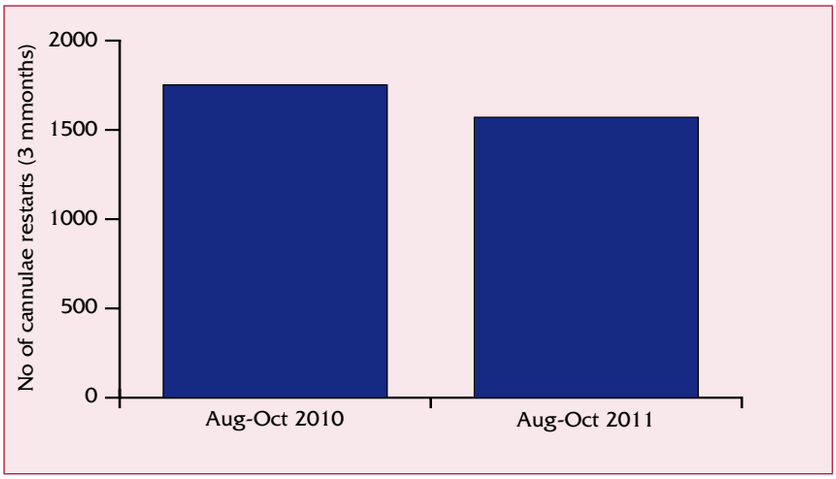



***Figure 3. Number. of cannulae restarts during 3-month study period 2010 v 2011 (advanced securement dressing)***

## Discussion

The securement and dressing of peripheral cannulae should ensure that a number of outcomes are achieved. First of all the dressing must be easy to apply; ease of application not only relates to the ability to apply the dressing so that it is not compromised, it also directly relates to the protection of the adhesive. The adhesive on an IV dressing is a key part and as such this key part must be protected from touch contamination. Rowley et al (2010) explain the role of key parts and key part protection in the prevention of infection, stating that 'if contaminated, key parts provide a direct route for transmission of pathogens between the procedure and the patient'. Morris and Tay (2008) describe how a good dressing technique is important in reducing peripheral cannula associated infection rates. Furthermore, the dressing must ensure that the IV site is easy to visualize. Finally, the dressing must assist in the completion of two particular tasks while the PVC is in place. These are being able to secure the device in place for the recommended duration and to prevent any extraluminal contamination and possible infection. When examining peripheral IV care in the early 1990s, Lundgren, et al (1993) found that 46% of the IV dressings were deemed unsatisfactory by the second day of use. More recently, an audit by Bravery et al (2006) demonstrated that 27.8% of the peripheral IV dressings reviewed did not meet the standard of the dressing being 'clean' and 'dry'.

The results of this audit provide insight into the reasons for premature cannula restarts. The data shows that most PVC restarts are owing to dislodgement, leakage and infiltration. The use of the advanced securement dressing led to a significant increase in numbers of PVCs lasting for the maximum period of 72hours. Intriguingly, the total number of PVC restarts during the comparative audit periods was 9% fewer in 2010 than in 2011. It is possible that better securement is leading to an overall reduction in PVC insertions but further evidence is required to support this conclusion.

## Limitations

Limitations are owing to the nature of its design as an audit of the factors leading to cannula removal. A number of potential alternative influences on device failure such as medication, type of administration (push or infusion) were not considered in this audit. Further work needs to be undertaken on the range of potential reasons for premature cannula failure.

In addition, any future investigation would benefit from a study design that includes randomization of the securement methods. Furthermore, a relevant clinical parameter not recorded in this audit is the dwell time of the cannula. As

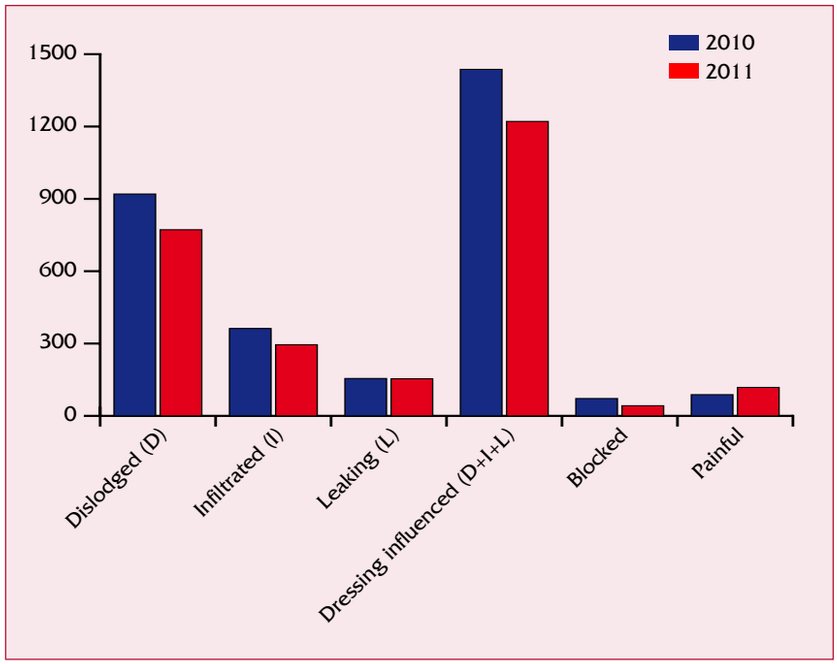



***Figure 4. Reasons for cannula resiting 2010 v 2011 (advanced securement dressing)***

the potential risk of complications is likely to increase with cannula dwell time, this important factor should be the primary outcome of future studies on the efficacy of PVC securement. This would allow for a more time-sensitive analysis of reasons for cannula resiting/restart.

## Conclusion

The results from this audit, comparing two ways of securing PVCs, suggest that advances in dressing technology can lead to a reduction in the amount of premature device failure.

Furthermore, standards associated with peripheral vascular access have undergone a transformation in recent years. National bundles have ensured a degree of evidence-based practice underpins actual clinical practice (DH, 2010). However, to date, bundles simply relate to the essentials of infection prevention in practice. It is anticipated that the concept of bundles will continue to develop. Patients will benefit from bundles that address issues associated with premature device failure such as occlusion and dislodgement. The selection of generic products for inclusion in care bundles for vascular access needs to be evidence based to ensure they support the wider objectives of care. BJN

*Conflict of interest: The author has conducted paid consultancy activities for 3M and Smith & Nephew.*

*Acknowledgements: Thank you to all the members of the Vascular Access Team at the Rotherham NHS Foundation Trust for assisting with data collection and data input.*

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## KEY POINTS

- Intravenous dressings usually have a number of qualities that broadly ensure adequate securement of the device and a barrier to extraluminal device infection
- An internal review of 6500 peripheral cannula outcomes suggested that around 36% failed as a result of dislodgement
- Advances in dressing technology can lead to a reduction in the amount of premature device failure
- The selection of generic products for inclusion in care bundles for vascular access needs to be evidence based to ensure they support the wider objectives of care

This article is reprinted from the British Journal of Nursing, 2012 (Intravenous Supplement), Vol 21, No 2