IVTEAM ORIGINAL
Guide for Authors

Jackson, A. (2018) Bundle example for short peripheral IV catheter insertion and post insertion care. IVTEAM Original. Published online 20 June 2018. p. 1-6. http://iv.team/2d814

Bundle example for short peripheral IV catheter insertion and post insertion care

Jackson, A.
RN, IV Nurse Consultant, The Rotherham NHS Foundation Trust, UK. Director IVTEAM.com

Abstract:

From a global perspective, central line bundle implementation has dramatically reduced the incidence of central line associated bloodstream infections (CLABSI). Bundles act as a procedural conduit that augment and improve patient outcomes. This article aims to offer an insight into an innovative approach to modern bundle design with a review of a peripheral IV catheter insertion and care bundle.

Key Words: Peripheral, IV, bundle

Conflicts of Interest: Owner and director IVTEAM.com

Introduction

At the beginning of this century health care providers instigated a journey that led towards zero central line infections (Weeks et al 2011). The earliest of these journeys (Berenholtz 2004) focused on methods to prevent central line associated bloodstream infection (CLABSI). At that time, this innovative philosophy of infection prevention helped to transform the out-dated view that central line infections were an inevitable, iatrogenic infective sequela of central line placement. A philosophy that was replaced with a clinical expectation of virtually zero central line infections.

Authors such as Berenholtz (2004) present a history of central line bundle utilisation that improves compliance with several expected clinical standards. In isolation, each of these components has a legitimate clinical standing. However, like the twigs they represent, the bundle helps deliver a strong and robust approach to patient safety. An approach that has dominated health care in the last decade (Hughes 2008).

Bundles are described as a collaboration of evidence-based interventions. Topics such as barrier precautions, skin antisepsis and choice of site are utilised to improve and standardise clinical standards (Resar et al 2012). However, it is important to note that bundles designed more than a decade ago differ to those implemented today. This article aims to offer a

descriptive insight into one of these innovative approaches to modern bundle design with a review of a peripheral IV catheter insertion and care bundle.

Traditional bundles

From a global perspective, central line bundle implementation has dramatically reduced the incidence of CLABSI. It is suggested bundles have contributed to a 39% CLABSI reduction in developing countries (Leblebicioglu et al 2013) and a 66% reduction in developed countries (Pronovost et al 2006). However, bundle utilisation has not remained the domain of central venous catheter placement. Healthcare is saturated with bundles that aim to improve patient safety in many environments. Examples include bundles associated with surgery (Ma et al 2017) and ventilator care (Burja et al 2018). It is that ability to unshackle the preconceived ideas of what constitutes a bundle that forms the origins of the work presented in this article.

Global evidence associated with bundles has influenced governments and policy makers when considering approaches to patient safety and infection prevention. This in turn has resulted in bundles being a key recommendation as the tool of choice to prevent central line infections (Loveday et al 2014; Cole 2012; O'Grady et al 2011). Published guidelines that provide evidence-based recommendations for reducing catheter-related infections, for example EPIC3 (Loveday et al 2014), suggest that CLABSI prevention initiatives can be aided with the introduction of "quality improvement interventions to support the appropriate use and management of intravascular access devices". With a similar aim to reduce CLABSI rates the Centers for Disease Control and Prevention (CDC) strongly recommend "hospital-specific or collaborative-based performance improvement initiatives in which multifaceted strategies are 'bundled' together to improve compliance with evidence-based recommended practices" (O'Grady et al 2011:57). These documents highlight the need to synergise evidence in a format that ensures safe procedural delivery of clinical practice associated with vascular access. In particular, EPIC3 (Loveday et al 2014) indicates that combining components such as protocols, procedural prompts, audits, practice guidelines and education has the potential to improve patient safety. EPIC3 (Loveday et al 2014) also deliver a fundamental change of direction regarding which clinical situations we can apply bundles. Authors are now suggesting that patient outcomes associated with devices such as peripheral IV catheters benefit from the use of bundles (Loveday et al 2014), as do areas beyond the traditional ICU environment (Christy et al 2011).

In addition, original bundles often focussed on a precise problem at a single point in time. Primarily on infection prevention during central line insertion (Pronovost et al 2006). However, this exclusivity fails to acknowledge that vascular access care is delivered along a continuum rather than at an isolated point in time. This is demonstrated with evidence that illustrates how bundles have a positive impact on standards of care when they are used for catheter maintenance (Harnage 2012).

Bundle redesign

Bundle redesign offers an opportunity to consider how bundles address a) the continuum of care; b) a wider range of associated clinical skills; c) prevention of all the relevant problems that relate to the skill and d) how the bundle is integrated into everyday practice.

The future of intravenous bundles should focus on improving the wider spectrum of clinical outcomes associated with everyday intravenous practice. Peripheral IV catheter care as a prime example of an everyday clinical procedure that will benefit from redefined bundle implementation.

Bundle compliance is an issue that bundle designers cannot ignore. Assured bundle compliance is a complicated issue. One particular consideration that was key to this bundle design was the necessity to deliver interventions into a real-world setting (Furuya et al 2017). Therefore, the design of this peripheral IV bundle was underpinned by a philosophy that acknowledged established tools and best practice approaches to clinical care.

Peripheral IV catheter bundle

In this section, we describe a peripheral IV catheter bundle that is in use within a medium sized district general hospital in the UK.

Click here to download the bundle

Resar et al (2012:2) define bundles as a "small set of evidence-based interventions for a defined patient segment/population and care setting that, when implemented together, will result in significantly better outcomes than when implemented individually". In addition to this traditional definition bundles may also be a collection of theories (e.g. education, human resources etc.) that are purposefully grouped together to improve specific patient safety outcomes along a clinical continuum. Certain elements of bundle content

are implicit within the care continuum in which they are delivered. These may not all be listed as a bundle component. Examples include education (Hansen et al 2014), leadership (Goeschel 2011), human resources (Hess and Bren 2013) and networking (Pruden 2011). Therefore, our bundle example should be viewed beyond what is printed. The bundle is merely one component of a wider multifaceted approach to vascular access standards within our organization (Jackson 2003, Jackson 2007). Furthermore, from the pre-bundle era we identified the use of 'critical pathways' as a tool to implement evidence-based practice. Critical pathways are clinical management plans that present goals for patients and provide the optimum sequence for clinical actions. We utilized the goals associated with critical pathways (Pearson et al 1995) as a framework to help to establish the foundations of the bundle described in this paper (see fig 1).

Critical Pathway Goals (Pearson et al 1995)

1. Implement checks to prevent unnecessary variation in practice.
2. Define expected standards.
3. Design interrelations between the care processes to ensure all relevant aspects of care are considered.
4. Ensure the bundle mirrors procedural and educational content for all professional groups.
5. Deliver a data collection framework that assists with practice review.
6. Decrease burdens associated with documentation.
7. Provide a tool to empower patients with knowledge of expected standards

Fig 1

Bundle development criteria

The foremost reason for bundle development is in the interests of patient safety (Weaver et al 2014). However, as mentioned earlier, when we embark on bundle development it is essential that both implementation and integration is considered.

Evidence abounds suggesting that bundles are clinically effective (Harnage 2012). Unfortunately, it is also suggested that bundles are not fully completed at the bedside (Furuya et al 2011). This warning is brought into stark focus when a study by Whelchel et al (2013) describes how only 16% of bundled components were fully considered during patient care. It remains unclear if a generalised bundle development process exists. To aid the development process we utilized an adaption of the critical pathway components as described by Pearson et al (1995) to evaluate bundle development.

Implement checks to prevent unnecessary variation in practice – Avoiding variation in practice is inherent throughout the bundle. The bundle defines evidence-based practice. However, it also defines the standards an organization expects to be delivered by the clinical staff they employ. Bundles with ‘boxes’ require completion to demonstrate clearly in the care record that an intervention was completed. Conversely, when not completed the ‘gap’ in the record is easily identifiable.

Define expected standards – The bundle components offer a simple critique of the standards expected along the length of the vascular access continuum.

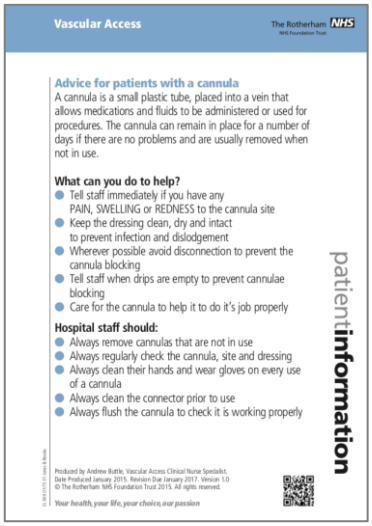
Design interrelations between the care processes to ensure all relevant aspects of care are considered – The peripheral IV catheter bundle described in this text clearly delivers beyond the traditional norms of bundles. This is achieved due to the design philosophy that considered vascular access as a continuum that has the potential for various preventable problems.

Ensure the bundle mirrors procedural and educational content for all professional groups –The bundle is not exclusive to any professional group. In turn, the evidence base of the bundle is reflected in guidelines and educational tools that are not profession specific.

Deliver a data collection framework that assists with practice review – The primary aim of the checklist is to ensure early recognition of potential problems such as infusion phlebitis or the potential for device dislodgement. However, the bundle components that assist with early recognition or prevention of vascular access problems also provide outcome data. As the bundle is also a care record the bundle becomes a repository of clinical outcome data that can form the basis of a review.

Decrease burdens associated with documentation – Traditional documentation associated with peripheral IV catheter care often required a sentence or more describing the condition of the infusion site and functionality of the vascular access device. The checklist approach incorporated within the bundle speeds documentation and offers a consistent delivery of content.

Provide a tool to empower patients with knowledge of expected standards – The bundle itself was not designed to directly offer patient information. However, it is located with other clinical documents that are readily accessible around the patients bed space. In addition, some of the core messages suggested in the bundle are supported by a patient information leaflet (see below – click image to download).


Vascular Access

The Rotherham NHS Foundation Trust

Advice for patients with a cannula

A cannula is a small plastic tube, placed into a vein that allows medications and fluids to be administered or used for procedures. The cannula can remain in place for a number of days if there are no problems and are usually removed when not in use.

What can you do to help?

- Tell staff immediately if you have any PAIN, SWELLING or REDNESS to the cannula site
- Keep the dressing clean, dry and intact to prevent infection and dislodgement
- Wherever possible avoid disconnection to prevent the cannula blocking
- Tell staff when drips are empty to prevent cannulae blocking
- Care for the cannula to help it to do it's job properly

Hospital staff should:

- Always remove cannulas that are not in use
- Always regularly check the cannula, site and dressing
- Always clean their hands and wear gloves on every use of a cannula
- Always clean the connector prior to use
- Always flush the cannula to check it is working properly

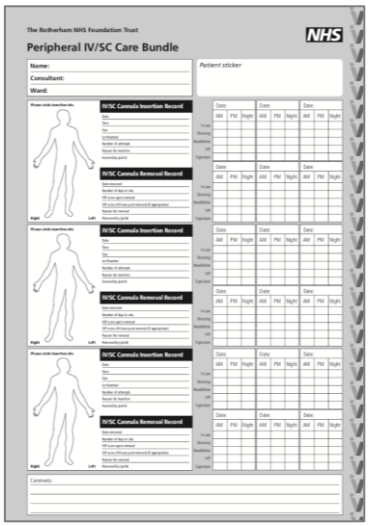
patient**information**

Produced by Andrew Buttle, Vascular Access Clinical Nurse Specialist.
Date Produced January 2015. Revision Due January 2017. Version 1.0
© The Rotherham NHS Foundation Trust 2015. All rights reserved.

Your health, your life, your choice, our passion

Peripheral IV bundle

The peripheral IV bundle as described in this text is a single sheet, double sided A4 paper document (see below – click image to download).


The Rotherham NHS Foundation Trust

NHS

Peripheral IV/SC Care Bundle

Name:
Consultant:
Ward:

Patient sticker

NISC Cannula Insertion Record

NISC Cannula Removal Record

Comments

The front page includes a section to document details of insertion and removal. This section includes details such as device size; site and details of who inserted the device. In addition, equivalent importance is placed on removal details such as the date and reason for removal.

The next section of the document is a checklist. This is aligned with the insertion and removal section and includes regular clinical checks. The checks comprise of:
Is the device in use?
Is the dressing intact or is a routine change required?
Is the needleless device in good working order or is a routine change required?
What is the condition of the IV site?

To accommodate the routine of the organisation we have ensured theses checks are completed at least three times a day. However, we accept and promote more regular checks as the situation requires, for example when an increased risk of IV site associated problems may exist (Gorski et al 2012).

In addition, we have included an 'IV' branding strip along the leading edge of the document. Our intention was to help identify the document quickly in the context of it being filed in a potentially busy set of health care documents.

Over the page, we find four main sections. The first two are essentially the bundle components. However, they have been written from a care plan perspective rather than like a checklist. In addition, they fulfil our requirement to improve more than just infection problems associated with vascular access. The standardized care elements focus on the wider clinical issues associated with both insertion and on-going care of peripheral IV devices. Topics covered include sharps disposal, infusion phlebitis, occlusion etc.

The decision to select particular bundle components for inclusion was based upon recommendations from the High Impact Interventions (Aziz 2009) and EPIC3 (Loveday et al 2014). In addition, locally derived evidence supported by published literature suggested the importance of highlighting issues such as infusion phlebitis and dislodgement prevention (Abolfotouh et al 2014).

The third section is a simple prompt to remind staff of the need to complete the checklist shown on the front page.

An illustration of the Visual Infusion Phlebitis (VIP) score (Jackson 2003) is also provided. This ensures staff have a reference tool from which to check the condition of peripheral IV sites. Placing the VIP score

within the bundle also serves as a reference point for audit and investigative purposes.

Finally, when designing the bundle we acknowledged a) that it would need to be implemented into a busy clinical area and b) evidence exists that suggests bundles are not always fully completed (Whelchel et al 2013). Therefore, the design of this peripheral IV bundle fulfils our philosophy of keeping the 'simple' simple and making the 'routine' routine.

Conclusion

The implementation of various IV bundles, including the peripheral IV bundle has been utilised to interrelate and normalise vascular access standards. In turn, this interdependent approach has allowed practitioners to recognise clinical skills associated with one particular type of vascular access can be utilised for other devices. Finally, vascular access standards were often described as having limited ownership (Jackson 2003). Bundles act as a procedural conduit that have the ability to augment and improve patient outcomes. Future bundles should focus on areas of clinical practice that will benefit from procedural direction and professional proprietorship.

Reference

Abolfotouh, M.A., Salam, M., Bani-Mustafa, A., White, D. and Balkhy, H.H. (2014) Prospective study of incidence and predictors of peripheral intravenous catheter-induced complications. Therapeutics and Clinical Risk Management. 10, p.993-1001. doi: 10.2147/TCRM.S74685.

Aziz, A.M. (2009). Improving peripheral IV cannula care: Implementing high-impact interventions. British Journal of Nursing. 18(20), p.1242–1246. doi: 10.12968/bjon.2009.18.20.45116

Berenholtz, S.M., Pronovost, P.J., Lipsett, P.A., Hobson, D., Earsing, K., Farley, J.E., Milanovich, S., Garrett-Mayer, E., Winters, B.D., Rubin, H.R., Dorman, T. and Perl, T.M. (2004) Eliminating catheter-related bloodstream infections in the intensive care unit. Critical Care Medicine. 32(10), p.2014–2020.

Burja, S., Belec, T., Bizjak, N., Mori, J., Markota, A. and Sinkovič, A. (2018) Efficacy of a bundle approach in preventing the incidence of ventilator associated pneumonia (VAP). Bosnian Journal of Basic Medical Sciences. 18(1), p.105-109. doi: 10.17305/bjbms.2017.2278.

Christy, N.E., McFadden, M., White, H.P. and Douglas, C. (2011) Moving into new frontiers: Fighting central line associated bloodstream infections house wide. American Journal of Infection Control. 39(5), p.E34–E35. Doi:10.1016/j.ajic.2011.04.083.

COLE, S. (2012) Scottish Intensive Care Society Audit Group: Central line insertion bundle (2nd edition). NHS National Service Scotland. [online]. Last accessed 18th June 2018 at: http://www.sicsag.scot.nhs.uk/hai/SICSAG-central-line-insertion-bundle-120418.pdf

Furuya, E.Y., Dick, A., Perencevich, E.N., Pogorzelska, M., Goldmann, D. and Stone, P.W. (2011) Central line bundle implementation in US intensive care units and impact on bloodstream infections. PLoS ONE. 6(1), p.e15452. doi: 10.1371/journal.pone.0015452.

Goeschel, C.A. (2011) Nursing leadership at the crossroads: Evidence-based practice 'Matching Michigan-minimizing catheter related blood stream infections' (*). Nursing in Critical Care. 16(1), p.36–43. doi: 10.1111/j.1478-5153.2010.00400.x.

Gorski, L.A., Hallock, D., Kuehn, S.C., Morris, P., Russell, J.M. and Skala, L.C. (2012) Recommendations for frequency of assessment of the short peripheral catheter site. Journal of Infusion Nursing, 35(5), p.290–292. doi: 10.1097/NAN.0b013e318267f636.

Hansen, S., Schwab, F., Schneider, S., Sohr, D., Gastmeier, P. and Geffers, C. (2014) Time-series analysis to observe the impact of a centrally organized educational intervention on the prevention of central-line-associated bloodstream infections in 32 German intensive care units. Journal of Hospital Infection. 87(4), p.220–226. doi: 10.1016/j.jhin.2014.04.010.

Harnage, S. (2012) Seven years of zero central-line-associated bloodstream infections. British Journal of Nursing. 21(Sup15), p.S6–S12. doi: 10.12968/bjon.2012.21.Sup21.S6

Hess, S. and Bren, V. (2013) Essential components of an infection prevention program for outpatient Hemodialysis centers. Seminars in Dialysis. 26(4), p.384–398. doi: 10.1111/sdi.12102.

Hughes, R.G. (2008) Nurses at the 'Sharp End' of patient care. Agency for Healthcare Research and Quality (US). Patient Safety and Quality: An Evidence-Based Handbook for Nurses.

Jackson, A. (2003) Reflecting on the nursing contribution to vascular access. British Journal of Nursing. 12(11), p.657–665. doi: 10.12968/bjon.2003.12.11.11315

Jackson, A. (2007) Development of a trust-wide vascular access team. Nursing Times. 103(44), p.28-29.

Leblebicioglu, H., Öztürk, R., Rosenthal, V.D., Akan, Ö.A., Sirmatel, F., Ozdemir, D., Uzun, C., Turgut, H., Ersoz, G., Koksal, I., Özgültekin, A., Esen, S., Ulger, F., Dilek, A., Yilmaz, H., Dikmen, Y., Aygún, G., Tulunay, M., Oral, M., Ünal, N., Cengiz, M., Yilmaz, L., Geyik, M.F., Şahin, A., Erdogan, S., Sacar, S., Sungurtekin, H., Uğurcan, D., Kaya, A., Kuyucu, N., Yýlmaz, G., Kaya, S., Ulusoy, H. and İnan, A. (2013) Impact of a multidimensional infection control approach on central line-associated bloodstream infections rates in adult intensive care units of 8 cities of turkey: Findings of the international Nosocomial infection control consortium (INICC). Annals of Clinical Microbiology and Antimicrobials. 12(1), p.10. doi: 10.1186/1476-0711-12-10.

Loveday, H.P., Wilson, J.A., Pratt, R.J., Golsorkhi, M., Tingle, A., Bak, A., Browne, J., Prieto, J., Wilcox, M. and UK Department of Health. (2014) Epic3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. Journal of Hospital Infection, 86, S1–S70. doi: 10.1016/S0195-6701(13)60012-2.

Ma, N., Cameron, A., Tivey, D., Grae, N., Roberts, S. and Morris, A. (2018) Systematic review of a patient care bundle in reducing staphylococcal infections in cardiac and orthopaedic surgery. ANZ Journal of Surgery. 87(4), p.239-246. doi: 10.1111/ans.13879.

O'Grady, N.P., Alexander, M., Burns, L.A., Dellinger, E.P., Garland, J., Heard, S.O., Lipsett, P.A., Masur, H., Mermel, L.A., Pearson, M.L., Raad, I.I., Randolph, A., Rupp, M.E., Saint, S. and the Healthcare Infection Control Practices Advisory Committee (HICPAC) (2011) HICPAC. Guidelines for the Prevention of Intravascular Catheter-Related Infections. (CDC Guidelines). Centers for Disease Control. [online]. Last accessed 17th June 2018 at: https://www.cdc.gov/infectioncontrol/guidelines/BSI/index.html

Pearson, S.D. Goulart-Fisher, D. and Lee, T.H. (1995) Critical pathways as a strategy for improving care: Problems and potential. Annals of Internal Medicine. 123(12), p.941.

Pronovost, P., Needham, D., Berenholtz, S., Sinopoli, D., Chu, H., Cosgrove, S., Sexton, B., Hyzy, R., Welsh, R., Roth, G., Bander, J., Kepros, J. and Goeschel, C. (2006) An intervention to decrease catheter-related bloodstream infections in the ICU. New England Journal of Medicine. 355(26), p.2725–2732. doi: 10.1056/NEJMoa061115

Pruden, J. (2011) PICU's mission to eliminate CA-BSI by joining a national collaborative. American Journal of Infection Control. 39(5), p.E156. doi: https://doi.org/10.1016/j.ajic.2011.04.264

Resar, R., Griffin, F.A., Haraden, C. and Nolan, T.W. (2012) Using Care Bundles to Improve Health Care Quality. IHI Innovation Series white paper. Cambridge. Massachusetts: Institute for Healthcare Improvement. [online]. Last accessed 18th June 2018 at: http://www.ihi.org/knowledge/Pages/IHIWhitePapers/UsingCareBundles.aspx

Weaver, S.J., Weeks, K., Pham, J.C. and Pronovost, P.J. (2014) On the CUSP: Stop BSI: Evaluating the relationship between central line–associated bloodstream infection rate and patient safety climate profile. American Journal of Infection Control. 42(10), p.S203–S208. doi: 10.1016/j.ajic.2014.05.020.

Weeks, K.R., Goeschel, C.A., Cosgrove, S.E., Romig, M. and Berenholtz, S.M. (2011) Prevention of central Line–Associated bloodstream infections: A journey toward eliminating preventable harm. Current Infectious Disease Reports. 13(4), p.343–349. doi: 10.1007/s11908-011-0186-8.
Whelchel, C., Berg, L., Brown, A., Hurd, D., Koepping, D. and Stroud, S. (2013) What's the impact of quality bundles at the bedside? Nursing. 43(12), p.18–21. doi: 10.1097/01.NURSE.0000437481.30251.e1.