Analysis of Routine Replacement of Peripheral Intravenous Catheters

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Abstract

Intravenous therapy is the most common invasive procedure among hospitalized patients (Webster, Osborne, Rickards & Hall, 2010). The majority of health institutions follow the recommended guidelines of replacing venous catheters 72 to 96 hours for the prevention of phlebitis and bacteremia (Webster, et al, 2010). Clinically-indicated replacement versus routine replacement of peripheral venous catheters by Webster, Osborne, Richard & Hall numerous randomized control trials were analyzed and compared. According to the research there was not a statistically significant difference in rates of bacteremia and phlebitis whether catheters were changed every 72 to 96 hours apart or less frequently upon clinical necessity; thus suggesting that there is little benefit for routine replacement of peripheral intravenous catheters.

The protocol: Initiation & Maintenance of Vascular Access Devices which was analyzed in this paper states that PIV catheters at said institution must be changed every 72 hours in the adult population. In order for a protocol to be accepted it has to be voted on by several committees and ideally should have three sources cited. This particular policy only had two sources and the evidence used for the protocol is the lowest level of evidence according to the hierarchy as there are no randomized control trials cited. Recommendations for the institution are that they do their own trial at the facility to add validity to the current policy or consider changing the policy to reflect the new information presented by current research.

A systematic review is a research method used for searching and integrating literature related to a specific clinical issue (LoBiondo-Wood & Haber, 2010). This is done by synthesizing the results of several studies in one article as in Clinically-indicated replacement versus routine replacement of peripheral venous catheters by Webster, Osborne, Richard, & Hall. The aforementioned reviews is appropriate for the PICO question: Does routine replacement of peripheral IV catheters reduce incidences of phlebitis and bacteremia more so than waiting until replacement is a clinical necessity for hospitalized patients? .This review was performed to compare the intervention of the routine changing of peripheral IV catheters every 72 to 96 hours to changing catheters only when they are clinically indicated. According to Webster et. al. 2010, clinical indications include blockage, pain, redness, infiltration, swelling, leakage, and phlebitis. As mentioned in the review less catheter changes will decrease patient discomfort associated with the procedure, and may be more cost-effective for health institutions.

All studies assessed were randomized control trials that compared routine removal with removal when clinically indicated (no crossover or cluster randomized trials were used). These types of studies are strong sources which increase the quality of the review and establish cause and effect in the data. The search yielded 198 trials, and of these, 6 studies were used in the systematic review because they met inclusion criteria. These studies used a computerized method of randomization. Brief reviews of the studies are described below.



The six trials had a sample size of 3455 participants. Four trials were conducted at a single center, acute inpatient setting, 1 in a multicenter trial of three hospitals, and one in the community setting. Aggregate data was used in the analysis, where the patient was used as the unit of measurement, instead of the peripheral IV catheter. Only studies where data were available per patient rather than per catheter were used.

The aforementioned systematic review included an exhaustive description of the strategy used to investigate, along with the method the authors used to develop their inclusion and exclusion criteria for the clinical trials. A search review is considered thorough if it includes several databases, if the reference lists of relevant articles are searched, and if other researchers were contacted to retrieve unpublished data (McKibbon et al. 1999). In this review the Cochrane Peripheral Vascular Diseases (PVD) Group performed a search via their specialized register and the Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library (Webster et al. 2010). “All publications describing randomized controlled trials of routine peripheral IV replacement compared with replacement based on clinical indications” were searched (Webster et al. 2010). All relevant titles and abstracts were reviewed by three of the authors and “full reports of potential trials were retrieved for further assessment of eligibility based on the inclusion criteria” (Webster et al. 2010).

The search included more than one database: MEDLINE, EMBASE, CINAHL, and AMED, in addition to the hand-searching of all relevant journals (Webster et al. 2010). To ensure that all possible studies were included, researchers and manufacturers were contacted to obtain unpublished data and “reference lists of potentially useful articles” (Webster et al. 2010). “Hand-searching through articles contributes to the completeness of retrieval, as occasionally those who index articles for databases such as MEDLINE may use inappropriate keywords or may miss articles or even whole journal issues” (McKibbon et al. 1999). By thoroughly searching, the authors of this article increased the validity and minimized bias.

These studies were appropriate for the analysis of routine replacement of peripheral IV catheters reducing the incidence of phlebitis and bacteremia more so than replacing catheters when there is a clinical indication. Only when the study had a sample size of less than 100, and all measured the same outcome, which is the prevention of catheter related phlebitis and reduction of bacteremia. The primary outcome of the review suggested that patients are not adversely affected if catheters are changed when clinically indicated rather than the recommended 72 to 96 hours. The rates of bacteremia and phlebitis were comparable, suggesting that there is no benefit for routine replacement. The treatment effect was very small. Between the clinically indicated group and the control group there was an increase in the odds ratio of bacteremia from 0.17 to 1.94 and of phlebitis which increased from 0.97 to 1.60. Neither increase was large enough to prove that catheters must be changed routinely. The incidence of infection was not statistically different between groups, but “catheter failure due to blockage was higher in the clinically indicated group” (Webster, Osborne, Richard, and Hall, 2010). The odds ratio increased from 0.90 to 1.42 for catheter blockage. Overall, there was very little difference in catheter associated complications between either groups, which indicates that there is no clinical need to change catheters routinely because there is no harmful effects toward the patient by waiting until clinically indicated.

The results of this study apply to any patient in the hospital setting who has a peripheral IV. Many patients, regardless of their age group, receive fluids or medications via an intravenous catheter at some time during their hospital stay. Therefore, the results of this study, if implemented, could benefit patients no matter their age or health condition. Considering that patients undergo several procedures, many of which are painful, if something can be done to prevent other painful treatments, such as inserting IV lines, it should be implemented. “Catheter insertion is an unpleasant experience for patients and replacement may be unnecessary if the catheter remains functional and there are no signs of inflammation” (Webster et al. 2010). Knowing that changing the IV catheter every three days does not necessarily decrease the incidence of phlebitis or bacteremia, patients should be able to keep the same PIV line throughout their stay. However, if there are any signs of infection or inflammation and the catheter should be removed immediately, as expected.

“Among hospitalized patients, intravenous therapy is the most common invasive procedure” (Webster et al. 2010). The findings of the study can be applied to any hospital setting and can be useful in minimizing not only the equipment and therefore cost, but also the pain and discomfort it causes patients to have their IV changed every few days. In addition, it minimizes the potential risk for infection considering “…each time skin integrity is breached, a potential portal for pathogens is provided” (Webster et al. 2010). Health care providers as well as patients should be pleased to learn that changing PIV every 72 hours does not decrease the incidence of phlebitis or bacteremia, and therefore is unnecessary. Not only will the health care professionals have one less task to perform, but less equipment would be needed, and patients would undergo fewer insertions of IVs and therefore less pain. Hospitals, as well as clinics and other community settings around the country, can benefit from these results and implement this new policy without any harmful effects to the patient while minimizing pain, discomfort, and infection.

This study considered all of the possible outcomes, harmful as well as beneficial. The focus of the study was on phlebitis and bacteremia to determine if waiting until there were clinical indications to change the catheter, such as signs of inflammation or infection, it would increase the incidence of these potential complications. The results showed that there is only a very slight increase in catheter related bacteremia and phlebitis when health care providers waited until necessary to change the PIV line. However, while it is acknowledged that there is a slight increase, it is not a significant enough increase to harm the patients or to prevent this policy from being implemented. Considering the phlebitis rate only increased by 1.8% and “most cases are mild requiring either no treatment or a simple removal of the catheter” it seems that the benefits definitely outweigh the detriments (Webster et al. 2010). This study also looks into the cost of the cannulation needed when catheters are changed every 72 hours. It was found that costs were significantly reduced in the clinically indicated group. Therefore, after considering both the negative aspects and the positive aspects of changing catheters only when clinically indicated as opposed to every 72 hours, “the primary outcome of this review suggests that patients are not adversely affected” and would spare them the unnecessary pain of routine re inserts (Webster et al. 2010).

Although this systematic review is a great source that can be used toward determining the proper amount of time a PIV should be left in place, other research that is available about peripheral IV lines should be considered as well. Guidelines provided by nursing organizations such as the Infusion Nursing Society or the Nurses Service organization, in addition to other research studies, are important resources that can help ensure a more clinically meaningful outcome. Other findings may suggest different protocol for replacing peripheral IVs. For instance, the Center for Disease Control as well as the Infusion Nursing Society recommends that catheters can be left in place up until 96 hours which contradicts most other findings that suggest replacement every 72 hours. The Joint Commission is another important resource to look into as they are responsible to ensure that nurses are adhering with the standards of practice. Therefore it is essential to consider other findings before implementing this new protocol.

The protocol relating to our PICO question is titled Initiation & Maintenance of Vascular Access Devices. The text within this policy states acceptable standards of practice relating to placement, utilization and management of peripheral intravenous catheters (PIV), and mid-line catheters. For the purposes of this paper the relevant information found in the protocol are the points that specifically address peripheral intravenous catheters. “A PIV….. may remain in the vein for up to three (3) days in the adult population.” The data collected in the systematic review is derived from research regarding the adult population, patients 18 or older. The protocol does state that “PIVs may remain in longer for the adult population with an order from the physician.” However this is strongly discouraged excluding circumstances relating to end of life care, and when ‘expert’ staff members are unable to obtain a new IV site.

The policy in question was revised by the clinical coordinator (charge nurse) of the Infusion center of this organization; she is an ASN RN. Patients come to the infusion center for outpatient intravenous therapy. The nurses who work on that unit are also responsible for placing peripherally inserted central catheters for inpatients and in past years traveled thru the facility placing PIVs in ‘hard stick’ patients. Via an interview conducted over e-mail the current clinical coordinator informed me that the policy was originally written by the previous clinical coordinator of the infusion center who was BSN prepared.

Additionally, in order to ascertain information regarding rules and regulations set forth for the development and approval of protocols (policies) at this particular institution interviews were conducted via e-mail with two other staff members. A staff educator in the Professional Development Department who is an RN with a masters in nursing education explained that the organization has a template required for all policies. According to her “a policy can be started if a need is assessed” for clarification of acceptable standards of practice and providing the use of “information that is evidenced based”. Subsequently, the new policy is submitted to the Professional Practice Council in order to be presented to a group of representatives from all clinical areas of the organization. As long as the committee approves the policy it is then posted on Healthstream, a website used for employees to remain up to date on their competencies.

The co-chair of the Professional Practice Committee, an APRN with specialty certification in psychiatric, and holistic nursing elaborated on the process of protocol development. “…the PPC requires three sources of EB research/references to support the policy changes or updates.” At the start of the approved policy being discussed in this paper there are only two sources listed, i.e. the Infusion Nurses Society Standards of Practice 2006, and Guidelines for the Prevention of Intravascular Catheter-Related Infections 2002. The policy also states that it was implemented in 2005, and revised last in November 2010. The PPC was one of three councils that approved the protocol; the other two are the Infection Control Committee, and the Policy Governance Committee.

According to the co-chair of the PPC there are no specific requirements regarding educational achievements for policy writers as long as they have some degree of expertise in the area they are writing about. It seems as though the EBP sources used for this protocol may be outdated at this point and not reflective of the recent research related to peripheral IV catheters. She stated that there is a new version of the Vascular Access Devices coming soon; however it does not necessarily include a change in the amount of time PIVs are allowed to remain in place in the adult population. The level of evidence for both sources cited in this protocol can be categorized as Level VII as they appear to be “opinion of authorities and/or reports of expert committees” which is actually the lowest level of evidence in the hierarchy (LoBiondo-Wood, 2010). Using the GRADE system which “…rates the quality of the evidence as high, moderate, low, or very low and then grades the strength of the evidence as strong or weak in setting forth practice recommendations” this protocol scores very low meaning “any estimate of effect is very uncertain” (LoBiondo-Wood, 2010). Therefore in order to improve the strength of the protocol it would be beneficial for the organization to seek out other forms of research evidence to support the policy. A randomized trial done at the facility would be an effective way to support or deny the strength of the current policy.

References

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