

# Safe administration of intravenous medication and management of central line

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Intravenous therapy is a crucial element of acute care management; this provides easy access for medication, maintaining fluid and electrolyte balance, and administration of blood products (Wiechula & Hodgkinson, 2002). This is an invasive procedure that entails a number of risks for the patient. This literature review will provide important information regarding the safe administration of intravenous medication and the management of the central line.

Safe Administration of Intravenous Medication. The article " Safe Practice in intravenous medicine administration" from the Nursing Standard journal provided a detailed account of safe administration of intravenous medication. The IV route has many advantages over other routes, mainly because of its absorption rate, but it must " only be used when its benefits outweigh its risks" (Lavery, 2008). The first step in safe administration of intravenous medication is assessment of the patient's condition and satisfying the 5 Rights of drug administration; Right Patient, Right Dose, Right Medication, Right Route, and Right time.

The patient's chart must also be checked for all the other drugs that the patient is currently taking. The expiration date of the medicine ordered must be checked as well. Drug interactions and interval of the medication must be considered as well. This must be taken seriously as 22% of medication errors committed on general medical practice were due to lack of knowledge of this little detail (Joanna Briggs Institute, 2005). As a confirmatory measure the drug order must be consulted with another nurse.

There was evidence that suggested the efficiency of having two nurses check medication orders prior to administration (Joanna Briggs Institute, 2005). Following hospital protocol, the procedure must be explained to the patient and acquire consent on the doing the procedure. Secondly, the materials needed for the procedure must be prepared. The materials needed will be dependent on the route specified which could be; bolus injection, intermittent infusion, and continuous infusion.

IV bolus injection requires the use of a syringe; conclusive evidence suggested that labels on syringes or enhancements on syringe may prevent medication errors (ISMP Medication Safety Alert, 2004). Application of aseptic technique is essential in the process of drug administration through the intravenous route. Thus, swabbing the injection port with alcohol is an important practice. The injection port is exposed to bacteria and injecting these to the patient's system must be avoided (Institute for Safe Medication Practices, 2007).

No conclusive evidence was presented on this claim. Upon swabbing the IV port with alcohol and letting it dry, the next step is to administer the medication at the IV port. The rate of the IV push must be observed carefully, since there are conclusive evidence of death occurring on an IV push that was done too quickly (Cohen, 2003). This is known as " Speed Shock" and will be discussed in detail later. If the method of administration is through continuous infusion, the rate of infusion must be confirmed with another nurse (Joanna Briggs Institute, 2005).

An infusion pump may be used to ensure accurate infusion rates. The careful use of the infusion pump must be observed by the nurse.. After drug administration, the patient must now be watched closely for adverse reaction to the drug. After assessment of the patient after administration, the central line must be flushed with a 5-10 ml 0.9% sodium chloride solution. This is a precautionary measure to relieve the cannula of any residual medicine (Lavery, 2008). Afterwards, the sharps and other equipments used should be discarded in a proper container.

CDC recommended that sharps should be disposed in a proper container; “ closable, puncture resistant, leakproof on the sides and bottom, and appropriately labeled or color coded” (CDC, 1998). Proper documentation and monitoring of therapeutic effect concludes the procedure (Wiechula & Hodgkinson, 2002). Management of the Central Line The article; “ Promoting Best Practice in the Management of Peripheral Vascular Devices” from the Joanna Briggs Institute, used an evidence based approach on the management of peripheral vascular devices.

It stressed a number of key recommendations in achieving best practices in the management of a central line (Wiechula & Hodgkinson, 2002). This literature will be central to this discussion. It is common medical knowledge that hand washing and observance of the aseptic technique is crucial for the prevention of infection. This was also pointed out in the article and was given utmost importance. The next guideline is the dressing of the central line; the article suggested the use of gauze or transparent dressing.

It also suggested that it should be changed when it is damp, loosened or soiled. Conclusive research from CDC noted that both the transparent and gauze dressings virtually have the same effect (CDC, 2002). Secondly, the routine replacement of IV catheters, IV therapy is an invasive procedure and these devices can harbor bacteria that can cause complications. In addition, it also stressed rotation of the site of catheter insertion every 48-72 hours to prevent phlebitis; this suggestion was well within the extent of rotation specified by the CDC which was every 72-96 hours (CDC, 2002).

Moreover, it also stressed that IV catheter should be replaced at the first sign of phlebitis. Another consideration for the removal of the catheter is evidence of local infection (Gosbell, 2005). The third guideline was the replacement of the IV administration sets at 72 hour intervals. These equipments include; blood products, piggy back, and lipid emulsions. When a medical order required the use of these materials, the healthcare provider must make sure that these materials should be replaced or disposed of when it goes past its usefulness.

This must be meticulously observed especially with blood products and lipid emulsions, which produces a higher incidence of bacterial colonization; this case requires the IV administration set to be replaced within 24 hours of initiating the infusion. Fourth, is the use of flush solutions to prevent thrombosis or infection, heparin is the most common flush solution in use today. A study with much legitimacy in it, has confirmed that flushing a catheter with a vancomycin/heparin lock will yield to a significant decrease in infection rate (Woensel, 2008).

Much debate surrounds the issue of whether it should be done continuously or intermittently. A recent study by the Cochrane Collaboration attempted to address this issue. Considering the inconclusive results of the study, it still claimed that intermittent flushing, “ were less likely to infiltrate, leak, or cause phlebitis” (Flint, Macintosh, & Davies, 2008). The fifth management approach to a central line is the use of in-line filters. Wietchula & Hudgkinson noted that this device is thought to reduce the incidence of infection, but no evidence confirms this claim.

A similar claim supported this notion that in-line filters have no significant relation to decreased incidence of infection in a study conducted by the Cochrane Collaboration (Foster, 2008). This study, too, was shrouded with impartiality due to the lack of sufficient data. Lastly, proper management of a central line requires documentation of insertion date and time of the intravenous device. This would also serve as a guide for the overall care of the patient (Wiechula & Hodgkinson, 2002). Complications of Intravenous Therapy Intravenous therapy is widely used in acute care management.

Due to the invasive nature of the procedure, healthcare providers must abide with known safe practices just like the ones outlined in this study. Failure to comply with safe practices can lead to infection and even death. The most disastrous complication can arise from failing to observe safe practice in intravenous medication. Meanwhile the patient can suffer from infections and much discomfort from failing to observe clinically effective practices on the management of the central line. These two topics will be explored in this section of the study.

Aside from describing “ Safe Practice in intravenous medicine administration”, this article also included some complications that arise in practices that are not clinically effective. Failure to assess the patient and confirming the medication can lead to disastrous results. A staggering 30% of medication errors arise from administering an inappropriate drug (Joanna Briggs Institute, 2005). An article entitled “ Medication Errors”, mentioned that improper disinfection of multi dose vials can leave the patient at risk for infection with staphylococcus aureus (Cohen, 2003).

The article even mentioned that refrigerating the MDV prolongs the life of the S. aureus compared with storing it in room temperature. In addition, it also mentioned the deadly effects of administering a drug too quickly (Cohen, 2003). This is otherwise known as “ Speed Shock” (Lavery, 2008). This is the body’s violent reaction to a foreign body that was abruptly introduced in the system. The patient may experience hypotension, shock, flushed face, tachycardia, shock, and cardiovascular collapse. Miscalculations in the required dosage can be deadly to the patient as well.

Failure of the healthcare provider to confirm the order with a doctor or colleague contributes to the occurrences of medication error. Studies have shown that one of the factors contributing to medication error is “ poor communication healthcare professionals”, which comprises of 19% of recorded incidents (Joanna Briggs Institute, 2005). The healthcare provider administering medications must be familiar with standard dosage computation and manipulation of infusion devices like the infusion pump.

There are concrete evidences published in the medical safety alert of ISMP regarding misuse of the infusion pump.

It stated: “ a misprogrammed infusion pump can leave a patient only a button press away from disaster” (Institute for Safe Medication Practice, 2002). Another complication is extravasations or infiltration. This condition is characterized by local edema and pain on the site of catheter insertion. This is caused by accidental administration of the drug to a surrounding tissue by a cannula poised in a wrong angle or problems in its patency. As mentioned earlier, failure to observe safe practices in managing the central line can also lead to serious complications.

The article “ Diagnosis and Management of Catheter Related Bloodstream infections due to staphylococcus aureus” outlined the complications arising from bad practices in management of peripheral vascular devices. Among the complications it discussed were; Catheter Colonization, Phlebitis, Infusate related bloodstream infection, and Cather related bloodstream infection. Colonization of bacteria on the catheter tip is the most common complication associated with wrongful management of the catheter tip.

The Maki hypothesis stated that bacteria from the skin surrounding the catheter site can migrate to the catheter and eventually to the bloodstream (Gosbell, 2005). Catheter related bloodstream infection may lead to bacteremia and sepsis. The bacterium that is most commonly associated with this kind of infection is *S. aureus* which account to 5-50% of cases and coagulase-negative staphylococci in 20% to 96% (Gosbell, 2005). Failure to



observe aseptic technique upon insertion of the IV catheter can contaminate the central line itself and directly introduce bacteria in the patient's bloodstream.

Another issue arising in practices that are not clinically effective is infusate-bloodstream infection. This is an infection through contamination of the fluids that are being administered. The use of the IV port either for injecting medicine or extracting blood from the patient can introduce microorganisms on the system. This commonly happens to blood products and lipid emulsions where bacterial growth is common. Lastly, phlebitis, this condition is characterized by redness, pain, and swelling around the insertion site.

Phlebitis may be caused by infection and other patient factors like the patient's inherent risk in developing such problems. Healthcare providers must be very careful in caring for patients undergoing intravenous therapy. Previous researches have shown that nosocomial infections due to bad practices in intravenous therapy account to 200, 000 cases each year (Wiechula & Hodgkinson, 2002). Patients arrive in the hospital to seek medical attention, it is only imperative that healthcare providers must deliver the quality of care that patients deserve and avoid aggravating their illness by complications that could be avoided by safe practices.