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The Effect of Needle Change on Bruising after Subcutaneous Heparin Injections

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Section B-09 of the Medications and IV Therapy chapter of Saint Vincent Hospital Nursing Procedure Manual addresses Administration of Subcutaneous Heparin. (Date of Issue 6/08) Its purpose is to provide a standard technique for subcutaneous administration of heparin. Heparin is used to prevent deep vein thrombosis in patients who are immobilized during their hospital stays. Step two of the Implementation section instructs the nurse to exchange the needle used to draw up the heparin with a new needle prior to injection. This is done by placing a sterile, 25 G 5/8" needle on the end of the medication syringe. Under the heading "Key Points" it states, "This assures a fine, sharp needle for injecting patients", suggesting needle sharpness provides a clinical benefit to the patient. King (2003) states "A needle loses a significant amount of its sharpness, and silicon lubrication in the process of piercing the skin, even more so in the process of first piercing the stopper of an insulin vial" (p.50). Although this statement is not specifically about heparin, it is reasonable to conclude that needle sharpness is lost because of contact with the stopper material and is independent of the vial contents. If so, is stopper puncturing significantly detrimental to needle performance? How can this potential performance deficit be evaluated? What impact does this have on the patient's injection experience? What is the patient benefit associated with changing the needle just prior to injection? Can this benefit be measured?

A literature search yielded what I believe is the most current research done on this subject. Although the articles' timelines do not meet the parameters outlined in the assignment, subcutaneous injection of heparin is a well-defined, standard nursing procedure taking place in the health care daily. The technique for subcutaneous injections appears to have changed little in the past twenty years leading one to conclude that these articles reflect current nursing methods and are valid.

Abstract

Evaluation of bruises and areas of induration after two techniques of subcutaneous heparin injection

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Subcutaneous administration of heparin occurs daily in the acute care setting. Bruises may occur after the injections. Injection technique is frequently suggested as contributing factor to the development of bruises. The purpose of this study was to compare the number and sizes of bruises and indurations associated with two accepted subcutaneous heparin injection protocols that differed in four elements. Variables investigated were syringe size, use of air bubble, needle change after drawing heparin into the syringe and type of sponge applied to the injection site. The hypothesis was that applying Technique A, using a 3 mL syringe, an air bubble, a needle change and a sterile dry sponge applied post-injection would be less traumatic to the tissue and result in fewer and smaller bruises and indurations than Technique B, that used a smaller syringe, no air bubble, no needle change and an alcohol sponge applied post injection. The study concluded that Technique A resulted in smaller areas of bruising and induration, and fewer indurations, but not a statistically significant lower number of bruises.

Bruising and indurations are not only unsightly and painful, they also prevent future use of the site. Employing a less preferred site may have unwanted medication absorption and/or comfort issues for the client. Given these concerns it is interesting to note that many of the suggestions made about the best way to perform a subcutaneous heparin injection are not based in research, and instead rely upon methods developed through tradition and accepted practices. The investigators selected four variables with the intent of reducing force, preventing leakage, eliminating superficial tracking/residue and eliminating alcohol as a potential source of vasodilation. The fifty patient participants were screened for a normal platelet count, no known clotting disorders and adequate abdominal surface area.

The study does not make clear what conditions were considered "known clotting disorders". Coagulation tests such as aPTT, PT and INR were not reported in the literature, suggesting these tests were not done to screen the participants. It is possible that study participants could have been taking prescription medications with the expressed or unintended effect of increased clotting times. Similarly, participants could have been taking over the counter medications or herbal supplements such as garlic and ginkgo in sufficient concentrations to impact clotting times prior to the heparin injection(s). Both of these conditions could have predisposed participants to bruise formation after a needle stick of any kind, unrelated to the injection technique.

The multiple grouped variables included in this study make it difficult, if not impossible to determine which variables are crucial and which may be trivial. The conclusions, then, apply only to the injection technique and not its individual elements. For this reason, application of Technique A to administer subcutaneous heparin in the clinical setting may be most helpful when a practicing nurse integrates the recommended variables on a case-by-case basis, as long as

they do not contradict agency policy. For example, if a patient reports stinging during the heparin injection, the nurse may elect to change the needle after draw up for all subsequent injections and note this in the chart for others to implement. Similarly, a gauze sponge could be used instead of an alcohol pad if a patient reports post injection stinging. Integrating them as responses to individual patient's conditions alters the rationale from preventive to reactive, which seems to be at odds with the author's original intent of prevention. From a personal perspective, I have observed no needle changes after heparin draw up during my clinical rotations although the policy clearly states a needle change step prior to injection. Using a gauze sponge or an alcohol wipe appears to be a nursing judgment, perhaps related to the nurse's assessment of his/her own injection skill or experience with the extent of bleeding after subcutaneous injections, although this hospital's policy indicates an antiseptic pad should be used. This study has implications for acute and long term subcutaneous administration of heparin. It is important to minimize trauma to the injection site to reduce patient anxiety and distress, lessen physical discomfort and preserve the integrity and availability of the injection site for future use.

Attempting to evaluate four independent variables within the context of one field study, while ambitious, is the major weakness of this study for the reason mentioned above. The authors acknowledge this when stating "…future investigation will need to be done to determine whether any one of the four variables investigated made the difference" (p.481). It was also interesting to note that not all subjects developed bruises. 18% of the patients treated using Technique A and 6% of the patients treated using Technique B remained bruise free. This suggests that bruising after heparin injection is avoidable for some patients although the exact method through which to achieve this, if it exists, remains unspecified.

Abstract

Effects of changing needles prior to administering heparin subcutaneously

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Subcutaneous administration of heparin occurs daily in the acute care setting. Bruises may occur after the injections. Injection technique is frequently suggested as contributing to the development of bruises. The purpose of this study was to determine if changing needles after drawing up heparin and before injecting it subcutaneously resulted in less bruising at the injection site. Patient participants received a subcutaneous abdominal heparin injection using one needle and a second injection where the draw up needle was replaced just prior to injection administration. An independent investigator evaluated each site for bruising 48 hours post injection by measuring the size of the bruise, if present. The investigators found no significant difference in bruise sizes between the one needle and two needle injection sites, leading them to conclude that needle change was extraneous, costly, and demonstrated no clinical benefit to the patient.

Bruising and indurations are not only unsightly and painful, they also prevent future use of the site. Employing a less preferred site may have unwanted medication absorption and/or comfort issues for the client. Given these concerns it is interesting to note that many of the suggestions made about the best way to perform a subcutaneous heparin injection are not based in research, and instead rely upon methods developed through tradition and accepted practices. The purpose of this study was to evaluate the effect of changing the needle after medication draw up and before subcutaneous heparin injection. Some practices recommend needle change while others do not. Needle replacement advocates speculate that bruising results from needle dullness and/or medication residue, although there exists no consensus. Needle replacement was the only variable in the study, the thought being that needle change prior to injection eliminates both medication residue and needle dullness associated with vial puncture.

The patient participants were screened using a completed blood count (CBC) that included a platelet count. Most of the thirty-one (31) surgical participants the had a primary diagnosis of cardiac disease. The study does not make clear what conditions were considered "clotting disorders". Coagulation tests such as aPTT, PT and INR were not reported in the literature, suggesting these tests were not done to screen the participants. With a primary diagnosis of cardiac disease, is possible that study participants could have been taking prescription medications or OTC medications with the expressed or unintended effect of increased clotting times. Both of these conditions could have predisposed participants to bruise formation after a needle stick of any kind, unrelated to the needle status. This was acknowledged by the authors as a possible limitation in that the study " did not examine the medication administered to patients before or during their admission. Drugs affecting coagulation may have additive or synergistic effects with heparin" (p.74). Finally, a hospital stay of at least four days

was required in order to participate in the study, perhaps resulting in a participant population with more severe or chronic conditions or possibly decreased initial health status.

The study results do not support needle change prior to abdominal subcutaneous injection of heparin in order to reduce the size of resultant bruises. From a personal perspective, I have observed no needle changes after heparin draw up during my clinical rotations at this facility, although the policy clearly states a needle change step prior to injection. This study has implications for acute and long term subcutaneous administration of heparin. It is important to minimize trauma to the injection site to reduce patient anxiety and distress, lessen physical discomfort and preserve the integrity and availability of the injection site for future use, but needle change probably does not contribute specifically to this goal. Also, needle change may have future cost implications related to using two needles for each heparin injection and generating twice the volume of needle waste needing expensive and regulated disposal.

Study results revealed that 19% of the participants developed no bruises. This percentage is consistent with bruise rates reported in an earlier study by Wooldridge and Jackson (1988), indicating Klingman's idea that "Bruising may, in fact, be a consequence of the drug itself" (p.71) may not be accurate. The bruise-free outcome suggests that post-heparin injection bruising may be avoidable for some patients although the exact method through which this occurs, if it exists, remains unspecified, but is probably unrelated to needle status.

Klingman mentions 1mL vs. 3 mL syringe use as having merit for future study. While syringe size was among the variables included by Wooldridge and Jackson, its impact could not be exclusively evaluated for the reasons mentioned earlier. Interestingly, this author did not reference the Wooldridge and Jackson study, stating "Specific research that studied the effects of

changing the needle compared with not changing the needle before the administration of subcutaneous heparin could not be found with the use of MEDLINE" (p72).

Klingman suggests injection duration is worthy of future study. During my literature search, I recall a study that evaluated injection time that was done some time after the Klingman study. I eliminated it from consideration as it was not my area of interest and injection duration is not specifically mentioned in the hospital policy.

References

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