Insertion of peripheral intravenous catheters – A complex act including nursing care and patient safety

An observational study performed at a local hospital in Tanzania

Emma Westergren och Matilda Andersson

Fall semester 2015
Självständigt arbete (Bachelor thesis), 15 hp
Nursing Programme, 180 ECT, Umeå University
Supervisor: Elisabeth Lindahl, Senior Lecturer, Department of Nursing
Insättning av perifer venkateter - En komplex uppgift som inkluderar omvårdnad och patientsäkerhet

Abstrakt

Bakgrund: Insättning av perifer venkateter (PVK) är en vanligt förekommande uppgift för sjuksköterskor. Denna praktiska färdighet kan anses vara komplex, då den inte bara kräver teoretisk och praktisk kunskap, utan också omvårdnad anpassad efter varje patients behov och tidigare erfarenheter.

Syfte: Syftet var att undersöka tillvägagångssättet vid insättning av perifer venkateter på ett lokalt sjukhus i Tanzania, med fokus på omvårdnad och patientsäkerhet.

Metod: Studien utfördes som en icke-deltagande observationsstudie och föregicks av en pilotstudie utförd i Sverige. Åtta observationer genomfördes som sedan analyserades med kvalitativ innehållsanalys.

Resultat: Kategorierna “Utförande” och “Respektera patienter” med tillhörande underkategorier utgjorde resultatet. ”Utförande” beskriver tillvägagångssättet vid insättnig av PVK, samt förberedelser och slutförande. “Respektera patienter” beskriver den givna omvårdnaden under det det praktiska utförandet.


Nyckelord: Perifer venkateter, omvårdnad, patientsäkerhet, Tanzania, låginkomstland.
Insertion of peripheral intravenous catheters – A complex act including nursing care and patient safety

Abstract

**Background:** Insertion of a peripheral intravenous catheter (PVC) is a common procedure performed by nurses. The practical skill is a complex act, which not only requires theoretical and practical knowledge, but also nursing care adjusted to each patient's history and needs.

**Aim:** The aim was to explore the procedure of inserting a peripheral intravenous catheter at a local hospital in Tanzania with focus on nursing care and patient safety.

**Method:** The study was performed as a non-participating observational study and was preceded by a pilot study performed in Sweden. Eight observations were made, which were analysed with a qualitative content analysis.

**Result:** The categories “Execution” and “Respecting patients” with associated sub-categories constituted the results. “Execution” describes how the procedure is performed, while “Respecting patients,” explains the performed nursing care during the practical skill.

**Conclusion:** The Model of Practical Skill Performance was used for interpreting and discussing the result. The model clarified that some components were not fulfilled and the performance can therefore not be considered as well proceeded. One can discuss whether it depends on lack of knowledge, resources and/or culture.

**Keywords:** Peripheral intravenous catheter, nursing care, patient safety, Tanzania, low-income country.
Index

Result .................................................................................................................. 3

Introduction ....................................................................................................... 1

Background ....................................................................................................... 1

How to insert a peripheral intravenous catheter? ........................................ 1
Nurses’ responsibilities .................................................................................. 2

Aim .................................................................................................................. 5

Method ............................................................................................................. 5

Settings ........................................................................................................... 5
Selection of participants .............................................................................. 6
Data collection ................................................................................................. 6
Analysis ........................................................................................................... 7
Research ethics ............................................................................................... 8

Results .......................................................................................................... 9

Execution ....................................................................................................... 9
Preparation ...................................................................................................... 9
Hygiene ........................................................................................................... 10
Performance .................................................................................................. 10
Completion ...................................................................................................... 11
Respecting patients ...................................................................................... 11
Information ..................................................................................................... 11
Interaction ...................................................................................................... 11

Discussion ..................................................................................................... 12

Results .......................................................................................................... 12
Substance and sequence ............................................................................. 12
Accuracy ........................................................................................................ 13
Fluency ........................................................................................................... 15
Integration ...................................................................................................... 16
Caring comportment ................................................................................... 16
A societal perspective ................................................................................ 18
Importance for nursing ............................................................................... 19

Method ........................................................................................................ 20
Ethical reflections ......................................................................................... 21

Conclusion .................................................................................................... 22

References .................................................................................................... 23
Appendix
I..............................................................................................................................................

Appendix
II...............................................................................................................................................
Introduction

Nurses perform many different elements and nursing care is an important part of the profession. As part of the nursing education at Umeå University preparing a Bachelor thesis is compulsory. The authors were curious about how nursing care, and patient safety, are considered during the insertion of peripheral intravenous catheters. When searching in databases the authors did not find studies conducted in low-income countries regarding this subject. This motivated the authors to perform the study in Tanzania during an international exchange within the programme.

Background

How to insert a peripheral intravenous catheter?

Insertion of peripheral intravenous catheters (PVCs) is a practical skill performed daily by nurses. It is the second most common invasive procedure performed on patients who are hospitalized (McGowan 2014). A PVC is a plastic catheter placed into a peripheral vein using a cannula. In Sweden PVCs are used for inserting blood transfusions, blood components, drugs, parenteral nutrition or fluid infusions to the blood stream (Ahlqvist el al. 2005).

Vårdhandboken is a webpage that provides clinical guidelines including methods and tools for how practical assignments best can be performed in health care. Vårdhandboken is produced by Inera AB which is a company owned by all the county councils and regions in Sweden. Medical Services Act (HSL) and the Social Services Act (SOL) are the foundation of Vårdhandboken. Further, Vårdhandboken is based on evidence and best practice. The purpose of Vårdhandboken is to ensure good and safe care on equal terms. Most municipalities and county councils in Sweden use Vårdhandboken as their guidelines (Ahrnstedt 2015). Therefore the authors chose to term Vårdhandbokens’ guidelines as the Swedish guidelines.

When choosing puncture site for insertion of a peripheral intravenous catheter, dorsum of the hand, forearm or bend is to prefer because of the well filled vessels and straight veins. According to Swedish guidelines the procedure for inserting a PVC
includes informing the patient about the procedure and the purpose of insertion, and controlling the identity of the patient. Identifying a suitable puncture site, using gloves, disinfecting the skin and applying the tourniquet are also crucial steps to take. To work according to an antiseptic method while inserting the PVC into the vein is very important. When the catheter is in situ, one must unclasp the tourniquet and control that the catheter is in the right position by giving an injection of sodium chloride. Fixating the PVC and documenting complete the procedure (Forslöw 2013).

**Nurses' responsibilities**

Redness, tenderness, swelling and pain are four symptoms of thrombophlebitis, which is a common complication of peripheral intravenous catheter in situ (Eiman Johansson et al. 2008). According to Ahlqvist et al. (2005) good knowledge about risks for complications, a good insertion technique, how to care for patients with PVCs, a small cannula size, duration of site-use <24 hours and good hygienic approach are important factors to decrease the risks for complications. On the other hand, Rickard et al. (2012) reported that the risks of thrombophlebitis were the same when removing the PVCs by routine (48h-96h) as when it was clinically indicated. Therefore they advocate that PVCs can be replaced when it is clinically indicated instead of by routine. Other factors that may cause complications while inserting a PVC are sensitivity to infections, patients' general condition and wound healing ability (Eiman Johansson et al. 2008).

The aim of Swedish healthcare is to provide good health and care on equal terms, for every individual in the population (SFS 1992:567). In Sweden, Registered Nurses (RN) are responsible for avoiding complications. It is a matter of great importance as it concerns patient safety. Kohn, Corrigan and Donaldson (2000) reported that deaths caused by medical errors was the 8th leading cause of death in the United States, a more common cause than to die in motor vehicle accidents or breast cancer. The following decade there were many attempts to reduce medical errors (Ulrich and Kear 2014). Stelfox et al (2006) investigated the impact of Kohn, Corrigan and Donaldsons’ (2000) report and found that the publication led to increased research about patient safety. Medical research and technology has developed significantly in
the last 50 years. In line with this, the requirement of knowledge has increased and health care professionals have more to do, more to manage and more people are involved than ever before. World Health Organisation [WHO] Europe (2015) defines patient safety as “The prevention of errors and adverse effects to patients associated with health care”. To achieve this, knowledge and practical skills are required by the nurse. According to Tingle (2012) most African countries lack national policies about safe health care and how it should be carried out. Due to lack of data the understanding of the situation regarding patient safety in African countries is inadequate. However, Tingle (2012) describes that invasive procedures, such as injections are problems in developing countries and causes health care associated infections.

The Institute of medicine (2001) mentions six key elements for improving safety in health care; safe, effective, patient-centered, timely, efficient, and equitable. These elements mean, among other things, that health care should be based on scientific knowledge, be performed respectfully with regard to the patient’s preferences, values and needs, and that equal care is provided to everyone regardless of gender, ethnicity, geographic location, and socioeconomic conditions (Institute of medicine 2001). Schwappach (2011) study conducted in 11 high-income countries, showed that one in ten patients reported medical, medication or laboratory errors in their care. Health care-associated infections is a global problem, with 1.4 million people suffering every day. The risk of being infected is 2-20 times higher in developing countries than in developed countries (Tingle 2012). According to Mänskliga rättigheter (2010) (Human rights) health care in Tanzania is characterized by acute shortage of health care professionals and lack of medicines and medical supplies. The countryside is especially vulnerable and there seem to be big differences in accessibility between different districts and classes. The prevalence of hospital-wide health care-associated infections are estimated to be 14.8% in Tanzania (Tingle 2012).

Helbling and Huwe (2015) imply that a culture of safety is a shared responsibility between the individual and the organization. It requires empowerment, communication and transparency to achieve a safe environment. Further, Helbling and Huwe (2015) describe that understanding what a culture of safety means is one prerequisite for improving care.
Worldwide, nurses have many practical elements as a part of their duties. Through the nursing education in Sweden the authors have learned many of these elements, and insertion of PVCs is one of them. During the author's education the Swedish guidelines of how to insert a PVC was used in the learning progress. Swedish guidelines are developed for the Swedish health care with regard to Sweden's political and economical circumstances. Using guidelines has helped the authors to establish good routines while inserting a PVC and has given confidence in the execution.

Injections can affect patients extensively if they suffer from fear of needles. Wright et al. (2009) reported that 22% of the participants in their study had a fear of needles, with symptoms such as dry mouth, sweating, short of breath, nauseous, feeling dizzy or passing out. Since nurses meet this group of patients they must be able to respond them correctly. It is important to confirm the patient's feelings and be respectful (Eide and Eide 2013, 259). Eide and Eide (2013, 345) describes that patients should be given information that is needed and information that they can understand. The information should include what will be done, why and when, and what results to expect. The information should be given in time in order to make the situation/survey predictable. Inadequate information can create anxiety (347).

To achieve good nursing care while performing practical skills a model was established in 2006 by a Nordic collaborative research group named Research in Nursing Skills (RiNS). The model is called The Model of Practical Skill Performance. Nielsen et al. (2013) showed that using this model made clearness in nursing possible. It increased the ability to plan and perform the assessments, and also facilitate reflection before, during and after the execution. The model also helped to maintain a holistic focus in nursing. Further, Nielsen et al. (2013) describes that using this model made the students feel more secure, since it helps to clarify that assignments contain more than just practical elements. The model was used in this study in order to demonstrate the performed nursing care. It constituted the framework for the protocol, but its main area of use was during interpreting and discussing the results.
Practical skills in nursing are complex acts. It involves multiple actions where caring intentions constitutes a basis for acting professionally as a nurse (Bjørk et al. 2013). The essence of nursing care is interaction between patient and nurse, with patient-centered care in focus. The patient should always be treated as a person with its own history and needs (Department of Nursing 2015). Knowledge about this, and the aforementioned challenges to achieve patient safety in African countries, created an interest among the authors to explore how the nurses performed the practical skill, insertion of PVCs, at Mchukwi Mission Hospital, Tanzania. The focus was on nursing care and patient safety.

**Aim**

The aim was to explore the procedure of inserting a peripheral intravenous catheter at a local hospital in Tanzania with focus on nursing care and patient safety.

**Method**

**Settings**

The study was carried out at Mchukwi Mission Hospital, which is a local hospital in Tanzania, located at the coast 150 kilometres south of Dar es Salaam. Tanzania is a country located on the west coast of Africa. It is more than twice the size of Sweden (Höglund 2015b). Tanzania as a low-income country (LIC) is one of the poorest countries in the world, despite years of aid and loans (Höglund 2015a). The coast is characterized by monsoon climate, which differs from the inlands’ hot and drier climate (Höglund 2015c). According to the Hospital Administrator at Mchukwi Mission Hospital, Hyacinta Maneno, the hospital has two medical officers and three assistant medical officers. There are eighteen nurses with different educational levels working at the hospital. The total number of hospital beds is one hundred. Further, Maneno describes that the idea to start the hospital was established by the Swedish Pentecostal Movement by the time of the catastrophic situation following after the heavy floods on Rufiji River 1969. The hospital still has support from Sweden, such as
financial and material support, which is an important part for the organization's existence. Furthermore, the Government of Tanzania and private donations economically support the hospital. At Mchukwi Mission Hospital PVCs are used for the same purposes as in Sweden, except for parenteral nutrition. Approximately 5 million PVCs are used annually in Swedish health care at a cost of 40 million Swedish crowns (Statens beredning för medicinsk utvärdering, 2013). At Mchukwi Mission Hospital the cost for one PVC is 350 Tanzanian shilling (1,40 Swedish crowns), which can be compared with the cost for a twenty-four hours stay at the hospital that is 3000 Tanzanian shilling (12 Swedish crowns) (Maneno).

**Selection of participants**

The study was performed at theatre, maternity-, female- and pediatric ward at Mchukwi Mission Hospital in Tanzania during four weeks. The selection of participants was made by purposive sampling. It means choosing people that is most relevant for the study (cf. Dahlgren, Emmelin and Winkvist 2007, 33). Since few nurses work at Mchukwi Mission Hospital no one was excluded from the study. The participating nurses had different working experiences, from three weeks up to 29 years. Three of the nurses had three years of education, and the remaining nurses had studied four years or more. None of them had a University degree. The nurses had learned to insert PVCs by theory and practical training, and they inserted PVCs daily or almost every day.

**Data collection**

During the time at the hospital the observers were located at different departments and followed different nurses during the days. In the morning, information was given to the nurse on duty about the study. If an opportunity was given to observe an insertion of a PVC, the agreement was that the participating nurse would inform the observers before proceeding. Since the nurses worked shifts and some mostly the night shift, it was not possible to observe all nurses during the stay. Also several nurses worked with administration and did not insert PVCs. Nine nurses were invited to participate, one declined participation. Finally, eight observations were made.
The study was performed as an observational study. The observations were performed by the authors, who were present during all observations. A pilot study was performed at the Clinical Training Centre for nursing students at the Department of Nursing at Umea University in Sweden before departure. The aim with the pilot study was testing the protocol and adjusting deficiencies. The final protocol is presented in Appendix I. The participating nursing students received information both verbal and in writing and had to sign a written consent in order to participate. The findings in the pilot study showed that the procedure often was performed quickly and therefore it was difficult to note all the details. With this insight the authors choose to construct a detailed protocol that required less complemented notes. It was a step by step protocol with space for additional notes. Each step contained one to two sentences that describes parts of the procedure of inserting a PVC. The protocol was inspired by the Swedish guidelines for insertion of PVCs and the Model of Practical Skill Performance. During the observations in Tanzania each observer had a protocol. In the field the observers were non-participating (cf. Malterud 2014, 177). After each observation the observers discussed their notes and compiled the data in a blank protocol.

Analysis

The analysis was a manifest qualitative content analysis. A manifest qualitative content analysis means describing the visible components and the meaning of the text (Graneheim Hällgren and Lundman 2004). The analysis contains; meaning units, condensed meaning units, subcategories and categories. Notes were not taken on every step of the protocol. Each protocol was analysed individually which resulted in eight different content analysis. Since the protocol was constructed as a step by step protocol, each step automatically became a meaning unit. The notes taken during the observation, were written down quickly and concise. The observers therefore chose to clarify the notes by writing whole sentences in the meaning units, however, they did do not add any new content. According to Graneheim Hällgren and Lundman (2004) the meaning units should be condensed, which means that the text is reduced, but the content is the same. Each meaning unit was discussed to make sure that the core message was not lost during the condensation. The condensed meaning units thus contain the same meaning as the meaning units, but with reduced
amount of text. Meaning units with similar content were sorted into sub-categories. Further, sub-categories with similar content were discussed and sorted into categories with the aim in mind. The categories covered the content of the sub-categories and were created so that no data could fit into more than one category or be excluded because of no similarities with the categories (cf. Graneheim Hällgren and Lundman 2004). When the analysis of each protocol was completed, the result were compiled. Identical sub-categories from each protocol were compiled and described in text.

Research ethics

The permission to carry out the study was given by the hospital secretary, Kasekwa. According to Medicinska forskningsrådet (2003, 17-19) (The science council of medicine), research in nursing should be based on four ethical principles. The principles are the autonomy principle, the beneficence principle, the principle of non-maleficence and the principle of justice. The autonomy principle implies that all individuals have the right to make their own decisions and should be respected by their ability to do it. In medical research the difficulty is to make sure that the participants understand the meaning of their participation in the study. The responsibility lies on the scientist to give the right information to the participants so they can make the decision to participate or not, on the correct basis (World Medical Association 2013). Therefore the participating nurses were informed individually, both verbally and in writing about their role in the study. The participation was based on free will. The study required a written consent from the nurses (Appendix II). According to CODEX (2015) the consent should be documented, be based on free will and defined for a specific research. The participants had the right at any time withdraw a given consent. Additional personal data and collected data can thereafter not be treated. To fulfil the aim patients were inevitably involved in the situation. Patients were not in focus during the observation.

During one observation an interpreter participated to facilitate communication between the participating nurse and the observers. The nurse understood some English, but it was obvious that he/she did not understand the purpose with the study and his/her role in it. Therefore the observers chose to use an interpret.
Results

The results are presented in two categories with associated sub-categories and are described in table 1.

Table 1. Presentation of categories and sub-categories.

<table>
<thead>
<tr>
<th>Sub-categories</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td>Execution</td>
</tr>
<tr>
<td>Hygiene</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
</tr>
<tr>
<td>Completion</td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>Respecting patients</td>
</tr>
<tr>
<td>Interaction</td>
<td></td>
</tr>
</tbody>
</table>

Execution

The category Execution describes the procedure of inserting a peripheral intravenous catheter. It also contains crucial steps before, and after insertion.

Preparation

The nurses prepared the material themselves before starting the procedure, or got help to do it by colleagues. The material were placed either on a table, in the bed or on the examination table. Only a few nurses had the material within reach. The preparation of material was usually sufficient, but it happened that the nurses realised that they lacked something after starting the procedure, and had to ask a colleague to bring it. As a part of the preparation the nurses were bending the wings of the PVC before inserting it into the vein. Some nurses did it after insertion while fixing the PVC.
Hygiene

All participants were wearing scrubs with short sleeves and had either short hair or the hair tied up. The use of jewellery such as ring and bracelet occurred in some of the observations. Some nurses disinfected their hands before putting on gloves, while others put on the gloves immediately. A few nurses used contaminated gloves or did not wear gloves at all. Regarding the use of apron, nurses either wore an apron that had already been used several times, or did not wear an apron at all. In some observations the material got contaminated since everything were placed in the bed or on the examination table.

Most nurses disinfected the patient’s skin with methylated spirit by using different methods such as rubbing the cotton piece back and forth or wiping it. During some observations it was noted that it was not possible to disinfect the skin, since the bottle with methylated spirit was not found. Most nurses were careful not to palpate the disinfected skin before insertion, but during some observations the nurses palpated the skin to locate the vein. Everyone was thorough with cleaning the skin if there were bloodstains.

Several participants used a PVC that had already been used, or saved the needle to make an second attempt to insert it.

Performance

The observations were performed at different wards and none of them had access to a tourniquet. The nurses had other solutions such as tying a glove or a urinary catheter around the patient’s arm or asking a colleague to help them stasis by holding their hands around the patient’s arm. The nurses inserted the needle with either determination or inserted it slowly. The majority of the nurses straightened the skin while inserting the PVC. Several nurses pulled the needle back and forth while the PVC was inserted. All insertions of PVCs were not successful, meaning that blood response did not occur after puncturing the skin. After inserting the PVC some participants placed the needle on the bed or examination table.

The nurses used different methods when fixating the PVC, but they had one thing in common, covering the puncture site. The materials that were used for fixation were
surgical tape, which was the most common, transparent bandage and Mepore. Since the Mepore did not seal around all sides, the nurse used a gauze dressing to wrap around the hand, to ensure the fixation of the PVC.

**Completion**

The majority of the nurses threw the used needle in a safety box for sharp objects, but did not do it until after finishing the procedure and fixing the PVC. It happened that a nurse threw all the used material, included the needle, in the trashcan. Regarding documentation all the successful insertions were documented in the files. The nurses documented by writing Cannula and the date of the insertion in the file.

Several procedures were performed with fluency. Some of the nurses also executed the procedure with ease. The remaining insertions were not considered to be performed with fluency since the performance had unnecessary interruptions, for example when the nurse had to pause the procedure because of lacking material.

**Respecting patients**

This category describes the nurses’ respect for the patient during insertion of PVCs.

**Information**

One way of informing the patient was to combine different ways of communication. This was done by explaining the procedure in words and using body language to show how the insertion would proceed, using the patient’s arm. Other informing strategies were not used.

**Interaction**

Some nurses were adjusting to the patient during the procedure by being flexible. For instance many of the insertions were made during labour, so the nurses were adjusting to the patient by inserting the PVC between the contractions. Further, nurses were committed to the patient by showing respect, empathy, and confirming the patient's feelings and needs. Some of those nurses also used appropriate physical
contact, and was communicating with the patient during the procedure.

**Discussion**

As previously mentioned, the aim of the study was to explore the procedure of inserting a peripheral intravenous catheter with focus on nursing care and patient safety. This was achieved by conducting an observational study.

**Results**

The Model of Practical Skill Performance, which is introduced in the background, is based on six different components: substance, sequence, accuracy, fluency, integration and caring comportment (Sommer et al. 2011). Nursing has been seen as a simple and technical skill but the creators of the model hope to show that it is a complex act. The model is mostly used in the learning process among nursing students practicing in hospitals, nursing homes or at skill centers (Bjørk et al. 2013). Bjørk et al. (2013) describe that the model can make it easier for students to involve all crucial steps during the practical skill. The model can also be used in teaching and it has facilitated for the teachers to guide the students (Bjørk et al. 2013). The authors found this model suitable for interpreting and discussing the results.

**Substance and sequence**

Substance and sequence merge with each other and include doing movements in a logical order, adapted to the patient and surrounding circumstances. This component is based on clinical guidelines, professional standards and principles (Sommer et al. 2011). Since the hospital staff did not work according to guidelines, this component is difficult to apply on the results in this study. If one compares their insertions with the Swedish guidelines one can see that they performed the practical skill similarly. Hence, the observers consider that the insertions of PVCs were performed in a logical order by most of the nurses. Not controlling the patient’s identity was one thing that differed from the Swedish guidelines. Ahlqvist et al. (2005) study showed that adherence to guidelines decrease the risk of complications and also increased care. If
guidelines had been available at the hospital the procedure might have been performed differently.

**Accuracy**

Accuracy means performing the practical execution correctly and precisely. It also includes giving relevant instruction and information to the patient, and to maintain security for the nurse, patient and the environment (Sommer et al. 2011). To be able to implement the process with accuracy, many factors need to be taken into consideration. The following part discusses important steps during the insertion of PVCs.

To reduce the risk for infections it is important to maintain good hygiene. This is crucial to ensure patient safety. WHO (2009, 140) recommends using gloves when there is a risk of touching blood, body fluids, secretions, excretions and items visibly soiled by body fluids. Since there is a risk of touching blood while inserting a PVC, it indicates usage of gloves, which not all of the nurses at the hospital did. Several of the nurses at Mchukwi Mission Hospital used jewellery at work, such as rings and bracelets. Fagernes and Lingaas (2011) examined the hand hygiene among 465 Norwegian health care workers. They concluded that health care workers should not use rings, watches or have nails longer than 2 mm since it increases the amount of bacteria on the hands. Furthermore, the study could not show that nail polish increase the amount of bacteria. Regarding the use of jewellery among the nurses at Mchukwi Mission Hospital the authors do not know why they used them. It may have been a cultural cause, since the observers noted that it was important for the persons to show their wedding ring, but may also be due to lack of knowledge. To maintain good hygiene, it is not only the nurse's personal hygiene that matters. To disinfect the patient's skin is also an important measure. According to WHO (2008, 8) an iodophor, tincture of iodine, 2% chlorhexidine or 70% alcohol should be used for cleaning the intended puncture site. At Mchukwi Mission Hospital, methylated spirit was used for cleaning the skin before insertion. The methylated spirit was also used as hand disinfection. WHO (2009, 32) recommend alcohol solutions containing 60-80% alcohol. The percentage of the methylated spirit, which the hospital used, is not
known. The hospital's choice of using methylated spirit both for cleaning the skin and disinfecting hands might be a question of cost.

Fixation is also an important part of accuracy since poor hygiene and the use of wrong dressings can increase the risk of infections (cf. Bernatchez 2014). When the nurses were fixating the PVCs at Mchukwi Mission Hospital, they used different methods, but they had one thing in common, covering the puncture site. Bernatchez (2014) explains that a transparent dressing do not need to be changed as often as a gauze- or tape- dressings, since the transparent bandage allows inspection of the puncture site. Covering the puncture site will lead to dressing changes more often, which can be painful for the patient, and may also increase the risk of infection. The dressings should always be sterile before use to reduce the risks of infections. At Mchukwi Mission Hospital the majority of nurses used surgical tape rolls that had been opened for a long time. Bernatchez (2014) describes that that kinds of dressings are often contaminated with bacterias.

To complete the procedure, the nurses documented the insertion in the patient's file. Nurses who documented wrote down the date of insertion, and the word “cannula”. Ahlqvist et al. (2009) investigated the documentation of PVCs and reported that inadequate documentation was common. Further they reported that notes in the file should include time, lumen size of the catheter, anatomic site of insertion and which side, right or left. The documentation at the Mchukwi Mission Hospital was not as detailed as Ahlqvist et al. (2009) advocates, but nevertheless it was an important part of the procedure since patients payed for all the material that was used during their hospitalization.

The ICN code of ethics for nurses, promotes that each patient has right to adjusted information so they can make decisions about their care and treatment (International Council of Nurses [ICN] 2012). In Sweden nurses are obligated by law to inform the patients (SFS 2014:821). The observations showed that the nurses at Mchukwi Mission Hospital rarely informed and communicated with patients.

In the following section some observations where the security was inadequate will be discussed. WHO (2008, 5) defines a safe injection, phlebotomy, lancet procedure or
intravenous device insertion as “A safe injection, phlebotomy, lancet procedure or intravenous device insertion does not harm the recipient, does not expose the provider to any avoidable risk and does not result in any waste that is dangerous for other people.” A cautious handling of needles is an important action to prevent blood contamination between patient and health care workers. The risk of needlestick injuries are present not only during the time for injection, but also after the procedure is performed (WHO 2015b). Some of the participating nurses recapped the needle, and once the needle was thrown in the general trashcan. These are factors that increase the risk of needle stick injuries (WHO 2015b). Most nurses threw the needle in a safety box, but not right after the insertion of the PVC. This is not according to recommendations (cf. WHO 2008, 7). Some of the nurses placed the used needle in bed or on the examination table which increases the risk of needlestick injuries. WHO (2008, 8) recommend to use, when available, needles with safety features that are activated either automatically or manually. Needles with safety features were not found at Mchukwi Mission Hospital.

During several of the observations the nurses pulled the needle back and forth while the PVC was inserted into the patient's vein. According to Forslöw (2013) it is prohibited since the needle can destroy the catheter and a part of the catheter can loosen and follow the blood stream. Several of the nurses were not aware of this risk, which was turned out during a conversation between the observers and them. At Mchukwi Mission Hospital, many nurses used the same PVC several times, if they failed to insert it on the first attempt. This can not be considered patient safe. WHO (2008, 7) recommend a new sterile single-use device for each procedure.

In conclusion the accuracy varied during the insertions. The PVCs were not always inserted correctly and precisely according to current research. Deficiencies regarding hygiene, handling of sharp objects and given information occurred. This affects the patient safety, which can be seen as inadequate during several observations.

**Fluency**

Fluency is the third component that means performing the execution with ease, without hesitation and unnecessary disruption (Sommer et al. 2011). Several of the observations were assessed to be performed with fluency, independent if they were
successful or not. An adequate preparation of the material is important to avoid unnecessary interruptions during the procedure (Verteuil 2011, 133). A few nurses forgot to bring some material during preparation, and the procedure can therefore not be considered to be performed with fluency (cf. Sommer et al. 2011).

**Integration**

Integration includes being attentive to the patient and his/her needs, have patience and be flexible (Sommer et al. 2011). As a nurse, you have to learn to interact with other people, and being flexible is an important part of nursing. Sometimes the participating nurses showed flexibility and they were adjusting to the patients during the procedure. This was especially noticeable during labour. Besides adjusting to body language, it is also important to communicate with the patient to gain knowledge about the patient’s wishes and needs. Arungwa (2014) reported that it is always the nurse who initiate conversations with patients. At Mchukwi Mission Hospital the communication was inadequate. This may be because the nurses did not take the initiative to communicate more than once, to inform the patient. Furthermore, one might speculate if this is due to the prevailing culture with different attitudes and a different hierarchy in the health care compared to Sweden.

**Caring comportment**

Caring comportment means being empathetic, dedicated and to use appropriate communication and physical contact. It also means respecting the patient’s autonomy and integrity, and confirming the patient (Sommer et al. 2011).

According to the ICN code of ethics for nurses, nursing should be based on respect for each individual, independent of colour, age, culture, religion and social status etc (International Council of Nurses [ICN] 2012). During the observations many patients were treated with respect. Further the code of ethics illustrates that the nurse should have values such as respectfulness, responsiveness, compassion, trustworthiness and integrity. The nurses who showed respect, also applied the other ethical values. Bramley and Matiti (2014) reported on a study aiming to understand patients experiences of compassion within nursing care. The findings showed that many
patients did not see the differences between compassion and nursing care. Further patients described that compassion is individual for each person and it also involves touching. Responsiveness was also something that patients described as compassion, that nurses took time to talk and listen to the them. Some described that compassion could also be shown when providing care/treatment. Some participating nurses in this study showed compassion while inserting the PVC, by confirming the patient by eye contact, making confirming sounds, and sometimes saying “pole” (sorry). The nurses were responsive according to the patient's body language, but there was no communication from patient to nurse.

A few nurses used physical contact during the procedure. The experience of being touched by a caregiver’s hands may be affected by for example; previous experience, context in which the touch occur, the patient’s age, sex, and cultural background. Touching can be divided into two groups, touch and therapeutic touch (Borch and Hillevik 2005). Borch and Hillevik (2005) interviewed patients about their experiences of all types of physical contact that they received during their hospitalization. The patients described touching as both positive and negative, but also that it did not convey anything or they just saw the touching as a part of nursing care. Patients described the positive touching as a sense of well-being and security and that they were seen as an individual. The negative experiences of touching were described as the opposite feelings like discomfort, a sense of dependency and not being seen as an individual. During insertion of PVCs the nurse has physical contact with the patient inevitably, since it is part of the procedure. But it is important to also include the therapeutic touch as it is a vital part of nursing care. The complexity for the nurse is to evaluate each patient individually and the responsiveness of the touch. The observers noticed that the participating nurses only used therapeutic touch on children. The reason for this is not clear to us, but one can speculate whether the reason may be cultural or whether there are some other reason. The observers felt that there was a certain hierarchy in the hospital, where healthcare workers were considered to have high status, and that might be the reason that therapeutic touching was not used.

Regarding caring comportment, many nurses showed flexibility and were involved in the patient. However, use of physical contact and communication was less common.
In conclusion, caring comportment was achieved by a few nurses, while important elements were lacking for it to be considered as fulfilled, by the other nurses.

**A societal perspective**

WHO (2015a) describes that it can be hard to maintain a high level of patient safety in developing countries, since the healthcare professionals often are working with limited resources and have to cope with difficult situations. These are important facts to keep in mind when discussing the performance of the insertions. The observations were carried out in Tanzania, a country with other laws and different conditions than a western country like Sweden. It might not be reasonable to expect the same high level of patient safety as in western countries. When talking to the nurses it emerged that the majority of them believed that they always had enough material to do the procedure the best way. The observers experienced otherwise during the observations, since tourniquets and disinfectant were missing during several observations. The lacking material at Mchukwi Mission Hospital might depend on the economical status. This speculation was confirmed by the assistant medical officer who indicated that the poor economy was due to the recently started nursing school.

Several of the insertions at the hospital were inadequate, such as hygiene and handling of needles. Furthermore, the best way to perform the procedure at Mchukwi Mission Hospital is a matter of discussion. At a hospital with lack of finances and limited resources, where patients themselves must pay for the material, it may be the only option to use the same PVC again after an unsuccessful attempt. If new PVCs would be used for each attempt, the risk of running out of PVCs would increase. In the worst case, this could have life-threatening consequences. When searching in data basis, the authors did not find any research about using the same needle (on the same patient during the same time), which makes it difficult to say how high the risk of infection actually is. Due to lack of research, it is difficult to say which approach is the most harmful, using the same needle on the same patient several times, or the risk of not being able to provide a patient with intravenous drugs or fluids.
Also, actions such as not replacing contaminated gloves, and use of an already used apron can have economic explanations. This affect, of course, the safety for both patient and nurse, but is perhaps inevitable due to the circumstances. This can be considered complex. Kruk et al. (2008) showed that nearly 50% of women giving birth in Tanzania must cut down on costs, borrowing money or selling possessions to afford the cost of giving birth at the hospital. The prevailing poverty is something that the hospital staff can be assumed to be aware of and also must take into account, by reducing the cost of the hospitalization. Societal changes like strengthened economy of the community and for the individual may be a prerequisite for improving conditions at the hospital, and thus, the safety for patient and nurse.

Nursing care is an important part of nursing and should be included in all parts of the profession (Bjørk et al. 2013). Important parts as communication and information were not fulfilled in all of the observations (cf. Sommer et al. 2011). Grant and Phil (2006) investigated the problems of communicative competence in the South-African health services. He describes how the relationship between the doctor-patient has developed much since the 1980's and that patient participation is now a major part of health care. However, he writes, that the traditional paternalistic model where the control lies in the health care workers’ hands, is still a dominant feature of health care in South Africa. The authors of this study perceived a certain hierarchy at the hospital, where health care workers were considered to have higher status than patients. One can speculate if there still is a certain paternalistic approach left at Mchukwi Mission Hospital or if there are other reasons for the lacking communication. However, Grant and Phil (2006) writes that an important part of changing attitudes is to start teaching students already at their first year of medical education. Furthermore, he describes the importance that health care workers and students understand that patient participation can save, not waste, time and resources, and that communication skill can be taught, shared and learned.

**Importance for nursing**

This study is relevant to get an understanding of the extent to which nursing care and patient safety are achieved in the practical skill, insertion of PVC. Dougherty (2011, 281) mention the importance of not underestimating the impact the insertion of a
PVC may have on the patient. Past bad experiences, dislike of needles or needle phobia, are factors that can generate anxiety for the patient. Anxiety, in turn, can lead to vasoconstriction, which can complicate the procedure. The nurses’ behavior and attitude towards the patient can have a direct impact on the patient’s experience of the procedure. Insertion of PVCs involve risks for both patient and nurse. For the patient, there are risks such as infection, bleeding and bruising, while the nurse is exposed to the risks of contact with blood and body fluids as well as stick injuries (Hart 2011, 121). These facts reinforce the importance of good nursing care and a patient-safe approach during the insertion of PVCs. The study shows that improvement is needed in this area.

**Method**

The aim was to do six to ten observations while nurses inserted PVCs and as previously mentioned eight observations were made, which answered the aim of the study. When choosing between interviews and observations, the authors chose an observational method because then you see how the procedure is actually performed. Regarding interviews there is always a risk that participants give answers that they believe are expected from them (cf. Yin 2013, 135).

During the observations a protocol was used to facilitate note taking. Using a protocol may have constituted as a barrier since one may focus on the steps written in the protocol, instead of focusing on how the nurses performed the procedure (cf. Yin 2013, 105). Anyhow this was considered before the study was carried out. During the pilot study the observers experienced that it would have been impossible to write down notes on blank paper, since the procedure often is performed rapidly and contains many different steps.

The observers chose to give information individually, both verbal and written. Giving information individually is beneficial, since the observers could adjust the information, and explain in a way so that the nurse could understand (cf. CODEX 2015). Further the nurses may have felt more comfortable to ask questions. There were opportunities to inform all the nurses in a group, which may have been preferable if there had not been opportunities to inform the nurses in the morning.
The information included the aim of the study, that the study was an observational study, the participants role in it, that participation was based on free will and that participating nurses had the right to withdraw their consent without being questioned (cf. CODEX 2015). Further, information should include consequences and risks that the research may cause (CODEX 2015). This was something that the observers did not inform about, since no risks were seen for the nurses to participate.

The observations considering nursing care, were made by looking at factors such as interaction, communication, response, body language and listening to the tone of the voice. Some parts were more difficult to understand, like the given information to the patients, since the observers did not control the spoken language. However, the observers perceived that nurses gave information to the patients by looking at the body language and listening to the communication between nurse and patient.

When analysing the collected data the authors chose to do a qualitative content analysis. The observers collaborated during the whole procedure. There may have been advantageously to first analyse individually, and then discuss the result that each observer had reached (cf. Malterud 2014, 118).

**Ethical reflections**

This study has not been reviewed by any council of research, but permission to conduct the study was provided by the hospital secretary after receiving the project plan for the study. Since the study was not ethically reviewed the observers have been working to maintain ethical considerations. The majority of the participants understood and spoke English. When it was unclear if the informed nurse did or did not understand the purpose of the study, an interpreter was used to clarify ambiguities. The person who interpreted was one of the hospital staff who spoke English very well. Yet it is not certain if the translation was correctly and that the right information was given to the participant. There is uncertainty if the interpreter translated the whole answer to the observers, or if he/she made a summary of the participants’ answers (cf. Kapborg and Berterö 2002). Nor can we know for sure that the other participants understood the purpose of the study and what their participation meant. With this in mind, the authors decided to inform all nurses individually. Many nurses asked questions and the observers got the opportunity to
clarify the purpose of the study and the nurses role in it. Since the observers traveled a long way to conduct the study, the nurses may have accepted participation because of benevolence to the observers. When the participants were informed it was very important to make clear that participation in the study was voluntary.

Since the patients were not observed, and therefore not part of the study, they were not asked for approval that the observers participated during the insertion. The authors spent a lot of time at the wards since they, as nursing students, wanted to take the opportunity to participate in the health care in Tanzania. The presence at the wards created a relationship with the patients. This made it feel natural for the authors to observe during the procedure. The choice not to ask patients can be questioned and if similar studies will be carried out, the authors would choose to ask the patients about permission to observe, in order to fulfill the principle of autonomy (cf. Medicinska forskningsrådet 2003, 17).

**Conclusion**

Insertion of PVCs is a common execution performed by nurses working at hospitals worldwide. This study explored the procedure of inserting PVCs. Using The Model of Practical Skill Performance when discussing the result, made it clear that some components were not fulfilled. According to Bjørk and Kirkevold (2000) the performance cannot be considered as well proceeded if not all components are included. One can discuss whether it depends on lack of knowledge, resources and/or culture. This question indicates that further research is needed within this area. It might be of interest to interview nurses about how they define nursing care and patient safety and which conditions/resources they consider to be necessary in order to achieve it. An additional suggestion for research is to conduct an interventional study with basis on The Model of Practical Skill Performance in order to illustrate important parts of nursing.
References


Graneheim Häggren, U. and Lundman, B. 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. 
_Nurse education today_ (24): 105-112.


Höglund, Lena. 2015a. _Ekonomi_.
http://www.landguiden.se/Lander/Afrika/Tanzania/Ekonomi (Collected 2015-12-29).

Höglund, Lena. 2015b. _Geografi_.
http://www.landguiden.se/Lander/Afrika/Tanzania/Geografi (Collected 2015-12-29).

Höglund, Lena. 2015c. _Klimat_.
http://www.landguiden.se/Lander/Afrika/Tanzania/Klimat (Collected 2015-12-29).

Institute of medicine. 2001. _Crossing the quality chasm: A new health system for the 21st century_.


http://apps.who.int/iris/bitstream/10665/44102/1/9789241597906_eng.pdf (Collected 2015-12-26).

World Health Organization. 2015a. Evidence of unsafe care in developing and transitional countries.  


## Appendix I - Protocol

<table>
<thead>
<tr>
<th>Moment</th>
<th>Ja</th>
<th>Nej</th>
<th>Kommentar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ergonomi</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitter placerad nära patienten och material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rätt höjd på sängen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rätt position av arm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ID-kontroll</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kontrollerar ID</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kontroll av namn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Relationsskapande</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation av sig själv</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orienterar sig om patienten upplevelser/förkunskaper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Information</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varför man behöver PVK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vad man ska göra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hygien</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basala hygienrutiner, håret uppsatt, nagellack? smycken? Förkläde</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handdesinfektion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handskar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desinfektera huden med</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stickmoment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Har kontrollerat ID</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vik ned venkateterns vingar innan inläggning för att undvika tryck mot huden</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stasa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sträcker huden vid punktion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sticker med bestämdhet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>När venkatetern placerats, kom ihåg att lossa på stasen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hantering**

<table>
<thead>
<tr>
<th></th>
<th>Ordning:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lägg metalledare direkt i burk för stickande/skärande föremål.</td>
<td></td>
</tr>
<tr>
<td>Kontrollera venkateterns läge genom injektion av steril isoton natriumklorid 9 mg/ml.</td>
<td></td>
</tr>
<tr>
<td>Rengör huden från eventuellt blodspill.</td>
<td>Ordning</td>
</tr>
<tr>
<td>Fixera venkatetern med ett sterilt förband med inspektionsmöjlighet och hög genomsläpplighet.</td>
<td>Ordning:</td>
</tr>
<tr>
<td>Märk förbandet med datum, tid och signatur på en bit häfta som sätts i kanten på förbandet.</td>
<td>Ordning</td>
</tr>
<tr>
<td>Dokumentera inlagd venkateter, även misslyckade försök.</td>
<td>Ordning:</td>
</tr>
<tr>
<td>Lyckad PVKsättning - Blodspår, genomspolning u.a, fixering av förbandet,</td>
<td>Ordning:</td>
</tr>
<tr>
<td><strong>Helhetsintryck</strong></td>
<td></td>
</tr>
<tr>
<td>Osäker, nervös, darrar, tvekar, verbalt uttrycker osäkerhet, nervösa skratt</td>
<td></td>
</tr>
<tr>
<td>Flyt utan onödiga avbrott eller tvekan och utför momentet med lätthet.</td>
<td></td>
</tr>
<tr>
<td>Fullföljer momentet.</td>
<td></td>
</tr>
<tr>
<td>Anpassa sig efter patienten och situation, är lyhörd, flexibel</td>
<td></td>
</tr>
<tr>
<td>Patientbemötande</td>
<td></td>
</tr>
<tr>
<td>- Respektfullt</td>
<td></td>
</tr>
<tr>
<td>- Bekräftande</td>
<td></td>
</tr>
<tr>
<td>- Patientmedverkan</td>
<td></td>
</tr>
</tbody>
</table>
- Empati
- Beröring
- Engagerad
- Kommunicerar
Appendix II - Consent

To the participants,

As part of our education at Umea University in Sweden we are conducting a study for our bachelor thesis in Nursing.

We would like to observe while you insert a peripheral intravenous catheter (PVC) as a part of our study. The aim of the study is to explore the procedure of inserting a peripheral intravenous catheter in a local hospital/rural hospital in Tanzania. We would like to get more information on the subject and your participation would help us understand more of the complexity of inserting a PVC.

The study will take approximately 15 minutes, or the time it takes to insert the peripheral intravenous catheter. During the observational study we will use a protocol to take notes. Participation is voluntary and you can at any time stop your participation and withdraw from the study without being questioned. All data will be handled with confidentiality, and no individual can be identified in the final report.

If you have any questions do not hesitate to ask us anything you want.

Emma Westergren
Emma.westergren@hotmail.com
+46 76 109 31 01

Matilda Andersson
Matilda.andersson@yahoo.se
+46 70 530 45 81

Sincerely,

Student
_________________________

Student
_________________________

I hereby approve participation in the study. I approve to be observed while inserting a Peripheral intravenous catheter (PVC). I agree that the observation will be summarized and compiled in the study.

Date

_________________________

Name

_________________________