THE PRELIMINARY APPROACH TO BUNDLE INSERTION AND MAINTENANCE IN PREVENTING PERIPHERAL INTRAVENOUS CATHETER-RELATED COMPLICATIONS

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ABSTRACT

***Introduction**: In Viet Nam, there are currently no studies on using of a Bundle in the care of peripheral intravenous catheters for both adults and children, as well as research on developing a tool for monitoring quality of care of peripheral intravenous catheters.* ***Objective**: To evaluate the content value of a bundle insertion, maintainance of peripheral intravenous catheter and tool for monitoring quality of care.* ***Method**: Study subjetcs were Bundle insertion and maintenance of peripheral intravenous catheters and quality of care checklist. The study was implemented from January to May 2020. The research was conducted according to the design of cross-cultural adaption of research instrument which adjusted research tools to the local culture. The Bundle's VietNamese version, English back translation version and the checklist were evaluated by the experts for the content validity compared to the original version and formed a complete scale in VietNamese.* ***Results**: The preliminary results indicated that the survey tool had been considered by experts to be suitable for application in practice. Bundle and checklist in VietNamese version had similar content with the original English version. Bundle and checklist were feasible to use in the patients with a peripheral intravenous catheterization.* ***Conclusion:** Bundle and checklist in VietNamese version had similar content to the original English version, suitable for practice.*

***Keywords:** Care bundle, peripheral intravenous catheters*

1. INTRODUCTION

Complications involving the peripheral intravenous catheter (PIVC) range from local complications such as displacement, drainage, chemical drainage or phlebitis to potentially severe systemic complications leading to the critical condition of peripheral line– associated bloodstream infection (PLABSI). There were various studies on central line–associated bloodstream infection (CLABSI), while clinical and epidemiological data on PLABSI was still incomplete [1]. One retrospective study reported a PLABSI rate of 0.5 / 1000 days hospital stay was lower than the CLABSI rate of 2.7 / 1000 days hospital stay; however, the total time of PIVC insertion and retention was 15 times higher than that of the central line device, therefore, the number of PLABSI patients with PIVC complications is high and significant considerations [2].

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One of the interventions that helped reduce the incidence of complications related to intravenous lines was the application of the care bundle [3]. The care bundle is an evidence-based three- to five-step intervention group, when combined together may be shown to be effective and improve the quality of care. There were some applications of the care bundles which, the bundle prevented ventilator-related pneumonia, Bundle for prevention of infection related to urinary tract, Bundle for prevention of central venous catheter infection [4]. As for the peripheral intravenous line, there had been several health care agencies that had developed Bundles during daily placement and care for patients with PIVC. The research indicated that the application of the Care Bundle may reduce the rate of phlebitis, septicemia [3]. In addition, the development of a tool for systematic assessment of all the important factors related to PIVC is essential to help nurses detect and promptly manage them.

In Viet Nam, there are currently no studies on the application of a Bundle in PIVC care for both adults and children, as well as research to build a tool to assess systematically the quality of care of peripheral intravenous catheter. In the established peripheral intravenous Bundle and care Bundle, the Society for Infection Prevention and Control incorporated the British National Health Authority to develop the tool. This is a visual, convenient tool for compliance monitoring, effective in preventing catheter-related infections [5-8]. About tools to evaluate the quality of peripheral line care; Lise Husby Hovik et al. calibrated and built upon a literature review a convenient tool with a full range of factors including phlebitis related signs and symptoms, catheter tape and other connection, documentation and usage indications. The tool had the reliability and level of convenience for nurses to use to access each care of PIVC. For the reason, the researchers would like to conduct a study to translate the peripheral intravenous Bundle and care Bundle of the Society for Infection Prevention and Control incorporated the British National Health Authority in English into VietNamese and Quality assessment tool for peripheral intravenous line care.

2. RESEARCH METHOD

Research period: From January to May 2020

Research design: The design of cross-cultural adaption of research instrument: adapting research tools to the local culture [9]

Study subjects: Bundle placement and care of PIVC; PIVC quality of care assessment checklist.

Bundle placement and care of PIVC developed by the Society for Infection Prevention and Control incorporated with the British National Health Authority. The tool was part of a set of practice standards “High impact practical interventions” as part of the project “Saving Lives” first published in 2005. Since then, the tool had been updated continuously in 2007 and 2010. The latest update was 2017. In the latest version of this set of the practice standards, there are seven groups of Bundles updated and added. Bundle for prevention of infections involving peripheral intravenous equipment. The tool consisted of 2 elements of the care process for 1 patient with a catheter device used to connect the peripheral intravenous line including a Bundle for the period of PIVC insertion and the Bundle for PIVC care. The PIVC bundle consisted of 5 steps: using aseptic technique, assessing the vein before insertion, preparing the patient’s skin, applying a permanent tape and recording medical records. The PIVC care bundle consisted of 6 steps: hand hygiene, use of appropriate personal

protective equipment, assess clinical indications and continuous venous status before each intervention, disinfect of PIVC ports before each intervention; change the infusion set, connect line according to the regulations and change the tape according to the prescribed procedure.

PIVC Quality of Care Assessment Checklist: Proposed by Lise Husby Høvik et al. [10] based on a study evaluating 63 health workers while providing care to 177 patients with 205 placement times of PIVC; Each PIVC is supervised by 2 independent assessors, a total of 410 PIVCs are monitored. This tool was developed into a checklist called PIVC-miniQ which includes 16 elements systematically into 4 groups of factors related to undesired catheter care quality outcome problems. The first group of factors was related to the signs and symptoms of phlebitis at the site of PIVC (9 factors include pain or pain while the touch, redness, swelling, heat, discharge / hard-to-touch caps and veins); in which signs were assessed by the researcher (redness, swelling, ...) and symptoms were expressed through the patient's perceptions (pain, pain while the touch, ..). The second group of factors reflects problems related to PIVC tapes and line connections related to possible damage to the functionality of 1 PIVC (5 elements include dirty tape, loose tape, or peeling, blood in the infusion line / extension cord and no date recorded on the tape). The third group of factors is related to the lack of nursing documentation on PIVC in the medical records (1 factor). The fourth group of factors involved in assessing the needs of the placement and maintenance of PIVC (indicative placement of PIVC); This factor evaluated the placement and retention of a PIVC without a clinical indication (1 factor).

Research process

The researcher got permission from the author to use the tool. The materials of Bundle insertion and care of peripheral intravenous catheters were used without authorization for training purposes, application in the healthcare field. The PIVC quality of care assessment tool was Permitted by Lise to be used in the study.

Translation phase from English to VietNamese were conducted by an independent translator was a Master of Nursing, C certificate in English (as the author of this study). The researcher translated the tool from English (original language) into VietNamese.

The back translation phase from VietNamese to English was conducted by an independent translator, who is a Nursing PhD student, certified in IELT 5.0. She has never known through research tools. The tool was translated back from VietNamese to English.

Examination of content after translation was sent to two American Doctors of Nursing to assess the consensus on content between the back translation English version and the original version. The both American Doctors of Nursing had confirmed the consent of the two versions, then the VietNamese translation was met content reliability while translated into VietNamese.

Once a complete VietNamese version was available, the tool were sent to nursing specialists for professional content validity evaluation. After sending letters to 5 experts, the researcher received feedback from 4 experts. Researcher sent four documents of a VietNamese translated version, an English back translation that had been content appraised by 2 American Nursing Doctors, the original version of the research tool and an assessment form of the VietNamese version tool to experts. The assessment form consisted of 5 questions designed based on the assessment form of a scientific research topic with 5 rating levels from 1 to 5 (Likert scale with 1 was very

inappropriate to 5 was very appropriate). The mean score for each response greater than or equal to 3.41 was considered appropriate [11].

3. RESULTS

Results of the translation into VietNamese, back translation into English and assessment of the content similar to the original version

During the study period from January to April 2020, the researcher carried out a translation from English to VietNamese for the Bundle PIVC and care and PIVC quality of care assessment tool.

In the first translation, the English back translation toolkit had been commented by 2 American Nursing Doctors. There were some points unclear need to be clarified in terms of content. For the First American Doctor of Nursing, words to reconsider like “every day” or “every time”; “Infusion” or “transfusion”, “Palpable hard vein” or “Palpable hard vein away from the PIVC”. For the 2nd Nurse Doctor, the contents that need clarification include “Red line along vein” or “Red line from the insertion site running along the vein”; “Tape soiled with blood or fluids” or “Tape or dressing soiled with blood or fluids”; “Unknown for PIVC indication” or “Unknown indication for PIVC”. After receiving feedback, the researcher had translated the content of the VietNamese version, send it to another independent translator to translate into the second English reverse translation version to send to the two American Nursing Doctors for re-evaluation. In the evaluation stage, the two American Nursing Doctors assessed that the English back translation version had similar content to the original version.

Compared to the original version, the English back translation version had a number of different words with the same contents. The contents of the toolkit was presented as follows.

Bundle for prevention of PIVC-related infections [12]

PIVC insertion stage

1. Sterile technique • Place PIVC using sterile technique includes hand hygiene
2. Assessment of intravenous • Perform an intravenous assessment of the patient before insertion of a PIVC
3. Prepare the skin • The patient’s skin is prepared with 2% Chlorhexidine gluconate in 70% alcohol and allows to dry completely. (If patient was sensitive to Chlorhexinde, povidine-iodine was applied)
4. Dressing changes • A sterile, semi-permeable, transparent tape is applied to the PIVC allows the catheter site to be monitored.
5. Documentation • Documentation included date, time and reason for the placement of PIVC. Assessment of intravenous strength, indicating the preparation of the placement. The type and size of the PIVC device should be recorded

Period of continuous care every day

1. Hand hygiene • Hands are disinfected immediately before and after each contact with an infected person using correct hand hygiene techniques
2. Personal protective equipment • Wear appropriate protective equipment when contacted patients according to hospital regulations
3. Assessment of clinical indications and continuous venous status • Indications of continuity of need and venous status should be recorded at least once per shift, PIVC is removed when a clinical indication is no longer indicated or if there are signs of phlebitis / bacterial infection • The placement should be observed at least during each shift on duty, in the case of PIVC, the VIP phlebitis score should be used.
4. Connect PIVC • Connection port and catheter shaft are disinfected with Chlorhexidine gluconate 2% in 70% alcohol and allow to dry completely. (If patient is sensitive, use povidine-iodine in 70% alcohol)
5. Replace the infusion set • Continuous infusion set should be changed at least every 96 hours • The infusion set uses continuously for blood transfusions and blood products should be changed every 12 hours, or when the infusion is finished. Platelets should be transfused through a new set of blood transfusion lines • The infusion set are labeled with the date and time to ensure they are replaced on time
6. Change the tape • Transparent, sterile tape should be changed at least every 7 days or earlier if the integrity of the tape is not present. • Site cleaning is performed with 2% Chlorhexidine in 70% alcohol and allow to dry completely (If patient is sensitive, use povidine-iodine in 70% alcohol) before each dressing change. • Change the tape to ensure that it uses appropriate sterile techniques according to current regulations of the medical facility

The PIVC-miniQ survey table monitors the quality of care for patients with intravenous connection equipment [13]

- Pain or pain when touching PIVCs
- Redness> 1 cm from the placement site
- Swelling> 1 cm from the placement site
- Warm in the placement site
- Pus
- Red line from the placement site along the vein

- The tissue around the site of the PIVC is tight and stiff
- Vein from PIVC site is prominent on the skin, can touch and spread far away
- Partially / completely deviated
- Adhesive tapes, tapes dirty with blood, fluid
- The tape edge is loose, folded up
- Only fixed with adhesive tape
- Blood in the infusion set
- Do not note the date of placing PIVC on the tape
- Do not know the indication of PIVC
- Missing PIVC notes in documentations

Results of the evaluation phase by the content experts toolkit

Research tool after translation was sent to 4 specialists in Nursing (2 Doctor of Nursing, 1 Master of Nursing, 1 Nursing Specialist I).

The average score to comment on the feasibility when applying to the clinical practice of the research tool was presented in graph 1.

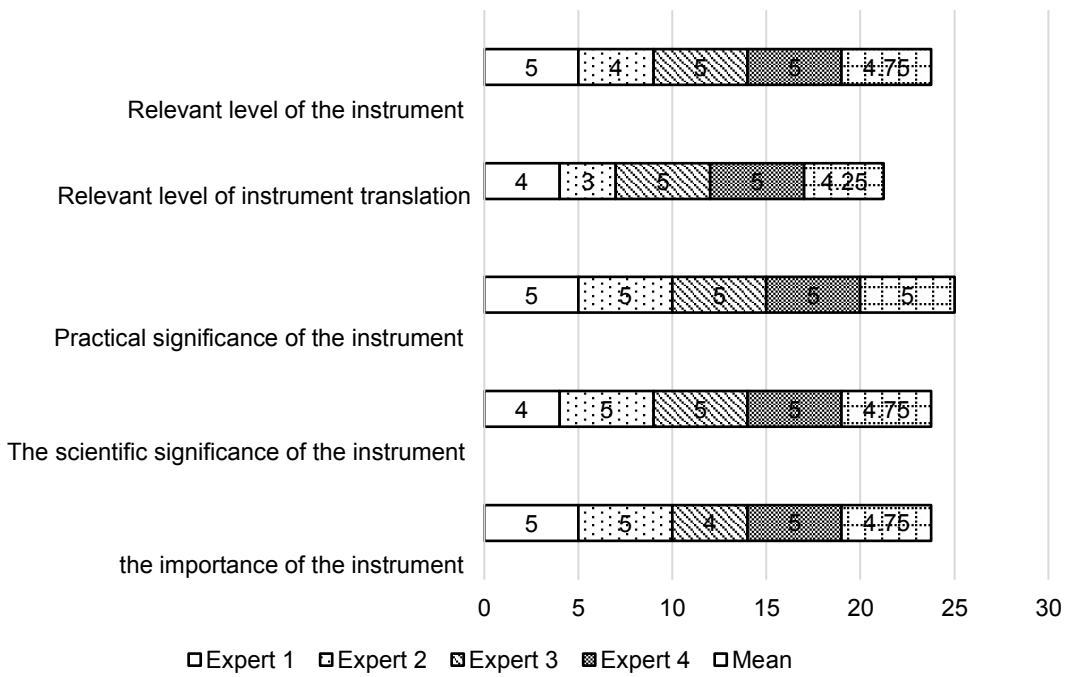

Figure 1. The feasibility of the instrument in applying into clinical practice

Research results show that factors surveyed by experts had an average score of greater than or equal to 4.24 for each factor (the lowest was 3 and the highest was 5);

4. DISCUSSION

The preminilary results indicated that the survey tool had been considered by experts to be applicable in practice. However, The experts provided comments the appropriateness factor of the research tool translation method. They had a common opinion that it was necessary to further assess reliability and validity by one study on a group of patients with catheter and though a group of nurses used the VietNamese version of the tool to apply in practice. Then, it was possible to have accurate

conclusions about the effectiveness of the VietNamese version tool. More specifically, about the care bundle, the expert feedback that Bundle prevention of infections related to intravenous equipment was very meaningful and practical if it was applied clinically. The translation method at this stage was quite reasonable, the translation was suitable when it was satisfactory in terms of similarities between translation - back translation. However, with the quality of care assessment checklist tool, an additional comment was noted that it was necessary to clearly describe how the assessment was done, and there was a table explaining each term or evidence pictures of the complications. This was a very positive expert response, as each checklist complication needed to have an evaluation criterion or a picture that specifically describes the sign or symptom of that complication. To overcome this shortcoming, in the next research phase to apply to clinical trials, there will be another step, with the author of the original checklist, to build a library of images with descriptions of complications in the checklist to ensure consistency of practice and reliability of using checklists.

In addition, because the translation from English to VietNamese and from VietNamese to English required that in addition to ensuring the similarity between the original version and English back translation, the VietNamese version needs to be translated for the users who are the nurses providing care for patients with an intravenous connection device. The nurses should understand correctly and conveniently while using this tool in clinical practice. Therefore, after synthesizing the corrections and suggestions from experts, the VietNamese version of the research tool was completed for the final complete version:

Bundle for prevention of PIVC-related infections

PIVC insertion stage

1. Sterile technique • Use sterile technique (including hand hygiene) when placing peripheral intravenous catheters
2. Asessment of the condition of the intravenous • Assess the patient's intravenous prior to peripheral intravenous catheter insertion
3. Prepare skin • The patient's skin is prepared with 2% Chlorhexidine gluconate in 70% alcohol and allows to dry completely. (If patient was sensitive to Chlorhexinde, povidine-iodine was applied)
4. Dressing changes • A sterile, semi-permeable, transparent tape is applied to the PIVC allows the catheter site to be monitored.
5. Documentation • Documentation included date, time and reason for the placement of PIVC. Assessment of intravenous strength, indicating the preparation of the placement. The type and size of the PIVC device should be recorded

Period of continuous care every day

1. Hand hygiene • Hands are disinfected immediately before and after each contact with an infected person using correct hand hygiene techniques
2. Personal protective equipment • Wear appropriate protective equipment when contacted patients according to hospital regulations
3. Assessment of clinical indications and continuous venous status • Indications of continuity of need and venous status should be recorded at least once per shift, PIVC is removed when a clinical indication is no longer indicated or if there are signs of phlebitis / bacterial infection • The placement should be observed at least during each shift on duty, in the case of PIVC, the VIP phlebitis score should be used
4. Connect PIVC • Connection port and catheter shaft are disinfected with Chlorhexidine gluconate 2% in 70% alcohol and allow to dry completely. (If patient is sensitive, use povidine-iodine in 70% alcohol)
5. Replace the infusion set • Continuous infusion set should be changed at least every 96 hours • The infusion set uses continuously for blood transfusions and blood products should be changed every 12 hours, or when the infusion is finished. Platelets should be transfused through a new set of blood transfusion lines • The infusion set are labeled with the date and time to ensure they are replaced on time.
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- Do not note the date of placing PIVC on the tape

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- Missing PIVC notes in documentations

LIMITATIONS

The study evaluated the accuracy of the content when translating the tool from English to VietNamese. The study has not yet applied a pilot study to a specific group of research subjects, therefore, the results did not present validity and reliability of the research tool.

The research process of translation and sending to experts to assess the applicability of research tools were not completely consistent with the guidelines of scientific research.

5. CONCLUSION

Bundle placement and maintainance of peripheral intravenous catheters and patient care quality assessment checklist with a VietNamese version was content similar to the original version. The contents of the VietNamese version of the Bundle and the initial feedback checklist can be applied to practice, it is necessary to have research on a group of subjects to assess reliability and validity. With comments by experts, Bundle and checklist were premilinary applied in clinical practice. Health care facilities may consider incorporating Bundle and checklist into patient care practices with peripheral venous catheters to prevent complications associated with peripheral intra venous catheters, especially complications of catheter-related sepsis. The further study should be conducted to apply the Bundle and checklist on a specific group of patients to assess the reliability and validity of the Bundle and checklist.

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