A SILVER ALGINATE COATED DRESSING TO REDUCE CATHETER-RELATED BLOODSTREAM INFECTION (CRBSI) AMONG ADULT ICU PATIENT: A RANDOMISED CONTROLLED TRIAL

DR MUHAMMAD ROSNAL RUSLAN

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Muhammad Rosnal Bin Ruslan

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LIST OF SYMBOLS AND ABBREVIATIONS

APACHE II	Acute Physiology And Chronic Health Evaluation II
ASAP	As Soon As Possible
BMI	Body mass index
BSI	Blood Stream infection
CABG	Coronary Artery Bypass Graft
CRBSI	Catheter Related Blood Stream Infection
CVC	Central Venous Catheter
HUSM	Hospital Universiti Sains Malaysia
ICU	Intensive Care Unit
KKM	Kementerian Kesihatan Malaysia

PICC	Peripherally Inserted Central Catheter
SAPSII	Simplified Acute Physiology Score II
USM	Universiti Sains Malaysia
DTP	Differential Time to Positivity

APPENDICES

ABSTRAK

Latar belakang: *Catheter-related bloodstream infection* (CRBSI) adalah jangkitan kuman dalam darah yang disebabkan oleh pengunaan kateter vena pusat. Pelbagai jenis dressing telah digunakan untuk pada kateter vena pusat untuk mengurangkan kadar CRBSI. Namun begitu jenis dressing yang paling ideal yang dapat mengurangkan kadar CRBSI masih dalam kajian**.** Kajian ini bertujuan membandingkan tahap keberkesanan dressing *silver alginate* dengan dressing konvensional dalam mengurangkan kadar CRBSI.

Metodologi: Seramai 98 orang pesakit di Unit Rawatan Rapi, Hospital Universiti Sains Malaysia, Kelantan yang mempunyai indikasi untuk pemasangan kateter vena pusat dibahagikan secara rawak kepada dua kumpulan: Kumpulan 1 untuk *dressing silver alginate* (n=49) dan Kumpulan 2 untuk *dressing* konvensional (n=49). Selepas pemasangan kateter vena pusat, *dressing silver alginate* atau *dressing* konvensional akan dipasang secara rawak. Kultur darah akan diambil pada hari ke-6 pemasangan atau lebih awal jika terdapat tanda-tanda jangkitan kuman atau sebelum kateter vena pusat dikeluarkan jika pesakit tidak lagi memerlukan kateter vena pusat sebelum hari ke-6. Kateter vena pusat dikeluarkan secepat mungkin apabila tidak lagi diperlukan atau ada tanda-tanda jangkitan atau tempoh kateter vena pusat melebihi 14 hari. Data demografi, kewujudan infeksi setempat, kolonisasi dan CRBSI akan direkodkan.

Keputusan: Tiada pesakit dari kumpulan *dressing silver alginate* dijangkiti CRBSI dan seorang pesakit dari kumpulan *dressing* konvensional dijangkiti CRBSI dengan masing-

masing (n=0, 0% vs n=1, 2.1%, *P*=0.99). Empat orang pesakit mendapat kolonsasi kateter di mana seorang pesakit dari kumpulan *dressing silver alginate* dan tiga pesakit dari kumpulan *dressing* konvensional dengan masing-masing (n=1, 2.1% vs n=3, 6.1%, *P*=0.617). Empat orang pesakit dijangkiti infeksi setempat di mana seorang pesakit dari kumpulan *dressing silver alginate* dan tiga orang pesakit dari kumpulan *dressing* konvensional dengan masing-masing (n=1, 2.1% vs n=3, 6.1%, *P*=0.617). Kumpulan *dressing silver alginate* menunjukkan penuruan kadar CRBSI, kolonisasi kateter dan infeksi setempat berbanding *dressing* konvensional. Namun begitu, penurunan tersebut adalah tidak signifikan dari sudut statistik dengan *p>0.05.*

Kesimpulan: *Dressing silver alginate* tidak berkesan untuk mengurangkan kadar CRBSI, kolonisasi kateter dan jangkitan setempat berbanding *dressing* konventional.

Kata kunci: CRBSI, kolonisasi kateter, jangkitan setempat, *dressing silver alginate*, *CVC*

ABSTRACT

Background: Catheter-related bloodstream infection (CRBSI) is a bloodstream infection related to the presence of a central venous catheter (CVC) in the patient's vein. Many types of dressing have been used on CVC to reduce the numbers of CRBSI. However, the most ideal dressing to reduce CRBSI is still under study. The aim of this study is to evaluate the effectiveness of silver alginate dressing in reducing CRBSI in comparison to conventional dressing.

Methods: A total of 98 ICU patient from Hospital Universiti Sains Malaysia, Kelantan that were indicated for CVC insertion were divided randomly into two groups; Group 1 for silver alginate dressing (n=49) and Group 2 for conventional dressing (n=49). The CVC was subsequently applied with either silver alginate dressing or conventional dressing. Blood culture was withdrawn from the CVC lumen on day 6 of catheter placement or earlier if infection was suspected or prior removal of the catheter in the patient whose catheter no longer needed before 6th day. CVC was removed as soon as possible if no longer required or suspicious of catheter-related infection or when the duration was more than 14 days. Demographic data, catheter colonization, the occurrence of local infection and CRBSI will be recorded.

Results: No subject in silver alginate group developed CRBSI and one subject in the conventional dressing group developed CRBSI, respectively (n=0, 0% vs n=1, 2.1%, P=0.99). Total of four subjects developed catheter colonization: one subject in silver alginate group and three subjects in the conventional dressing group, respectively (n=1, 2.1% vs n=3,

6.1%, P=0.617). Total of four subjects developed local infection: one subject in silver alginate group and three subjects in the conventional dressing group, respectively (n=1, 2.1% vs n=3, 6.1%, p=0.617). Silver alginate dressing group showed less proportion of CRBSI, catheter colonization and local infection compared to conventional dressing. However, these results were not statistically significant with p>0.05.

Conclusion: Silver alginate dressing is not effective in reducing CRBSI, catheter colonization and local infection compared to conventional dressing.

Keywords: *CRBSI, Catheter colonization, local infection, Silver alginate dressing, CVC*

CHAPTER 1 : INTRODUCTION

1.1 Background

Catheter bacterial colonization and CRBSI is among the complication of CVC placement. According to Infectious Diseases Society of America (IDSA), CRBSI can be diagnosed when 1 of the following criteria is present:

- Growth of the same microorganism from the culture of a catheter segment by semi-quantitative roll-plate method (>15 colony-forming units [CFUs]/plate) or quantitative culture by sonication method (10^2 CFUs) and percutaneously obtained peripheral blood culture.
- Paired blood cultures obtained simultaneously from a catheter lumen and peripheral blood meets the criteria for CRBSI by quantitative blood cultures (3-fold colony count and catheter lumen vs peripheral) or Differential Time to Positivity (DTP) (2-h difference in time to positivity, catheter lumen vs peripheral) (1).

Epidemiology of CRBSIs is usually estimated by the number of cases per 1000 days of implanted CVC (2). Based on Malaysia Registry Intensive Care report in 2016, CRBSI rate was 0.3 per 1000 catheter days (2). CVC use is associated with bacterial colonization of the catheter and an increased incidence of bloodstream infections. CRBSI will affect the duration of ICU stay, health care cost and mortality rate (3). E. Tacconelli *et al*., 2009 estimated that

35.9 to163.9 million euro are CRBSI associated costs in Germany, United Kingdom, Italy, and France (4). Catheter colonization is defined as a positive semi-quantitative tip culture with>15 colony-forming units/catheter tip without clinical sepsis (5). Catheter colonization is a risk factor for CRBSI (6).

Several studies conducted regarding silver alginate dressing for the prevention of CRBSI and reduction of catheter colonization. Silver alginate provides broad-spectrum antimicrobial effectiveness up to 7 days by releasing of its active ionic silver. It will also absorb moisture around the catheter insertion site and creates a zone of inhibition surrounding the dressing and thus further inhibiting bacterial growth. It is effective against methicillin-resistant Staphylococcus aureus, Staphylococcus aureus, Pseudomonas and E-Coli (7).

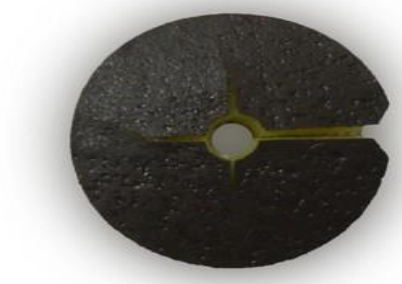

Figure 1.1: Silver alginate dressing

A slit, circular-shaped sterile dressing consisting of two layers:

- An absorbent polyurethane foam layer which provides for the absorption of wound exudate.
- An ionic silver alginate matrix which provides for broad antimicrobial effectiveness and helps prevent contamination from external bacteria (7).

In this study, we evaluate the effectiveness of silver alginate dressing in reducing CRBSI in comparison to conventional non-drug-coated dressing.

1.2 Study Rationale

Most of the studies regarding the effectiveness of silver alginate dressing were conducted among the paediatric population. Those studies show the potential that Silver alginate coated dressing has in reducing catheter colonization and CRBSI. Conducting this study in adult ICU patient can ascertain the effectiveness of Silver alginate coated dressing in reducing catheter colonization and CRBSI among adult ICU population.

1.3 Literature Review

Silver alginate provides broad-spectrum antimicrobial effectiveness by releasing its active ionic silver. It will also absorb moisture around the catheter insertion site and creates a zone of inhibition surrounding the dressing and thus further inhibiting bacterial growth (7).

ML Hill *et al*., 2010 conducted RCT to evaluate the safety of a silver–alginate containing dressing to reduce peripherally inserted central catheter (PICC) infections in neonatal intensive care unit (NICU) patients and proved that Silver Alginate dressing is safe to skin. In addition, this study showed that the CRBSI rate is less in Silver alginate group, even the result is not statistically significant. Khattak *et al*., 2010 conducted RCT to measure systemic silver absorption when using silver-impregnated alginate central catheter dressings in very low birth weight (VLBW) neonates and to monitor bloodstream infection. It proved that mean serum silver concentrations in the treatment group were below levels anticipated to result in toxicity (9). Besides, this study also concluded that silver alginate group had a 45.8% reduction in infection/1000-line days. However, too few patients were enrolled to draw meaningful efficacy conclusions about the prevention of bloodstream infection (9). Lai NM *et al*. 2016 concluded that silver-alginate patch appeared safe, but the evidence is still insufficient for a recommendation in practice. A large study evaluating the reduction in CRBSI is warranted (10). All these show the Silver Alginate dressing is safe and has potential in reducing CRBSI.

As for the reduction in colonization, Ostendorf *et al*., 2005 conclude that catheter colonization was significantly reduced (12% silver-coated vs 33% not silver uncoated) (11).

Catheter colonization is a risk factor for CRBSI (6). There is potential in silver coated dressing.

CHAPTER 2 : STUDY OBJECTIVE

2.1 General Objective

To evaluate the effectiveness of silver alginate dressing in reducing CRBSI among adult ICU patients.

2.2 Specific Objective

1. To compare the proportion of catheter colonization in patient with silver alginate dressing and conventional dressing.
2. To compare the proportion of CRBSI in patient with silver alginate dressing and conventional dressing.
3. To determine the duration of catheter sustainability (onset of local infection).

CHAPTER 3 : MANUSCRIPT

3.1 Article Title

Title:

A silver alginate coated dressing to reduce Catheter-related bloodstream infection (CRBSI) among adult ICU patient: Randomised Controlled Trial.

Running Head:

Effectiveness of Silver Alginate dressing VS Conventional dressing

Author:

Muhammad Rosnal RUSLAN[1], Sanihah CHE OMAR[1], Shamsul Kamalrujan HASSAN[1], Siti Suraiya MD NOOR[2]

Institutional Affiliations:

[1]Department of Anaesthesiology & Intensive Care, School of Medical Sciences,

Universiti Sains Malaysia, 16150, Kubang Kerian, Kelantan, Malaysia.

[2] Department of Microbiology, School of Medical Sciences,

Universiti Sains Malaysia, 16150, Kubang Kerian, Kelantan, Malaysia.

Corresponding Author's Details:

Dr Muhammad Rosnal Bin Ruslan

Department of Anaesthesiology & Intensive Care,

School of Medical Sciences,

Universiti Sains Malaysia,

16150, Kubang Kerian, Kelantan, Malaysia.

Email: mrosnal@gmail.com

Telephone: +6013-4052145, +6097676095 Fax: +609-7653370

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3.2 Abstract

Background: Catheter-related bloodstream infection (CRBSI) is a bloodstream infection related to the presence of a central venous catheter (CVC) in the patient's vein. Many types of dressing have been used on CVC to reduce the numbers of CRBSI. However, the most ideal dressing to reduce CRBSI is still under study. The aim of this study is to evaluate the effectiveness of silver alginate dressing in reducing CRBSI in comparison to conventional dressing.

Methods: A total of 98 ICU patient from Hospital Universiti Sains Malaysia, Kelantan that were indicated for CVC insertion were divided randomly into two groups; Group 1 for silver alginate dressing (n=49) and Group 2 for conventional dressing (n=49). The CVC was subsequently applied with either silver alginate dressing or conventional dressing. Blood culture was withdrawn from the CVC lumen on day 6 of catheter placement or earlier if infection was suspected or prior removal of the catheter in the patient whose catheter no longer needed before 6th day. CVC was removed as soon as possible if no longer required or suspicious of catheter-related infection or when the duration was more than 14 days. Demographic data, catheter colonization, the occurrence of local infection and CRBSI will be recorded.

Results: No subject in silver alginate group developed CRBSI and one subject in the conventional dressing group developed CRBSI, respectively (n=0, 0% vs n=1, 2.1%, P=0.99). Total of four subjects developed catheter colonization: one subject in silver alginate group and three subjects in the conventional dressing group, respectively (n=1, 2.1% vs n=3,

6.1%, *P*=0.617). Total of four subjects developed local infection: one subject in silver alginate group and three subjects in the conventional dressing group, respectively (n=1, 2.1% vs n=3, 6.1%, *P*=0.617). Silver alginate dressing group showed less proportion of CRBSI, catheter colonization and local infection compared to conventional dressing. However, these results were not statistically significant with $p>0.05$.

Conclusion: Silver alginate dressing is not effective in reducing CRBSI, catheter colonization and local infection compared to conventional dressing.

Keywords: *CRBSI, Catheter colonization, local infection, Silver alginate dressing, CVC*

3.3 Introduction

A central venous catheter is defined as a catheter whose tip is in the inferior vena cava, superior vena cava or right atrium (12). Central venous catheters can be classified based on the type of insertion (i.e., central, peripheral), location of insertion (e.g., jugular, subclavian, femoral, brachial), duration of catheter use (short-term, mid-term, long-term), number of lumens and whether the catheter is implanted or not (12).

CVC is inserted in ICU for a various reason, for example, to administer medication that required central intravenous route such as ionotropic drugs, hemodynamic monitoring, administration of parenteral nutrition and difficult intravenous access etc. (12). However, the usage of CVC is not without risk, and CRBSI is one of the risks (13).

According to IDSA, CRBSI can be diagnosed when 1 of the following criteria is present:

- Growth of the same microorganism from the culture of a catheter segment by semi-quantitative roll-plate method (>15 colony-forming units [CFUs]/plate) or quantitative culture by sonication method (10^2 CFUs) and percutaneously obtained peripheral blood culture
- Paired blood cultures obtained simultaneously from a catheter lumen and peripheral blood meets the criteria for CRBSI by quantitative blood cultures (3-fold colony count and catheter lumen vs peripheral) or Differential Time to Positivity (DTP) (2-h difference in time to positivity, catheter lumen vs peripheral) (1).

Epidemiology of CRBSIs is usually estimated by the number of cases per 1000 days of implanted CVC (2). Based on Malaysia Registry Intensive Care report in 2016, CRBSI rate was 0.3 per 1000 catheter days (2). CVC use is associated with bacterial colonization of the catheter and an increased incidence of bloodstream infections. CRBSI will affect the duration of ICU stay, health care cost and mortality rate (3). E. Tacconelli *et al*., 2009 estimated that 35.9 to 163.9 million euro are CRBSI associated costs in Germany, United Kingdom, Italy and France (4). Catheter colonization is defined as a positive semi-quantitative tip culture with>15 colony-forming units/catheter tip without clinical sepsis (5). In fact, catheter colonization is a risk factor for CRBSI (8).

Several studies conducted regarding silver alginate dressing for the reduction of CRBSI and catheter colonization. ML Hill *et al*., 2010 and Khattak *et al*., 2010 conducted 2 RCTs and eventually concluded that silver alginate dressing reduces the proportion of CRBSI (8-9). However, the results for both studies were not statistically significant (8-9). Ostendorf *et al*., 2005 conclude that catheter colonization was significantly reduced by silver coated dressing (12% silver-coated vs 33% not silver uncoated) (11). Catheter colonization is a risk factor for CRBSI (6). This shows that there is potential for Silver alginate dressing to reduce catheter colonization and subsequently reducing CRBSI.

Silver alginate dressing consist of a slit, circular-shaped sterile dressing consisting of two layers which are absorbent polyurethane foam layer and ionic silver alginate matrix. The absorbent polyurethane foam layer will provide absorption of wound exudate. On the other hand, the ionic silver alginate matrix will provide a broad antimicrobial effectiveness and helps prevent contamination from external bacteria (7). Silver alginate coated dressing

provides broad-spectrum antimicrobial effectiveness up to 7 days by releasing of it active ionic silver. It is effective against methicillin-resistant Staphylococcus aureus, Staphylococcus aureus, Pseudomonas and E.Coli (7).

In this study, we evaluate the effectiveness of silver alginate dressing in reducing catheter local infection, catheter colonization and CRBSI in comparison to conventional non-drug-coated dressing among adult ICU patients. In addition, our study is also intended to determine catheter sustainability, which reflected by the onset of local infection.

3.4 Methodology

This study involved a prospective, double-blinded randomised controlled trial which has been approved by the Medical Research and Ethics Committee (JEPEM) of University Sains Malaysia. One-hundred and eight ICU patients in HUSM with the age of 18 years old or more who were indicated for CVC placement were recruited between September 2019 to September 2020 and randomised into 2 groups: Silver alginate dressing (n=54) and conventional dressing (n=54). Only patient that had no evidence of sepsis and bacteraemia were included. Patients were excluded from the study if they have allergies to silver alginate. Patients were withdrawn from the study if they had died before the blood culture was taken or their CVC dislodged or removed before blood culture was taken.

Samples were allocated into 2 groups via random envelopes. These envelopes were numbered from 1 to 108. Using simple randomization via www.random.org, those envelopes were randomly assigned into 2 groups. The 1st 54 numbers that were randomly arranged would be Group 1 (intervention group), and another 54 number would be grouped in group 2 (control group). Envelopes in group 1 were filled in with the silver alginate dressing while envelopes in group 2 were filled in with the conventional dressing. Then another set of random sequence from 1 to 108 was generated. The envelope assigned to each participant based on the second random sequence generated. For example, the 1st patient recruited would be assigned to the 1st number (envelope) generated. 54 patients in the intervention group were applied with silver alginate dressing after CVC insertion (Group 1). 54 patients in the control group were applied with the conventional dressing after CVC insertion (Group 2).

The doctor who recruited the participant was blinded about the group allocation at the time of recruitment and CVC insertion. They would be only aware when they need to apply the dressing after CVC insertion. They only opened the envelope after completion of CVC insertion. The patients were blinded to what type of dressing they received. CVC will be inserted at the internal jugular vein according to CVC care bundle guidelines.

Routine blood culture was collected at day 6 of CVC to check for bacterial colonization. When there was a high suspicion of CRBSI/ Local infection, paired blood culture is taken. When the catheter no longer needed prior 6th days, routine blood culture would be taken prior to catheter removal. Catheter dressing was inspected every day for local infection by the appointed nurse (the assessor) on top of routine inspection by intensive care nurses in-charge of the patient. The assessor was not informed about intervention made and will inspect and report the condition around CVC routinely as usual.

Prior inspection by the assessor, the intensive care nurse in-charge of the patient would remove the dressing without informing the assessor the dressing types the patient was on. The dressing was changed weekly for both groups. The unnecessary catheters were removed ASAP. The maximum duration of the catheter was 14 days. Participants were followed up until the catheter was removed. For example, if the CVC was removed at day 7, then the patient was followed up until day 7. Since the maximum duration of the catheter was 14 days, the maximum duration for follow up was 14 days. Any serious adverse event would be reported according to Malaysian Guidelines for Safety Reporting of Investigational Product 1st edition 2014. Demographic data, the reason for admission, APACHE ii and SAPS ii score, presence of local infection, colonization and CRBSI were be recorded.

The sample size was determined based on the proportion of catheter without colonization findings. Previous study by Hannan *et al*, 2002 (14), showed that no colonization was detected in 60% of the catheter after the application of the conventional dressing. Therefore, we estimated that a sample size of 49 subjects per group were required to achieve 80% power of study at alpha value of 5%. We estimated that the proportion of catheter without any colonization was 85% with the application of new silver alginate dressing (8). With a potential of 10% of subjects drop out, the final sample size calculated was 108 subjects. The sample size was calculated based on dichotomous chi-square analysis (independent prospective of two proportion) where each null hypothesis is tested with respect to a two-sided alternative hypothesis. An equal proportion of sample for each group was estimated (m=1).

All data were initially recorded in Microsoft Excel Spreadsheet before it was transferred to and analysed by using STATA 12.0 (StataCorp, College Station, TX, USA). Data were explored descriptively to check for any incorrect data entry. If there was any missing data, the necessary effort was made to retrieve the required data. The distribution of all continuous data was evaluated by using the histogram. Data were presented as mean and standard deviation if it was normally distributed and the skewed continuous data were presented as median and Inter Quartile Range (IQR). Categorical data were presented as frequency and percentage. Both descriptive and univariate statistical analysis was adopted where appropriate. Categorical data were tabulated using the contingency table and Pearson chi-square test was used to find any potential association between them. All univariable analysis assumptions were checked and assessed before interpretation of the results. Non-parametric

analysis was used if any of the statistical test assumptions were violated. All probability values were two-sided. A *P*-value of less than 0.05 was considered statistically significant.

3.5 Result

One-hundred and eight patients were enrolled in this study. Ten patients were withdrawn due to inability to take blood culture on day-6 (two patients died, three dislodge CVC, three CVC removed by the managing team). Hence, a total of 98 patients were included in the final analysis (49 Silver Alginate dressing, 49 conventional dressing). **Table 3.1** showed the baseline demographic for all subjects. On average, the age of subjects recruited was 46.8 years (SD=17.2) of age. They were predominantly male (n=62, 63.3%) with an average BMI of 26.2 (SD=4.7). The average score for both SAPS and APACHE score were 32.4 (SD=10.7) and 11.3 (SD=5.4), respectively. Out of the 98 patients, majority of them underwent operative procedure before admission to ICU. Most common procedure are neurology (n=69, 70.4%) and gastrointestinal (n=14, 14.3%) related surgeries. Subjects with medical-related diagnosis consisted the least number of patients admitted (n=2, 2.1%). The mean duration of catheter inserted was 14 days (IQR=7-14).

Development of catheter colonization and local infection were evaluated (Table 3.2). Result showed that a total of four subjects developed catheter colonization, one subject in silver alginate group and three subjects in the conventional dressing group, respectively (n=1, 2.1% vs n=3, 6.1%, *P*=0.617). However, this finding was not statistically significant. An evaluation of individual patient criteria in patients with catheter colonization was carried out (Table 3.3). Results showed that patients who developed catheter colonization had higher mean average age of 61.3 years (SD=12.9) as well as relatively low mean APACHE score (mean=9.6 (SD=5.6) vs mean=11.3 (SD=5.4)) and SAPS score (mean=28.6 (SD=10.5) vs mean=32.6

(SD=10.7)). Furthermore, the duration of catheter insertion was noted to be of shorter duration (median=6.5, IQR=6-9.5).

3.6 Discussion

CVC usage in ICU is very common for the purpose of monitoring and treatment of critically ill patients to provide long-term venous access. Unfortunately, their use may result in CRBSI. In Asia, it was reported to be of 6.8 infections per 1000 central line days (15).

There are many risk factors for CRBSI and can be divided into host factor and catheter factor. Old age, history of CRBSI, chronic illness, immune deficiency, malnutrition, total parenteral nutrition, bone marrow transplant and skin trauma are among the host related factor (16-17). On the other hand, type and duration of the catheter, incision site care, conditions of insertion and skill of the individual who inserted the catheter are among the catheter related factor (18–20).

Antimicrobial-impregnated or antiseptic dressings have been successfully implemented in ICUs to reduce CVC related infection (21). The bacteriostatic properties of silver were known in modern medicine during the 19th century (22). Silver alginate has demonstrated in vitro bactericidal activity against *Staphylococcus aureus*, methicillin-resistant *S. aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida albicans* (23). The Silver alginate dressing will release of active ionic silver for broad-spectrum antimicrobial effectiveness for up to seven days. It absorbs moisture around the catheter insertion site and creates a zone of inhibition surrounding the dressing further inhibiting bacterial growth (7).

Two RCTs by ML Hill *et al*., 2010 and Khattak *et al*.,2010 conducted a concluded that silver alginate reduces the proportion of CRBSI, but the result is not statistically significant (8-9). Ostendorf *et al*. 2005 conclude that catheter colonization was significantly reduced (12%

silver-coated vs 33% not silver uncoated) (11). Our study showed that Silver Alginate group had a lower proportion of local infection, catheter colonization and CRBSI. Unfortunately, those results were not statistically significant with $P>0.05$ based on Fisher Exact Test. This showed a similar result trend in term of CRBSI as previous studies conducted by ML Hill *et al*., 2010 and Khattak *et al*.,2010. This may be prevented by having a larger sample size. On the other hand, the median onset of local infection was 6 days in the absent of CRBSI and seven days in the present of CRBSI. Lin KY *et al*., 2017 stated that median time from insertion of a central catheter to the occurrence of central line-associated bloodstream infection was eight days (24).

Bloodstream infections associated with CVC have multiple aetiologies. Hence it is unlikely that addressing extraluminal migration from colonised skin alone will eradicate CVC associated infections. A comprehensive approach that includes evidence-based care bundles is needed to eradicate CVC associated infection. (25-29). Example of those care bundle are Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011 (27) and Malaysia CVC care bundles 2008 (30).

3.7 Limitation

There were several limitations in our study. First, mostly the patients recruited were from neurosurgical discipline. This happened because HUSM has abundance of neurosurgical patient as it is the main neurosurgical center in East Coast Malaysia and most neurosurgical patient will require CVC. The result of this study may not represent the true adult ICU population.

The second limitation of this study is that we did not measure silver levels in the study group. Silver can be absorbed from the skin, and there is very little information about health effects after skin contact with silver compounds.

Finally, it is not easy to blind the assessor to the intervention as both dressing look dissimilar and can be identified especially if the assessor is well verse with many types of CVC dressing.

3.8 Conclusion

Usage of Silver alginate dressing did not significantly reduce the local infection, catheter colonization and CRBSI. Further study with a larger sample size is needed to assess the effectiveness of Silver alginate dressing in reducing local infection, catheter colonization and CRBSI.

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