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**“Minimizing Blood Culture False Positive Rate by
Educational Intervention on Proper Collection Techniques
at Caritas Baby Hospital”**

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Minimizing Blood Culture False Positive Rate by
Educational Intervention on Proper Collection
Techniques at Caritas Baby Hospital

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Minimizing Blood Culture False Positive Rate by Educational Intervention on Proper Collection Techniques at Caritas Baby Hospital

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Dedication

To all Palestinian children who deserve to have good health for healthy
Palestinian Society

"Children, I love you so much"

To my parents who supported me

To my husband who carried a lot of stress

To my children who I will never forget

Declaration

I certify that this thesis submitted for the degree of master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed:

Suhair Jeries Elias Qumsiyeh

Date:

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Title: Minimizing Blood Culture False Positive Rate by Educational Intervention on Proper Collection Techniques at Caritas Baby Hospital

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Abstract

Hospitals have a problem that is the rate with which bacteria external to the patient contaminate blood cultures (BCs). If specimen collectors use poor collection technique, they can introduce organisms into BC bottles that mislead physicians into thinking that patients have bacteremias. The results can add more cost for treatment, lead to unnecessary antibiotic therapy, prolonged hospital stay, and monitor the patients with more tests. Thus the practice of aseptic technique in the collection should be emphasized. The goal of this study was to determine the effectiveness of the education intervention program on the proper procedure of blood collection in minimizing false positive (F+) rates of BC samples collected by nurses ward 'A' at Caritas Baby Hospital (CBH).

The aim of the study was to determine the effect of the educational intervention on nurses' ward 'A' knowledge, attitudes, and practices (KAP). And To determine the effect of the educational intervention in minimizing and making the move towards zero BC F+ rates for the intervention ward.

A hospital based quasi-experimental study with intervention and control group modalities was carried out in two pediatric wards at CBH in southern West Bank-Palestine.

The study targeted two populations, nurses working in the pediatric wards and BC sets.

A 51-items questionnaire developed by the researcher was given to 41 participants nurses in ward 'A' as intervention group and ward 'B' as control group before (pretest) and one month after (posttest) the educational intervention. The questionnaire included items related to updated BC practices and procedures, was pre-tested for validity and reliability in addition to pilot testing prior to data collection.

A total of 1117 BC samples were obtained from patients admitted at ward 'A and B' from May till July 2009, three months pre-intervention, and from September-October till November-December 2009, three months post-intervention. The BC F+ rates for the intervention and control wards were compared between the two periods.

The findings showed that the majority of the participants were PN (83%) with long experience and assessment for the intervention nurses revealed lack of knowledge and poor practices regarding BC collection technique. The findings of the study illustrated that the mean grades in the pretest for nurses' ward 'A' and 'B' was similar, and there was no significant difference between the two mean grades ($p= 0.51$). Thus the need for educational intervention emerged.

Comparing the posttest mean grades for the intervention (92.8) and the control nurses (50.3), the findings illustrated that there was significant difference between the two groups ($p=0$).

Pre-test and post-test grades for the control group were the same, while for the intervention group showed significant difference ($p=0$) with mean grades of 48.4 VS 92.8 respectively indicating that their knowledge and practice improved post-intervention. The clinical findings of this study indicated changes in nurses ward 'A' intended behaviors on-the-job concerning BC collection technique that been noted by the observation.

The BC findings revealed that the intervention ward 'A' had a baseline average F+ rate of (1.9%) and the control ward 'B' had a rate of (3%) from a total of 555 BC specimens collected pre-intervention. There were no significant differences in F+ rate for both wards from the baseline data ($p= 0.37$).

The average F+ rate decreased from 1.9% pre-intervention to 0.3% post-intervention for the intervention ward and from 3% to 1.5% for the control ward. Although there were no significant differences between the two wards post-intervention ($p= 0.07$) from 562 BCs drawn, however; a significant reduction in the BC F+ rate ($p=0.04$) was achieved in the intervention ward using new protocol for BC procedure. This indicates the effectiveness of the educational intervention program.

The recommendations for the Ministry of Health, to adopt polices to ensure Laboratory Information System to calculate the BC F+ rates are initiated in each laboratory of the different health settings to keep track on the contamination rates.

For the nursing academic institutions, to add the BC collection technique in the curriculum, and to emphasize on training in the clinical field as well as teaching the theoretical context of the process.

For the managers of the hospitals in general and CBH in specific, to consider the utilization of standard protocol for drawing BCs including use of proven disinfectants as skin prep. Adopt variety of strategies as continuously educating staff members on the correct procedure and provision of appropriate resources.

العنوان: تقليل نسبة الاحتمال الايجابي الخاطئ لزراعة الدم عبر التدخل في التعليم حسب مجموعة تقنيات مناسبة في مستشفى الكريetas للأطفال.

اعداد: سهير قمصية

المشرفة: الدكتورة سمية الصايح

ملخص الدراسة

تعرض المستشفيات الى مشكلة. وهي نسبة تواجد البكتيريا الخارجية التي تفسد زراعة الدم. فاذا استخدم جامع العينة تقنية جمع غير صحيحة فستدخل الكائنات الحية في زجاجات زراعة الدم والتي تضلل الأطباء الى الاعتقاد بأن ذلك المريض لديه بكتيريا في الدم. ويمكن أن تضيف هذه النتيجة المزيد من تكاليف العلاج، والتي تؤدي الى العلاج بالمضاد الحيوي الغير الضروري واطالة مدة بقائه في المستشفى ومتابعته بفحوصات أكثر. وبالتالي يجب أن يتم التركيز على تقنية التعقيم في عملية جمع الدم.

هدفت الدراسة لتحديد تأثير برنامج تعليمي وتدريبى للجراءات المناسبة في عملية جمع الدم من الطفل المريض لتقليل نسبة الاحتمال الايجابي الخاطئ في عينات زراعة الدم التي جمعتها ممرضات قسم (أ) في مستشفى الكريetas للأطفال.

- تحديد تأثير التدخل في التعليم على المعرفة والسلوك و الممارسة لممرضات قسم (أ).
- تحديد تأثير التدخل في التعليم في تقليل وتحريك نسبة الاحتمال الايجابي الخاطئ لزراعة الدم باتجاه معدل الصفر.

تستند الدراسة شبه التجريبية في مستشفى الكريetas للأطفال على نماذج مجموعة التدخل والتحكم التي تم تنفيذها في قسمين للأطفال في هذا المستشفى. استهدفت الدراسة ممرضات قسم الأطفال (أ و ب) وعينات زراعة الدم. طورت الباحثة نموذج استطلاع والمكون من ٥١ فقرة حيث شاركت في تعبئته ٤١ ممرضة يعملن في قسم (أ) كمجموعة تدخل وفي قسم (ب) كمجموعة تحكم. وتمت تعبئة النموذج على مرحلتين: الاولى شهر أي الفحص القبلي وشهر بعد التدخل في التعليم (الاختبار البعدي، أي ما بعد التدخل). وتضمن الاستطلاع فقرات لها علاقة بجراءات محدثة لجمع عينات زراعة الدم، وقد تم اختبارها لتحديد المصدقية والمعولية، بالإضافة الى تجربتها قبل جمع المعلومات.

تم الحصول على ما مجموعه ١١١٧ عينة لزراعة الدم من المرضى الذين تم ادخالهم الى قسمي (أ و ب) من أيار الى تموز ٢٠٠٩، أي ٣ شهور قبل التدخل، ومن أيلول-تشرين أول الى تشرين ثاني-كانون أول ٢٠٠٩، أي ٣ شهور بعد التدخل. وفقد تم مقارنة المعدل الايجابي الخاطئ لزراعة الدم لأقسام التدخل والتحكم بين الفترتين.

وكشفت النتائج بأن أغلب المشاركين بالدراسة ٨٣% هم من الممرضات العملييات (PN) وذات خبرات طويلة. وأن ممرضات التدخل ينقصهم المعرفة والممارسة الصحيحة لجمع عينات زراعة الدم.

أظهرت الدراسة بأن متوسط علامات الممرضات في القسمين (أ و ب) كانت متشابهة ولا يوجد دلالة احصائية بينهما ($P=0,51$) قبل اعطاء البرنامج التعليمي والتدريبى. وبالتالي انبثقت الحاجة الى التدخل في التعليم. ولقد تمت مقارنات عدة بعد التدخل وقد كانت النتائج التالية:

- لقد ارتفعت نسبة معدل العلامات لممرضات التدخل الى (٩٢,٨) وبقيت علامات ممرضات التحكم (٥٠,٣)، وهذا الفارق كان واضحا بين المتوسطان وهو ($P=0$).

- كانت نتائج ما قبل التدخل وما بعده لمجموعة التحكم متساوية. ولكن أظهرت مجموعة التدخل فرق واضح ($P=0$) مع متوسط الدرجات ٤٨,٤ مقابل ٩٢,٨ والتي بينت ان معرفتهم وممارستهم تحسنت بعد التدخل.

أظهرت النتائج العملية لهذه الدراسة تغيير واضح في السلوك فيما يتعلق بتقنيات تجميع زراعة الدم على العمل الذي لوحظ من قبل المتابعة والمراقبة.

- أما بالنسبة للمقارنة بين عينات الدم لنسبة احتمال الايجابية الخاطئة وقد كانت النتائج التالية:
- كشفت نتائج زراعة الدم بأن قسم التدخل (أ) لديه معدل خط اساس متوسط الايجابية الخاطئة (٩, ١%) وقسم التحكم (ب) من مجموع ٥٥٥ عينة تجميع زراعة الدم قبل التدخل. ولم يكن هنالك اي تغيير ملحوظ من البيانات الاساسية ($P=0,3$)
 - انخفضت نسبة متوسط الايجابية الخاطئة من ١,٩% قبل التدخل الى ٠,٣% بعد التدخل لقسم التدخل و من ٣% الى ١,٥% لقسم التحكم. بالرغم من انه لم يكن هنالك فرق واضح بين القسمين قبل التدخل ($P=0,07$) من ٥٦٢ عينة زراعة دم مسحوبة , بينما حققت النتائج تخفيض واضح في معدل الايجابية الخاطئة لزراعة الدم ($P=0,04$) في قسم التدخل باستخدام نظام جديد لتجميع زراعة الدم. وهذا يوضح مدى تأثير برنامج التدخل في التعليم.

توصي الدراسة بأن تتبنى وزارة الصحة سياسات لضمان مختبر نظام المعلومات لحساب معدل الايجابية الخاطئة لزراعة الدم على ان تبدأ في كل مختبر في مختلف الاماكن الصحية لتتبع مسار معدلات التلوث.

على مؤسسات التمريض الاكاديمية أن تضيف تقنيات جمع زراعة الدم الى مناهجها التعليمية والتدريبية في جمع عينات زراعة الدم

لمدراء المستشفيات بصفة عامة وبصفة خاصة في مستشفى الكريetas للأطفال، النظر في استخدام نظام موحد لسحب عينات الدم بما في ذلك استخدام المطهرات.

اعتماد مجموعة من الاستراتيجيات مثل تعليم وتدريب الموظفين المعنيين بالاجراء الصحيح على جمع عينات زراعة الدم وتوفير الموارد المناسبة لهم لجمعها بالطريقة الصحيحة.

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List of Abbreviations

BC	Blood culture
BCC	Blood Culture Contamination
BCT	Blood Culture Team
CBH	Caritas baby hospital
CE	Continuous Education
CLSI	Clinical and Laboratory Standards Institute
Dr	Doctor
ET-CH	Ethanol-Chlorhexidine
F+	False positive
KAP	Knowledge, Attitude, and Practice
MOH	Ministry Of Health
NGOs	Non Governmental Organizations
P/N	Practical Nurse
QA	Quality Assurance
RN	Registered Nurse
SPS	Sodium polyanetholsulfonate
SUHT	Southampton University Hospitals NHS Trust
SUMC	Soroka University Medical Center
VS	Versus
WB	West Bank

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