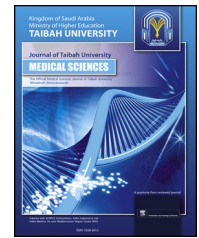




Taibah University

Journal of Taibah University Medical Sciences

www.sciencedirect.com



Original Article

Rate of blood culture contamination in a teaching hospital: A single center study



Abdulaziz Y. Alnami, MBBS^a, Abdulrahman A. Aljasser, MBBS^a,
Raed M. Almousa, MBBS^a, Armen A. Torchyan, MPH^b,
Abdulaziz A. BinSaeed, PhD^b, Ali M. Al-Hazmi, MBBS^b and Ali M. Somily, MD^{c,*}

^a College of Medicine, King Saud University, Riyadh, KSA

^b Department of Family and Community Medicine, College of Medicine, King Saud University, Riyadh, KSA

^c Department of Pathology and Laboratory Medicine, College of Medicine, King Khalid University Hospital and Saud University, Riyadh, KSA

Received 12 May 2015; revised 3 August 2015; accepted 4 August 2015; Available online 4 September 2015

المخلص

أهداف البحث: قد يؤدي تلوث عينات مزرعة الدم إلى مشكلة كبيرة في العناية بالمريض، وذلك من خلال إعطائه مضادات حيوية ليس بالضرورة أن يتناولها وقد تكون لها أعراض جانبية، وإهدار للموارد الصحية. تهدف هذه الدراسة لحساب معدل تلوث عينات مزرعة الدم في مستشفى الملك خالد الجامعي بالرياض، ومعرفة الأسباب المحتملة لذلك.

طرق البحث: تعتبر هذه الدراسة ذات تصميم مسحي استعادي، وتمت مراجعة كل عينات مزرعة الدم التي سلمت إلى مختبر وحدة الأحياء الدقيقة في مستشفى الملك خالد الجامعي خلال فترة الدراسة من ١ يناير إلى ٣١ ديسمبر لعام ٢٠١٢ م.

النتائج: وجدنا أن متوسط نسبة تلوث عينات مزرعة الدم لعام ٢٠١٢ م هو ١.٩٪، بينما كان معدل عينات تجرثم الدم الحقيقي هو ٨.٧١٪. كما وجدنا أن النسبة العظمى من العينات الملوثة هي من المكورات العنقودية سالبة الكوجيوليز بنسبة ٨٧٪. وقد لاحظنا أن معدل تلوث عينات مزرعة الدم يرتفع بشكل ملحوظ في موسم الصيف مقارنة بالأشهر المتبقية من السنة (في شهر يونيو ١.٣٨٪، وفي يوليو ٣.٩٧٪، وفي أغسطس ٣.٧٢٪)، أخيراً فإن الوحدات الجراحية كان لها النصيب الأكبر من معدل تلوث عينات مزرعة الدم ٣.٩٢٪، يليها وحدات العناية المركزة ٢.٦١٪، ثم الوحدات الباطنية بمعدل ٢.٤٨٪.

الاستنتاجات: إن معدل تلوث عينات مزرعة الدم في مستشفى الملك خالد الجامعي لعام ٢٠١٢ م يعتبر ضمن المعدل العالمي المقبول لتلوث عينات مزرعة

الدم، كما أن الوحدات الجراحية كان لها أعلى نسبة لتلوث عينات مزرعة الدم، وأن المعدل يرتفع بشكل ملحوظ في فترة الصيف.

الكلمات المفتاحية: مزرعة الدم؛ تلوث؛ المكورات العنقودية سالبة الكوجيوليز؛ المملكة العربية السعودية؛ الوحدات الجراحية

Abstract

Objectives: Contamination of blood samples can lead to serious problems in patient management. The administration of unnecessary antibiotics, wastage of hospital resources, and risks to patient life are some of the known hazards. This study aimed to calculate the rate of blood culture contamination and associated factors at King Khalid University Hospital (KKUH), Riyadh, KSA.

Methods: This is a retrospective cross-sectional study. The total study population was calculated based on a review of all of the request sheets for blood cultures submitted to the microbiology laboratory from 1st of January to 31st of December, 2012, at KKUH, Riyadh, KSA.

Results: The rate of blood culture contamination (false positive) was 1.9%, while 8.71% of the blood culture samples had true infections (true positive). *Coagulase negative staphylococcus (CoNS)* was the most predominant isolate (87%). The rate of blood culture contamination was significantly higher during the summer season of June (1.38%), July (3.97%) and August (3.72%) compared to other months of the year (p value < 0.05). The surgical units in this study had the highest rate of

* Corresponding address: Department of Pathology, College of Medicine, King Khalid University Hospital and King Saud University, PO Box 2925, Riyadh 11461, KSA.

E-mail: ali.somily@gmail.com (A.M. Somily)

Peer review under responsibility of Taibah University.



Production and hosting by Elsevier

blood culture contamination (3.92%), followed by intensive care (2.61%) and medical units (2.48%).

Conclusion: The rate of blood culture contamination at KKUH is within the acceptable international range. The highest rates of blood culture contamination occurred during the summer season and in the surgical units.

Keywords: Blood culture; *Coagulase negative staphylococcus*; Contamination; Saudi Arabia; Surgical units

© 2015 The Authors.

Production and hosting by Elsevier Ltd on behalf of Taibah University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Bacteraemia is defined as an invasion of the bloodstream by viable microorganisms and can be categorized as transient, intermittent, or persistent.¹ Bloodstream infections continue to be a major cause of mortality and morbidity in hospitalized patients despite advances in therapy and supportive care.^{2–4} Bloodstream infections can be acquired in a community or in healthcare facilities, and the source of bacteraemia is classified as either primary, where there is no apparent source of infection, or secondary, which is due to infection in other sites of the body such as the respiratory, gastrointestinal, or integumentary systems.⁵ Central line-associated bloodstream infection (CLABSI) is a major problem worldwide.^{6,7} The prevalence of sepsis due to bacterial bloodstream infections in intensive care units (ICUs) remains high and is ranked as the 10th highest cause of death.^{8–10} The associated 30-day mortality rate for community-acquired bloodstream infection ranges between 13 and 19%, and it is higher (30–50%) in ICU patients with sepsis.^{11–13} For this reason, rapid and accurate detection of bacteraemia by blood culture is critical for improving the clinical outcomes of septic patients by starting the most appropriate antibiotics.¹⁴ In recent years, several blood culture systems, such as BACTEC (BD Diagnostics, Sparks, USA) and the BacT/Alert system (Biomérieux, Nurtingen, Germany), have been developed that have high degrees of sensitivity and detect >95% of clinically significant bacteria in the blood within 48–72 h. Extension of the incubation of blood cultures to 5 days is recommended, and incubation beyond 5 days is indicated in cases where fastidious bacteria is suspected.^{15,16}

Blood culture contamination continues to be a troublesome issue and has been a source of frustration for both medical microbiologists and clinicians for decades.¹⁷ Contaminated blood cultures can cause difficulties in interpreting an actual positive blood culture, and this subsequently can lead to unnecessary treatment of the patient and can expose him to the side effects of a drug that he does not need. Prolonged hospital stays and unnecessary and costly care are additional issues.^{18,19}

Blood culture contamination is defined as the recovery of normal skin flora (*coagulase-negative staphylococci*,

Propionibacterium spp., *Aerococcus*, *Micrococcus*, *Bacillus* spp. [not *B. anthracis*], *Corynebacterium* spp. [diphtheroids], and alpha-hemolytic streptococci) from a single blood culture.²⁰ The rate of blood culture contamination is a recommended measurement of health care quality, and it should be continuously monitored to keep it within the international standard rate (not exceeding 2–3%).^{21,22} Several studies have shown that proper use of an effective antiseptic measurement reduces the rate of blood culture contamination in health care; careful disinfection of the phlebotomy site with 70% ethanol is recommended, followed by application of chlorhexidine gluconate (30 s) as a skin antiseptic.^{23,24} Other reports have documented significant reductions in the rate of blood culture contamination after implementing standardized practices for blood culture collection by a dedicated phlebotomy team and the use of blood culture collection kits.^{2,25,26} Changing the needle before the inoculation of the blood culture bottle has a non-significant effect on the rate of blood culture contamination, and this practice will increase the risk of needle stick injury and exposure to blood-borne diseases.²⁷ Central venous catheters are colonized with organisms up to 25% of the time and can be a source of contamination; therefore, percutaneous collection of blood is preferred to avoid undesirable consequences of this practice.²⁸

Targeting busy departments with high rates of blood culture contamination such as emergency rooms, paediatrics and surgery by implementing specific measures as a part of quality improvement interventions will reduce the rate of contaminated blood.²⁶

Unfortunately there is a large gap in the current knowledge regarding blood contamination on Saudi Arabia. Thus, the objectives of our study were to calculate the rate of blood culture contamination during a study period from January 1 to December 31, 2012, at King Khalid University Hospital (KKUH), Riyadh, Saudi Arabia, and to identify factors associated with high rates of blood culture contamination.

Materials and Methods

This study is a quantitative observational retrospective cross sectional study. We reviewed all of the blood culture samples submitted to microbiology laboratory from the 1st of January to the 31st of December in 2012. The study was conducted at King Khalid University Hospital (KKUH) affiliated with King Saud University, which is a 950-bed teaching hospital with a total of 125 new admissions per day. It serves as a primary, secondary and tertiary referral centre for more than one million inhabitants of Riyadh and nearby cities.

We reviewed all of the request sheets for blood culture submitted to the microbiology laboratory in 2012 at King Khalid University Hospital (KKUH) in Riyadh, Kingdom of Saudi Arabia. For all of the blood culture bottles received in the microbiology laboratory, we recorded the volume of blood in each bottle and then incubated them immediately in the automated blood culture machine, the BacT/Alert system (Biomérieux, Nurtingen, Germany). In the case of a positive blood culture flagged by the automated blood culture machine, an immediate Gram stain was performed, and the

Download English Version:

<https://daneshyari.com/en/article/3484279>

Download Persian Version:

<https://daneshyari.com/article/3484279>

[Daneshyari.com](https://daneshyari.com)