CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2547771

**Available online at: http://www.iajps.com** ***Research Article***

# THE IDENTIFICATION OF COAGULASE NEGATIVE STAPHYLOCOCCI AS AN EMERGING THREAT AND ITS OPPOSITION WITH REFERENCE TO TIME

**[1]Dr. Mirza Ameer Faizan Ali, [2]Dr. Yasmin Fatima, [2]Dr. Kiran Zahra**

[1]Demonstrator, Pathology Department, Civil Military Hospital Lahore Medical College, Lahore,
[2]Ex House Officer Nishter Hospital Multan

**Abstract:**

***Objective:*** *The main purpose of the study is to identify the incidence of seclusion of coagulase-negative staphylococci. Determination of opposition of staphylococci to methicillin with the passage of time is also the objective of the study.*

***Methods:*** *The study was of illustrative and crosswise. It was organized at Services Hospital, Lahore from August 2016 to November 2017. It consisted of patients present in the exhaustive care unit. According to the sample, patients were given suitable culture media through injections. These were kept in inoculation for about one day. Temperature given them during incubation was 35◦C. After that different observation were made on colony like the physical appearance of the colony, staining, positive and negative coagulase tests. Staphylococci were then identified on the basis of these observations. A 30 microgram Cefoxitin disc was used for the identification of methicillin opposing separated staphylococci. Numbers of coagulase opposing staphylococci were calculated every year. Their opposition to the methicillin was also determined. Different samples of staphylococci which were separated during the same time period were compared with each other.*

***Results:*** *Total 1331 samples of patients were studied for about three years. It was observed that from the total of 1331 patients 43.65% were coagulase-negative staphylococci. In 2011 36.5% and in 2012 61% patients with coagulase-negative were identified. It was found that the numbers of patients having negative coagulase were increasing year after year according to the survey. The rates of opposition to methicillin were also found to be enhanced gradually. These were enhanced from 22.7% to 34.3% and again to 59.6% to in 2012. Mostly samples for experiments came from blood about 53.5%. Some samples were also found to come from seepage or scrub which was about 35.1%.*

***Conclusion:*** *It has been concluded that numbers of coagulase-negative staphylococci and its opposition towards methicillin is enhancing observed in the admitted patients in clinics.*

**Keywords:** *CoNS, Methicillin, MRCoNS.*

**Corresponding author:**

**Dr. Mirza Ameer Faizan Ali,**

*Demonstrator, Pathology Department,*
*Civil Military Hospital Lahore Medical College, Lahore.*

QR code

*Please cite this article in press Mirza Ameer Faizan Ali et al.,* ***The Identification of Coagulase Negative Staphylococci As An Emerging Threat And Its Opposition With Reference To Time.,*** *Indo Am. J. P. Sci, 2019; 06(01).*

## INTRODUCTION:

Coagulase-negative staphylococci were found to be commonly present in laboratories of microbiology. Some of these bacteria were found to be harmful. They were observed to cause a disturbance in medically important experiments, also found to cause skin infection in human or secretions of mucus. Microbiology has been progressed now a day to a large extent. It has been created a challenge for the microbiologists to separate the harmful and advantageous bacteria [1]. These are now found to be present in hospitals. They are mainly affecting patients with weak immune systems and causing bacteraemia. These are especially found to occur in devices which have been frequently used in internal body parts [2]. 50 to 70% of infections interrelated to the catheter are caused by Staphylococci epidermidis among the CoNS sufferers [1, 2]. Some other CoNS were also separated which includes Staphylococcus saprophyticus, Staphylococcus lugdunensis, Staphylococcus haemolyticus and staphylococcus Schleifer [1]. These are rarely present in the bloodstream.

The treatment of staphylococci is mostly done by penicillin. But due to improvement and advancement in the medical field over the many years, the opposition in staphylococci has been also altered. Staphylococcus is found to be involved in the preparation of beta-lactamase. This beta-lactamase was against the discovery of methicillin. But after sometime staphylococcus aureus raised which was fighting to methicillin [1, 3]. Studies on atomic values shown that the opposition is due to mec-A gene. This mec-gene was present on a mobile genetic element called staphylococcal cassette chromosome. Its almost 8 various types are well known so far [3].

With the passing of time, rates of CoNS separation enhanced and due to this their opposition to methicillin also increases. Methicillin opposition increases because coagulase-negative staphylococci stick to the epidermis of the workers and sufferer present in the hospital [4]. This grouping performs its function as a basin for separates. These can oppose more than two drugs. And they can act as antibiotic opposing genes. These genes can move to CoNS as well as to Staphylococcus aureus [4]. Such types are also challengeable in curing an injury. The reason behind this is that they can form little biological films so creating complexity for antibiotics to enter into their surface [1]. The growing frequency of CoNS is an affair of sombre unease.

The greater separation rates of CoNS and MRCoNS in different medical samples. The greater virulence improved this study to evaluate its frequency in our flair.

## MATERIAL AND METHODS:

The study was of illustrative and crosswise. It was organized at Services Hospital, Lahore from August 2016 to November 2017. Medically important samples of victims were gathered in the medical labs for experimentation. More responsive patients were unruffled without considering their age and femininity. These were collected simply by arbitrary technique procedure. These patients had devices permanently present in their bodies which were admitted in the Intensive Care Unit. 1100 bed facilities for patients were available at that hospital.

When the sickness was neglected during a course of treatment, the replica of patients was observed during the similar course of sickness. The observed samples included blood, seepage, abrasion swabs, cadaver fluids, urine, catheter and sputum. Blood, seepage, catheter tips were injected into the blood. MacConkey agar and urine on cysteine electrolyte deficient agar. While sputum was inoculated on the blood and chocolate agar plates. Before culturing on blood and MacConkey agar plate's blood specimens were given the warmth in Brain Heart Infusion broth. A blood specimen was kept in incubation for about one day at 35◦C temperature. After incubation for about one day in the presence of air or oxygen, the various organisms were recognized. Different individuals were identified by observing their external structure, their responses to gram staining, by performing catalase and tube coagulase test. A small assemblage of grey coloured was observed on blood agar plates, lactose fermenting assemblage on MacConkey agar dishware. These tests confirmed the presence of grape-like clusters of gram-positive cocci and a positive catalase test was recognized as staphylococci. CoNS were identified in the various organisms by negative tube coagulase test. A saline suspension was made by adding the same colonies in 2ml of saline. The saline suspension is equal to 0.5 McFarland. This solution was then injected onto the Muller Hinton agar plate. Cefoxitin disc of about 30 micrograms was applied to it. Its function is to identify the methicillin opposition as per the Clinical and Laboratory Standard Institute etiquette [13]. After one day of incubation at 35◦C in the presence of oxygen, different isolates were identified and observed. Separates showing the region of the reticence of greater than or equal to 25mm present near the cefoxitin discs were marked as perceptive. Whereas isolates were marked as MRCoNS whose region of reticence was observed less than or equal to 24mm.

CoNS identified and counted during every year were recorded. Also, their opposing ability to methicillin and taster allotment was also dogged. SPSS analysis was used to determine the data. Data was established

in the forms of graphs by Microsoft word. Staphylococcus aureus was also isolated showing methicillin opposition and was compared with MRCoNS.

**RESULTS:**

Total 1331 samples of patients were observed during the study. Out of them 581 were CoNS. It was observed during the study that the numbers of CoNS tend to increase each year. In May 2009 to Jan 2010 the numbers of CoNS were 110, 134 in 2011 and 337 in 2012 as shown in the table.

311 from the total of 581 CoNS obtained from blood samples and 204 from seepage. The increase in MRCoNS aggregates was much dominant when competed with MRSA separated during the same time phase.

**Table – I:** CoNS Separation Regularity (June 2009 – May 2012)

| Month Year - Month Year | Staphylococci (13331) | | CoNS (581) | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| June 2009 - May 2010 | 412 | 3.091 | 110 | 18.933 |
| June 2010 - May 2011 | 367 | 2.753 | 134 | 23.064 |
| June 2011 - May 2012 | 552 | 4.141 | 337 | 58.003 |

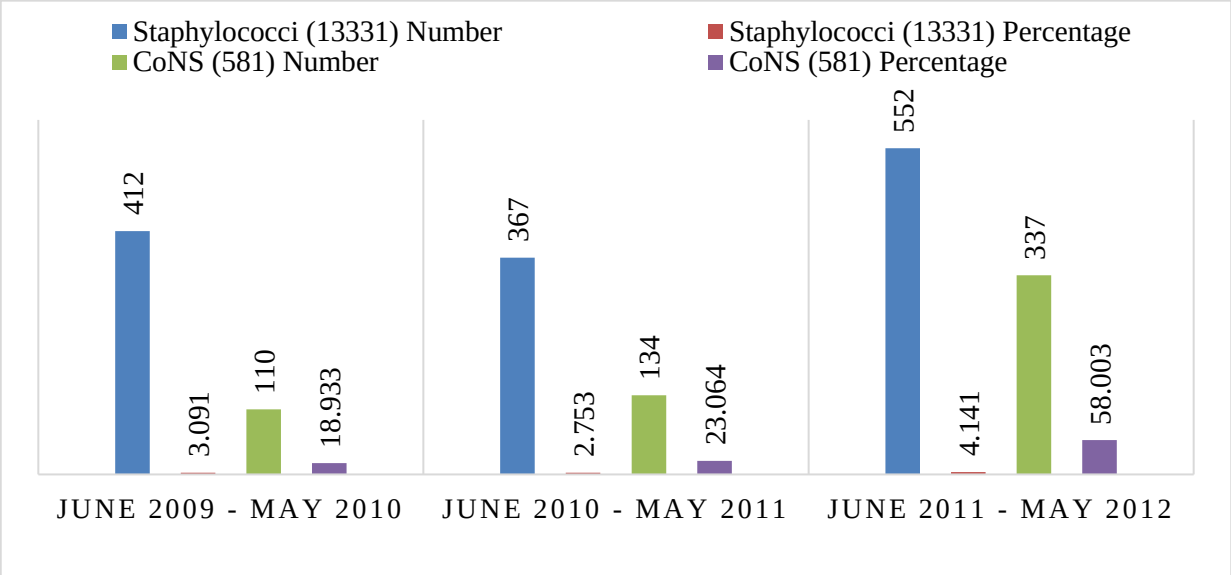



**Table – II:** CoNS Versus MrCoNS (June 2009 – May 2012)

| Month Year - Month Year | MRCoNS (272) | | CoNS (581) | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| June 2009 - May 2010 | 25 | 9.191 | 110 | 18.933 |
| June 2010 - May 2011 | 46 | 16.912 | 134 | 23.064 |
| June 2011 - May 2012 | 201 | 73.897 | 337 | 58.003 |

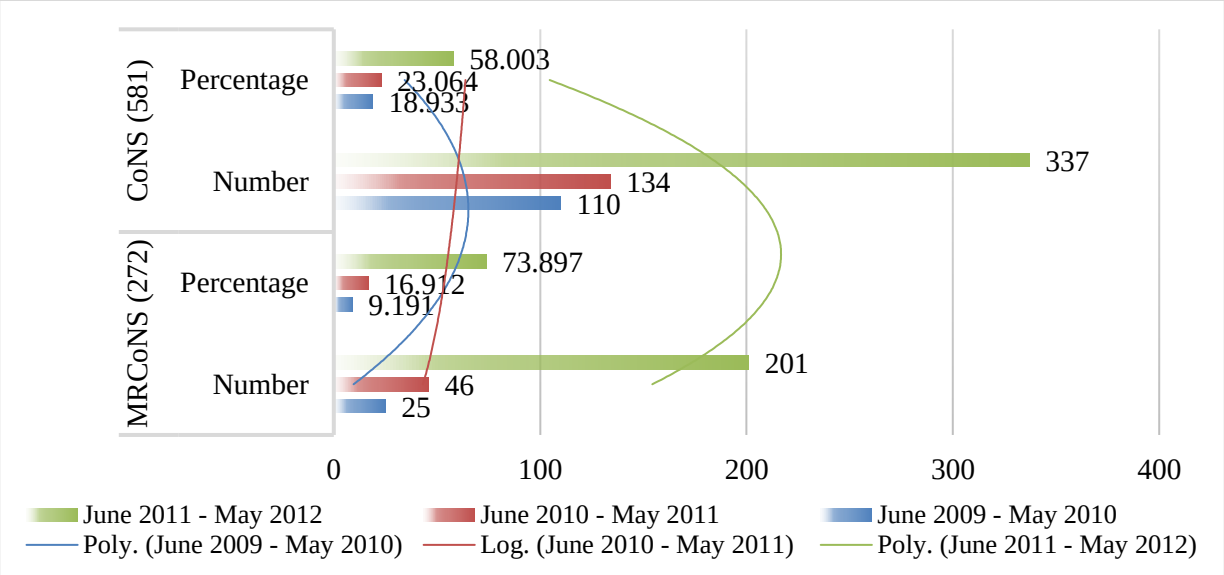



**Table – III:** CoNS Samples distribution (Number & Percentage)

| CoNS | Number | Percentage |
|---|---|---|
| Blood | 311 | 53.50 |
| Guidelines, Swab and Seepage | 204 | 35.10 |
| Urine | 60 | 10.30 |
| Septum | 6 | 1.00 |

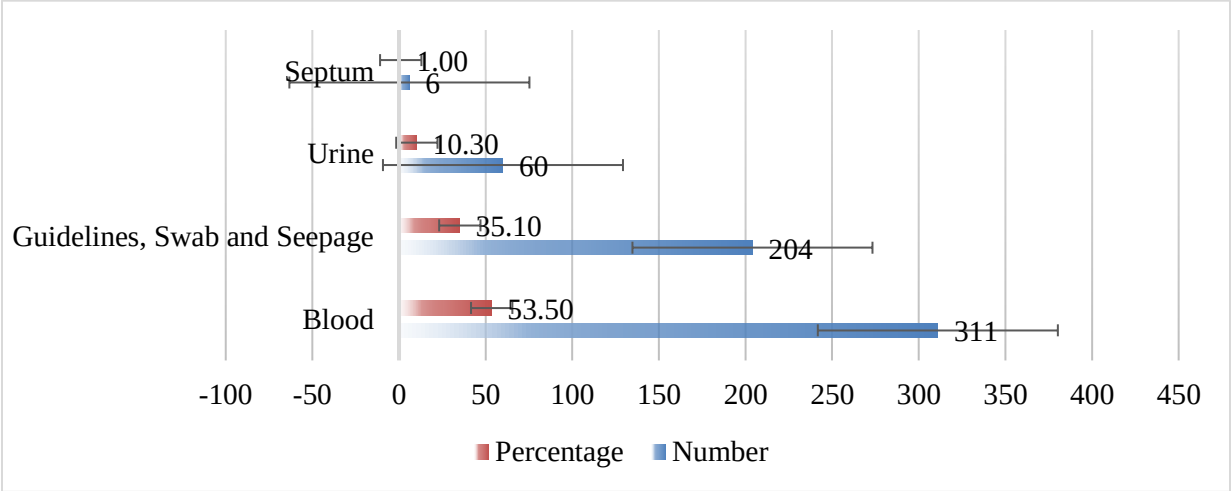
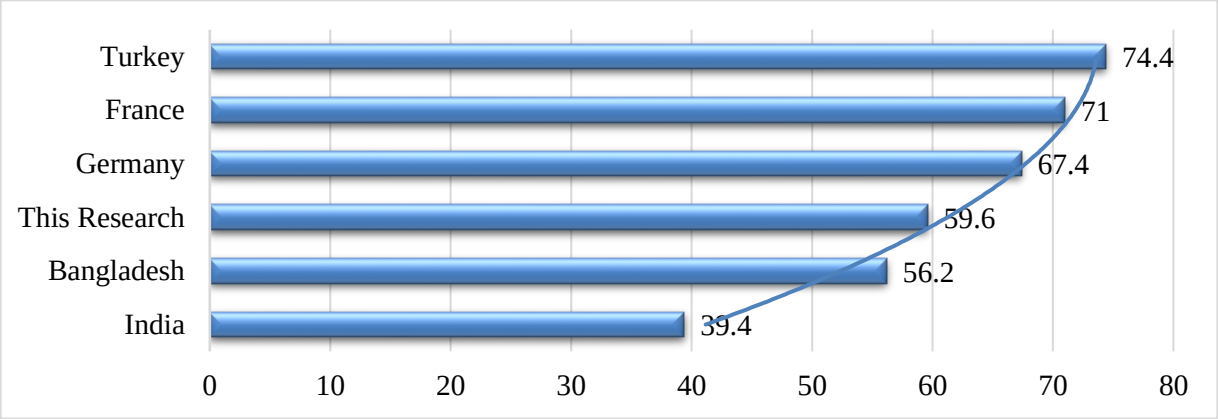



**Table – IV:** Country Wise MRCoNS Prevalence

| Country | Percentage |
|---|---|
| India | 39.4 |
| Bangladesh | 56.2 |
| This Research | 59.6 |
| Germany | 67.4 |
| France | 71 |
| Turkey | 74.4 |




**DISCUSSION:**

CoNS show methicillin opposition due to mec-Agene. It enables them to fight against all β-lactams. Only a few antibiotic drugs left for cure [6]. Almost 70-80% medical separates are opposite to methicillin [1] out of overall CoNS. The increasing rates of CoNS and MRCoNS are observed not in national but also other worldwide studies. According to reports of one study the commonness of CoNS and MRCoNS ranging between 30-43% in different samples available in hospital [7]. Widespread of MRCoNS was observed to be 70% while identifying antimicrobial vulnerability blueprint among CoNS isolates from Civil Hospital Karachi [8]. MRCoNS also present in Turkey, France, Germany, Bangladesh and the Kingdom of Saudi Arabia with the prevalence of about 39.4% to 74.4% [9 – 12].

The rates of methicillin opposition among staphylococci have enhanced in the subsequent two decades as reported by National Nosocomial Infectious Surveillance of the United States of America [13]. In Spain methicillin opposition for CoNS was found to be increased from 32 to 61.3% from 1986 to 2002 [14].

According to the NNIC reports, the risks of CoNS increased from 9% up to 27%. While methicillin opposition from 1980 to 1989 enhanced from 20% to 60%. The nosocomial infections caused by MRCoNS about 88.4% according to the reports of NNIS [13]. CoNS were considered as the major cause of nosocomial infections according to the NNIS, Surveillance and Control of Pathogens of Epidemiologic Importance. While the SENTRY program categorized it as the second biggest reason. Linked nosocomial and community-acquired bacteraemia was supposed to be the third major cause of NNIS and SCOPE. According to the findings of the surveillance program, the rate of methicillin opposition between CoNS is almost similar to each other. These rates are as follows; 77.3% by NNIC, 80.4% by SCOPE and 75% by exhaustive Care Antimicrobial Opposition Epidemiology [13, 12, 16].

Some other current studies also show greater separation rates of CoNS in infections of blood torrent. In Tanzania, a tertiary care hospital reported the most frequent virulent present in the blood sample. It was present in the blood sample about 67.4%. While it was reported as the second most frequently present virulent about 16.9% causing bacteraemia [18]. It was supposed to be the third major factor as observed in the hospitals of Canada [19]. In our findings, it was about 20% frequent according to the observations in 2009-2012. In China, while studying the sequence of antimicrobial opposition among gram-positive cocci the spreading of MRCoNS was noticed to be 89.5% [20].

It has been also noticed that prosthetic valve endocarditis and native valve endocarditis also has a significant linkage with CoNS. Although it is not included in our experiments. It was noticed that about 10% of samples of infective endocarditis are due to CoNS. And these are the most frequent infections which cause intracardiac prosthetic device contagion. It has been observed by the potential group study that 67% of these separated samples were fighting against methicillin Staphylococcus epidermis [22]. Whereas 16% non-intravenous medicine users with PEV have been recognized to be linked with CoNS. In native valve endocarditis in non-intravenous medicine users, 8% out of these have been caused by CoNS while 41% caused due to MRSE [23].

As described previously, the growing rate of isolation of MRCoNS is dangerous. It can alter the mec- gene to Staphylococcus aureus in vivo. [5] One study reported that the passing rate of MRCoNS inside the population to be 19.2%. A greater physiological similarity was found to be present between SCC-Iva in MRSA and MRSE [24]. After the failure of MRSA

nasal transfer of MRCoNS was identified in a study. This study was organized in Finland. This study showed that 61% inhabitants MRCoNS and 3% carried both MRSA and MRSE which shares the similar SCCmectype V [25].

## CONCLUSION:

The regularity of separation of CoNS and its opposition to methicillin is intensifying day by day. It has been estimated to increase to almost double amount after every year. So it should be properly cured otherwise it may become serious health confront for healthcare. Maintaining proper antibiotics, adequate guidance, avoidance of longer exposure to clinical devices and more evaluation of MRCoNS epidemiology is the need of the present situation.

## REFERENCES:


1. Sun HL, Wang H, Chen MJ, Liu YM, Hu ZD, Liao K, et al. An antimicrobial resistance surveillance of gram-positive cocci isolated from 12 teaching hospitals in China in 2009.Zhonghua Nei Ke Za Zhi 2010;49:735-40
2. Zingg W, Dermatomes N, Imhof A, Senn G, Ruef C. Rapid colonization with methicillin-resistant coagulase-negative Staphylococci after surgery. World J Surg 2009; 33:2058-62.
3. Chu VH, Miro JM, Hoen B, Cabell CH, Pappas PA, Jones P, et al. Coagulase-negative staphylococcal prosthetic valve endocarditis--a contemporary update based on the International Collaboration on Endocarditis: a prospective cohort study. Heart 2009; 95:570-76
4. Chu VH, Woods CW, Miro JM, Hoen B, Cabell CH, Pappas PA, et al. Emergence of coagulase-negative staphylococci as a cause of native valve endocarditis. Clin Infect Dis 2008;46:232-42.
5. Barbier F, Ruppé E, Hernandez D, Lebeaux D, Francois P, Felix B, et al. Methicillin-resistant coagulase-negative staphylococci in the community: high homology of SCC mec IV between Staphylococcus epidermidis and major clones of methicillin-resistant Staphylococcus aureus. J Infect Dis 2010; 202:270-81.
6. Ibrahim S, Salmenlinna S, Virolainen A, Kerttula AM, Lyytikäinen O, Jägerroos H, et al. Carriage of Methicillin-Resistant Staphylococci and their SCC mec types in a long-term-care facility. J Clin Microbial 2009; 47:32-7.
7. Perveen I, Majid A, Kanwal S, Naz I, Sehar S, Ahmed S, et al. Prevalence and Antimicrobial Susceptibility Pattern of Methicillin-Resistant Staphylococcus aureus and Coagulase-Negative Staphylococci in Rawalpindi, Pakistan. British Journal of Med Medical Res 2013; 3:198-209.
8. Ehsan MM, Memon Z, Ismail MO, Fatima G. Identification and antibiotic susceptibility pattern of coagulase-negative staphylococci in various clinical specimens. Pak J Med Sci 2013;29:1420-4.
9. Khadri H, Alzohairy M. Prevalence and antibiotic susceptibility pattern of methicillin-resistant and coagulase-negative Staphylococci in a tertiary care hospital in India. Int J Med Medical Sci 2010; 2:116-20.
10. Haque N, Bari MS, Bilkis L, Hossain MA, Haque S, Islam MA, et al. Prevalence and antimicrobial resistance of methicillin-resistant Staphylococcus epidermidis isolated at Mymensingh Medical College Hospital. Mymen Singh Med J 2010; 19:163-9.
11. Sader HS, Watters AA, Fritsch TR, Jones RN. Daptomycin antimicrobial activity tested against methicillin-resistant staphylococci and vancomycin-resistant enterococci isolated in European medical centres 2005. BMC Infect Dis 2007; 7:29.
12. Koksal F, Yasar H, Samasti M. Antibiotic resistance patterns of Coagulase-negative Staphylococcus strains isolated from blood cultures of septicemic patients in Turkey. Microbial Res 2009; 164: 404-10.
13. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004.A report from the NNIS System Division of Healthcare Quality Promotion, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Public Health Service, US Department of Health and Human Services Atlanta Georgia. Am J Infecting Control 2004; 32:470-85.
14. Cuevas O, Crescendo E, Vindel A, Guinea J, Sánchez-Conde M, Sánchez-Somolinos M, et al. Evolution of the antimicrobial resistance of Staphylococcus spp. In Spain: Five Nationwide Prevalence Studies 1986 to 2002. Antimicrob Agents Chemother 2004;48:4240-5.
15. Wisplinghoff H, Bischoff T, Talent SM, Seifert H, Wenzel RP, Edmond MB. Nosocomial bloodstream infections in US hospitals: analysis of 24,179 cases from a prospective nationwide surveillance study. Clin Infect Dis 2004; 39:309-17
16. Fridkin SK, Steward CD, Edwards JR, Pryor ER, McGowan JE Jr, Archibald LK, et al. Surveillance of antimicrobial use and antimicrobial resistance in United States hospitals: project ICARE phase 2. Project Intensive Care Antimicrobial Resistance

Epidemiology (ICARE) hospitals. Clin Infect Dis 1999; 29:245-52.
17. Moyo S, Aboud S, Kasubi M, Maselle SY. Bacteria isolated from bloodstream infections at a tertiary hospital in Dar es Salaam, Tanzania—antimicrobial resistance of isolates. South Afr Med J 2010; 100:835-8.
18. Wilson J, Elgohari S, Livermore DM, Cookson B, Johnson A, Lamagni T, et al. Trends among pathogens reported as causing bacteremia in England2004-2008. Clin Microbial Infect 2011; 17:451-8.
19. Adam HJ, DeCorby M, Rennie R, Karlowsky JA, Hoban DJ, Zhanel GG; Canadian Antimicrobial Resistance Alliance (CARA). Prevalence of antimicrobial resistant pathogens from blood cultures from Canadian hospitals: results of the award 2007-2009 study. Diag Microbiol Infect Dis 2011; 69:307-13.
20. John JF, Harvin AM. History and evolution of antibiotic resistance in coagulase-negative Staphylococci: Susceptibility profiles of new anti-staphylococcal agents. There Clin Risk Manage 2007; 3: 1143-52.
21. Cervera C, Almela M, Martinez Martinez JA, Moreno A, Miró JM. Risk factors and management of Gram-positive bacteremia. Int J Antimicrob Agents 2009; 34:26-30.
22. Katayama Y, Ito T, Hiramatsu K. A new class of genetic element, staphylococcus cassette chromosome mec, encodes methicillin resistance in Staphylococcus aureus. Antimicrob Agents Chemother 2000; 44:1549-55.
23. Archer GL, Climo MW. Antimicrobial susceptibility of coagulase negative staphylococci. Antimicrob Agents Chemother 1994; 38: 2231-7.
24. Wielders CL, Vriens MR, Brisse S, de-Graaf-Miltenburg LA, Troelstra A, Fleer A, etal. In-vivo transfer of mec A DNA to Staphylococcus aureus. Lancet 2001; 357:1674-75.
25. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing: Twentieth Informational Supplement M 100-S20. Wayne, PA, USA; 2010.