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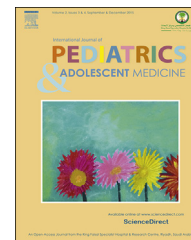


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ORIGINAL RESEARCH ARTICLE

The prevalence of community-associated methicillin-resistant *Staphylococcus aureus* among outpatient children in a tertiary hospital: A prospective observational study in Riyadh, Saudi Arabia



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Received 13 August 2015; received in revised form 9 September 2015; accepted 10 September 2015

Available online 3 October 2015

KEYWORDS

Community-associated;
MRSA;
Prevalence;
Saudi Arabia

Abstract *Background and objectives:* The emergence of methicillin-resistant *Staphylococcus aureus* (MRSA) infections among previously healthy persons in community settings, without exposure to health care facilities, has been noted recently. Colonization rates of community-associated MRSA (CA-MRSA) have been reported to range from 0 to 9.2 percent. The nose and open skin areas are considered the most important sites for colonization. The aim of our study was to assess the prevalence and to describe the antibiotic susceptibility pattern of CA-MRSA among outpatient children.

Patients and methods: We prospectively screened every third consecutive child presenting to our pediatric emergency department of King Saud Medical City, a 275 bed tertiary care teaching hospital in Riyadh, Saudi Arabia, from March through July 2015.

Results: We analyzed a total of 830 screening results (n = 478 males, 57.6%). Most of the screened patients were from Riyadh (n = 824, 99.3%). A total of 164 (19.8%) were found to

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Peer review under responsibility of King Faisal Specialist Hospital & Research Centre (General Organization), Saudi Arabia.

be colonized with *S. aureus*, and of these 38 (4.6%) with MRSA. Thus, the MRSA rate amongst all *S. aureus* carriers was 23.2%. All MRSA were susceptible to vancomycin, (94.7%) were susceptible to linezolid, (65.8%) to clindamycin, and (89.5%) to trimethoprim/sulfamethoxazole.

Conclusion: The rate of MRSA carriage among children in Riyadh province was within the range reported internationally. As the MRSA rate among *S. aureus* infected children was 23.2%, empirical MRSA coverage should be considered in children with suspected *S. aureus* infections. Copyright © 2015, King Faisal Specialist Hospital & Research Centre (General Organization), Saudi Arabia. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

The emergence of methicillin-resistant *Staphylococcus aureus* (MRSA) infections among previously healthy persons in community settings, without exposure to health care facilities, has been noted recently [1,2]. Community-associated (CA)-MRSA strains and healthcare-associated (HA)-MRSA strains differ in terms of epidemiology, microbiology, and clinical manifestations [3]. The rapid spread of CA-MRSA has been characterized by outbreaks of cutaneous infections in healthy individuals, but can also cause soft tissue and bone infections, sepsis and endocarditis, as well as necrotizing, frequently lethal pneumonia, especially after influenza infection.

Colonization rates of CA-MRSA have been reported to range from 0 to 9.2 percent [4]. The nose and open skin areas (e.g., wounds and device exit sites) are considered the most important sites for colonization [5,6]. Nasal carriage of MRSA is an important risk factor for subsequent MRSA infection and transmission of this pathogen [7].

Several studies have shown that the prevalence of CA-MRSA varies geographically. Global outbreaks have been reported from the United States (US) and New Zealand [8]. In a population-based surveillance study of three US communities in 2001–2002, 8%–20% of all MRSA isolates were CA-MRSA by definition, with the highest incidence among children <2 years old [9]. King et al also demonstrated that approximately two-thirds of all community-associated *S. aureus* skin infections in Atlanta were due to MRSA clones 300 [10].

The highest rates of CA-MRSA carriage (>50%) are reported in North and South America, Asia, and Malta. Intermediate rates (25–50%) are reported in China, Australia, Africa, and some European countries, such as Portugal (49%), Greece (40%), Italy (37%) and Romania (34%). Other European countries, including the Netherlands and Scandinavian Countries, have generally low prevalence rates. However, epidemiological data from separate studies are often not comparable, owing to differences in study design and populations sampled [11].

Although several studies have reported the prevalence of MRSA nasal carriage in patients in health care settings [12,13], this subject has been rarely investigated in healthy individuals in the broader community [14]. In Saudi Arabia, CA-MRSA was assessed by Fawzia et al in outpatient children at a university hospital from 2005 to 2008, where they found that 29.8% of clinical *S. aureus* isolates were CA-MRSA [15]. Of these cases, 64.7% were not associated

with known risk factors. However, they evaluated clinical isolates rather than conducting active screening for MRSA. Another study on the prevalence of MRSA in the Western region of Saudi Arabia found that the prevalence of MRSA was 39.5% [16]. Infection was commonly associated with wound, skin, and soft tissue infections.

Currently, no data in Saudi Arabia on MRSA carriage in children is available. We aimed to assess the prevalence and to describe the antibiotic susceptibility pattern of MRSA among outpatient children in King Saud Medical City, a 1400 bed tertiary care hospital with a 275-bed children's hospital in Riyadh, Saudi Arabia.

2. Patients and methods

The study was approved by Research Advisory Council at this center. Informed consent was obtained from all legal guardians of participants.

2.1. Study design

We prospectively screened the anterior nares of children presenting to our pediatric emergency department of King Saud Medical City, a 275 bed tertiary care teaching hospital in Riyadh, Saudi Arabia, from March through July 2015.

Children under the age of 14 years who presented to the emergency department were eligible for the study. Patients who were hospitalized during the 12 months prior to their emergency visit, and those who were known MRSA colonizers, were excluded from the study. Thus, all newly detected MRSA colonizers in our study were defined as CA-MRSA.

Specimens were taken from each third consecutive patient meeting the inclusion criteria, and each patient was enrolled only once during the study period.

The attending emergency physician collected data on patient demographics (age, gender and history of recent hospitalization, antibiotic use and MRSA carriage).

2.2. Laboratory methods

A swab from each opening of the anterior nares were collected using pre-moistened sterile cotton swabs with normal saline solution, and were transported in Amie's transport medium.

Nasal swabs were processed within 2 h of collection and primary plating was done on mannitol salt agar (MSA)

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