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NASAL CARRIAGE SCREENING FOR METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS AMONG HEALTH CARE WORKERS AT GOVERNMENT HOSPITALS IN MISURATA, LIBYA

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ABSTRACT
Methicillin-resistant Staphylococcus aureus (MRSA) is a well-recognized public health problem throughout the world. The past two decades have witnessed an alarming expansion of staphylococcal disease caused by community-acquired methicillin resistant Staphylococcus aureus. In this study, we investigate the antimicrobial susceptibility of methicillin-resistant Staph. aureus. We screened 178 health care workers at Misurata Government hospitals, Libya. Antimicrobial susceptibility testing was carried out by using Kirby–Bauer's disk diffusion method as per Clinical and Laboratory Standards Institute guidelines. Isolates from 38 of the 178 subjects (21%) were confirmed as MRSA by Antimicrobial resistance patterns tested. The results showed that the percentage as follows; ciprofloxacin (63%), trimethoprim/sulfamethoxazole (50%), erythromycin (57%), clindamycin (21%), quinuprisin/dalfopristin (16%), vancomycin (9%) and mupirocin (8%). The study's results shows evidence that the health care workers could serve as MRSA carriers and play an alarming role in the dissemination of MRSA to the public and other workers.

INTRODUCTION
The hospital is an ideal environment for the transmission of pathogens, because patient with similar diseases and susceptibilities are housed in an enclosed community. Methicillin-resistant *Staphylococcus aureus* prevalence is high among health care workers (HCWs), and there is a dynamic spread of strains cross the globe. The prevalence varies from hospital to hospital in various countries, with high rates (32–52%) reported mainly inthe developing countries [Vonberg et al.]. MRSA carriage among HCWs can render other measures of infection control ineffective [Pathare et al.]. In most cases, colonized are generally asymptomatic, but they can be a potential reservoir of infection for susceptible patients. Moreover, it has been reported that HCWs have been the source of MRSA outbreaks in several hospital settings around the globe. Spread of MRSA strains inresource-limited settings may cause devastating consequences due to lack of adequate facilities for laboratory detection and patient management [Fishbain et al.]. MRSA carriageis an important predisposing factor for developing MRSA infection [Gould et al.,], and this increases the cost of patient care. Given the impact of MRSA infection, early identification of colonized patients and HCWs and implementing control measures such as decolonization of high-risk patients or those undergoing surgical procedures can minimize the chances of developing MRSA infection [Fishbain et al.,]. A study by Sai et al reported an efficacy of decolonization of 73% when considering patients with carriage limited to nasal cavities [Groom et al.,]. Few studies conducted in Libya have shown persistently high rates of antimicrobial resistance, with *S. aureus* being reported as a predominant pathogen in patients with surgical site infections [*Ahmedh* et al, *Nazeer* et al.,]. In the current study we investigated the prevalence and antimicrobial susceptibility profiles of MRSA among HCWs in the main hospitals.

MATERIALS AND METHODS
Our study was carried out in hospital based cross-sectional study conducted among major different hospitals in the city. 178 samples were collected from government hospitals in Misurata city, Libya. The samples were taken from the anterior nares of consenting as follows: a single culture swab was gently rotated inside both nares. Specimens were immediately sent to the laboratory and processed. Contact details were collected from the doctors for follow-up of any possible positive MRSA but these were kept confidential from the hospital. Positive MRSA carriers were approached confidentially for follow-up. Nasalswabs were inoculated onto blood agar and mannitol salt agar plates for S. aureus isolation.Plates were incubated at 37°C and examined for

growth after 24–48 hours. S. aureus was initially screened based on the presence of golden yellowish or creamy white colonies on mannitol salt agar and subcultured on nutrient agar (NA). Isolates from NA were further identified by Gram staining reaction and catalase test reaction and confirmed phenotypically by coagulase tests. The antimicrobial susceptibility testing was carried outby using Kirby–Bauer's disk diffusion method as per Clinical and Laboratory Standards Institute guidelines.

RESULT AND DISCUSSION

In this study, out of the 178 specimens examined, 37 (21%) were confirmed as MRSA by Antimicrobial resistance patterns tested. The results showed that the percentage as follows; ciprofloxacin (63%), trimethoprim/sulfamethoxazole (50%), erythromycin (57%), clindamycin (21%), quinuprisin/dalfopristin (16%), vancomycin (9%) and mupirocin(8%). The data collected were analyzed by SPSS software statistical application version 21.

Previous studies in Libya revealed that the prevalence of MRSA was reported around 39%[Zorgani A et al] and misidentification of MRSA in Libyan hospitals have in our study a lower prevalence was reported. Evolution of methicillin resistance by S. aureus has been traced to the acquisition of the exogenous gene (mecA) which is part of the staphylococcal cassette chromosome mec (SCCmec) (types I–VII) and is under the control of MecI (arepressor) and MecR1 (a transducer) and, when present, the regulatory/signalling proteins of the blaZ system. The mecA gene codes for additional penicillin-binding protein(PBP2a), a peptidoglycan transpeptidase, can confer resistance to all β-lactam antibiotics (penicillins, cephalosporins, and carbapenems) [P. Stapleton et al.,]. Other isolates containing a particular variant of SCCmec types II and III have expanded range ofresistance due to the presence of additional resistance genes. The presence of PBP2a, or mecA positivity, can be typed using methicillin or oxacillin (isoxazolyl penicillin), hence the acronym MRSA- or oxacillin-resistant S. aureus (ORSA) [D. Velasco et al.,]. Unknown carriers among patients may introduce MRSA into the hospital and serve as a source of transmission to other patients, primarily via the transiently colonized hands of hospital staff. An investigation by Vonberg et al. indicated that screening of HCWs should be performed before starting work duties in order to prevent the detection of transient, shortterm MRSA carriage that may occur during a work shift [Vonberg RP et al.]. However, such MRSA transmission between hospitals has also been documented [Ayliffe et al.,], andhealthy individuals with nasal MRSA colonization are more likely to develop an infection after having medical procedures performed in the hospital [Albrich].

In the present study, a marginal high proportion of the confirmed MRSA isolates (21%) exhibited resistance to ciprofloxacin (63%. Resistance to mupirocin was only present in a small proportion of confirmed MRSA isolates, and only 1 of the isolates exhibited a high level of mupirocin resistance (8%). Mupirocin ointment is the drug of choice for treating nasal MRSA colonization and it has been reported to be effective in eliminating MRSA colonization [Ellis et al.,]. The increasing trend of MRSA infections has been a noticeable global problem. We identified a steady increase in the rates of MRSA colonization and infection in a tertiary care centers in Libya. We need to recognize the importance of infection control policies, including hand hygiene and proper isolation practices. And also, continued surveillance for MRSA and other emerging multidrug-resistant pathogens is alsoneeded.

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