

Prevalence of Nasal *Staphylococcus aureus* Colonization in a Dermatology Practice and Implications for Care

Recognition of high-risk individuals is accomplished by eliciting pertinent past medical history.

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S *taphylococcus aureus* is a gram-positive aerobic bacterium that is a prevalent and detrimental pathogen in humans. Infections associated with this common bacterial microorganism are increasingly problematic in hospital and other healthcare settings. *Staphylococcus aureus* (*S. aureus*) and, more recently, methicillin-resistant *Staphylococcus aureus* (MRSA) can cause skin and soft tissue infections, urinary tract infections, pneumonia, invasive infections, surgical site infections (SSI), and are the leading causes of nosocomial infections. *S. aureus* nasal carriers have a two- to 10-fold increased risk of developing SSI or intravenous catheter infections.¹ Increased prevalence of infections has significantly impacted the field of dermatology and therefore raised the importance of determining contributory factors in the matter. The anterior nares are a primary reservoir for *S. aureus*, and individuals have historically been designated as persistent carriers (approximately 20 percent of individuals), intermittent carriers (~ 30 percent), and non-carriers (~ 50 percent).² The purpose of

this study is to determine the prevalence of nasal carriage of *S. aureus* in a healthcare subpopulation, specifically among a dermatology practice. In order to determine how many patients were *S. aureus* carriers in a dermatology practice, a brief questionnaire and bacterial nasal swabs were obtained from 50 participants.

Take-Home Tips. *Staphylococcus aureus* is a common micro-organism that has become an increasingly prevalent and detrimental pathogen in humans. Infections associated with this pathogen have been exceedingly problematic in hospitals and other healthcare settings, thereby raising the question of the actual prevalence of asymptomatic nasal carriage of *S. aureus* in a healthcare subpopulation, specifically among a dermatology practice. Out of 50 participants, *Staphylococcus aureus* was isolated from seven (14 percent) of our patient population. Of the seven patients found to be colonized in the nares, six (86 percent) admitted to personally visiting a healthcare setting in the last month. Healthcare providers must take comprehensive histories and carefully examine patients' past and current medical conditions, in addition to recent visits to healthcare settings or contact with individuals that are sick, in order to uncover asymptomatic carriers and prevent unwanted infections. ●

Methods

Our aim was to assess the prevalence of nasal colonization of *S. aureus* among a patient population of dermatology patients. We intended to uncover potential factors that may contribute to an increased risk of exposure, and thereby ascertain their potential relevance. Fifty patients were recruited from the general and aesthetic dermatology practice of Dr. Renée Cobos, located in Fullerton, CA. Patients were selected during a period of two months/days, beginning in July 2010.

Participants were enrolled without regard to presenting complaints and no exclusion criteria were set.

Participants were selected objectively (non-randomly) and were presented with the option to participate in the study. If willing, a medical assistant presented the patient with a written consent form. Once written consent was obtained, recruited patients were asked to complete a medical questionnaire about their age, occupation, and pertinent medical history. Upon completing both forms, cultures were taken from a single site.

As a result of *S. aureus* colonizing the skin and mucosal surfaces of humans, it is widely accepted that the anterior nares is the most consistent reservoir of the bacterium.² Therefore, for the purpose of this study, a nasal swab was collected for examination. Cultures were obtained by gently rubbing bilateral anterior nares of each participant with a sterile transport swab. It should be noted that the nares of each participant were not cleansed prior to obtaining a sample and the swab was not moistened prior to swabbing. Specimen swabs were then placed in an agar tube labeled with pertinent patient information and sent to Labwest Inc. laboratories for examination under controlled conditions within 12 hours of collection. Species identification and applicable antibiotic susceptibilities was performed by Labwest Inc. and reported to our office. All participants were informed of culture results and offered appropriate nasal decolonization treatment with topical mupirocin therapy and oral antibiotic when indicated with a positive culture for organisms other than normal flora. Patients were not compensated for their participation in this informal study.

Results

Fifty participants from a general and aesthetic derma-

tology practice were entered into the study to examine and evaluate the prevalence of nasal *S. aureus* colonization. Thirty-six (72 percent) subjects were female and 14 (28 percent) were male. Results of the cultures from the fifty participants showed that seven (14 percent) grew pure growths of *S. aureus* and two (4 percent) grew *Klebsiella pneumoniae*. Finally, 41 (82 percent) showed no growth beyond normal flora. The seven participants whose nasal cultures were positive for *S. aureus* presented with a variety of chief complaints ranging from follow up for eczema, acne, verruca treatment and annual full body skin exams. Of the seven participants, six (86 percent) admitted to visiting a healthcare setting, specifically a hospital or doctor's office, in the last month.

Various studies have shown that *S. aureus* colonization rates in healthy, asymptomatic populations are 20-25 percent, but vary among different populations (and are influenced by age, underlying illness, race, living/working environment).¹ In a 2003-2004 study, it was found that 29 percent of the US population (approximately 78.9 million persons) were colonized in the nares with *S. aureus*.³ Our data reflects community rates of asymptomatic nasal colonization.

Discussion

It is necessary to be aware of the risks and more importantly what types of patients are more susceptible to *S. aureus*. Persistent nasal carriers have an increased risk of *S. aureus* infection (intermittent carriers and non-carriers have a low risk).² In this particular study, patients who had recently been in a healthcare setting, such as a doctor's office, Emergency Department or Urgent Care, and/or had contact with a family member with a history of immune deficiency, composed a large percent (86 percent) of our patient population that were found to be *S. aureus* nasal carriers. Patient risk factors for *S. aureus* infections include colonization, immunosuppression (diabetes, HIV infection), dialysis, indwelling catheters, and young children.² Nasal carriage of *S. aureus* is a well-defined risk factor for the development of infections in patients of nearly all categories in healthcare settings.⁴

Limitations of our study that should be considered are the fact that our results purely represent a conven-

ience sample from a single institution and therefore cannot be generalized or used to predict prevalence rates in other practices. Our sample size of 50 participants furthermore limits our data. Our methods merely screened participants for nasal carriage and therefore excluded individuals that may have been colonized in the oropharynx, axilla, groin, perineal area or in wounds, which may have underestimated rates of colonization. Our medical questionnaire did not further explore the demographics such as socioeconomic status, current living conditions or hygiene practices, that previously have been linked to infection rates.

In spite of our limitations, our research truly highlights the prevalence of asymptomatic carriers and therefore supports the notion that these participants are acting as vectors or “reservoirs” for transmission, which ultimately may transpire to produce infections in close contacts.⁵ In a 2009 study in the Netherlands, there was found to be a transmission rate of 47 percent from MRSA-colonized subjects to their household contacts. Furthermore, when MRSA was transmitted to household contacts, 67 percent of contacts became MRSA colonized.⁶ As a result of our research and compelling results, there is an obvious need and place for incorporating active surveillance for *S. aureus* colonization. Members of a healthcare team should actively screen patients for possible colonization by taking thorough histories and inquiring about a patient’s history.

Healthcare providers should specifically inquire about patients’ visits to a hospital, Emergency Department, Urgent Care, doctor’s office, nursing home or ambulance transport within the last month of their office visit date. In addition, healthcare team members and clinicians should inquire about a patient’s recent contact with individuals inhabiting assisted living or nursing homes or those who have undergone prolonged stays in a hospital. Contact with such individuals place the greater population at an increased risk of exposure to *S. aureus*, thus providing one explanation for the increase in prevalence of asymptomatic carriers. We believe that having close contact with an individual in a skilled nursing facility, nursing home or hospital, working in a health care setting and personally visiting a physician or a hospital is a chief component and factor in community infection,

thus placing such patients in a high risk group and should therefore warrant extra attention by healthcare providers.

Patients should be questioned about recent activities, illnesses and potential exposures in order to properly identify asymptomatic carriers and to prevent subsequent infections. These inadvertent carriers may be at an increased risk for developing distal infections during routine biopsies, excisions, or cosmetic procedures that may be commonly performed in a dermatology setting thus highlighting the importance of recognition. To prevent *S. aureus* infections, persons found to be nasal carriers of the pathogen should undergo treatment with mupirocin or oral antibiotic therapy in an attempt to eliminate colonization prior to undergoing medical procedures.

In addition to incorporating screening policies, healthcare professionals should partake in appropriate hand hygiene and universal precautions. Properly integrating these prevention measures in healthcare settings will ultimately benefit the patient and their close contacts, in the home and work place, and potentially help reduce the occurrence of community infection rates.

Conclusion

Further study is warranted to explore the benefits of incorporating such prevention measures and the immediate effects on subsequent prevalence statistics. Proper recognition of high-risk individuals can be accomplished by eliciting pertinent past medical history. Healthcare providers should inquire about personal visits to a hospital, Emergency Department, Urgent Care, doctor’s office, nursing home or ambulance transport within the last month of their office visit date. Based on our findings, we recommend that a patient found to be in a higher risk category based on above outlined exposure measures be screened with a nasal swab prior to routine biopsies, surgeries or cosmetic injections/procedures in order to stave off more serious infections and complications. Therefore, if found to be positive nasal carriers of *S. aureus*, patients should be treated appropriately and re-cultured until negative before undergoing any procedure where skin will be disrupted. ■

Clinical Case Report: MRSA in a Dermatology Practice

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1. Perl TM, Golub JE. New approaches to reduce Staphylococcus aureus nosocomial infection rates: treating S. aureus nasal carriage. *Ann Pharmacother.* 1998;32(1):57-16.
2. Van Belkum A, Verkaik NJ, De Vogel CP, et al. Reclassification of Staphylococcus aureus Nasal Carriage Types. *J Infect Dis.* 2009;199(12):1820-6.
3. Gorwitz RJ, Kruszon-Moran D, McAllister SK, et al. Changes in the Prevalence of Nasal Colonization with Staphylococcus aureus in the United States, 2001 - 2004. *J Infect Dis.* 2008;197(9):1226-34.
4. Kluytmans JA, Wertheim HF. Nasal carriage of Staphylococcus aureus and prevention of nosocomial infections. *Infection.* 2005;33(1):3-8.
5. Schechter-Perkins EM, Mitchell PM, Murray KA, et al. Prevalence and Predictors of Nasal and Extranasal Staphylococcal Colonization in Patients Presenting to the Emergency Department. *Ann Emerg Med.* 2011; Jan 14 Epub.
6. Mollema FPN, Richardus JH, Behrendt M, et al. Transmission of Methicillin-Resistant Staphylococcus aureus to Household Contacts. *J Clin Microbiol.* 2010;48(1):202-7.