

Common Cold and *Staphylococcus aureus*. Should You Wear Scrubs, Gowns, and Masks?



Staphylococcus aureus

Staphylococcus aureus (*S. aureus*) are Gram-positive spherical bacteria which appear grape-like when viewed through a microscope. *S. aureus* colonizes mainly in the nasal passages, but it may regularly be found in most other anatomical locales and is a leading cause of soft tissue infections. Though normally not associated with influenza, in the last three pandemics (1918,

1957-58, and 1969), the addition of a *S. aureus* infection was an important cause of increased morbidity and mortality [Todar K. <http://textbookofbacteriology.net/staph.html>].

The spread of *S. aureus* is mainly through human-to-human contact. Each year, some 500,000 patients in American hospitals contract a staphylococcal infection. Therefore, efficacy of commonly used barrier precautions in a hospital setting is of particular interest.

Bischoff and colleagues conducted a study to test the effectiveness of scrubs, gowns, and masks, on the airborne dispersal of *S. aureus*. During experimental sessions, healthy nasal carriers of *S. aureus* sitting in an airtight test chamber wearing either street clothes, surgical scrubs, surgical scrubs plus a fluid resistant gown, or the latter plus a face mask (3MTM N95 Particulate Respirator), were exposed to common cold rhinovirus serotypes [Bischoff et al. ICAAC 2006 K1676].

Infection was determined by virus isolation in nasal washes and by measurement of homotypic serum-neutralizing antibody titers on paired acute and convalescent specimens. To assess illness, eight symptoms (sneezing, runny nose, nasal obstruction, sore or scratchy throat, cough, malaise, chills, headache) were each evaluated daily by a rating scale of 0 to 4. The total symptom score was the sum of the individual symptom ratings. A cold was defined as being present if a subject had a total symptom score > 6 and a runny nose on 3 or more days and/or the subjective impression of a cold.

Based on cold symptom score, all subjects in the study developed a symptomatic cold after the rhinovirus challenge. Compared to counts in those wearing street clothes, airborne levels of *S. aureus* were decreased by 75% when wearing surgical scrubs, by 80% when adding a surgical gown, and by 82% when wearing a face mask ($p < 0.001$). Male volunteers shed *S. aureus* twice as frequently

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mg/kg (Day 8). No concentrations were found on days 18 to 31. The numbers of enterococci, *E. coli*, lactobacilli, and bifidobacteria were reduced, while other enterobacteria and yeasts increased. There was no impact on bacteroides. No *C. difficile* strains were isolated. The investigators concluded that dalbavancin and tigecycline do not select for intestinal colonization of *C. difficile*.

In most parts of the world CDAD is not required to be reported to public health authorities, resulting in a limited understanding of its epidemiology. To gain a better understanding of what is occurring with this disease, Dr. Steven Gelone and colleagues launched the first global, web-based surveillance project of CDAD (www.rmhca.com/cdadproject/) in October 2005. As of May, 2006 there were 775 clinician respondents. A total of 630 (81%) were from the US and 145 (19%) were from the rest of the world (Table 1) [Gelone et al. ICAAC 2006 K1006].

Increased participation in this worldwide surveillance project would contribute to a better understanding of the epidemiology of CDAD.

Table 1: US versus Rest of World (ROW) Results

	US (n = 630)	ROW (n = 145)
Increased # of cases of CDAD	315 (50%)	34 (24%)
Increased # of severe cases of CDAD	316 (51%)	46 (32%)
Increased treatment relapse	353 (56%)	48 (33%)
Attributable colectomy	220 (35%)	33 (23%)
Attributable death	189 (30%)	35 (24%)

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resistant SP isolates collected in year 5, compared with 1.1% (9/825) in year 1 and 8.5% (60/710) in year 3. All *erm(B)+mef(A)* serotype 19A isolates in year 5 were MDR (resistant to ≥ 2 antibacterial classes), with high rates of resistance to amoxicillin-clavulanate (83.1%), cefuroxime (100%), erythromycin (100.0%), cotrimoxazole (100%), and tetracycline (100.0%). Resistance to telithromycin was rare (0.7%) and no isolates were levofloxacin resistant.

Type 19A has steadily increased in prevalence, as well as in resistance to common drug classes. The multiresistant *erm(B)+mef(A)* SP 19A clone continues to spread in the US. Common among patients aged 0-2 years, this SP 19A clone exhibits a high degree of MDR, particularly to the β -lactams and the macrolides. Results of the studies presented at the 2006 ICAAC conference in San Diego point to a growing need to include this serotype in future vaccine formulations.

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into the air as did female volunteers. No significant alteration of the airborne spreading patterns under different clothing conditions was found. Thus, the most efficient reduction in the airborne spread of *S. aureus* was obtained by changing into sterilized surgical scrubs. However, even under the most effective clothing regime 0.12 CFUs/m³/min of *S. aureus* were spread into the environment.

Special accommodations such as isolation procedures for *S. aureus* carriers suffering from these conditions appear unjustified in view of the airborne dispersal of this pathogen. However, patients and staff should be encouraged to practice basic hand washing techniques, which may include antiseptic washes and shampoos and the application of topical antibiotic ointments to the anterior nares of the nose. The use of disposable aprons and gloves by staff reduces skin-to-skin contact and may therefore further reduce the risk of transmission. The spread of *S. aureus* is of particular concern as it has become resistant to many commonly used antibiotics [Stucki et al. *Antimicrobial Agents and Chemotherapy* 2006].