



CHICAGO JOURNALS



Intraoperative Patient-to-Healthcare-Worker Transmission of Invasive Group A Streptococcal Infection

Author(s): Thomas R. Talbot, Addison K. May, William T. Obremskey, Patty W. Wright, Titus L. Daniels

Source: *Infection Control and Hospital Epidemiology*, (-Not available-), p. 000

Published by: [The University of Chicago Press](#) on behalf of [The Society for Healthcare Epidemiology of America](#)

Stable URL: <http://www.jstor.org/stable/10.1086/661596>

Accessed: 07/08/2011 10:26

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



The University of Chicago Press and The Society for Healthcare Epidemiology of America are collaborating with JSTOR to digitize, preserve and extend access to Infection Control and Hospital Epidemiology.

<http://www.jstor.org>

RESEARCH BRIEF

Intraoperative Patient-to-Healthcare-Worker Transmission of Invasive Group A Streptococcal Infection

Group A *Streptococcus* (GAS) bacteria cause a variety of infections, including necrotizing soft-tissue infections. While transmission of GAS from an infected patient to a healthcare worker (HCW) has been reported, most episodes result in pharyngitis or asymptomatic colonization. Healthcare-associated GAS transmission resulting in invasive infection has rarely been described. At our institution, following surgical debridement of a patient with GAS necrotizing fasciitis, 2 HCWs developed GAS infection, including 1 case of necrotizing fasciitis with associated toxic shock syndrome (TSS). We describe the resultant investigation and identification of suspected routes of transmission in this rare yet serious event.

In June 2009, an extensive debridement of both lower extremities was performed on a 55-year-old patient with necrotizing fasciitis and myonecrosis following blunt injury (day 1), as reported previously.¹ The patient presented with septic shock and required urgent operative debridement and hip disarticulation. Blood and wound cultures grew *Streptococcus pyogenes*. Despite aggressive debridement and initiation of broad-spectrum antibiotics and intravenous immunoglobulin, the patient died on hospital day 10. On day 3, surgeon A, a participant in the debridement, developed a sore throat and was diagnosed with GAS pharyngitis by rapid streptococcal antigen testing. A throat culture sample was not obtained. Her symptoms resolved with oral antibiotic treatment.

On day 8, surgeon B, who assisted with the disarticulation of the index patient's left hip, developed malaise, subjective fever, and chills, as reported previously.¹ The following day, erythema and edema of the right foot and thigh ensued. Physical examination was notable for extensive tinea pedis. He was admitted to receive intravenous antibiotics, fluid hydration, and monitoring. Despite this therapy, clinical deterioration with development of TSS occurred, which necessitated transfer to the intensive care unit, inotropic support, and intravenous immunoglobulin administration. The patient's lower-extremity erythema progressed, and operative debridement was performed within 72 hours of admission. Intraoperative findings were consistent with necrotizing fasciitis. Blood cultures grew *S. pyogenes*. Following repeated debridement procedures, a course of intravenous antibiotics, and supportive care, surgeon B gradually recovered and was discharged after 12 days.

Following identification of the 2 secondary GAS cases, a formal event analysis was performed that included epidemiologic evaluation of the index patient, all HCWs involved with the patient's care, and all patients who had contact with

the infected HCWs. Intraoperative infection-control practices were reviewed. Pharyngeal specimens were collected for GAS culture from all HCWs involved with the index patient's initial and subsequent surgical procedures. Rectal swab samples were not collected.

Evaluation of infection-control practices in the operating room (OR) revealed reported usage of personal protective equipment, including caps, masks, and gowns, at all times during the procedure. Shoe covers and/or specific OR shoes were used, but impervious boot covers were not worn by surgeon B. Additionally, surgeon A noted a loose fit to her surgical mask and did not wear eye protection while utilizing electrocautery, surgical saws, and pulsatile lavage. There was gross contamination through the surgical gowns of the clothing of surgeons A and B, with delayed removal of soiled attire. Surgeon B also noted soaking of his socks with blood and body fluid. Easy access to replacement scrubs and shower facilities was not readily available. Both HCWs wore contaminated clothing after the procedure had concluded.

Twenty-eight HCWs who had contact with the index patient during the initial and subsequent surgical debridement procedures were screened for GAS. Only the 2 HCWs described had evidence of colonization or infection. The GAS strains from the index patient and surgeon B were identical by pulse field gel electrophoresis. Because a throat culture sample was not obtained for surgeon A, no isolate was available for molecular testing. Prior to the development of his symptoms, surgeon B performed surgery on 5 patients. All of these patients were followed, and none developed a subsequent GAS infection.

Patient-to-HCW transmission of invasive GAS is a rare but potentially serious event (Table 1).²⁻⁹ Most reported instances have resulted in asymptomatic pharyngeal colonization or pharyngitis in the affected HCWs. Nosocomial patient-to-HCW GAS transmission resulting in invasive soft-tissue infection has rarely been reported. Often, such cases occur after exposure to a patient with a substantial disease burden (eg, extensive necrotizing soft-tissue infection).

The case of invasive GAS soft-tissue infection and TSS described here may have resulted from gross contamination of surgeon B's clothing and shoes, from where tinea pedis may have served as a portal of entry. However, the delay from exposure to symptom onset (8 days) could indicate an initial colonization of surgeon B's oropharynx, with delayed transmission to his feet. As a result of these findings, intraoperative adherence to standard precautions was emphasized, including the importance of appropriately fitted masks, the use of eye protection, and removal of soiled attire as soon as can safely be performed. In addition, replacement scrub attire was made readily available to OR personnel. While some have suggested alterations to personal-protective-equipment recommendations for the care of patients with suspected GAS necrotizing

TABLE 1. Reports of Group A *Streptococcus* (GAS) Transmission from Patient to Healthcare Worker (HCW)

Report	Index patient infection	No. of HCWs who developed GAS infection due to secondary transmission (type of infection)	Potential factors contributing to transmission
Kakis et al ⁵	GAS necrotizing cellulitis	24 (pharyngitis)	
Chandler et al ³	GAS pharyngitis and necrotizing fasciitis	2 (both with pharyngitis)	Both HCWs involved in index patient debridement procedure; gross contamination of surgical attire
Lacy et al ⁶	GAS necrotizing fasciitis	1 (invasive GAS pneumonia)	
DiPersio et al ⁴	GAS necrotizing fasciitis	3 (2 with pharyngitis, 1 with scarlet fever)	
Auerbach et al ²	Nursing home-related cluster of GAS infections	2 (1 with GAS pharyngitis and pneumonia, 1 with pharyngitis)	
Valenzuela et al ⁹	Invasive GAS infection	1 (GAS toxic shock syndrome)	Transmission occurred following performance of CPR on index case
Lannigan et al ⁷	GAS necrotizing fasciitis	2 (both with upper-extremity GAS cellulitis)	Lack of glove use while caring for index patient; presence of dermatitis on affected skin
Sablier et al ⁸	GAS necrotizing fasciitis	1 (necrotizing fasciitis)	Transmission related to sharps injury incurred during initial debridement of index patient
This study ¹	GAS necrotizing fasciitis	2 (1 with necrotizing fasciitis with toxic shock syndrome, 1 with pharyngitis)	Contamination of surgical attire during debridement; presence of tinea pedis on affected extremity

skin infections (eg, a switch from surgical masks to N95 particulate respirators),³ it is unclear whether such measures would have prevented the transmission in our cluster.

While guidelines exist regarding the prevention of GAS transmission from an infected or colonized HCW to patients,¹⁰ less is described regarding transmission of invasive GAS infection to HCWs from infected patients. This case serves as a reminder of the importance of the adherence to standard precautions, including the removal of contaminated clothing as soon as possible after exposure and the cleaning of contaminated skin, and of the value of designing systems that facilitate these actions.

ACKNOWLEDGMENTS

Financial support. This project was supported by institutional funds.

Potential conflicts of interest. T.R.T. has received research funding from Sanofi Pasteur. All other authors report no conflicts of interest relevant to this article.

**Thomas R. Talbot, MD, MPH;^{1,2} Addison K. May, MD;³
William T. Obremsky, MD, MPH;⁴
Patty W. Wright, MD;¹ Titus L. Daniels, MD, MPH¹**

Affiliations: 1. Division of Infectious Diseases, Department of Medicine, Vanderbilt University School of Medicine, Nashville, Tennessee; 2. Department of Preventive Medicine, Vanderbilt University School of Medicine, Nashville, Tennessee; 3. Divisions of Trauma and Surgical Critical Care, Department of Surgery, Vanderbilt University School of Medicine, Nashville, Tennessee; 4. Division of Orthopaedic Trauma, Department of Orthopaedics and Rehabilitation, Vanderbilt University School of Medicine, Nashville, Tennessee.

Address correspondence to Thomas R. Talbot, MD, MPH, A-2200 Medical

Center North, 1161 21st Avenue South, Vanderbilt University Medical Center, Nashville, TN 37232 (tom.talbot@vanderbilt.edu).

Received February 19, 2011; accepted April 18, 2011; electronically published July 26, 2011.

Presented in part: 5th Decennial International Conference on Healthcare-Associated Infections; Atlanta, Georgia; March 20, 2010 (Abstract 398).

Infect Control Hosp Epidemiol 2011;32(9):000-000

© 2011 by The Society for Healthcare Epidemiology of America. All rights reserved. 0899-823X/2011/3209-00XX\$15.00. DOI: 10.1086/661596

REFERENCES

1. May AK, Daniels TL, Obremsky WT, Kaiser AB, Talbot TR. Steroids in the treatment of group A streptococcal necrotizing soft tissue infection. *Surg Infect* 2011;12:77-81.
2. Auerbach SB, Schwartz B, Williams D, et al. Outbreak of invasive group A streptococcal infections in a nursing home: lessons on prevention and control. *Arch Intern Med* 1992;152(5):1017-1022.
3. Chandler RE, Lee LE, Townes JM, Taplitz RA. Transmission of group A *Streptococcus* limited to healthcare workers with exposure in the operating room. *Infect Control Hosp Epidemiol* 2006;27(11):1159-1163.
4. DiPersio JR, File TM Jr, Stevens DL, Gardner WG, Petropoulos G, Dinsa K. Spread of serious disease-producing M3 clones of group A *Streptococcus* among family members and health care workers. *Clin Infect Dis* 1996;22(3):490-495.
5. Kakis A, Gibbs L, Eguia J, et al. An outbreak of group A streptococcal infection among health care workers. *Clin Infect Dis* 2002;35(11):1353-1359.
6. Lacy MD, Horn K. Nosocomial transmission of invasive group A *Streptococcus* from patient to health care worker. *Clin Infect Dis* 2009;49(3):354-357.
7. Lannigan R, Hussain Z, Austin TW. *Streptococcus pyogenes* as a

- cause of nosocomial infection in a critical care unit. *Diagn Microbiol Infect Dis* 1985;3(4):337–341.
8. Sablier F, Slaouti T, Dreze PA, et al. Nosocomial transmission of necrotising fasciitis. *Lancet* 2010;375(9719):1052.
 9. Valenzuela TD, Hooton TM, Kaplan EL, Schlievert P. Transmission of “toxic strep” syndrome from an infected child to a firefighter during CPR. *Ann Emerg Med* 1991;20(1):90–92.
 10. Weber DJ, Rutala WA, Denny FW Jr. Management of healthcare workers with pharyngitis or suspected streptococcal infections. *Infect Control Hosp Epidemiol* 1996;17(11):753–761.