American Journal of Infection Control 42 (2014) 254-9

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Knowledge, perceptions, and practices of methicillin-resistant *Staphylococcus aureus* transmission prevention among health care workers in acute-care settings

Dorothy J. Seibert PhD, RN [a,*], Karen Gabel Speroni PhD, RN [b], Kyeung Mi Oh PhD, RN [a], Mary C. DeVoe RN [b], Kathryn H. Jacobsen PhD [c]

[a] *School of Nursing, George Mason University, Fairfax, VA*
[b] *Inova Fair Oaks Hospital, Fairfax, VA*
[c] *Department of Global & Community Health, George Mason University, Fairfax, VA*

Key Words:
Attitudes
Health personnel
Infection control
Inpatients
Health care-associated infection
Nursing personnel

Background: Health care workers (HCWs) play a critical role in prevention of health care-associated infections such as methicillin-resistant *Staphylococcus aureus* (MRSA), but glove and gown contact precautions and hand hygiene may not be consistently used with vulnerable patients.
Methods: A cross-sectional survey of MRSA knowledge, attitudes/perceptions, and practices among 276 medical, nursing, allied health, and support services staff at an acute-care hospital in the eastern United States was completed in 2012. Additionally, blinded observations of hand hygiene behaviors of 104 HCWs were conducted.
Results: HCWs strongly agreed that preventive behaviors reduce the spread of MRSA. The vast majority reported that they almost always engage in preventive practices, but observations of hand hygiene found lower rates of adherence among nearly all HCW groups. HCWs who reported greater comfort with telling others to take action to prevent MRSA transmission were significantly more likely to self-report adherence to recommended practices.
Conclusions: It is important to reduce barriers to adherence with preventive behaviors and to help all HCWs, including support staff who do not have direct patient care responsibilities, to translate knowledge about MRSA transmission prevention methods into consistent adherence of themselves and their coworkers to prevention guidelines.

Drug-resistant health care-associated infections (HAIs) such as methicillin-resistant *Staphylococcus aureus* (MRSA) are a growing concern in acute-care settings. HAIs cause a significant burden on the health care system as a result of extended hospital stays, expensive treatments, and increased mortality rates.[1,2] For example, the costs and length of stays doubled for MRSA infections.[2,3]

Health care workers (HCWs) may contribute to the spread of MRSA and other HAIs within a hospital and to the community through failure to adhere to recommended practice guidelines. Prevention efforts in a variety of patient care units, including outpatient clinics and intensive care units, have been shown to significantly reduce HAI-related MRSA.[4-7] However, the frequency of hand hygiene (washing with soap and water or using alcohol-based hand sanitizers) and the consistent use of contact precautions, such as the use of gloves and gowns, are often found to be suboptimal.[8,9] The US Centers for Disease Control and Prevention guidelines recommend contact precautions for all interactions that may involve contact with MRSA-infected or MRSA-colonized patients or with potentially contaminated areas in a patient's environment.[10] The World Health Organization also recommends consistent performance of hand hygiene before and after contact with the each patient and his or her environment.[11] Observed adherence of HCWs with these prevention practices has been found to be about 68%-82% for use of gloves, about 68%-77% for use of gowns, and about 48%-69% for hand hygiene after patient contact.[8,9,12] HCWs may become vectors of infection, transferring the infectious agent from 1 patient to another via contamination of skin, clothing, or equipment.[13-15] HCWs may also become colonized with MRSA, and asymptomatic

* Address correspondence to Dorothy J. Seibert, PhD, RN, School of Nursing, George Mason University, 4400 University Dr, MS 3C4, Fairfax, VA 22030-4444.
E-mail address: dseibert@gmu.edu (D.J. Seibert).
This project was supported by a grant from the Epsilon Zeta chapter of Sigma Theta Tau, the Honor Society of Nursing.
Conflicts of interest: None to report.

0196-6553/$36.00 - Copyright © 2014 by the Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.ajic.2013.09.005

carriers may inadvertently transmit the bacterium to patients.[16-19] (About 4.6% of HCWs in the United States are MRSA carriers.[13])

HCWs can play a critical role in preventing HAIs caused by MRSA.[20,21] HCWs' knowledge of and perceptions about MRSA may strongly influence their willingness to routinely engage in preventive practices.[10,22,23] Once knowledge gaps, barriers to adherence, and other factors that may inhibit adherence are identified, interventions to reduce MRSA transmission can be implemented.[23-25] The goal of our study was to evaluate knowledge, perceptions, and practices related to MRSA among a diverse sample of HCWs—medical, nursing, allied health, and support services staff—at an acute care hospital. Understanding these factors will contribute to action plans that include all HCWs in efforts to reduce MRSA transmission in the acute care setting.

METHODS

Study population

As part of a comprehensive evaluation of HCW knowledge, attitudes/perceptions, and practices/behaviors (KAP) about MRSA, we conducted a cross-sectional survey of HCWs at a 182-bed hospital in the mid-Atlantic region of the United States from September through November 2012. All HCWs with direct patient care and those who enter patient care areas were asked to complete a questionnaire, including medical staff (physicians, physician assistants, and nurse practitioners on medical staff), nurse staff (registered nurses and other types of nurses), allied health professionals (such as cardiopulmonary therapists; physical therapists; occupational therapists; speech therapists; social workers; and laboratory, medical imaging, and pharmacy staff), and support staff from environmental services, foodservices, engineering, security, and patient registration.

Data collection

HCWs were recruited via e-mail, staff newsletters, posters displayed in employee locker rooms, and announcements on the hospital's research Web page. Department managers were informed about the survey at administrative meetings and asked to promote the survey to their colleagues and distribute the e-mail invitation. Additionally, HCWs were informed about the survey during visits by the research team to clinical departments. Responses to the 33-item survey, which included 3 open-ended and 49 close-ended questions, could be submitted on paper forms deposited in survey collection boxes located in the mailroom or could be submitted electronically via a Zoomerang Web survey. Characteristics of participants are described in Table 1.

Survey instrument

The questionnaire included 7 demographic questions; 4 multiple choice and 2 true/false questions about knowledge; 12 ordinal questions about perceptions of MRSA; and a series of 6 yes/no questions about practice adherence by self and other HCWs. The perceptions of MRSA questions (with a 5-point Likert scale ranging from strongly disagree to strongly agree) rated susceptibility, severity, the benefit of practice adherence, self-efficacy, and cues to take action. Additional questions included 7 yes-or-no questions about barriers to adherence with recommended practices related to time management, communication, access to equipment, the environment, and patient characteristics. Also included were12 yes-or-no questions about resources and preferred education methods and 3 open-ended questions for reporting barriers, other education methods, and suggestions for reducing transmission of MRSA.

Table 1
Demographic characteristics of survey participants by health care worker (HCW) group

HCW group*	Medical	Nurses	Allied health	Support staff	Total
No. of participants	49	129	48	50	276
Proportion of total sample (%)	17.8	46.7	17.4	18.1	100
Age in years (%)					
18-25	6.1	14.8	6.2	8.3	10.6
26-35	16.3	24.2	29.2	22.9	23.4
36-45	26.5	25.8	29.2	18.8	25.3
46-55	24.5	25.0	25.0	25.0	24.9
≥56	26.5	10.2	10.4	25.0	15.8
Sex (%)					
Women	47.8	91.3	72.9	77.1	78.0
Men	52.2	8.7	27.1	22.9	22.0
Education (%)					
Doctoral degree	85.4	0.8	10.6	2.0	17.6
Master's degree	8.3	11.7	19.1	10.0	12.1
Bachelor's degree	6.2	57.0	29.8	20.0	36.6
Associate's degree/ diploma/ certificate	0	27.4	38.3	38.3	26.3
High school or less	0	3.1	2.1	30.0	7.3
Experience in years					
Range	0-45	0-43	0-33	0-30	0-45
Mean ± standard deviation	17.5 ± 11.7	14.0 ± 11.1	14.5 ± 9.8	8.3 ± 7.7	13.7 ± 10.8
Work status (%)					
Full time	82.6	66.1	70.2	78.7	71.9
Part time	17.4	21.3	23.4	12.8	19.5
As needed	0	12.6	6.4	8.5	8.6

*HCW included medical staff: medical doctors (n = 41); other medical staff, such as physician assistants and nurse practitioners (n = 8); nurses: registered nurses (n = 112); other nursing staff, including certified nursing assistants and emergency medical technicians (n = 17); allied health: medical imaging staff (n = 15); physical medicine and rehabilitation: physical therapists, occupational therapists, and speech therapists (n = 10); laboratory staff (n = 10); other allied health staff, including dietitians, pharmacists, respiratory therapists, and social services (n = 13); support staff: patient registration/clerical (n = 27); environmental services (n = 10); and other support staff (n = 13).

To improve the validity of the survey instrument, the questionnaire included 17 questions about contact precautions, colonization, mode of transmission, bacterial viability, and hand hygiene efficacy previously used by Burkitt et al[24] in a large study of HCWs at Veterans' Administration health care facilities; 9 questions from the study by Trigg et al[25] of HCWs at a National Health Systems hospital in the United Kingdom; and 3 questions regarding concern about transmission, knowing someone with MRSA, and community-acquired MRSA adapted from a study of HCWs in North Dakota by Koltes.[22] The specific wording of the questions is provided in Tables 2-4.

Survey validity

A pilot test of the survey by 6 HCWs from another hospital in the same part of the country was conducted. Additionally, 12 infection preventionists, 2 nurse educators, and 6 HCW members of the hospital's research council rated the relevance and clarity of each item on a 4-point scale (from not relevant to highly relevant and from not clearly written to clearly written). A content validity index was calculated from these scores. A content validity index score of 0.80 (on a scale of 0 to 1) is desirable, and the assessors rated the relevance of the questions at 0.98 and the clarity at 0.97. After the questionnaires were completed, Cronbach's α was used to evaluate the internal consistency of the survey items. The scores for internal consistency of the perception variables, the knowledge scores, and