

Hand Contamination of Healthcare Workers in an Ambulatory Wound Care Setting

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ABSTRACT

Background

As stated in the Centers for Disease Control and Prevention Guideline for Hand Hygiene in Health-Care Settings, failure to perform appropriate hand hygiene is considered the leading cause of healthcare-associated infections (HAIs) and spread of multidrug-resistant organisms.¹⁻⁴ Cross-transmission of infection between patients occurs primarily via the contaminated hands of healthcare workers.^{2,3,5-8}

Over the past several decades, a significant shift in healthcare delivery from the acute, inpatient hospital setting to a variety of ambulatory and community based settings has occurred.⁹ Vulnerable patient populations rely on frequent and intensive use of ambulatory care to maintain or improve their health. There is a paucity of research on hand hygiene in the ambulatory care practice setting despite its expanding role in healthcare. The objective of this study was to determine if the hands of healthcare workers become contaminated with pathogens during routine patient care in an ambulatory care setting.

Methods

Healthcare workers in a wound care center gave informed consent prior to participation. Healthcare worker's hands were sampled at two different moments during a patient encounter using a "glove juice" recovery technique. Hand samples were plated for total aerobic counts and onto selective media for pathogenic marker organisms, including Methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile*, *Acinetobacter*, Vancomycin-resistant *Enterococci* (VRE).

Results

A total of 36 hand samples from seven different healthcare workers were taken during two sampling periods. Six of the seven healthcare workers were contaminated at some point during the study. Furthermore, 22.2% of all samples taken were positive for at least one pathogen. Four samples (11.1%) were positive for *Acinetobacter*, 3 samples (8.3%) were positive for MRSA and one sample (2.8%) was positive for *C. difficile*. Samples were taken at two different moments during a patient encounter. Twenty-one percent of samples taken after initial patient contact were positive while 23.5% of samples taken after patient care were positive for healthcare-associated pathogens.

Conclusions

The hands of healthcare workers in an ambulatory care setting are contaminated during different moments of a patient encounter. Six of the seven healthcare workers had contaminated hands at some point during the study suggesting that hand hygiene is necessary during moments of the patient encounter. Because hands were not sampled prior to initial patient contact it is difficult to determine when hands become contaminated during patient encounters. The data generated from this study will be used for further ambulatory care studies to determine hand contamination during moments of patient encounter using the World Health Organization's 5 moments for hand hygiene.

INTRODUCTION

The ICP Hand Hygiene Network is a network of local Infection Preventionists, formed in 2003 by GOJO Industries, Inc Healthcare Marketing Team with the following goals:

- Establish the mission and values of the ICP Hand Hygiene Network
- Establish a "community of practice" for processes and systems to allow rapid and easy exchange of information on what works and doesn't work for hand hygiene in an acute care setting
- Establish a nurse/researcher grant program for Network members and associates to facilitate research and publication in the field of hand hygiene

The GOJO Industries, Inc ICP Hand Hygiene Network decided to study hand contamination in healthcare personnel in a wound care clinic for the following reasons:

- As stated in the Centers for Disease Control and Prevention Guideline for Hand Hygiene in Health-Care Settings, failure to perform appropriate hand hygiene is considered the leading cause of healthcare-associated infections (HAIs) and spread of multidrug-resistant organisms.¹⁻⁴
- Cross-transmission of infection between patients occurs primarily via the contaminated hands of healthcare workers.^{2,3,5-8}
- Over the past several decades, a significant shift in healthcare delivery from the acute, inpatient hospital setting to a variety of ambulatory and community based settings has occurred.⁹
- Vulnerable patient populations rely on frequent and intensive use of ambulatory care to maintain or improve their health.
- There is a paucity of research on hand hygiene in the ambulatory care practice setting despite its expanding role in healthcare.

Research Objective:

Determine if the hands of healthcare workers become contaminated with pathogens during routine patient care in an ambulatory care setting.

MATERIALS AND METHODS

Approval for this study was obtained from Summa Health System's Institutional Review Board. Healthcare workers in a wound care center gave informed consent prior to participation. Healthcare worker's hands were sampled at two different moments during a patient encounter using a hand sampling method described in the ASTM Standard Tests Method E 1115-10 and commonly referred to as the "glove juice" recovery method.

Definitions:

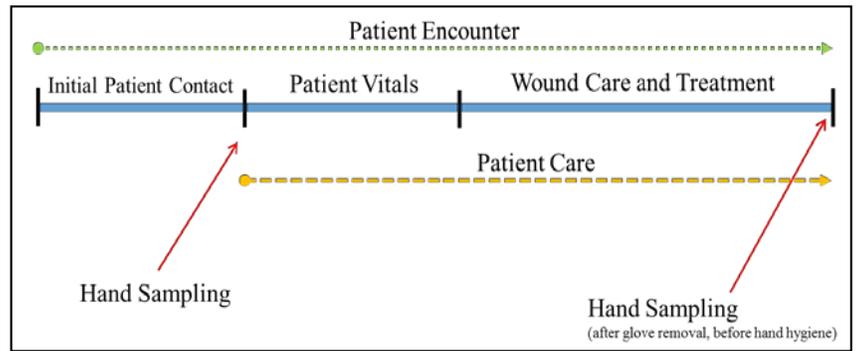
- Initial Patient Contact: Meeting and greeting the patient in the waiting room and assisting them into the exam room
- Patient Care: After the patient is in the exam room, begins with nursing assessment including vital signs and wound care
- Patient Encounter: The entire care process including the initial patient contact, wound care, and patient discharge

Healthcare worker hands were sampled immediately after initial patient contact and before initiating patient care (baseline microbial load on nurses hands) and after patient care (contaminated during patient care)

Twenty ml of each sample was centrifuged at 10,000 g for 10 min. Fifteen ml of the supernatant was removed; the pellet was resuspended in the remaining 5 ml of supernatant. The concentrated samples were plated for total aerobic counts and onto selective media for pathogenic marker organisms, including Methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile*, *Acinetobacter*, Vancomycin-resistant *Enterococci* (VRE)

MATERIALS AND METHODS — CONTINUED

Figure 1: Schematic of a typical patient encounter beginning with the initial patient contact and ending after wound care and treatment. The two moments of hand sampling are shown (after initial patient contact and after patient care).



RESULTS

Pathogen	Positive Samples	Total Samples	Percentage Positive
MRSA	3	36	8.33%
VRE	0	36	0.00%
<i>Acinetobacter</i>	4	36	11.11%
<i>C. difficile</i>	1	36	2.78%
Gram Negative	4	36	11.11%
At least 1 Pathogen			22.22%
2 or more Pathogens			0.00%

Table 1: Frequency of specific pathogenic bacteria on healthcare worker's hands during a patient encounter in a wound care clinic.

HCW	Samples Collected			Positive Samples			Percent Positive
	After Contact	After Care	Total	After Contact	After Care	Total	
A	4	4	8	0	0	0	0.00%
B	5	3	8	2	1	3	37.50%
C	3	2	5	0	1	1	20.00%
D	3	3	6	1	0	1	16.67%
E	2	2	4	1	0	1	25.00%
H	1	1	2	0	1	1	50.00%
J	1	2	3	0	1	1	33.33%
	19	17	36	4	4	8	22.22%

Table 2: Breakdown of samples collected and subsequent contamination result. Approximately 22% of all samples were positive for healthcare-associated pathogens. Of those samples, 21.05% after initial patient contact and 23.53% after patient care were positive. Six of the 7 (85.71%) healthcare workers had contaminated hands at some point during the study suggesting that hand hygiene is necessary during moments of the patient encounter.

Worker Code	Patient Code	Moment Sampled	
		After Contact	After Care
H	A	Negative	<i>C. difficile</i>
C	B	Negative	MRSA
B	C	<i>Acinetobacter</i>	<i>Acinetobacter</i>
	D	<i>Acinetobacter</i>	Negative
D	E	<i>Acinetobacter</i>	Negative
E	F	MRSA	Negative
J	G	No Sample	MRSA

Table 3: Analysis of the acquisition of healthcare-associated pathogens on healthcare worker's hands during patient encounters. Three healthcare workers were negative after initial patient contact but became positive after patient care. Two healthcare workers were positive after initial patient contact but were negative after patient care suggesting removal of contamination via hand hygiene. Finally, it appears healthcare worker B's hand was contaminated after initial patient contact and the contamination remained through the entire patient encounter and then into the next patient encounter.

CONCLUSIONS

The hands of healthcare workers in an ambulatory care setting are contaminated during different moments of a patient encounter.

- 22.22% of samples were positive for healthcare-associated pathogens
 - 21.05% of samples after initial patient contact were positive
 - 23.53% of samples after patient care were positive
- Six of the seven (85.71%) healthcare workers had contaminated hands at some point during the study suggesting that hand hygiene is necessary during moments of the patient encounter.
- Because hands were not sampled prior to initial patient contact it is difficult to determine when hands become contaminated during patient encounters.

The data generated from this study will be used for further ambulatory care studies to determine hand contamination during moments of patient encounter using the World Health Organization's 5 moments for hand hygiene.

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