

Frequency of *Klebsiella pneumoniae* carbapenemase- (KPC-) and non-KPC-producing *Klebsiella* species contamination of healthcare workers and the environment



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Background

- Contamination of healthcare worker (HCW) gowns & gloves and contamination of the near-patient environment are surrogate markers for patient-to-patient transmission.
- Frequency of HCW gown and glove contamination, and patient environmental contamination with KPC-producing *Klebsiella* is unknown.

Objective

- To assess the frequency of HCW gown and glove contamination after caring for a patient with KPC-producing *Klebsiella* and non-KPC-producing *Klebsiella*.
- To examine patient, environmental, and HCW factors associated with higher contamination.

Methods

- HCWs entering patient rooms with known KPC- or non-KPC-producing *Klebsiella* were asked to participate.
- The number of times that the HCW touched 1 of 9 environmental surfaces and the number of HCW-patient interactions were counted.
- Before room exit, HCW gloves and gowns were cultured in a standardized fashion by the researcher.
- Environmental sampling of the 9 surfaces was performed.
- P* values are either from a chi square or Fisher's exact test where appropriate.

Results

- We observed 96 interactions with KPC-producing and 124 with non-KPC-producing *Klebsiella*.
- Table 1 shows the frequency with which KPC- and non-KPC-producing *Klebsiella* contaminated HCW gowns or gloves, or the near-patient environment.
- Table 2 shows specific variables associated with HCW gown or glove contamination.
- Factors associated with HCW gown or glove contamination included wound care, manipulation of catheter, and caring for a patient with ETT or tracheostomy.

Table 1. Frequency with which KPC- and non-KPC-producing *Klebsiella* contaminated HCW attire or environment.

Pathogen	Healthcare worker gown or glove contamination			Environmental contamination		
	Proportion	% (95% CI)	p	Proportion	% (95% CI)	p
KPC-producing <i>Klebsiella</i>	10/96	10.4 (5.1-18.3)	.17	2/19	10.5 (1.3-33.1)	.08
Non-KPC-producing <i>Klebsiella</i>	21/124	16.9 (10.8-24.7)		9/24	37.5 (18.8-59.4)	

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Results, cont.

Table 2 – Association between Healthcare Worker (HCW) Activities, Patient-Specific Factors, and Type of HCW and Contamination of HCW Gowns and Gloves with *Klebsiella pneumoniae* Carbapenemase (KPC)-Producing *Klebsiella* and non-KPC-Producing *Klebsiella* Species on Room Exit

Variable	Frequency of contamination % (proportion) of opportunities	p
HCW activity in room		
Physical examination	13.3 (21/158)	.59
Wound care	36.4 (4/11)	.05
Manipulation of catheter	37 (10/27)	<.001
Taking vital signs	16.3 (8/49)	.61
Touching bed rail	22.8 (18/79)	.006
>5 minutes in patient room	16.8 (18/107)	.33
>2 patient contacts	25 (25/100)	<.001
>2 environmental contacts	23.7 (23/97)	<.001
Patient specific factors		
Presence of urinary catheter	17.2 (29/168)	.012
Presence of ET tube tracheostomy	34.9 (15/43)	<.001
HCW type		
Physician/nurse practitioner	3.9 (3/78)	.001
Registered nurse	16.3 (15/92)	
Other	26 (13/50)	

Conclusions

- Frequency of HCW gown or glove contamination after caring for a patient with KPC-producing or non-KPC-producing *Klebsiella* was substantial at approximately 14%.
- Further work needs to be done to delineate the mechanisms of patient to patient transmission of KPC-producing *Klebsiella*.