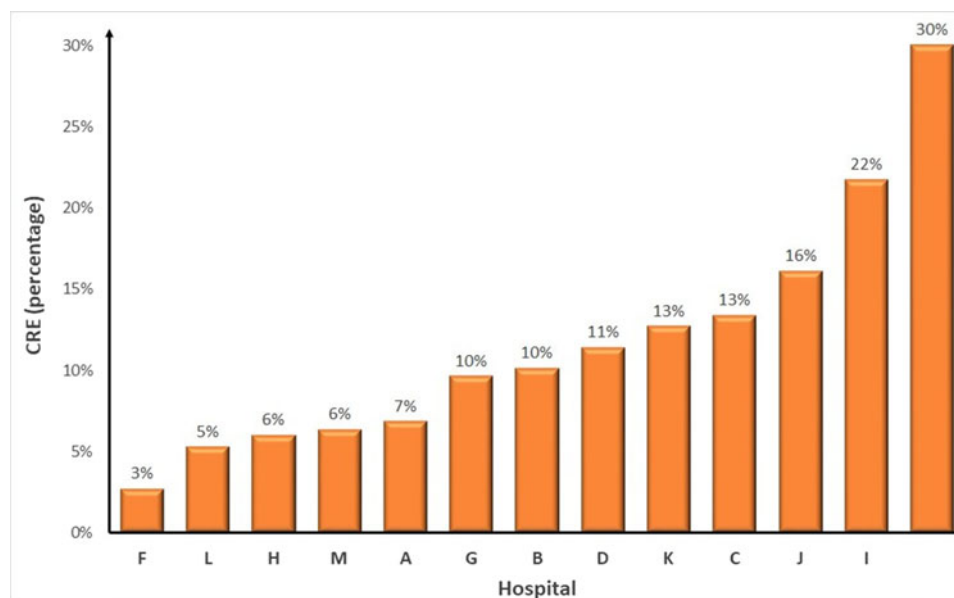**Fig. 1.**

Fig. 2.

CRE Enterobacteriaceae. **Conclusions:** Over 25 years, CRE percentage increase from almost zero in 1995–1999, to >20% in 2015–2019.
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Presentation Type:
Poster Presentation
Self-Contamination and Failure Modes During PPE Doffing: A Comparison of Two Powered Air-Purifying Respirator Hoods
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Background: High-level personal protective equipment (PPE) protects healthcare workers (HCWs) during the care of patients with serious communicable diseases. Doffing body fluid–contaminated PPE presents a risk of self-contamination. A study assessing HCW failure modes and self-contamination with viruses during PPE doffing found that, of all PPE items, the highest number of doffing failure modes and highest self-contamination risk occurred during removal of the 1-layer powered air-purifying respirator (PAPR) hood. Hood type may affect contamination risk; however, no experimental evidence exists comparing hood types. **Objective:** We quantified and compared the risk of self-contamination with viruses during doffing of a 1e-layer versus a 2-layer PAPR hood. **Methods:** In this study, 8 HCWs with experience using high-level PPE donned PPE contaminated on 4 prespecified areas with 2 surrogate human viruses, bacteriophage MS2 (a nonenvelope virus) and Φ6 (an enveloped virus). They completed a clinical task then doffed PPE according to a standard protocol. Following doffing,

inner gloves, hands, face, and scrubs were sampled for viral contamination using infectivity assays. HCWs performed the entire sequence twice, first with a 1-layer hood with 1 shroud then with a 2-layer hood with 2 shrouds. The Wilcoxon rank-sum test was used to compare viral contamination between the 2 hood types. HCWs were video-recorded to identify failure modes in their doffing process using a failure modes and effects analysis to identify ways that individual actions deviated from optimal behavior. **Results:** Φ6 transfer to hands, inner gloves, and scrubs were observed for 1 HCW using the 1-layer hood versus scrubs only for 1 HCW using the 2-layer hood. MS2 transfer to hands was observed for 2 HCWs using the 1-layer hood versus none using the 2-layer hood. Inner glove contamination was observed for 6 of 8 HCWs using the 1-layer hood versus 2 of 8 using the 2-layer hood. **Conclusions:** A significantly higher number of MS2 virus was recovered on the inner gloves of HCWs using the 1-layer versus the 2-layer hood (median difference, 2.27×10^4; $P = .03$). In addition, 31 failure modes were identified during removal of the 2-layer hood versus 13 failure modes for the 1-layer hood. The magnitude of self-contamination depends on the type of PAPR hood used. The 2-layer hood resulted in significantly less inner glove contamination than the 1-layer hood. However, more failure modes were identified during the doffing process for the 2-layer hood. In conclusion, the failure modes identified during the use of the 2-layer hood were less likely to result in self-contamination compared to the failure modes identified during use of the 1-layer hood.

Presentation Type:
Poster Presentation
Self-Contamination While Doffing Personal Protective Equipment

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Background: Personal protective equipment (PPE) effectiveness can be undermined by inappropriate doffing methods. **Objective:** We used human factors engineering methods to evaluate self-contamination during PPE doffing. **Methods:** In this study, 30 participants at a Midwestern academic hospital (A) donned and doffed 3 mask styles (n = 10), 2 gown styles (n = 10), and 2 glove styles (n = 10; the Doffy glove has a tab to facilitate doffing). Also, 30 additional participants at hospital A (residents or fellows, nurses, special isolation trained staff [SITS]) and 10 SITS at academic hospital B doffed a surgical mask, a breakaway neck gown, and exam gloves (PPE ensemble) twice: once while distracted with conversation and once when not distracted. We randomized the order in which participants used different PPE styles or they did the doffing scenario. We collected demographic data. We applied Glo Germ Mist (1.5 dilution in water) with a mucosal atomizer to participants' PPE before they doffed. We video-recorded

Table 1.

Table 1: Contamination Results

PPE type tested		Number of participants who self-contaminated	Median (range) number of spots
Masks & Gloves			
	Earloop	7/10	2 (0-12)
	Pouch	8/10	3 (0-14)
	Surgical	6/10	2 (0-7)
Gloves			
	Standard exam gloves	8/10	2.5 (0-9)*
	Doffy glove	3/10	0 (0-2)*
	Doffy glove after viewing "beak method" training video	5/10	0.5 (0-4)
Gowns & Gloves			
	Breakaway	8/10	6.5 (0-38)
	Tape-tab	7/10	3.5 (0-30)
PPE Ensemble			
Residents and Fellows			
	Distraction	6/10	2.5 (0-16)*
	Non-distraction	8/10	13.5 (0-43)*
Nurses			
	Distraction	7/10	4.5 (0-22)
	Non-distraction	9/10	6.5 (0-23)
Hospital A SITS			
	Distraction	9/10	7.5 (0-46)
	Non-distraction	10/10	11.5 (2-35)
Hospital B SITS			
	Distraction	6/10	3 (0-12)
	Non-distraction	8/10	3.5 (0-32)