Evaluation of Three Swab Transport Systems for the Recovery of Respiratory Tract Pathogens

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Background

Adequate specimen collection, organism survival, and subsequent release from the transport device are imperative for sensitive pathogen detection to occur. In recent years, swab transport devices have been improved by the addition of flocked swabs. These swabs have fibers that are attached perpendicular to plastic shaft applicator, to prevent trapping of the clinical sample. This study compared two brands of FDA cleared flocked swabs – Puritan Liquid Amies Transport System (Puritan Medical Products Co., LLC, Guilford, ME) (PF) and Copan eSwab Transport System with modified Liquid Amies (Copan Diagnostics, Inc, Brescia, Italy) (CF), to the Copan Transystem with liquid Stuart media (C).

Methods

Serial dilutions of *Haemophilus influenzae* (ATCC strain 10211), *Streptococcus pneumoniae* (ATCC strain 49619), and *Bordetella pertussis* (ATCC strain 9797) were made in sterile saline from 10^4-10^7 colony forming units/mL (CFU/mL). Swabs were inoculated with 100 mL of the suspension (image 1). Swabs were inserted into their corresponding transport device and plates were inoculated with either 100 mL of transport media (PF and CF), or by rolling the swab on the plate (C) and streaking for confluence at 0, 24, and 48 hours. Swabs were held at room temperature until inoculation. All plates were performed in triplicate. After 24 hours of incubation, colonies were counted manually and the counts were averaged (image 2).

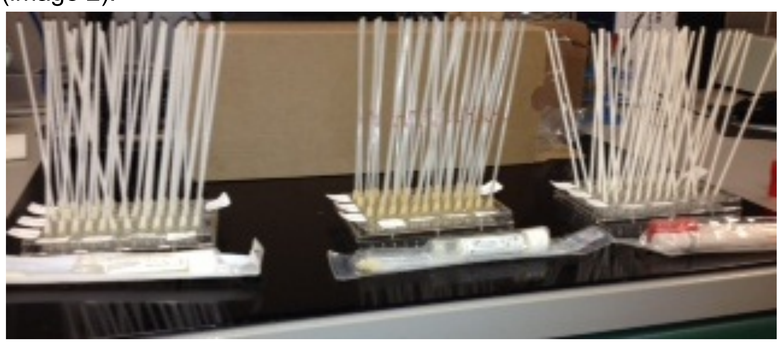

Image 1. Swabs inoculated with dilutions of organisms

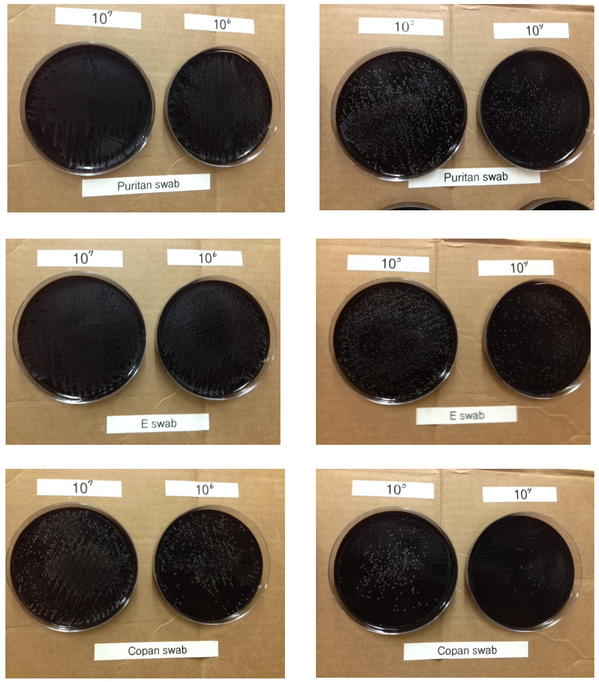

Image 2. *B. pertussis* plated at time 0 with 10^7-10^4 CFU/mL

		0 Hours				24 Hours				48 Hours			
		10^7	10^6	10^5	10^4	10^7	10^6	10^5	10^4	10^7	10^6	10^5	10^4
PF	*H. influenzae*	TNTC	TNTC	>200	55	TNTC	TNTC	>200	23	TNTC	>200	21	2
	S. pneumoniae	TNTC	>200	64	4	TNTC	>200	35	13	TNTC	>200	125	35
	B. pertussis	TNTC	TNTC	>200	>200	TNTC	TNTC	>200	127	TNTC	TNTC	>200	93
CF	*H. influenzae*	TNTC	TNTC	>200	45	TNTC	>200	114	10	>200	173	79	5
	S. pneumoniae	>200	33	23	<1	143	7	2	<1	72	1	0	0
	B. pertussis	TNTC	TNTC	>200	140	TNTC	TNTC	>200	52	TNTC	>200	85	5
C	*H. influenzae*	108	26	3	0	97	53	1	1	108	4	2	0
	S. pneumoniae	0	0	0	0	0	0	0	0	0	0	0	0
	B. pertussis	TNTC	>200	147	9	>200	187	15	1	>200	118	16	<1

Table 1. Colony counts recovered from plate inoculation

Image 3. Puritan , Copan eSwab, and Copan Transystem.

Results

Results are summarized in table 1. TNTC = too numerous to count. All colony counts are in CFU. PF and CF performed comparably for *H. influenzae* at all concentrations and time points. For *B. pertussis*, PF and CF recovered approximately equal numbers of organisms at zero and 24 hours, but CF recovered less CFU at 48 hours. PF swab recovered more organism at each dilution and time point than CF for *S. pneumoniae*. *S. pneumoniae* was not able to be recovered from the C swab at any dilution or time point.

Conclusion

PF and CF with their respective transport media recovered more CFU than the C swab without transport media consistent with other data on flocked swabs. Low numbers of organisms might not be recovered after 48 hours from the CF and C swabs, so delivery to the laboratory and planting should be performed as soon as possible. PF outperformed the CF for some fastidious organisms, but further study is needed to extrapolate these findings to other organisms.

Please contact Debra Reardon at debra.reardon@vtmednet.org with any questions.
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