Survival of pneumococci in three different commercial collection and transport systems (swabs) – do we miss pneumococcal disease due to flaws in transport conditions?

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Background

Streptococcus pneumoniae is a major pathogen for pneumonia, septicemia and meningitis. Identification can be done directly from patient samples or from cultures. However, susceptibility testing is only possible from cultures. We studied the culturability of pneumococci stored for up to 48h in different collection and transport swabs. Additionally we investigated the influence of inoculated bacterial mass, temperature and strain on recovery.

Materials and methods

We chose three different collection and transport systems: deltaSwab (deltalab), Sigma Transwab (MWE) and eSwab (Copan). *S. pneumoniae* ATCC49619 was chosen for initial studies on the influence of time and inoculum. To mimic **patient samples (PS)** a McFarland 0.5 solution was prepared and serially diluted. Swabs were inoculated with 100µl of the dilutions and stored at 4° C or room temperature (RT). Culture controls were done at 0, 24 and 48h. To mimic the situation of **sending strains to reference laboratories (RS)** we inoculated the swabs with the bacterial mass from a complete 90mm agar plate grown o/n at 35° C, 5%CO_2. 20 different pneumococcal strains were used. Swabs were stored at 4° C or RT. Culture controls were done after 0, 24 and 48h.

Results

The serially diluted ATCC 49619 could be recovered from the sigma Transwab down to a dilution of 1:100 and from the eSwab down to a dilution of 1:10. From the delta swab pneumococci could neither be recovered after 24 nor after 48h. Recovery from RS swabs was sufficient for all swabs and all storage types after 24h. However, after 48h of storage the amount of bacteria was already much reduced in the deltaSwab if stored at RT. For all swabs recovered amounts of bacteria were high if swabs were stored at 4° C.

All three swabs contain liquid Amies.

Figure 1: Swab systems tested: from left to right: eswab (Copan), Transswab (MWE), deltaswab (deltalab)

PS	eSwab			Transwab			delta-swab		
ATCC49619	0h	24h	48h	0h	24h	48h	0h	24h	48h
4°C	+	1:10-1:100	1:10	+	1:100-1:1000	1:100-1:1000	+	-	-
room temperature	+	1:1-1:10	1:1	+	1:100	1:10-1:100	+	-	-

Table 1: Results for **„patient samples“ (PS)**

RS	eSwab			Transwab			delta-swab		
20 strains	0h	24h	48h	0h	24h	48h	0h	24h	48h
4°C	+	+	+	+	+	+	+	+	+
room temperature	+	+	+	+	+	+	+	(+)	(+)

Table 2: Results for **„reference laboratory samples“ (RS)**

Conclusions

The three transport systems differed markedly in their recovery rate for pneumococci. Surprisingly recovery of pneumococci from swabs, which were stored at 4° C was higher than recovery from swabs which were stored at RT. Different strains did not show markedly different recovery rates. **Transport longer than 48h cannot be recommended.** Because the transport media recipes are identical we assume that the differences are caused by the plastic.

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