PRESENTED AT NVMM & NVVM SPRING MEETING 2009
PAPENDAL, NETHERLANDS

Comparison of Medical Wire's new Sigma-Swab With HealthLink Amies Transport System (Copan) for maintenance of microorganisms viability.

Stuczen M, Edwards-Jones V, Manchester Metropolitan University, Manchester, United Kingdom

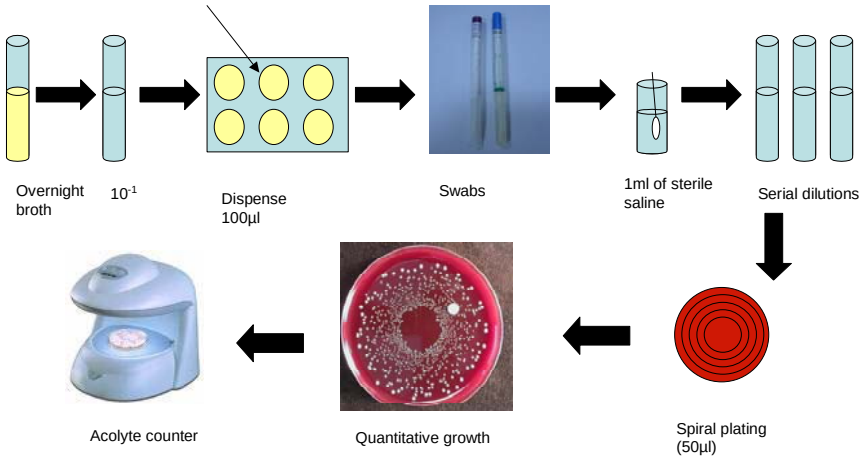
Introduction

Swab transport systems are used for a variety of specimen types and they must maintain organism viability during transport prior to plating. Also, the ideal swab system must absorb organisms from the infection site and allow release of organisms from the swab to the appropriate media. These are the most important aspects to be considered when choosing the appropriate collection device. Liquid and gel-based swab systems have been used for many years, but have limitations such that the specimen is diluted by immersion within the liquid or gel.

The objective of this study was to evaluate Medical Wire's Sigma-Swab and Copan's HealthLink Transporter (HLT) swab for their ability to release and maintain viability of *Escherichia coli* and *Staphylococcus aureus* and their mixtures. The Sigma-Swab is a new, medium free transport system and the absence of transport medium means there is no dilution of the specimen. In this study, the standard M40-A method (CSLI) was compared with a modified method, that incorporated the effect of nutrients absorbed onto the swab, on the recovery of organisms. During wound surface swabbing it is likely, that nutrients (body liquids, skin cells) as well as bacteria can be transferred to the transport device which can cause overgrowth during transport and these effects were tested for in the modified method.

Methods

- The suspension from a freshly grown isolate of each strain (*Staphylococcus aureus* - NCTC 6571 and *Escherichia coli* – ATCC 8739) was prepared in sterile saline diluted 1:10. Serial 10-fold dilutions were prepared from the suspension and plated onto nutrient agar as a control of quantitation. The plates were then incubated at 37°C for 24h, and a colony count was obtained to confirm inoculum concentration.
- Swabs were placed for 10 sec. into the saline suspension allowing the fluid to absorb. This was repeated using nutrient broth instead of saline in the modified method.
- Swabs were then inserted back into the transport device.
- Swabs were incubated at room temperature and at 4°C for 0, 24h and 48h.
- After the appropriate incubation period (to obtain baseline count – time zero - after 15 min. of incubation) each swab was removed and placed into 1 ml of sterile saline and mixed for 1 min.
- Serial dilutions prepared in sterile saline were inoculated onto the nutrient agar using spiral plater (Don Whitley Scientific, BS5687).
- All plates were incubated at 37°C for 24h in aerobic conditions.
- After incubation, a quantitative count was performed using Acolyte counter (Don Whitley Scientific).
- All experiments were carried out in triplicate



Results

Table 1. Recovery of S.aureus and E.coli from Sigma-Swab and Amies swab incubated at 4°C and RT and processed by standard CSLI procedure.

Organism	Swab System	No of CFU recovered at time period. (% in parenthesis)		
		0h	24h	48h
Staphylococcus aureus 4ºC	Sigma-Swab	8.62×10^5	7.75×10^5 (90)	7.61×10^5 (88)
	Amies swab	4.65×10^5	4.01×10^5 (86)	4.74×10^5 (102)
Escherichia coli 4ºC	Sigma-Swab	1.14×10^6	1.10×10^6 (96)	2.59×10^6 (227)
	Amies swab	9.44×10^5	9.53×10^5 (101)	2.42×10^6 (256)
Staphylococcus aureus RT	Sigma-Swab	8.62×10^5	2.38×10^6 (276)	3.58×10^6 (415)
	Amies swab	4.65×10^5	1.59×10^6 (342)	2.44×10^6 (524)
Escherichia coli RT	Sigma-Swab	1.14×10^6	4.67×10^6 (409)	4.57×10^6 (401)
	Amies swab	9.44×10^5	5.28×10^6 (559)	9.75×10^6 (1032)

Table 2. Recovery of S.aureus and E.coli from Sigma-Swab and Amies swab incubated at 4°C and RT and processed by modified method.

Organism	Swab System	No of CFU recovered at time period. (% in parenthesis)		
		0h	24h	48h
Staphylococcus aureus 4ºC	Sigma-Swab	3.76×10^6	8.48×10^6 (225)	1.16×10^7 (308)
	Amies swab	3.79×10^6	5.33×10^6 (140)	5.23×10^6 (137)
Escherichia coli 4ºC	Sigma-Swab	8.30×10^6	1.25×10^7 (150)	1.55×10^7 (186)
	Amies swab	9.68×10^6	1.79×10^7 (184)	2.11×10^7 (217)
Staphylococcus aureus RT	Sigma-Swab	3.76×10^6	2.31×10^7 (614)	4.20×10^7 (1117)
	Amies swab	3.79×10^6	2.91×10^7 (768)	5.11×10^7 (1348)
Escherichia coli RT	Sigma-Swab	8.30×10^6	3.20×10^7 (385)	3.55×10^7 (427)
	Amies swab	9.68×10^6	5.31×10^7 (548)	6.58×10^7 (680)

Both the Sigma-Swab and HTL were considered acceptable by CSLI M40-A criteria for both strains at 48h, but the Sigma-swab performed better using *E.coli.* The Sigma-swab released more CFU than HTL for the specimens processed by the standard procedure. For specimens processed by the modified method the release of bacteria was similar. Overgrowth was observed at 24h and 48h for both strains incubated at RT and processed by standard procedure and 4ºC and RT for samples incubated in the presence of nutrients.

Figure 2. *S. aureus and E.coli mixture in ratio 1:1 after incubation at 4ºC for 48h.*

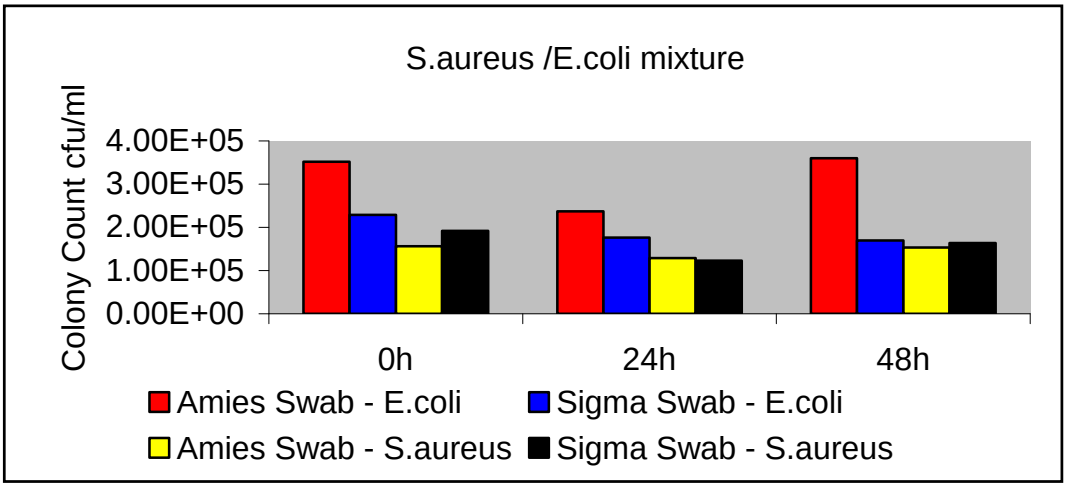
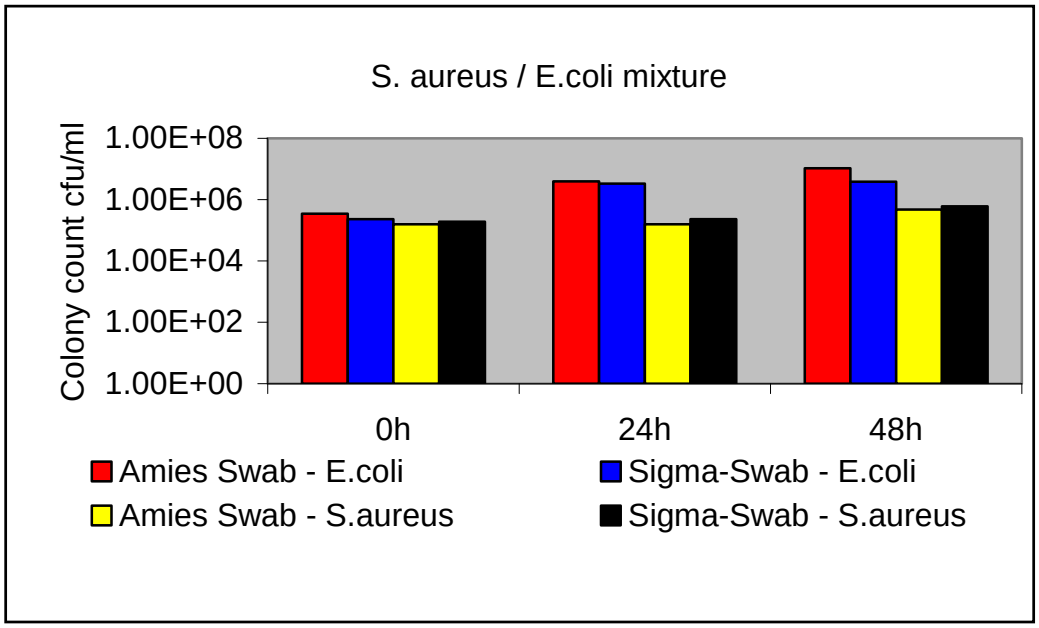


Figure 3. *S.aureus and E.coli mixture in ratio 1:1 after Incubation at room temperature for 48h. 1.8 log overgrowth of Escherichia coli on Amies swab comparing to 1.1 log overgrowth on Sigma-Swab.*



Discussion/ Conclusion

Loss of viability during transport will have a negative effect on bacterial culture results, especially when they are present in low numbers, also, the presence of nutrients can cause overgrowth during the transport. The perfect transport device should maintain viability of bacteria and prevent overgrowth. The Sigma-swab and Amies swab met acceptance criteria for all isolates tested, but the Medical Wire Sigma-swab medium free transport system maintained viability of bacteria optimally compared to the Copan HealthLink Amies swab.

References

1.Quality Control of Microbiological Transport Systems: Approved Standard. NCCLS document M40-A. 2003.

2. Sarina M, Lawrence D.M. Comparative Evaluation of Two New Amies Swab Transport Systems BD CultureSwab MaxV(+) (Copan) and the Fisherfinest (Starplex) Swab. ASM 105th General Convention, Atlanta 2005.

Manchester Metropolitan University

mwe medical wire