

CPHM- Performance of Eswab® Collection System Comparing to Semi-solid Swab in Gram Smear and Culture Interpretation and Reporting in Clinical Microbiology Laboratory

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Abstract

Background: Few studies have assessed the impact of Eswab® on Gram smear, culture interpretation and reporting from clinical specimens. We evaluated the performance of Eswab collected specimens planted by WASP® inoculator (EW) and by manual method (EM), comparing to the results obtained by conventional planting using semi-solid swab collection kit (CP).

Method: **Protocol A:** A total of 200 clinical specimens were collected on semi-solid swabs and planted routinely. These samples were then transferred by sterile technique into the Eswab vials and planted manually and by WASP for Gram smear (where applicable) and culture. **Protocol B:** Nasal and buccal specimens were collected from 10 volunteers in Eswab and semi-solid swabs. Additional 20 clinical bronchoscopic wash and drainage fluid specimens were transferred into Eswab vials and the semi-solid swabs. Gram smear and culture were performed by the three methods. The results of EW or EM were compared to that of CP and categorized based on the impact on working up and reporting as Agreement (A), minor discrepancy (MinD), and major discrepancy (MD).

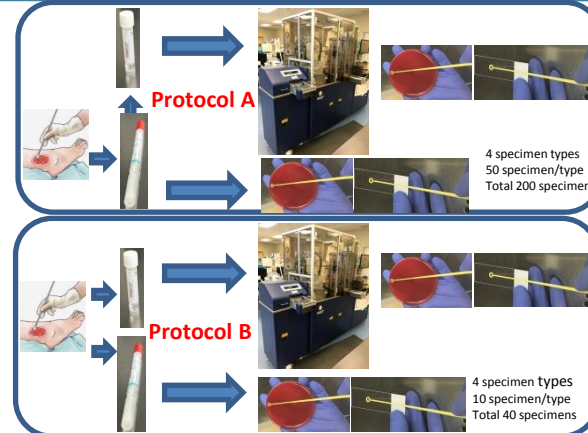
Results: 1) Smear interpretation: **Protocol A:** For WBC quantitation, 40% of specimens had MinD and 11% had MD, while 51% showed MinD and 4% MD for bacterial quantitation between EW and CP. Changes in cell morphology was noted in 12.5% of Eswab Gram smears where cells appeared more dense, difficult to differentiate between WBC and RBC, and contained more debris and background staining than the conventional swabs. **Protocol B:** 25% of the samples had MinD with 5% MD for WBC quantification, while 47.5% had MinD with 2.5% MD for bacterial counts between EW and CP. 85% of bacterial count discrepancies represented increased bacterial counts by EW. Altered cell morphology was again observed in protocol B. Similar results were found when comparing EM to CP in the two protocols. 2) Culture Results: **Protocol A:** For final report, there were 60.5% MinD and 3.5% MD between EW and CP. For **Protocol B**, no MD was identified with 85% MinD between EW and CP. Similar results were observed between EM and CP. In specimens with MinD for bacterial growth, more colonies from the Eswab and better isolation in EW were observed.

Conclusions: Eswabs improved bacterial yield from Gram smear and culture compared to semi-solid swabs. EW showed better colony isolation. Some cell morphology changes in Eswab specimens might impact the interpretation of intracellular bacteria and differentiation between WBCs and RBCs. Gram smear competence training is important for the transition from semi-solid swabs to Eswabs.

Background

The purpose of the evaluation was to determine if the Eswab can provide results comparable to those seen with the semi-solid swabs routinely used by the clinical laboratory.

Methods



The results of EW or EM were compared to that of CP and categorized, based on the impact on working up and reporting, as
1) Agreement (A): the results match with no difference in reporting.
2) Minor Discrepancy (MinD): quantitative discrepancy but no clinical impact and report would not change.
3) Major Discrepancy (MD): the difference between methods resulted in a clinical impact on report.

Results

Smear Interpretation:

Protocol A (See Table 1)

- 11% and 4% MDs for WBC and bacterial counts comparing EW to CP.
- Similar results were found when comparing EM to CP.

Protocol B

- Less MD with 85% of bacterial count discrepancies represented increased bacterial counts by EW.

Table 1. Summary of Gram Stain Results Comparing EW to CP (Protocol A)

Type of specimen	Number of specimens with minor discrepancy (MinD) (%)			Number of specimens with major discrepancy (MD) (%)		
	WBC quantitation	Bacterial quantitation	Both WBC & bacteria quantitation	WBC quantitation	Bacterial quantitation	Both WBC & bacteria quantitation
Superficial wound	16 (32%)	9 (18%)	7 (14%)	9 (18%)	3 (6%)	0
Vaginal specimen	9 (18%)	27 (54%)	8 (16%)	2 (4%)	1 (2%)	0
Total	25 (25%)	36 (36%)	15 (15%)	11 (11%)	4 (4%)	0

Results continued

Smear Interpretation

(cont.): 12.5% of Eswabs in Protocol A showed cell morphology change with cells appearing more dense or more difficult to differentiate between WBC and RBC, and contained more background staining when comparing to CP. Similar morphology change were also observed in the Eswabs in Protocol B (Figure 1).

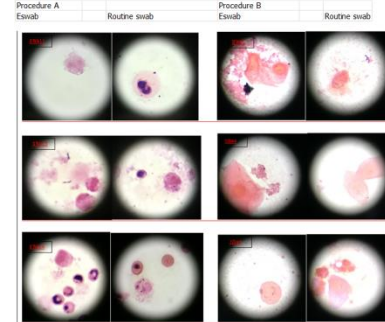


Figure 1. Comparison of Gram smear microscopic observations. SW #11, 12, 14, and 18 are superficial wound specimens from procedure A. EW #1, 10A, and 15 #1 are bronchoscopic wash and nasal swab specimens from procedure B. In SW #11, the Eswab WBC is fragmented and the nuclei were not clear. In SW #12 the cells looked fragmented and might be difficult to appreciate intracellular bacteria in the Eswab specimen. In SW #14 and 18, the cells became dense and difficult to appreciate nuclei and detectable bacteria in the Eswab specimen. In SW #6 and 15 #4, lower dense debris was found in Eswab compared to routine swabs. In SW #5, the cell became rounded and agglutinated were not appreciated.

Culture Results:

Protocol A (Table 2)

- More colonies and better isolation in EW.
- Similar results were observed between EM and CP.

Protocol B

- No MD when comparing to CP.

Table 2. Summary of Culture Results Comparing EW to CP (Protocol A)

Type of Specimen	Minor Discrepancy (MinD)	Major Discrepancy (MD)
Superficial wound	27 (54%)	4 (8%)
Vaginal	30 (60%)	3 (6%)
Throat	38 (76%)	0
GBS Screen	26 (52%)	0
Total	121 (60.5%)	7 (3.5%)

Conclusions

- Eswabs improved bacterial yield from Gram smear and culture
- Cell morphology changes in Eswab specimens may impact the interpretation of intracellular bacteria and differentiation between WBCs and RBCs.
- Gram smear competence training is important for the transition from semi-solid swabs to Eswabs.