

A comparative evaluation of automated (Copan WASP®) versus manual methods for plate streaking and specimen processing



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Introduction

Laboratories are under pressure to produce quality results, with shorter turn-around-times using fewer materials and staff. The Copan Walk-Away Specimen Processor (WASP®) is an automated total solution for microbiology specimen processing (Figure).



Figure 1. The Copan Walk-Away Specimen Processor (WASP)

Aims

Our aim was to assess the performance and efficiency of the WASP versus manual processing in a high throughput clinical diagnostic microbiology laboratory.

Methods

The plate-streaking ability of the WASP was assessed using 50 specimens (27 pus swabs, 10 sputa, 10 stools and 3 pus samples (Figure 2)). Specimens were inoculated manually onto plates and were then either streaked by the WASP or manually by a technologist.

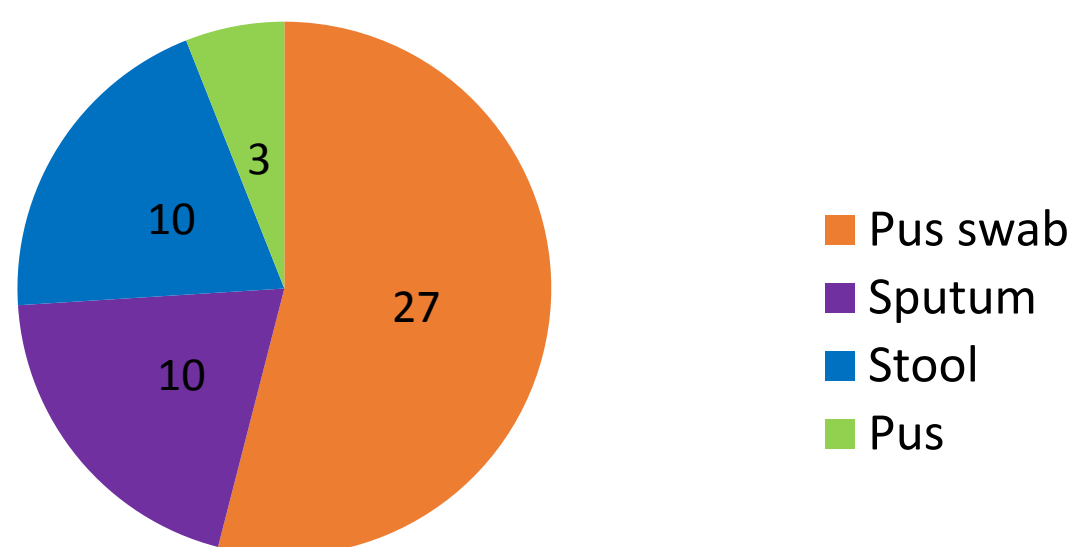


Figure 2. Specimens: streak only mode

The second part of the evaluation assessed the WASP for complete specimen processing (inoculation and streaking) using 50 urines, 50 stools and 30 pus specimens (Figure 3).

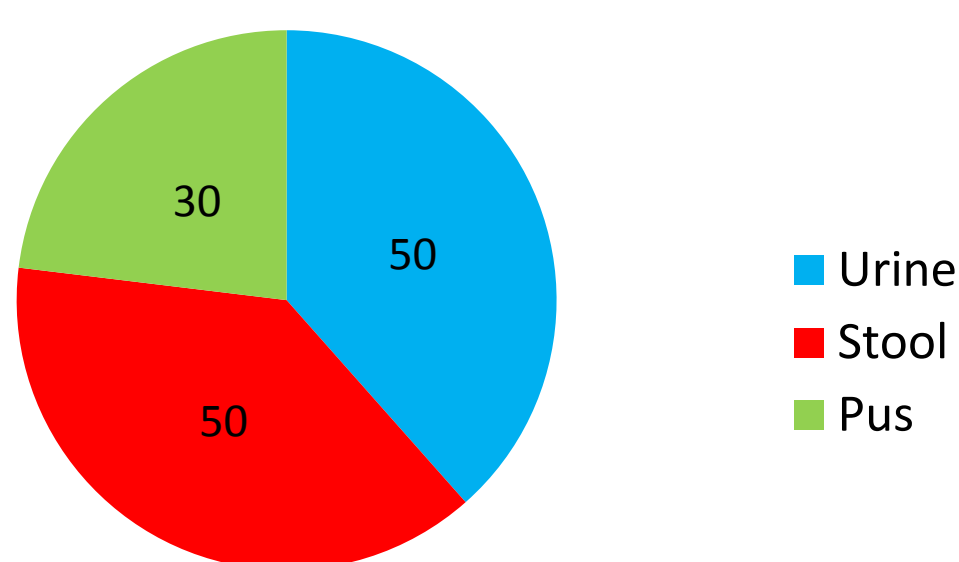


Figure 3. Specimens: complete specimen processing

All specimens except pus were tested in duplicate for both methods (twice on WASP and twice manually). Efficiency and quality parameters were assessed including: organism recovery, grading of growth, single colony adequacy and cross-contamination. A stress run was performed using 100 urine specimens to test robustness. Reproducibility and accuracy was calculated. Productivity was assessed by calculating full time employee (FTE) "hands-on-time" saved (Figure 4).

Results

Efficiency and Quality:

Table 1. Reproducibility and accuracy of Copan Walk-Away Specimen Processor (WASP) vs. manual methods

	Reproducibility (WASP)	Reproducibility (Manual)	Accuracy (WASP)	Accuracy (Manual)
Streak only mode	94%	94%	100%	95%
Urine	94%	86%	97%	94%
Stool	82%	96%	80%	95%

Reproducibility and accuracy was not calculated for pus specimens. There was zero cross-contamination observed with the WASP. The stress test plated 100 urines on a bi-plate within 20 minutes, which was found to be highly efficient. Overall, the WASP showed better single colony adequacy and grade 3 growth of colonies which allows for better interpretation of plates and more colonies for further investigations.

Productivity:

There was a time-saving with all methods using the WASP, which was more evident for specimen processing than streak-only mode (Table 2). Time saving was also increased when using the WASP for pus swabs which included gram stain preparation and broth inoculation.

Table 2. Full time employee (FTE) "hands on time" saved

	FTE "hands on time" saved
Streak only mode	25 minutes per 100 plates
Urine	63 minutes per 100 urines
Stool	105 minutes per 100 stools
Pus	190 minutes per 100 pus (+ gram stain + broth)

URINE Timing

MANUAL	Time	WASP	Time
Number of specimens: 10 urines (uriselect biplate ie. 2 specimens per plate)		Number of specimens: 10 urines (uriselect biplate ie. 2 specimens per plate)	
Routine morning	5 min	Switch on WASP, daily	8 min
Preparation of bench		maintenance	
		Load carousel	1 min
	(Not included)		(Not included)
Decant into appropriate urine container and label - 3 min (not included)			
Unpack specimens onto bench	2 min	Load pre-labelled specimens on WASP	40 sec
Collect and label plates		Select WASP program	
Light Bunsen burner	3 sec	WASP planting and streaking time	7 min
Invert specimen			
Remove lid			
Dip loop into specimen	5 min		
Inoculate and streak plates			
Stack plates for incubator	15 sec	Offload plates from WASP	15 sec
Pack into incubator		Pack into incubator	
Total time (Manual)	7 min 18 sec	Total time (WASP)	7 min 55 sec
		Hands on time	55 seconds
FTE total hands-on-time SAVED = 6 min 23 sec			

Figure 4. Example of productivity calculation

Limitations

The major challenges related to the specifications of the specimen containers and media plates currently in use by the laboratory.

Conclusion

The WASP showed comparable efficiency and quality to the existing manual processing method, with significant time saving. The WASP displayed better reproducibility and accuracy for urines compared to stool specimens. Technical problems associated with the WASP settings for stool processing may have contributed to this reduction in accuracy. To fully automate specimen processing using the WASP system, standardized media (size and quality) and high quality specimen containers and a move towards liquid-based microbiology specimen collection (e.g. ESwab™ collection and transport system) is recommended. The WASP is a promising tool for automated specimen processing in high throughput microbiology laboratories.

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