

# COMPARISON OF TWO COMMERCIAL QUANTITATIVE SYSTEMS FOR DETERMINING THE MINIMUM INHIBITORY CONCENTRATIONS OF *SALMONELLA* AND *SHIGELLA* SPECIES

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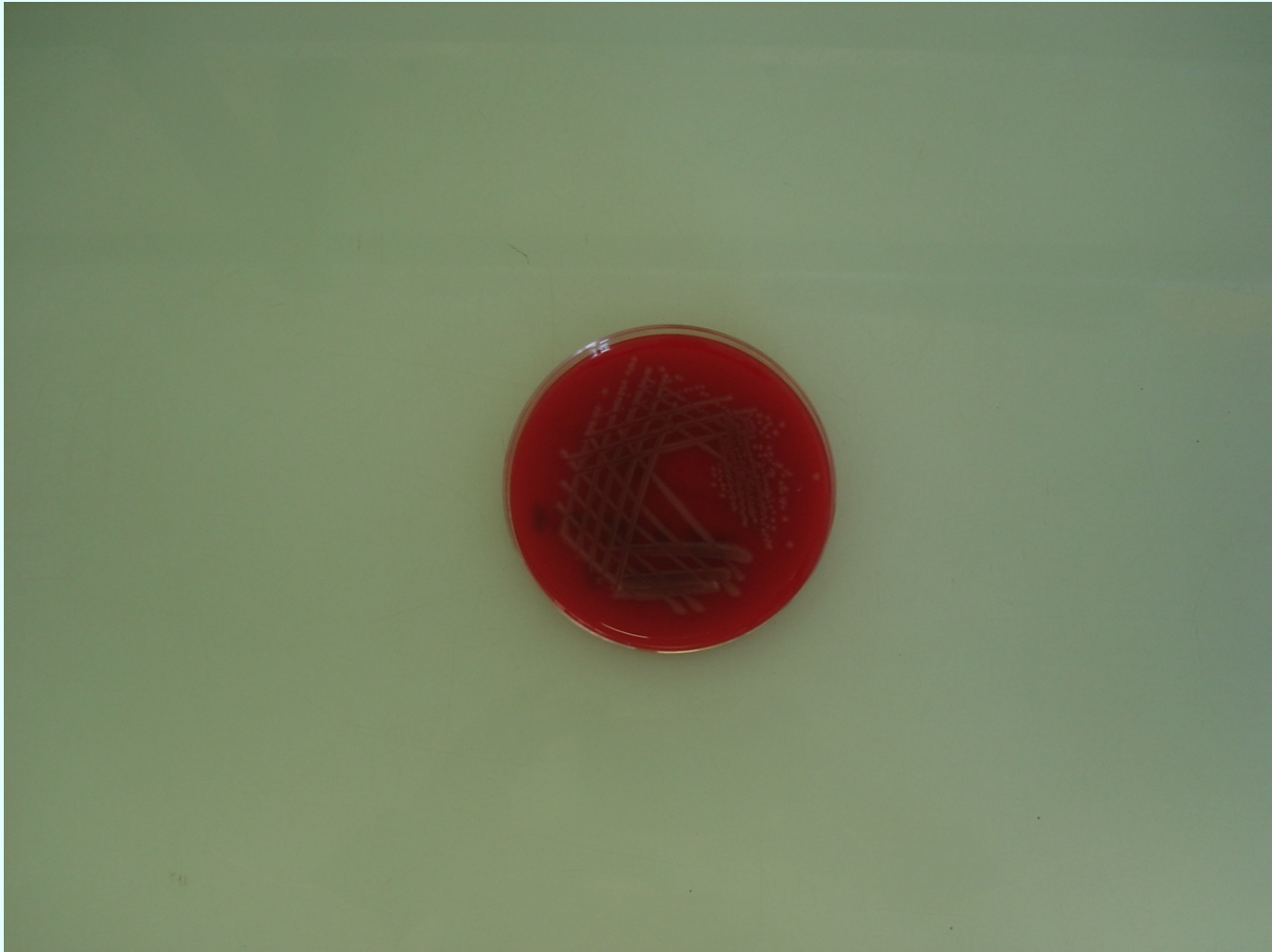
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## Introduction

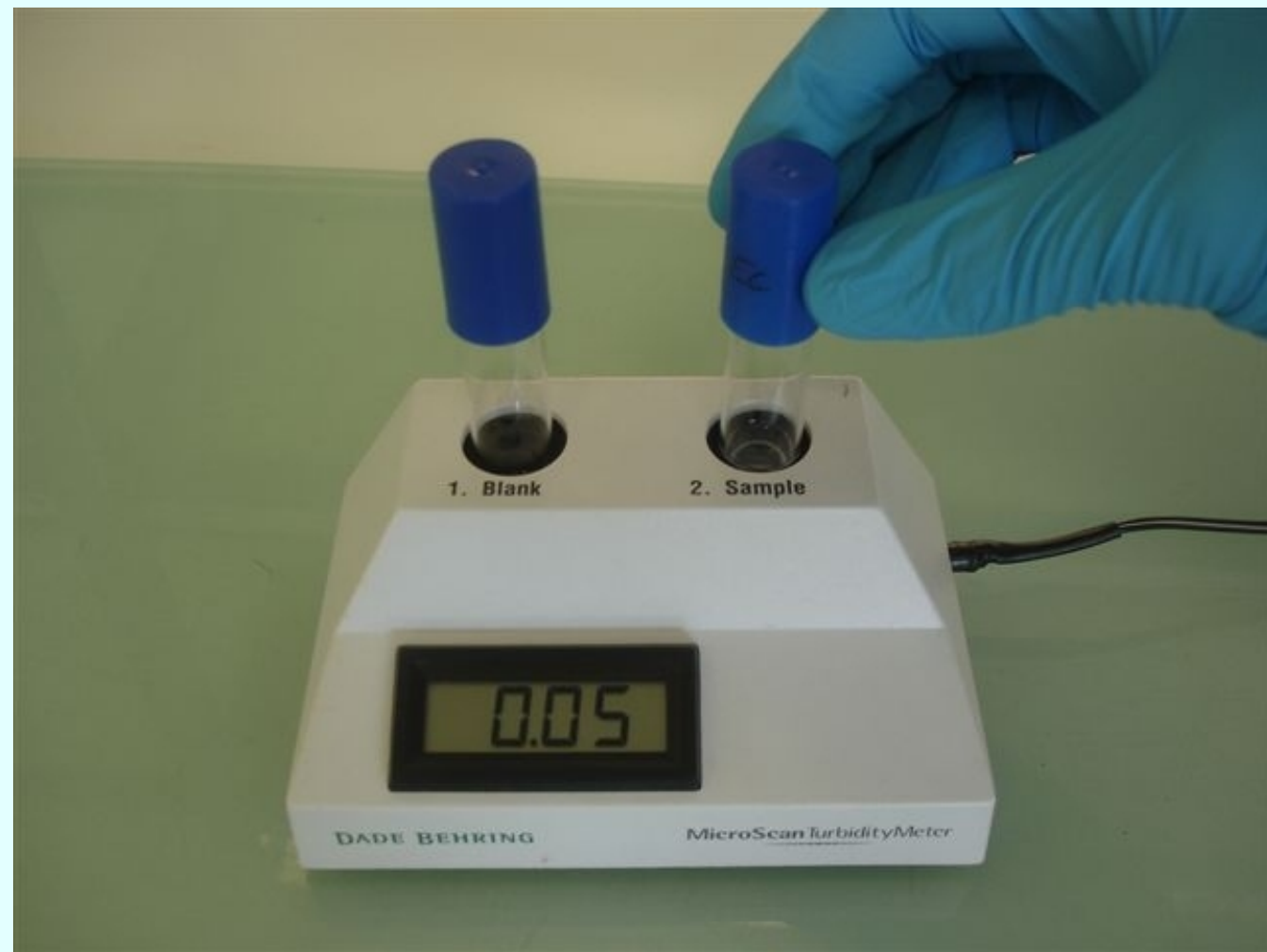
Minimum Inhibitory Concentration using Etest strips is performed on all isolates of *Salmonella*, *Shigella* and *Vibrio cholerae* isolates submitted to EDRU as part of the national surveillance program for South Africa. Monitoring resistance trends in these pathogens is used for epidemiological purposes and to provide clinicians with data that can be used to select appropriate treatment to patients. Both commercial strips are based on the gradient method, which offers a quantitative technique to determine the Minimum Inhibitory Concentrations (MIC) against microorganisms. Antibiotics used for this study include; ampicillin, amoxicillin/clavulanic acid, ciprofloxacin, imipenem and ceftriaxone.

## Methodology

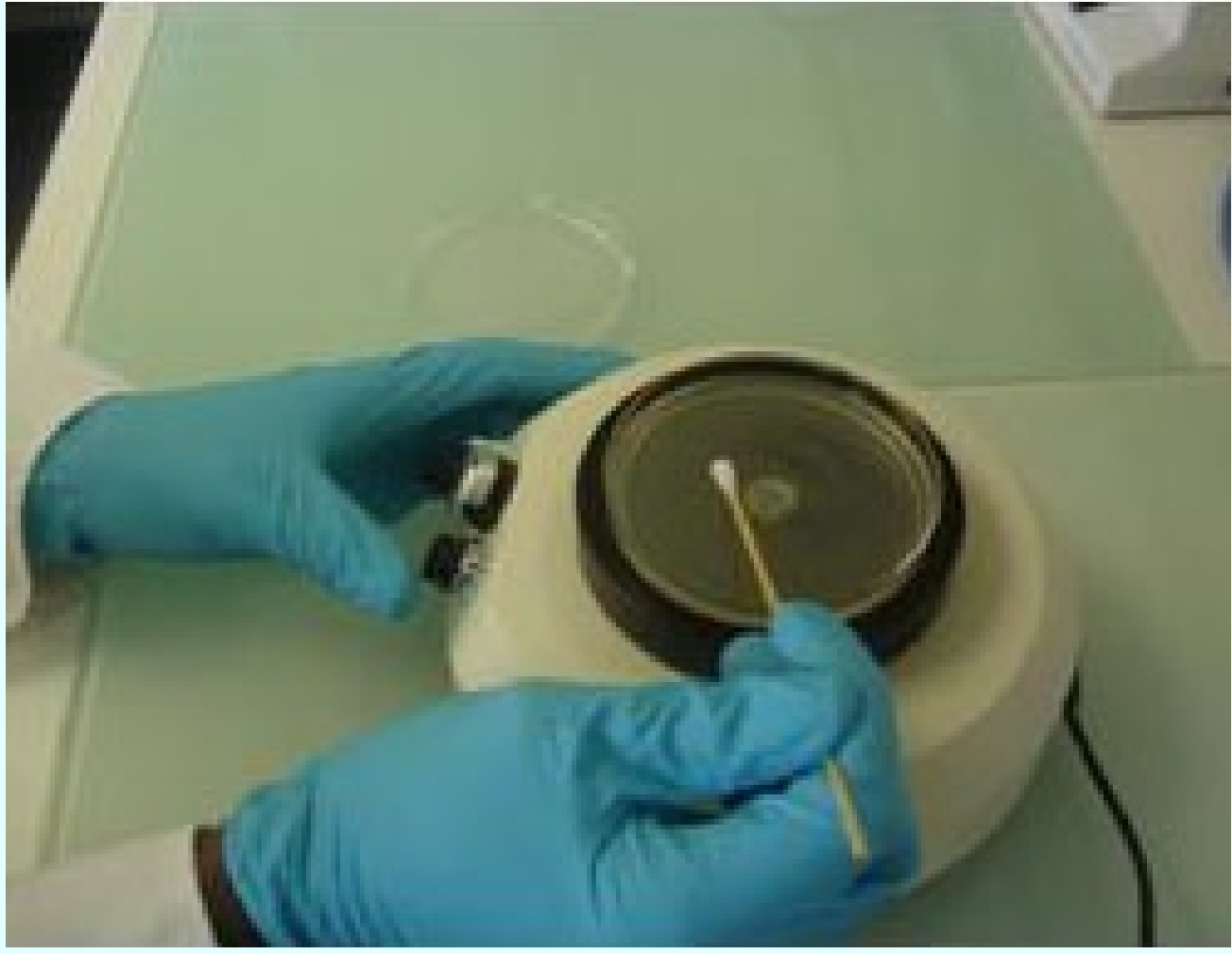
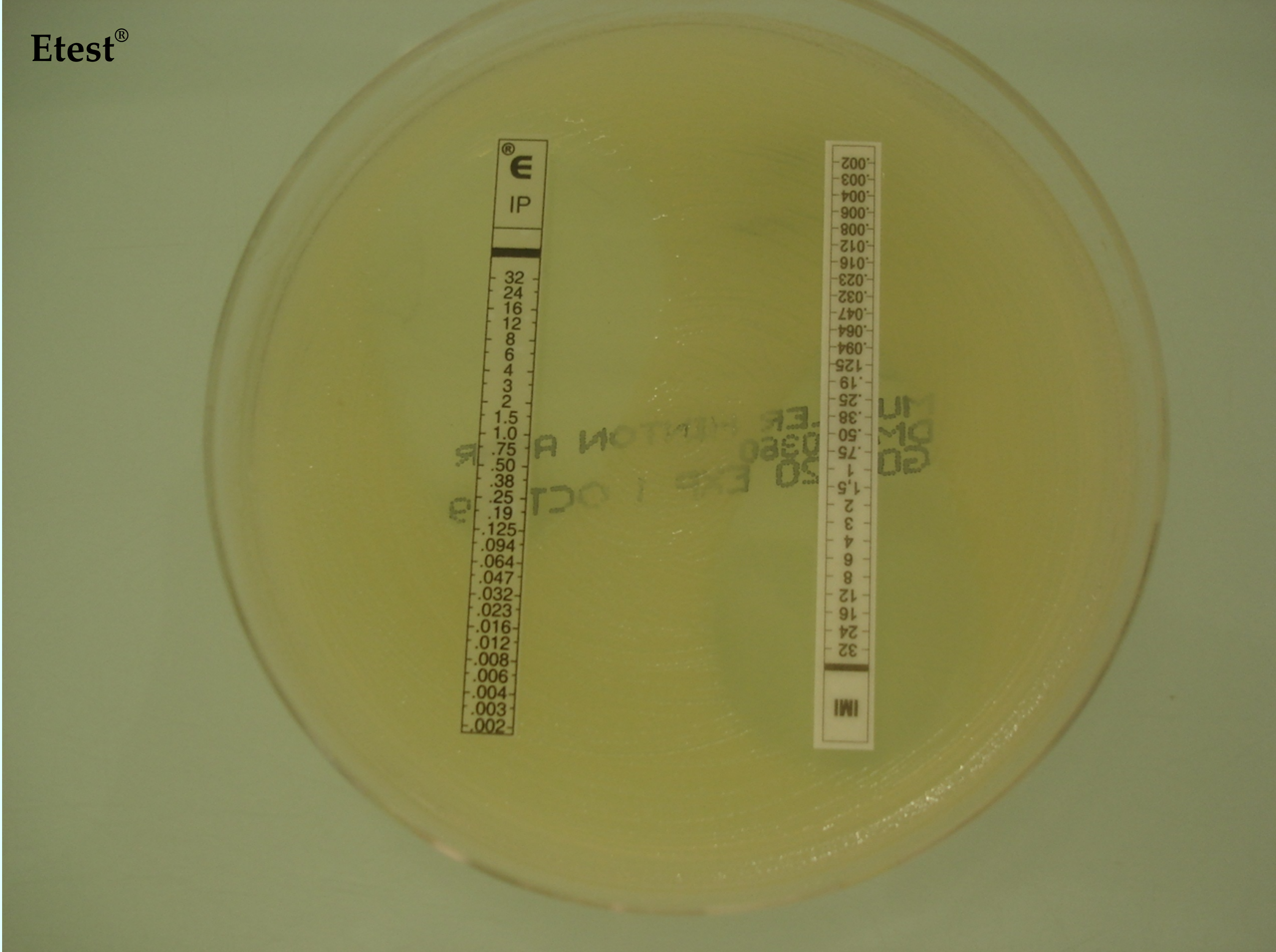
A total of 85 Strains were serotyped according to the standard operating procedures of the laboratory. Isolates were tested using the Etest<sup>®</sup> (AB bioMérieux, Sweden)) and MIC Test Strip<sup>®</sup> (LIOFILCHEM, Italy). Antimicrobial susceptibility testing was carried out according the manufacturers recommendation using Mueller Hinton agar. The turbidity of the suspension was obtained using a microscan turbidity meter which was appropriate to a McFarlane 0.5 standard. Retro C80<sup>®</sup> (rotary plater) was used to achieve uniformed streaking on agar plates. Antibiotic strips were applied to the inoculated plate using a Nema C88<sup>®</sup> (vacuum pen). *E. coli* ATCC<sup>®</sup> 25922 was included as a quality control strain. Agar plates were incubated at 37°C for 18 hours. A one dilution difference was used for discrepancies when reading the minimum inhibitory concentration.



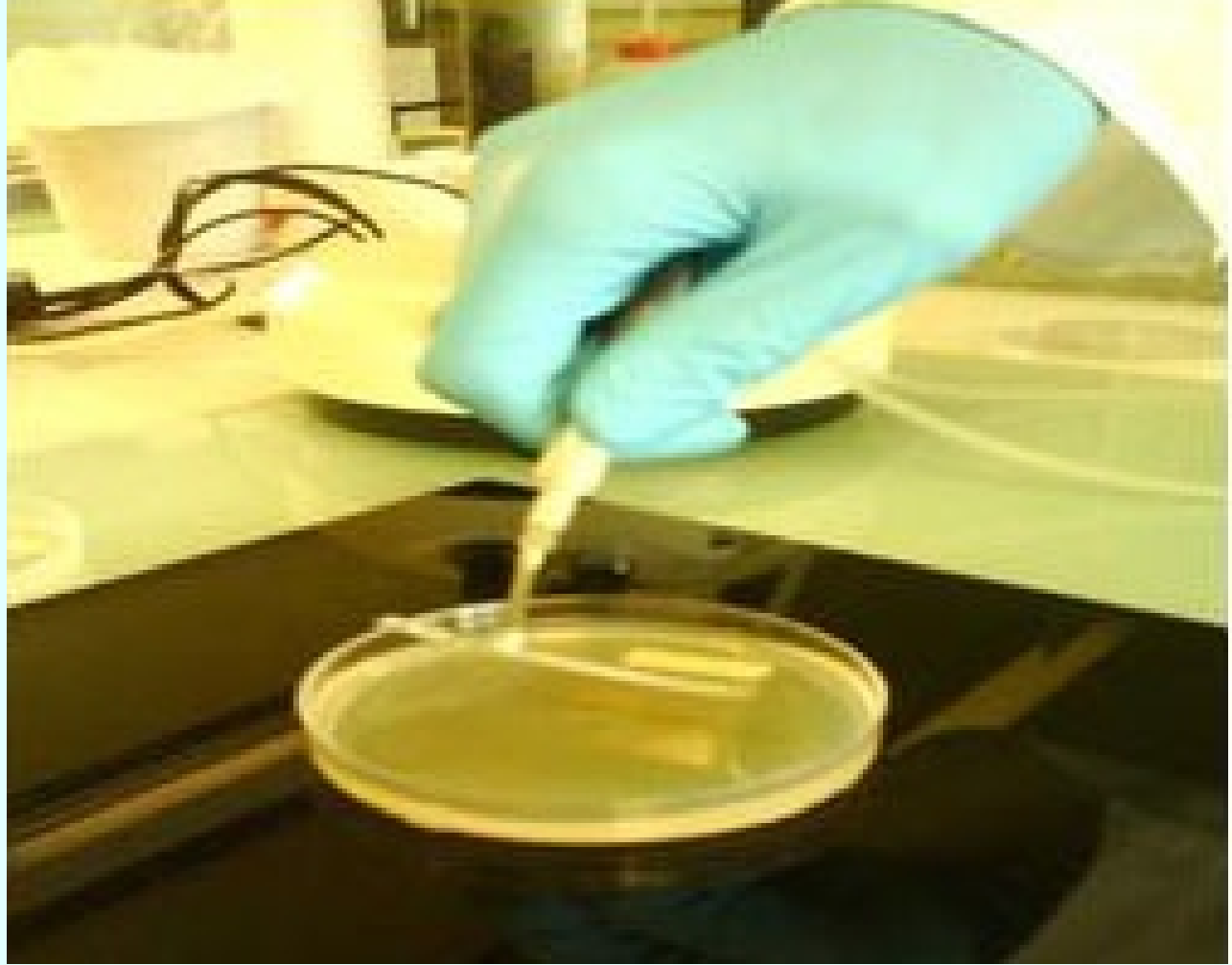
Pure isolate



Suspension reading equating to a McFarlane 0.5 standard



Using a Retro C80<sup>®</sup> (rotary plater)



Placing the antibiotic strip using a Nema C88<sup>®</sup> (vacuum pen)

## Results

Of the total of 85 isolates, 23 *Salmonella* serotypes and 48 *Shigella* serotypes were screened against the various antibiotics (Table 1). The Etest<sup>®</sup> method classified 53/85 (62%) as sensitive and 32/85 (38%) resistant to ampicillin. When using MIC Test Strip<sup>®</sup>, 41/85 (48%) strains were sensitive, 9/85 (11%) intermediate and 35/85 (41%) to ampicillin. With regards to amoxicillin/clavulanic acid; 61/85 (72%) of the isolates were sensitive, 7/85 (8%) intermediate and 17/85 (20%) resistant with the Etest strips<sup>®</sup>. 54/85 (64%) sensitivity, 2/85 (2%) intermediate and 29/85 (43%) was observed when using MIC Test Strips<sup>®</sup>. There was 84/85 (99%) sensitivity and 1/85 (1%) resistant to ceftriaxone with for both methods. All the isolates 85/85 (100%) were susceptible to ciprofloxacin and imipenem for commercial strips (Table 2).

Table 1: Serotypes of enteric pathogens included in study

		Number isolates	of
<i>Salmonella enterica</i> serovar	Typhi	1	
	Typhimurium	10	
	Enteritidis	4	
	London	2	
	Newport	2	
	Blockley	1	
<i>Shigella flexneri</i>	Chandans	1	
	Infantis	1	
	Sandiego	1	
	2a	14	
	3a	9	
<i>Shigella sonnei</i>	1b	6	
	6	5	
	variant X	6	
	I	5	
<i>Shigella boydii</i>	II	16	
	2	1	
Total isolates		85	

Table 2: Results (in percentage %) of minimum inhibitory concentrations

Antibiotic	S,I,R	Etest (%)	Liofilm (%)	Range (mg/ml)
Ampicillin	S	62	48	≥8
	I	0	11	16
	R	38	41	≥32
Amoxicillin/ clavulanic acid	S	72	64	≥8
	I	8	2	16
	R	20	34	≥32
Imipenem	S	85	85	100
	I	0	0	0
	R	0	0	0
Ciprofloxacin	S	100	100	≥1
	I	0	0	2
	R	0	0	≥4
Ceftriaxone	S	99	99	≥8
	I	0	0	16-32
	R	1	1	≥64

## Conclusion

Etest strip (AB bioMérieux, Sweden)) and the MIC Test Strip (LIOFILCHEM, Italy) systems performed favorably. There were a few discordant results between the two strips, which would need to be repeated and clarified by use of an independent, third MIC system, as we need to verify which of the test strips were giving discordant results (Table 3). The two commercial systems are easy to perform, read and provide equivalent results.

Table 3: Relative agreement

Total isolates	Ampicillin	Amoxicillin/ clavulanic acid	Ciprofloxacin	Imipenem	Ceftriaxone
	85	85	85	85	82
Discrepancies	14	17	2	2	0
Concordance	72	69	84	83	82
Exclusion	0	0	0	1	4
Relative agreement	84.7%	81.2%	98.8%	97.6%	100%

Acknowledgments/potential sources of bias:  
This work was supported in part by Davies Diagnostics (Pty) Ltd, Johannesburg, South Africa

