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Molecular detection of pathogens for acute gastroenteritis

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Background: Acute gastroenteritis (AGE) is caused by a wide range of pathogens including bacteria. Culture methods for diagnosis of bacterial pathogens of AGE is time-consuming and labour intensive, with results available only after 3-4 days. This study aimed to compare a same-day-to-result commercial molecular method using BD MAX™ Enteric Bacterial Panel for the detection of bacterial faecal pathogens against conventional culture method, and to characterise the epidemiology of bacterial AGE in Singapore.

Material/methods: PCR for *Campylobacter* spp., *Salmonella* spp., *Shigella* spp./Enteroinvasive *Escherichia coli* (EIEC) and Shiga toxin-producing *E. coli* (STEC)/*Shigella dysenteriae* was performed on the BD MAX™ platform. Concurrent routine bacterial culture was performed for *Salmonella*, *Shigella*, *Campylobacter*, *Vibrio* and *Aeromonas* spp. DNA extracts obtained from the BD MAX™ extraction tubes were separately tested using a laboratory-developed PCR assay (LDT) against the same bacterial pathogens detected by BD MAX™ assay. In addition, a separate LDT for enterotoxigenic *E. coli* (ETEC) detection was performed. Bacterial culture and the LDTs were used as the reference “gold standard”, against which the results from BD MAX™ were compared.

Results: 299 samples were included in the study, with no bacterial pathogens detected in 190 samples (63.5%). The following bacterial pathogens were detected: *Salmonella* (n=56, 18.7%), *Campylobacter* (n=29, 9.7%), *Vibrio parahaemolyticus* (n=6, 2.0%), *Shigella*/EIEC (n=6, 2.0%), ETEC (n=4, 1.3%), STEC (n=2, 0.7%), *Aeromonas* (n=2, 0.7%) and *Plesiomonas shigelloides* (n=1, 0.3%). When compared to the “gold standard”, conventional culture method missed 36 (33.0%) out of 109 pathogens, including *Salmonella* (n=15), *Campylobacter* (n=11) and *Shigella* (n=4). Conversely, testing by BD Max™ alone failed to detect 13 (11.9%) pathogens which were not in the BD Max™ panel and 2 *Salmonella* spp. BD Max™ reported 7 (2.3%) false-positive results. A combination of BD

Max™ testing and culture for halophiles would have a diagnostic sensitivity of 96.2% and specificity of 96.6%.

Conclusions: BD Max™ increased the detection yield of bacterial AGE pathogens, but the absence of detection capability for *Vibrio* and *Aeromonas* affects the overall sensitivity of the system. A combination of culture for *Vibrio* and *Aeromonas* with BD Max™ usage will provide for optimum detection sensitivity.