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Comparison of rapid quantitative PCR-based and conventional culture-based methods for enumeration of *Enterococcus* spp. and *Escherichia coli* in recreational waters

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ABSTRACT

Recreational water quality is currently monitored using culture-based methods that require 18 to 96 h for results. Quantitative PCR (QPCR) methods that can be completed in less than 2 h have been developed, but they could yield different results than the conventional methods. We present two studies in which samples were processed simultaneously for *Enterococcus* spp. and *Escherichia coli* using two culture-based methods (EPA method 1600 and Enterolert/Colilert-18) and QPCR. The proprietary QPCR assays targeted the 23S rRNA (*Enterococcus* spp.) and *uidA* (*E. coli*) genes and were conducted using lyophilized beads containing all reagents. In the first study, the QPCR method developers processed 54 blind samples that were inoculated with sewage or pure cultures or were ambient beach samples. The second study involved 163 samples processed by water quality personnel. The correlation between results of QPCR and EPA 1600 during the first study (r^2) was 0.69 for *Enterococcus* spp., which was less than that observed between the culture-based methods (r^2, 0.87). During the second study, the correlations were similar. No false positives occurred in either study when QPCR-based assays were used with blank samples. Levels of reproducibility measured through coefficients of variation were similar for results by *Enterococcus* QPCR and culture-based methods during both studies but were higher for *E. coli* QPCR results in the first study. Regarding the concentration at which beach management decisions are issued in the State of California, the agreement between results of *Enterococcus* QPCR and EPA method 1600 was 88%, compared to 94% agreement between EPA method 1600 and Enterolert. The beach management decision agreement between *E. coli* QPCR and Colilert-18 was 94%. The samples showing disagreement suggested an underestimation bias for QPCR.