

Factors affecting the relationship between quantitative polymerase chain reaction (qPCR) and culture-based enumeration of *Enterococcus* in environmental waters.

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ABSTRACT

Aims: To determine the extent to which discrepancies between qPCR and culture-based results in beach water quality monitoring can be attributed to: (i) within-method variability, (ii) between-method difference within each method class (qPCR or culture) and (iii) between-class difference.

Methods and Results: We analysed 306 samples using two culture-based (EPA1600 and Enterolert) and two qPCR (Taqman and Scorpion) methods, each in duplicate. Both qPCR methods correlated with EPA1600, but regression analyses indicated approximately 0.8 log₁₀ unit overestimation by qPCR compared to culture methods. Differences between methods within a class were less than half of this and were minimal for between-replicate within a method. Using the 104 *Enterococcus* per 100 ml management decision threshold, Taqman qPCR indicated the same decisions as EPA1600 for 87% of the samples, but indicated beach posting for unhealthful water when EPA1600 did not for 12% of the samples. After accounting for within-method and within-class variability, 8% of the samples exhibited true between-class discrepancy where both qPCR methods indicated beach posting while both culture methods did not.

Conclusion: Measurement target difference (DNA vs growth) accounted for the majority of the qPCR-vs-culture discrepancy, but its influence on monitoring application is outweighed by frequent incorrect posting with culture methods due to incubation time delay.

Significance and Impact of the Study: This is the first study to quantify the frequency with which culture-vs-qPCR discrepancies can be attributed to target difference - vs - method variability.

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