Reply to Dr. Kim and Colleagues Regarding Use of a Rapid Ethylene Glycol Assay

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We thank Kim et al. for comments regarding our article on the utility of the rapid ethylene glycol (EG) assay [1]. We recognize that other institutions may have alternative approaches for the diagnosis of toxic alcohol ingestions. Kim et al. suggest use of unexplained acidosis as the major laboratory sign for evaluation of toxic alcohol ingestion. However, this has the potential to miss recent ingestions that have not progressed to acidosis. In our retrospective studies covering 14 years of toxic alcohol analysis at our medical center, we found 20 cases of toxic alcohol poisoning whose initial laboratory studies showed elevated osmolal gap (OG) without anion gap or acidosis [2,3]. We agree that readers should be aware of the strengths and limitations of any particular approach.

The ethanol volatile screen order described in our study is targeted towards detecting ingestion of toxic alcohols based on OG. Pathology residents or attendings are notified of cases with OG greater than 15 and then contact the clinical service to determine if gas chromatography (GC) analysis is needed. The OG threshold of 15 was established to provide a balance between detecting cases and avoiding too many false positives by using a lower threshold. Mindful that cases may present without an elevated OG, clinical services always have the option of directly requesting GC analysis based on clinical history or other signs such as acidosis or anion gap. Additionally, the rapid EG assay may be ordered independently, allowing quick assessment of EG ingestion even in “late” ingestions.

To clarify other points raised, the 222 rapid EG measurements performed on 106 patients included multiple measurements performed during hospital encounters for management of EG poisoning. These were not repeated measurements due to instrument error or other analytical issues. Lastly, while GC analysis for glycols was not performed on the 93 patients with negative rapid EG cases, detailed chart review revealed no evidence of any missed EG cases. There were six cases of isopropanol ingestion and one case of methanol ingestion, all detected in a timely manner following GC analysis for these compounds [1].

Based on our work and another publication from a national reference laboratory [4], the rapid EG assay can provide excellent detection of EG and is very unlikely to produce false negatives. The major limitation is the potential for false positives by propylene glycol which is readily recognized by reaction kinetics. In those cases, the need for GC can be assessed based on the same type of discussion with clinicians that occurred prior to the availability of the rapid EG assay.

As a practical concern, many clinical laboratories are facing a shortage of medical technologists and laboratory technicians. The trend is towards lean environments that make it very challenging to offer labor-intensive technologies such as GC. Thus, the gold standard analytical method for toxic alcohols is often not available with fast enough turnaround time to impact clinical decision-making for antidote therapy or dialysis [5]. Development and optimization of rapid assays for toxic alcohols would be a significant improvement in patient care.

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Compliance with Ethical Standards

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