

Investigation of False Positives in CEDIA Buprenorphine Assay in Urine Drug Screening

Authors Ke, W.¹, Bennett, M.J.¹, Butlin, L.¹, Kinniburgh, D.W.¹

¹Alberta Centre for Toxicology, University of Calgary, Calgary, Alberta, Canada

Background

Retrospective analysis of clinical laboratory data can be employed to monitor the performance of testing assays as well as evaluate test utilization. Urine drug testing is standard practice in the management of patients with an opioid use disorder. This testing is typically done via an immunoassay screen followed by a mass spectrometry confirmation. Immunoassays are subjected to cross-reactivity and can lead to false-positive results. The objective of this study was to use historical data to determine the rate of false positive buprenorphine results in an opioid dependent population.

Methods

Urine drug screening results spanning a one-year period were mined to determine samples that screened positive for buprenorphine but confirmed negative for buprenorphine and/or its metabolite norbuprenorphine. Buprenorphine results were collected on an Olympus AU480 instrument and the mass spectrometry results were collected using an in-house developed multiple reaction monitoring method on an Agilent 6470 instrument.

Results and Discussion

During Jan 2023 to Dec 2023, 28.0% of the CEDIA positive buprenorphine samples above a cut-off concentration of 10 ng/mL were not confirmed by LC-MS/MS. The false positive rate increased to 81.8% when considering only buprenorphine results with a concentration ranging from 10 ng/mL to 50 ng/mL and increased to 97.8% when considering buprenorphine results between 10-20ng/ml. Further investigation into the false positive results between 10-50 ng/ml revealed the presence of high concentrations of morphine, codeine, hydromorphone, methadone and methamphetamine (alone or in combination) in the urine samples at concentrations lower than what is required for cross-reactivity in the package insert.

Conclusions

Our findings determined that there were a significant number of false positive values for buprenorphine when we compared the immunoassay results to the mass spectrometry confirmation results. The specificity of the CEDIA buprenorphine assay appears to be influenced by the cumulative presence of structurally related and unrelated compounds. When conducting urine drug testing in an opioid-dependent population, it may be necessary to consider raising the buprenorphine cut-off due to the presence of other opioids and substances of abuse in the sample.

Key Words

Buprenorphine, False Positive, Cross Reactivity, Drug Screen