SMS messaging to become a complement to existing passive AE reporting systems. At the Queensland University of Technology, we hope to leverage the potentials of SMS messaging and bring it to the PC of chronic disease, with a specific focus on diabetes to improve the reporting of AEs for antidiabetics. The collective work on designing interventions that address the important link between AEs and MA might encourage the extension of the PC spectrum to address more interrelated outcomes and provide the base for additional, more comprehensive meta-analyses in the future.

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Leeb A, Regan AK, Peters IJ, Leeb C, Leeb G, Effler PV. Using automated text messages to monitor adverse events following immunisation in general practice: an analysis of an Australian programme because they likely require 2-way communication for participants. Such interventions require integrated contributions from personnel with technical, allied health, and medical expertise.

In Reply It is well known that nonadherence to therapies in chronic diseases is associated with increased morbidity, mortality, and health care costs. Poor adherence is known to result from an interplay of multiple factors related to patient, therapy, and health care system. Key factors affecting adherence include motivation, forgetfulness, adverse effects, cost of therapy, complexity of regimen, and patient beliefs about disease or therapy.

Our recent systematic review and meta-analysis exploring the role of text message intervention for enhancing adherence in chronic disease identified 16 randomized clinical trials. These studies employed text messaging as a reminder to the patient to adhere to their medication, offered motivation, and provided a means of providing-disease specific information or education. The trials did not use text messaging to collect information related to adverse effects of medications. The intervention focused on development of simple strategies providing support at an individual level.

Ahmadvand and colleagues suggest that text messaging platforms could be upscaled to include the ability for collecting information on adverse effects and adverse events. We agree that new approaches such as this are valuable to explore. These approaches could add complexity and cost to existing programs because they likely require 2-way communication, as well as additional personnel to monitor participant replies and health professionals to guide needs of each individual participant.

At The George Institute for Global Health, Westmead Hospital, and The University of Sydney, Australia, we are currently evaluating a multicenter randomized clinical trial (ACTRN12613000793718) sponsored by the National Health and Medical Research Council, studying a more complex text message-based intervention focused on medical adherence as part of secondary prevention for cardiovascular diseases. The text message–based intervention program includes simple reminders, motivation, and customized education on medications and associated adverse effects, as well as encouraging 2-way communication for participants. Such interventions require integrated contributions from personnel with technical, allied health, and medical expertise.

Our systematic review and meta-analysis3 provides preliminary evidence on the effectiveness of this intervention. There remains a need for robust future research that considers personalized needs and incorporates multiple strategies to support adherence.

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Toxic Alcohol Calculations and Misinterpretation of Laboratory Results

To the Editor We read with interest the Teachable Moment in a recent issue of JAMA Internal Medicine by Himmel and colleagues3 and commend them on sharing this experience of medical error and disclosure. Regarding the clinical aspects of toxic alcohol poisoning, a few points merit discussion.

First, the ethanol concentrations provided are discordant. The molecular mass of ethanol is 46.1 g/mol and to convert mmol/L to mg/dL, multiply by 4.61 (this corrects for the unit change); therefore a level of 8.1 mmol/L converts to 37.3 mg/dL, not 144 mg/dL (31.2 mmol/L). Depending on which is correct, very different interpretations will be drawn. Second, when facing an elevated osmole gap, one must determine if the gap can be accounted for by ethanol alone. The authors do not specify whether the osmole gap of 27 was adjusted for the ethanol. Importantly, ethanol’s contribution to the osmole gap is more than 1 mosm to 1 mmol. In fact, it ranges from 1.21 to 1.25 mosm to 1 mmol. Practically speaking, a conservative correction of 1.20 (ie, adding a fifth of ethanol) becomes particularly important at high concentrations of ethanol, say over
20 mmol/L, a common source of high osmole gap confusion and unnecessary fomepizole administration. Only if the level is 8.1 mmol/L, rather than 31.3 mmol/L, is it justified to test for toxic alcohol levels.

Next, the methanol concentrations are also problematic. Again, there is a conversion error because the upper limit of normal of 4 mg/dL converts to 1.25 mmol/L, not 0.84 mmol/L (molecular mass 32 g/mol). More importantly, the corrected level of 0.06 mmol/L is implausibly low. Traces of methanol are present in distilled, fermented, and even non-alcoholic beverages. Co-ingested ethanol inhibits methanol metabolism, allowing methanol to accumulate. A more likely value was 0.6 mmol/L in this chronic alcoholic. Regardless, this concentration is clinically insignificant, and the case illustrates the danger of reporting very low concentrations as anything other than undetectable. By reporting a discrete value, normal or nontoxic levels can be viewed as positive, misinterpreted, mistranscribed, and misconverted, as this case demonstrates, leading to unnecessary investigation and treatment.

Lastly, because ethanol easily out-competes methanol for oxidation by the alcohol dehydrogenase family of enzymes, even 8 mmol/L of ethanol would be expected to block 6 mmol/L of methanol, providing time to clarify the clinical picture. The acidosis is not severe and is consistent with alcoholic ketoacidosis, rendering the decision to initiate hemodialysis less emergent. The patient denied suspicious ingestions beyond gin presumably purchased from the Liquor Control Board of Ontario. And William Osler reminds us to listen to our patients, they are telling us the diagnosis.

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Letters

To the Editor We read with interest the article by Himmel and colleagues1 that discussed the institution of hemodialysis for an erroneous laboratory result: a teachable moment. JAMA Intern Med. 2016;176(4):431-432.

Conflict of Interest Disclosures: None reported.


To the Editor We read with interest the Teachable Moment by Himmel et al1 in a recent issue of JAMA Internal Medicine describing the case of a female patient inappropriately treated with hemodialysis for an erroneous value of serum methanol. Although we would agree that ordering appropriate investigations and considering an unexpected laboratory value in the context of the patient’s clinical signs and symptoms are essential to prevent inappropriate patient management and safeguard patient safety, we also wish to express mindful considerations about this case.

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Laboratory diagnostics develop through a hierarchical pathway that entail the preanalytical, analytical, and postanalytical phases.2 Indeed, the total testing process is not foolproof, and many problems may emerge throughout the activities of test ordering, sample collection, sample analysis, and results reporting. The case described by Himmel et al1 should be seen as a clerical example of how the use of appropriate information, technology, and tools could have made a transcriptional error virtually impossible. In the vast majority of modern clinical laboratories, test results are no longer manually transcribed, even when they are performed using point-of-care testing devices. Laboratory data are automatically transmitted from the analyzer to the laboratory information system according to broadcast or query-host technologies.3 Many laboratories have also implemented expert and clinical decision support systems that have been developed for improving the quality of the validation process through the production of alarms whenever laboratory data deviate from a preestablished set of rules. The system flags abnormal results, including those of many toxic compounds such as methanol,4 and the flagged results then require careful revision by an expert pathologist. Finally, double checking results entered of diagnostic tests is now commonplace in low-technology laboratories that cannot afford high-value information technology or for analyses performed by manual techniques and instrumentations not connected to the laboratory information system. Despite many ongoing efforts to increase the quality of laboratory diagnostics, the chance that a transcriptional error such as reported by Himmel et al1 may occur is very unlikely in modern clinical laboratories. Despite this, we encourage all clinical laboratories to continue recording and monitoring all types of errors by using well-established quality indicators,5 therefore increasing the safety of the total testing process.

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Conflict of Interest Disclosures: None reported.


In Reply We appreciate the interest and comments provided by Su and Hoffman, Lippi and Plebani, and Wu and Sivilotti in regards to our Teachable Moment “Hemodialysis in a Healthy Patient—A Case of an Erroneous Laboratory Result.”

Su and Hoffman are correct that a low or normal osmolar gap does not exclude methanol poisoning. Specifically, in the later stages of methanol poisoning the osmolar gap may be normal, and the anion gap may be elevated.2 We further agree that being aware of the most up-to-date recommendations3 for the management of methanol toxic effects can be challenging, and that when in doubt it is prudent to consult a medical toxicologist. In our case, the poison control center was consulted, and they made recommendations that were based on the available guidelines at that time.4

Lippi and Plebani bring to light the errors modern laboratories make to provide consistent and accurate results. Our implicit assumption of the reliability of results made us all the more surprised when we discovered the next morning that a transcription error had occurred in the laboratory. If nothing else, this experience has made us appreciate how little we as clinicians understand of the science behind quality checks and processes in hospital laboratories, even as we heavily rely on their results for our decision making. The complexity of medicine has taken this out of the domain of clinicians, and so we appreciate that these comments provide supplementary information on how laboratories might prevent errors like this from happening again in the future.

We agree with Wu and Sivilotti that our ethanol values were discordant. This represents, ironically, a calculation error related to conversion of SI to empirical units, and as such should read: “Serum toxicology screening demonstrated a serum ethanol level of 37.3 mg/dL (8.1 mmol/L) and a methanol level of 19.22 mg/dL (6.00 mmol/L) (normal range: <4.00 mg/dL [<1.25 mmol/L]).” Fortunately, this does not change the main finding of our case report; specifically, that the methanol value was transcribed as abnormal when, in fact, the level was below the lower limit of normal. As a result of our case the laboratory no longer reports the exact methanol value if it is below the lower limit of normal to avoid a similar error.

Our case, and the discussion thereafter, highlights not only the importance of automated laboratory results but also the importance of interpreting results in the context of the patient’s presentation. When discordance arises, it is important to pause and think critically about the information and to engage in conversations with colleagues, medical toxicology, as well as laboratory staff.

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Letters


Syncope While Driving in Denmark

To the Editor The recent study by Numé et al1 in a recent issue of JAMA Internal Medicine reports an association between prior hospitalization for syncope and increased risk of motor vehicle crashes, with subsequent recommendations for including syncope in the assessment of fitness to drive. This study differs significantly from previous studies in that the patients in this Danish nationwide cohort study were older (median age, 66 years), with a higher incidence of cardiovascular disease (34.8%).1 Thus, while the cause of syncope was not reported, this group possibly had syncope owing to another cause besides vasovagal syncope (VVS). In a study of highly symptomatic patients with VVS (mean [SD] age 38 [17] years), there was a low incidence of VVS while driving (2 of 174 cases), with a low estimated risk of serious harm or death (<0.0035% per person-year).2

Neurally mediated syncope was identified as the most common cause (37.3%), followed by cardiac arrhythmias (11.8%), in an earlier study evaluating the clinical characteristics, causes, and prognosis of syncope while driving.3 Among 3877 patients evaluated for syncope, 381 (9.8%) patients (mean [SD] age 55.8 [18.4] years) had syncope while driving, with a low recurrence of syncope while driving (2.6%).3

The National Highway Traffic Safety Administration 2014 Crash Data Key Findings4 revealed that there were 32 675 people killed in motor vehicle crashes in the United States. Among the fatalities, 31% were due to alcohol impairment; 28% due to speeding; and 10% due to distracted driving. While the risk of serious harm or death due to syncope while driving is low and may be mitigated with lifestyle measures to abate VVS episodes, the cause of syncope in the Danish study is unclear, but an older population with a significant incidence of cardiovascular disease suggests a more ominous cause.

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In Reply We thank Chen-Scarabelli and Scarabelli for their interest in our study.1 We acknowledge that our study lacks data on the causes of syncope and cannot estimate risk attributable to specific causes of syncope. Our study was based on hospital International Classification of Diseases diagnosis codes, which do not specify the etiology of syncope. Many cases of syncope remain of unknown origin, however, and clinicians will still need to evaluate patient fitness to drive after an episode of syncope.

Our study of a nationwide cohort of 41 039 adult patients with a primary discharge diagnosis of syncope is representative of the most common clinical presentations of syncope.2 Our study of an unselected, nationally representative population has a different design than previous studies of selected patients with specific diagnoses, such as the recent study by Dr Tan and colleagues3 on vasovagal syncope and driving. Most previous studies have been based on small numbers of selected participants, and collected self-reported data about syncope, driving, and collisions that are subject to selection, recall, and information biases. In contrast, we used the total Danish general population, statistically controlled for available variables, and analyzed objective measures of subsequent accidents.

We agree that the risk of subsequent motor vehicle accidents after an episode of syncope is small in absolute terms, but nevertheless, these data raise important questions about policies concerning driving. Many initiatives are designed to reduce speeding, drunken driving, and driving while distracted by mobile devices. Even though traffic accidents owing to medical conditions such as syncope are less common than these causes, the medical profession has the expertise and the responsibility to assess fitness for driving after syncope because accidents may injure both the patient and others. We argue that further research needs to be done, emphasizing appropriate study design, sample size, and outcome measurements, to examine why this association between syncope and motor vehicle crashes occurs. Meanwhile, syncope should be considered as one of several factors in a broad assessment of medical fitness to drive.

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