

and type 2 diabetes<sup>13</sup> should increase pediatric endocrinologists' familiarity with these treatments and their safety profiles.

The ultimate goal is to improve patient outcomes and reduce the mortality gap currently seen for people with T1D. Aligning practice with guidelines informed by stronger research such as this paper by Katz will help to direct efforts to improve management of hypertension and dyslipidemia in youth with T1D to achieve this goal. ■

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## "Toxicohistrionics": Flint, Michigan and the Lead Crisis



In this volume of *The Journal*, Gómez et al report an in-depth analytical view of events that occurred in Flint, Michigan, in 2014 and 2015.<sup>1</sup> The events in Flint, which apparently arose from a change in the water supply, entered the public realm through news outlets rather than the scientific literature. On September 24, 2015, data released to the public triggered a media firestorm. By April 20, 2016, a report on National Public Radio opened with a paragraph that read, "Lead seepage into the drinking water in Flint, Michigan, has caused a massive public health crisis and prompted President Obama to declare a federal state of emergency there."<sup>2</sup>

This "public health crisis" was based in large part on a study that found an increase in the percent of subjects with elevated blood lead levels from 2.1% to 4.0%. At the time, I found myself asking, "Does this imply that the geometric mean blood lead level doubled or the number crossing an arbitrary threshold doubled or perhaps even the number requiring treatment doubled?" Some of those scenarios would indeed be troubling for any physician treating children. The data as published in February 2016, by Hanna-Attisha et al are accurate as presented, but left many questions.<sup>3</sup> The focus was on a single

point change from 2013 to 2015 given as pre and post change in the water supply. The data show the change in percentage of blood lead levels of >5 µg/dL, the current upper limit of normal, between the 2 events.

Gómez et al take a closer look at the Flint data and have answered many questions, and raised a number of issues about how we in the scientific community communicate risk and statistics.<sup>1</sup> These authors conclude that, over an 11-year span, blood lead levels in this community continued to decrease and that it is impossible to differentiate the increase that occurred in 2015 from other random variations over time. A similar change occurred in 2010-2011. The mean blood lead level did not double. It increased by 0.11 µg/dL. No children underwent chelation therapy in this time. The authors are to be congratulated for a straightforward presentation of the data. Based on this

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The author is and has testified in cases involving lead exposure on behalf of defendants, but not in the state of Michigan.

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more comprehensive view of the data, the furor over this issue and the resultant firings and criminal actions seem way out of proportion to the actual risks to children from lead exposure.

There certainly were good reasons to repair the damages to the Flint water system. The finding of increased lead levels in the water would be sufficient to prompt changes. Other risks such as Legionnaire's disease may also have been demonstrated.<sup>4</sup> In retrospect, however, there was no reason to escalate to a lead-related public health crisis, particularly because, from a purely objective statistical standpoint, the changes seen could simply have been due to random variation. The use of 2 data points may contribute to the logical fallacy post hoc ergo propter hoc: establishing a cause–effect relationship based on temporal sequence. The question is whether a different presentation of the data and more critical journalistic review could have prevented this event?

Percent increases and terms like doubling, as repeated by the media, may not present a meaningful measure of risk. As has been extensively studied, blood lead levels in the US have decreased from a mean of 15 µg/dL in the mid-1970s<sup>5</sup> to the current levels, which are generally <2 µg/dL.<sup>6</sup> This commendable success is on the basis of elimination of lead in gasoline, canning, paint, and other sources with improved nutrition particularly with iron supplementation. Flint, Michigan, seems to have shared in this success and has continued to decrease to a mean of 1.15 µg/dL in 2016.

I have in the past used the term “toxicohistrionics” to describe public and professional overreactions to substances in our food chain or environment where real risk has been exchanged for theoretical risk.<sup>7</sup> Many times this reporting is on the basis of weak but statistically significant associations found in the realm of epidemiology. It is pleasant to comment on a study that reports critically analyzed epidemiologic data on an event where reporting in the media and publication never gave us a real sense for the degree of “crisis.”

I do not wish to seem to be unduly critical of the Hanna-Attisha et al publication, because it reflects a trend in the current literature to use percentages and partial data instead of more granular and undigested detail.<sup>3</sup> This tactic may, however, lead to untoward public perception of statistics when such words as “doubling” used employed. “Doubling” may represent an increase of 400 per thousand to 800 per thousand, which everyone would agree is an issue. However, going from 1 per billion to 2 per billion is also doubling.

The authors of this article have wisely steered away from the issue as to whether the subtle increase of blood lead levels would

have any perceptible impact on this population.<sup>1</sup> I would point to a noted lead researcher, Dr Howard Hu, who when commenting on the situation in Flint, Michigan, said that “low-level lead exposure can be mitigated by good parenting, good schooling and good nutrition.”<sup>8</sup> Certainly, the data do not support the wild accusations in the media of devastating harm. Is there any problem with overstating the risks? Indeed, the concern would be that by overly focusing on this issue, we are not focusing on the equally important issues of nutrition, education, housing, and inner-city stress and violence that many have pointed to as prominent risk factors in the development of lower socioeconomic children. In shifting our focus from a more balanced perspective, we may be falling short in advocating for the children in our nation. ■

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