From the Editor-in-Chief

Remember Flint

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HUMAN BEINGS HAVE MINED, USED, AND VALUED LEAD FOR over 6,000 years. The chemical term for “lead” comes from the Latin, *plumbum*, which was chosen precisely because the soft, malleable metal can be so easily bent and shaped into pipes or plumbing. Across time, it has been fashioned into tools, toys, and utensils, used as a sweetener for wines, and even added to gasoline for that extra kick in a car’s engine and to paint for that gleaming sheen covering the walls of one’s home.

Lead’s many dangers have been documented since, at least, the era of the Roman Empire. In the first century AD, for example, the Greek physician Pedanius Dioscorides noted, “lead makes the mind give way.” Indeed, many have speculated that Nero’s infamous fiddling while Rome burned was brought about by his habit of drinking wine in lead vessels.

Nearly 18 centuries later, Benjamin Franklin learned a thing or two about lead while using “hot lead” typesetting for printing *Poor Richard’s Almanac* and his many other brilliant publications. In 1786, he wrote a colleague about wrist drop and other neurological effects incurred by workers exposed to lead.

In 1914, Drs. Henry Thomas and Kenneth Blackfan of the Harriet Lane Home at the Johns Hopkins Hospital reported a Baltimore boy who, after eating the white, lead paint covering the slats of his crib, developed brain swelling and unrelenting seizures, and then died a miserable death.¹ By the 1920s, and extending well into the 1970s, pediatricians and scientists found more and more evidence of the dangers of lead poisoning only to be trumped by the industries making lead-containing products.

Most notably, the pediatrician and child psychiatrist Herbert Needleman and his colleagues documented the dangers of lead on childhood behavior and cognition in 1979.² As Dr. Needleman famously explained,

“Lead is a brain poison that interferes with the ability to restrain impulses. It’s a life experience, which gets into biology and increases a child’s risk for doing bad things.”

Yet, it was not until 2012 that the US Centers for Disease Control and Prevention (CDC) lowered the acceptable blood lead level to 5 micrograms per deciliter (dL), which represents the 97.5th percentile of blood lead levels in US children aged 1-5 years from 2 consecutive cycles of the National Health and Nutrition Examination Survey. (As points of reference, between 1960 and 1970, the blood lead level requiring medical intervention in children was 60 micrograms per dL; from 1970 to 1985, it was lowered to 30; from 1985 to 1991, the level was 15; and in 1991, the CDC lowered the level to 10 micrograms per dL.)

We now know that even at the lowest levels, lead in the body interferes with the normal functioning of just about every cell in the body because it chemically displaces elements that are essential to daily life, such as calcium, zinc, and iron. Lead blocks the elegant manner in which red blood cells carry and deliver oxygen, how one moves his muscles or her limbs, and, perhaps most importantly, the transmission of electrical messages by the brain.

Hence, it is hardly surprising that most pediatricians (myself included) insist that the *only* normal serum blood lead level is *zero*.

Epidemiologically, this problem disproportionately affects the poor—and more specifically, poor African American youngsters—living in our crumbling urban centers. At least 4 million households have children living in them who are being exposed to dangerously high levels of lead. Today, more than 500,000 American children, aged 1-5 years, already have blood lead levels higher than 5 micrograms per dL.

Sadly, most of these poisoned children reside in homes riddled with lead paint flaking off the walls and windowsills. Small children, who tend to explore the world with their mouths, eat the lead chips because they taste sweet. Moreover, when lead paint chips are broken down, one is left with a toxic dust that is easily inhaled. Paint companies were required to remove lead from their products in 1978, but there are still more than 38 million homes in the United States with deteriorating lead-painted walls. Landlords refuse to abate these homes because it

costs so much money; the renting parents have neither the funds for nor access to safer housing elsewhere. As a result, the families living in substandard housing are constantly exposed and re-exposed to this toxin.³

Lest one think it is only old houses where lead lurks, consider the fact that for decades Americans were exposed in the form of leaded gasoline fumes. Although the content of lead in gasoline began a steady decrease in the 1970s, the US government did not completely ban it until 1996. Nevertheless, there remains lead contamination in the soil as well as in the food and water chain from all those years of leaded gasoline, not to mention areas where smelting and mining operations occurred.

This brings us to Flint, Michigan, and the horrific, senseless, and negligent contamination of the water supply in this once proud and thriving community.

As a native Michigander, I am old enough to have fond memories of Flint. During the 1960s, when General Motors was the largest corporation in the world, we called the town “Buick City” because of the massive automobile plant based there and where thousands of new sedans rolled off the assembly line every day. Back in the days of “Sunday drives,” my father loved piling my mother, sister, and me in his new Buick Le Sabre for excursions to Flint. Once there, we typically dined at a restaurant my mother enjoyed and played at a three-course miniature golf range my sister, father, and I adored.

I recall my childish wonder over the billowing smokestacks of the General Motors plant, which we could see long before we ever got into the city and which we thought were symbols of progress and prosperity. Back then, people used to laughingly refer to the Flint River as “GM’s sewer,” but few of us thought much about the public health risks and environmental damage such prosperity brought along with it.

Today, Flint is a tragic shadow of those glory days of industry and the rise of America’s middle class. Roughly 100,000 people live there, 40% of them below the poverty line. More than half of the population is African American. Every day, the denizens of this town, especially its children, contend with a full plate of health risks and ill health determined by social and economic factors rather than innate biology.

Yet none of these assaults have been more shocking than results of the state of Michigan's decision in April of 2013 to divert Flint's water supply from Detroit and build its own pipeline to Lake Huron. (Detroit's aging water works, incidentally, provides the water for much of southeastern Michigan and draws its water from Lake Huron, as well.) The move was supposed to save roughly \$5 million per year. There was, however, a huge problem in that the pipeline from Flint to the great lake would not be ready for 2 to 3 years. The interim solution announced on April 24, 2014, was that instead of continuing its longtime contract with the Detroit Water Works, Flint would draw its water from the polluted Flint River.

Within weeks, it was clear to many Flint residents that something was wrong. The water was yellow-brown in color and tasted awful. In fact, the water was heavily contaminated with fecal coliform bacteria and other organic matter. Several groups of concerned citizens contacted the state-appointed "city emergency manager" (Flint's duly elected city government had been shut down in 2011 by Governor Rick Snyder as a means of righting the city's books). The state government's initial response was to deride these groups as "chronic complainers."⁴

Ultimately, the contamination could not be ignored, and in January of 2015, state authorities announced they were adding huge amounts of chlorine disinfectant (but no anticorrosion agents) to the water supply in an ill-advised attempt to rid the water of its brown, smelly, and

potentially disease-causing qualities. The chlorine disinfectant and its byproduct, a group of chemical compounds known as trihalomethanes, “changed the chemistry” of what flowed through the pipes and led to the erosion of many of the city’s aging, lead pipe, water service lines. It must be noted that during this period, Michigan state employees working in Flint were provided with bottled water to avoid drinking the tap water. General Motors, too, stopped using the Flint River water because it was corroding and ruining its machinery.

Over the spring and summer of 2015, Dr. Marc Edwards, a professor of civil and environmental engineering at Virginia Tech, investigated the possibility of lead leaching into the water. He found that 40% of the water samples contained lead levels greater than 5 parts per billion (ppb) and that the 90th percentile of homes tested were above 25 ppb, with a great many homes exceeding 100 ppb. As points of comparison, the US Environmental Protection Agency deems 15 ppb of lead to be the highest limit in drinking water and, thus, dangerous for consumption; the World Health Organization (WHO) has set its limit at 10 ppb.

By August of 2015, the import of Edwards’ findings inspired Dr. Mona Hanna-Attisha, a pediatrician at Flint’s Hurley Medical Center, to begin testing her patients for lead. The overall number of Flint children with elevated blood lead levels climbed from 2.4% to 4.9% between 2013 and 2015, and in high risk neighborhoods, 4.0% to 10.6%. In the tradition of John Snow and the heroic epidemiologists who followed, Dr Hanna-Attisha gathered her data and, in September, reported her findings to the health authorities.⁵

Instead of springing to corrective action, the Michigan state government pushed back hard, arrogantly, and ruthlessly. And this negligence hardly stopped at the state line. The federal government, in the form of the Environmental Protection Agency, apparently knew about the lead leeching and corroded pipes issue for months but did little to sound any alarms. By October of 2015, the governor realized he had no choice but to switch back to using Detroit water. At this point, however, the damage had already been done. The “Flint story” was reported around the world, much to my home state’s discredit, and, even worse, the detriment of the health and future of innocent, underprivileged children.

Sadly, the story hardly ends at the Flint city limits. Even though the US Congress banned the use of lead water pipes in 1986, current estimates of the lead service lines still in use in the United States range from 3.3 to 10 million lines. Worse, over the past 2 decades, there has

been a marked reduction in federal spending on clean water programs, infrastructure, and lead pipe replacement. This means that there are many more aging cities where one of the most basic necessities of human life, water, may well be contaminated with lead and other toxins.

The Environmental Protection Agency has estimated that we need to invest \$384 billion by the year 2030 to insure that every American has access to clean drinking water. Yet because we have been so negligent in taking care of aging public water works and water lines across the country, the American Water Works Association estimates that the bill is more likely to be more than \$1 trillion over the next 25 years.⁶

At the dawn of the 20th century, our predecessors dreamed of a utopian safety net of government public health agencies, at the local, state, and federal level, that would protect the citizenry with informational campaigns, inspections, surveillance, and regulations to protect our food, medications, vaccines, water, air, and other essential elements of healthy living. Indeed, one of modern government's finest creations is the public health system, but it is an enterprise that requires constant attention and the appropriate financial and human resources to do its job well.

As we have staggered through the first few decades of the 21st century, one cannot help but worry about the dystopia brought about by partisan squabbling, ideology trumping pragmatism and common sense, sharp budget and tax cuts, dangerous gridlock, and the inability of our government officials to actually do the jobs we elected them to perform.

Accommodating these grave issues with comprehensive, proactive approaches (rather than the stopgap, reactive emergency funding articulated in Washington and the state of Michigan with respect to Flint) requires a huge set of appropriations bills to pass through the US Congress in partnership with the state legislatures and their taxpayers. The plaintive question to ask is, when are we, as a modern and wealthy nation, finally going to place our collective health above politics, special interests, and greed?

This, I think, will take a revolution—not of the type Benjamin Franklin and his peers envisioned, but a revolution of thought, action, and priorities, nonetheless. It is time to take arms against the maladies we can and know how to prevent based upon the evidence, studies, and policies we have devoted our careers to developing.

History demonstrates all too well that when it comes to the public's health, "penny wise, pound foolish" decisions made today almost always cost us much more tomorrow, both in actual dollars and in human lives.

Instead, we must promote the power of disease prevention and harm reduction. And in moments of budgetary hesitance or not so benign neglect, we must remind those who decide such matters, to remember Flint.

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We begin our Op-Ed section with a celebration of the late Avedis Donabedian on the 50th anniversary of the publication of his seminal article “Evaluating the Quality of Medical Care.” Originally published in the June 1966 supplement issue of *The Milbank Quarterly*, it remains our most cited paper. Putting Donabedian’s work into historical perspective and contemporary context are our guest contributors Donald Berwick, the president emeritus of the Institute for Healthcare Improvement, and Daniel M. Fox, the president emeritus of the Milbank Memorial Fund.

Our regular columnists add superb contributions of their own: our newest Op-Ed contributor, John McDonough, analyzes the politics on substance abuse policy in the US Congress; Catherine DeAngelis writes about the need for more primary care doctors; Sara Rosenbaum reports on hospital community benefit spending and how that might improve the social determinants of health in the communities hospitals serve; Joshua Sharfstein proposes a plan for global budgeting for rural hospitals; and Jonathan Cohn looks at the overprescription of medications that lack clinical value and profit taking of the pharmaceutical industry.

The June issue’s lead article is by Lawrence O. Gostin and Rebecca Katz. In the wake of last year’s Ebola crisis, several major global commissions have questioned the future efficacy of the International Health Regulations (IHR), which, over the past decade, have served as the governing framework for global health security. These commissions also found issues with the leadership structure of the WHO, the agency charged with the oversight of IHR. Gostin and Katz present an overview of the IHR, comment on the recent commission reports evaluating them, and offer proposals for fundamental reform and strengthening of IHR core capacities.

William B. Weeks, Gregory R. Kotzbauer, and James N. Weinstein describe both the methods they have developed using publicly available Medicare data to transparently measure health care value and the initial results generated from their application. Such an approach, the authors argue, allows patients to compare hospital performance, make better-informed treatment decisions, and decide *where* to obtain care for particular health care problems.

Emma Coles, Helen Cheyne, Jean Rankin, and Brigid Daniel analyze Scotland's new national health policy, *Getting It Right for Every Child*. This pathbreaking, multifaceted program is designed to improve children's well-being via early intervention, universal service provision, and multiagency effort working across traditional silos and boundaries.

Scott D. Grosse, John D. Thompson, Yao Ding, and Michael Glass analyze data from Washington State for their paper on the use of economic evaluations and cost analyses to inform newborn screening policy decisions.

Trisha Greenhalgh, Claire Jackson, Sara Shaw, and Tina Janamian contribute a review of the literature and a case study on achieving research impact through co-creation (the process of collaborative knowledge generation by academics working alongside other stakeholders to produce, rather than translate between universities and society) in community-based health services.

We hope you find the June 2016 issue of *The Milbank Quarterly* helpful in your work. I write these good wishes in late March, while the winter's snow is still on the ground and its frost in the air. Nevertheless, the very mention of the word *June* hints at a summer of content, not so far away. Play ball.

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