

# Methanol Toxicity Outbreaks in the Americas: Strengthening National Prevention and Response Measures

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Unintentional poisonings remain a substantial global health challenge, resulting in an estimated 106,683 deaths and 6.3 million disability-adjusted life years in 2016.[1] Of these poisonings, methanol toxicity results from the metabolic breakdown of ingested methanol found in cleaning products, antifreeze, paints, and harmful and potentially lethal acidic compounds, among others. Consumption of tainted alcoholic beverages has recently been documented as one source of toxic exposure whose clinical diagnosis and management is too often delayed.[2]

At the 1992 UN Conference on Environment and Development (the 'Earth Summit') and the 1994 Intergovernmental Forum on Chemical Safety, global leaders highlighted the need to strengthen capacities for diagnosis, surveillance and response concerning exposure to harmful chemicals by setting up national poison control centers. These centers offer key clinical guidance for diagnosis and management of poisonings, conduct data monitoring and include a clinical treatment area or toxicology laboratory. Over the past two decades, however, only 47% of WHO member states have confirmed the existence of poison control centers, leaving significant gaps across Africa and Asia.[1] Moreover, recent outbreaks of methanol toxicity reported worldwide—including in the Czech Republic and Honduras in 2012, Libya in 2013, Kenya in 2014 and Nicaragua in 2015—highlight the need for greater attention to reducing harmful chemical exposure to promote population health.[3,4]

On the patient care side, clinicians are challenged to take a comprehensive medical history and thoroughly evaluate symptoms such as decreased consciousness and visual acuity, nausea, vomiting and abdominal pain, in order to exclude differential diagnoses of metabolic acidosis or other conditions. They must be prepared to administer correct care promptly to avoid complications like kidney failure, blindness or death.[3] Low-resource settings with weak health system infrastructures, however, may not have antidotes, medical services or intensive care support readily available, further jeopardizing low-income and other vulnerable populations.

In the Dominican Republic (DR), we analyze data collected from the surveillance system of the Ministry of Health's General Division of Epidemiology. The Ministry recently reported five significant outbreaks of methanol poisoning, as nationally notifiable events (i.e. individuals requiring medical attention), due to ingesting contaminated or counterfeit alcohol from clandestine distilleries. Specifically, outbreaks occurred in December 2017 (41 intoxications/29% mortality), December 2019 (4 intoxications/50% mortality), April 2020 (369 intoxications/62% mortality), November 2020 (9 intoxications/56% mortality) and April 2021 (25 intoxications/44% mortality).[4] Yet to date, no formal poison control center exists in the country.

To address this concerning health problem, the Administration of president Luis Abinader published Executive Order 275-21 (*Decreto Presidencial*) in April 2021, which expanded the scope

of Executive Order 288-96 to apply Law 50-88 on Drugs and Controlled Substances in the Dominican Republic; the Order is designed to strengthen oversight of controlled substances in the DR,[5] and recognizes the legal production, distribution and importation of methanol, isopropanol and propanol, but strictly for industrial use. Federal agencies were mandated to evaluate

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drinks sold in markets and dismantle clandestine factories producing tainted alcohol. The Ministry of Health also developed public educational campaigns to raise awareness on the hazards of consuming illicit alcoholic beverages.

**Recommendations for the Americas Region** In the Americas, limitations in clinical diagnostic tools, recommended medical treatment, emergency or intensive care unit capacity and insufficient health worker training hinder quality health care delivery across communities. In order to close this practice gap, we recommend national governments implement a four-pronged approach that can reduce exposure to harmful substances and protect population health. These strategies include continuing national government oversight of the industrial use of methanol, monitoring commercial sales of alcoholic beverages, strengthening public health infrastructure and implementing capacity-building activities.

First, national oversight should prioritize laws to regulate industrial use of methanol as a primary material or adjuvant in product manufacturing; these laws should support quality control measures that allow for tracking product purchases, commercial distribution and customs declarations. With such legal mechanisms in place, production can be monitored and the clandestine use of methanol in liquor production limited and finally discontinued.

Second, strict guidelines are needed to help ensure that liquor distributors and other points of commercial sales do not acquire, distribute or store unlicensed products whose consumption can be dangerous to health. Additional public policies enforcing standardized processes prohibiting inclusion of 'home brew' manufacturing of unauthorized alcohol products would also aid in controlling such poisonings.

Third, clinical guidelines and surveillance must streamline emergency management for methanol toxicity across health institutions. National epidemiological surveillance in hospitals and primary health care centers can help leaders promptly identify outbreaks and at-risk communities. Moreover, investment in poison control centers can support surveillance programs, offer appropriate treatment and management with clinical expertise, and reinforce connections between health workers, community leaders and local residents.

Fourth, continuing education seminars for health workers can hone clinical suspicion and offer periodic updates on data trends. Furthermore, health professionals' training and graduate studies should incorporate scientific content and toxicology case studies into curricula. Community engagement led by health workers can also improve health literacy through local educational campaigns and public service announcements prepared especially for public transportation, newspapers and social media. Finally, with support from regional health agencies like PAHO, knowledge transfer across the Americas can be guided by countries with established poison control centers, advanced clinical protocols and robust surveillance programs.

Emerging environmental contamination and chemical hazards will require strong public health leadership to develop preparedness and response plans in order to achieve Sustainable Development Goal target 3.9 (by 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals, and air, water and soil contamination) and indicator 3.9.3 (mortality rate attributed to unintentional poisoning). With 35 countries in the Americas region, building a holistic and integrative model involving all stakeholders—including government, private sector, clinicians and the general public—can pave the way for improved efforts to reduce exposures to harmful hazards and ultimately enhance population health outcomes. 

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