Unintentional Poisoning in North Carolina:
An Emerging Public Health Problem

Marsha D. Ford

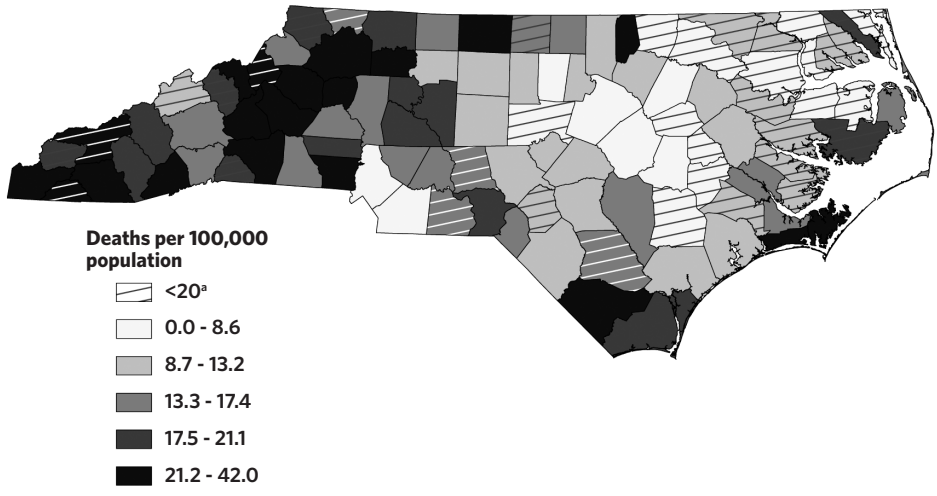
Unintentional poisoning is a fast-growing public health problem that once evoked an image of a street denizen injecting heroin or snorting cocaine. Today's victim is white, male, and middle-aged—and the drugs are prescribed. In North Carolina, unintentional poisoning is the second-leading cause of death due to unintentional injury, and injuries due to any cause are the leading cause of potential years of life lost. Comprehensive prevention measures are needed now to stem this burgeoning problem.

Unintentional poisoning is the second-leading cause of unintentional death due to injury in North Carolina and the leading cause among adults aged 35-54 years. Unintentional poisoning occurs accidentally, when no harm is intended, and can result from misuse and abuse of prescription and recreational drugs, overuse of drugs prescribed for medical reasons, and exposure to chemicals, gases, vapors, venoms, biological toxins (such as foodborne toxins), and other substances [1]. In the past decade, these deaths have nearly quadrupled in number in the state, affecting all areas, but especially the western and southeastern counties (Figure 1). In recent years, substantially larger numbers of patients have required medical care and advice in hospitals, in emergency departments, and by calling the Carolinas Poison Center (Charlotte, NC), the poison center for North Carolina. Unintentional poisoning is a growing and significant cause of death and injury, but it is largely preventable. Public health, regulatory, and legislative strategies are needed to address the root causes of this emerging epidemic.

The Problem

Recognition of the growing problem of poisoning in North Carolina began in 2002, when a pronounced spike in poisoning-related deaths was noted by state health officials. A subsequent Centers for Disease Control and Prevention Epidemic Intelligence Service investigation of 1,096 cases of unintentional poisoning that occurred between 1997 and 2001 documented the causal role of prescription opioids [2]. Subsequently, the Task Force to Prevent Deaths from Unintentional Drug Overdoses was convened to examine this problem and recommend interventions. Since that

Figure 1.
Deaths Due to Unintentional Poisoning Among North Carolina Residents, by County, 2006-2009



Note. Data are no. of deaths per 100,000 persons (statewide rate, 11.0 deaths per 100,000 population). Data are from the North Carolina State Center for Health Statistics (unpublished, 2010). Analysis was performed by the Injury Epidemiology and Surveillance Unit, North Carolina Division of Public Health.
[a]Rates based on <20 deaths are considered statistically unreliable.

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time, despite the adoption of some task force recommendations, the increase in deaths from unintentional poisoning has accelerated. Between 1999 and 2009, the rate of death (defined as the number of deaths per 100,000 persons) due to unintentional poisoning increased by 212.7%. In comparison, the rate of death due to motor-vehicle accidents—the leading cause of injury-related deaths in North Carolina—decreased by 28.8% (Figure 2) (North Carolina State Center for Health Statistics, unpublished data, 2010).

Unintentional poisoning is one of several types of unintentional injury and can be fatal or nonfatal. In 2008, injuries were the third-leading cause of death among North Carolina residents, with 6,275 injury-related deaths; the first- and second-leading causes of death were diseases of the heart (17,417 deaths) and cancer (17,403 deaths), respectively. More importantly, among persons aged 65 years and younger, the average potential years of life lost due to unintentional poisonings was 9 times the average years of life lost due to chronic diseases, such as heart disease, cancer, and diabetes mellitus. This reflects the fact that injuries, including unintentional poisonings, occur in younger patients [3].

Although deaths due to unintentional poisoning in North Carolina are concerning, the number of deaths is smaller than the number of injuries requiring medical treatment in hospitals or triage and management by the Carolinas Poison Center. In 2007, unintentional poisonings were responsible for 3,445 hospital discharges, 8,696 emergency department visits, and 63,412 calls to the poison center (Table 1). In relative terms, in 2007, North Carolina residents were "four times more likely to be hospitalized, 10 times more likely to seek treatment from an [emergency department], and 52 times more likely to call the [Carolinas Poison Center] than to die from [an] unintentional poisoning" [4p12]. The economic burden is substantial. On a national level, Finkelstein and colleagues [5] estimated that, in 2000, the total lifetime

Table 1.
Demographic Characteristics Associated With Unintentional Poisoning Among North Carolina Residents, by Select Outcomes, 2007

	Hospital discharge, no.[a]		ED visit, no.[b]		Carolinas Poison Center call, no.[c]	
Characteristic	**Overall**	**Per 100,000**	**Overall**	**Per 100,000**	**Overall**	**Per 100,000**
Sex						
Male	1,618	36.5	4,105	92.7	31,442	710.1
Female	1,827	39.4	4,591	99.1	31,970	690.0
Total	3,445	38.0	8,696	96.0	63,412	699.8
Age, years						
≤4	149	23.4	1,823	285.9	37,059	5,811.7
5-9	22	3.5	294	48.1	5,075	795.9
10-14	19	ND[d]	203	34.2	2,131	359.0
15-19	118	19.0	594	95.8	1,627	262.4
20-24	163	26.7	598	98.0	1,900	311.4
25-34	356	29.2	1,091	89.5	3,520	288.7
35-44	584	43.5	1,232	91.9	3,441	256.5
45-54	725	55.7	1,181	90.8	2,929	225.2
55-64	527	51.5	733	71.6	2,375	232.1
65-74	399	67.4	466	78.7	1,598	270.0
75-84	278	75.4	331	89.7	1,117	302.8
≥85	105	73.6	150	105.2	525	368.1
Total	3,445	37.9	8,696	96.0	63,297	696.5

Note. Analysis was performed by the Injury Epidemiology and Surveillance Unit, North Carolina Division of Public Health, unless otherwise indicated. ED, emergency department.

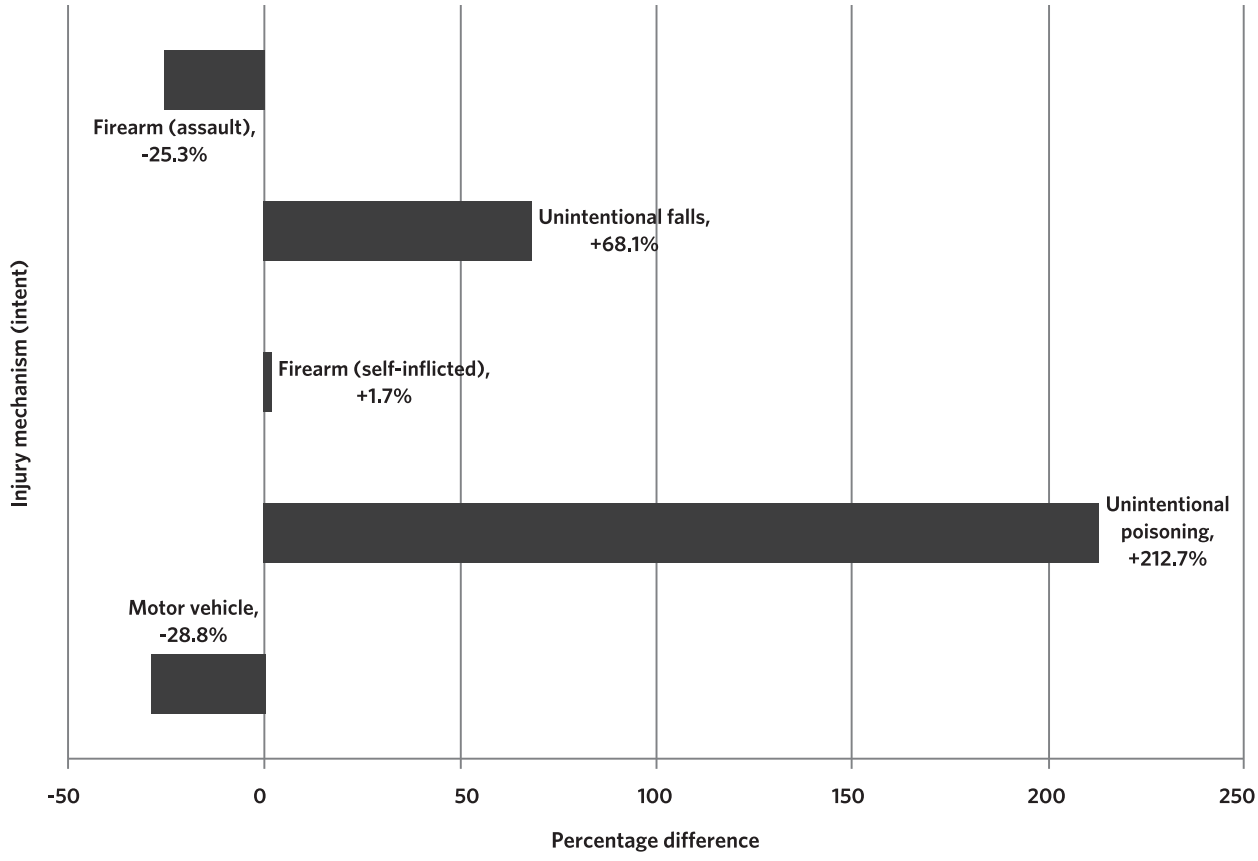
[a]Data are from the North Carolina State Center for Health Statistics (unpublished, 2010).

[b]Data are from the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (unpublished, 2010).

[c]Data are from the Carolinas Poison Center (unpublished, 2010). Analysis was performed by the Carolinas Poison Center.

[d]No data (ND) are specified because the rate is based on <20 deaths and is considered statistically unreliable.

Figure 2.
Percentage Difference in Injury-Related Deaths Among North Carolina Residents Between 1999 and 2009



Note. Data are percentage differences in the no. of deaths per 100,000 persons. Data are from the North Carolina State Center for Health Statistics (unpublished, 2010). Analysis was performed by the Injury Epidemiology and Surveillance Unit, North Carolina Division of Public Health.

costs of poisonings resulting in death were $23 billion, the total lifetime costs of poisonings resulting in hospitalization with survival were $2 billion, and the total lifetime costs of poisonings requiring medical care without hospitalization were $1 billion (all values are 2000 dollars).

Prescription and recreational drugs are most commonly involved; they were listed as the primary cause in 92.8% of deaths from unintentional poisoning in North Carolina in 2008. These results mirror national data showing that drugs were involved in 92% of all poisoning-related deaths in 2005-2006 [6]. Prescription medications are responsible for substantially more deaths than are illegal drugs. The increase in deaths due to opioid analgesic drugs (ie, natural and synthetic pain medications, such as hydrocodone, oxycodone, fentanyl, and propoxyphene) is significantly greater than the increase due to illegal drugs, which are more readily perceived as dangerous [7]. Narcotics (ie, opioid analgesic drugs and illegal drugs, such as opium, heroin, and cocaine) were the primary causal factor in 72% of deaths due to prescription and recreational drugs in North Carolina in 2008. Among fatalities occurring in 2008 in which drugs were mentioned as the primary cause, methadone and other opioid analgesics were listed as the primary cause in 59%, whereas cocaine and heroin were mentioned as the primary cause in only 19%. Thus, needed interventions must primarily address the problems arising from use and misuse of prescription pain medications.

Substances responsible for the remaining unintentional poisoning deaths (28%) in 2008 also deserve attention. Responsible agents included antiepileptic and sedative hypnotic drugs; nonopioid analgesics, such as aspirin and acetaminophen; drugs acting on the nervous system, such as antidepressants and antipsychotics; alcohol; other gases; solvents; pesticides; and other/unspecified drugs and chemicals. Root causes and interventions must also be determined to decrease deaths due to these substances.

Current Initiatives

A number of individual activities and tactics are currently being promoted by interested organizations and agencies that function separately, albeit with ongoing intergroup communications for many activities. Two major initiatives with promise of unifying these activities are underway.

The Injury and Violence Prevention Branch of the North Carolina Division of Public Health has formed an Unintentional Poisonings Subgroup as part of its Strategic Advisory Council, which was created to address injury and violence statewide. This subgroup is tasked with monitoring poisoning rates and trends, investigating methods to improve data coding and collection, identifying promising practices or evidence-based approaches to decrease poisoning rates, and increasing education and awareness around unintentional poisonings to physicians and other health care professionals, consumers, and makers of public policy.

The North Carolina Institute of Medicine (NCIOM) issued, in 2009, a prevention action plan, the culmination of a series of issue-focused meetings on determinants of death and disability statewide [8]. The action plan contains evidence and consensus-based recommendations to decrease risk factors for preventable causes of the most significant diseases and health conditions, including injuries due to unintentional poisonings. The plan served as a foundation for the state's health objectives for 2020 [9].

Several other statewide and local activities are notable. The Carolinas Poison Center is working with the North Carolina Division of Medical Assistance and a social-marketing consultant from the Division of Public Health to create a social-marketing program designed to reduce rates of death and hospitalization due to unintentional poisoning due to opioid analgesics. This project will initially target a high-risk population of Medicaid recipients, identifying behavioral determinants and then assessing and developing strategies to change behaviors in the high-risk population.

Project Lazarus, a nonprofit community-based program, is focused on decreasing deaths due to prescription opioid medications. Based in Wilkes County, the project serves the western part of North Carolina, using a community-coalition model to educate medical care professionals, patients, and community members and to provide free rescue kits that include physician-prescribed naloxone (an antidote), to reverse an opioid overdose.

The Division of Medical Assistance has implemented a Recipient Management Lock-In Program for Medicaid recipients who meet high-use specifications for analgesic and antianxiety medications. These recipients will be limited to 1 prescriber and 1 pharmacy for obtaining controlled substances, such as opioid analgesics (eg, oxycodone and hydrocodone) and antianxiety medications (eg, benzodiazepines). Claims not meeting these specifications will be denied.

The Controlled Substances Reporting System maintains a record of every outpatient prescription for all schedule II-V controlled substances dispensed by North Carolina retail outpatient pharmacies [10]. Prescribers can access this password-protected database to ascertain a patient's history of these prescription medications. The Controlled Substances Reporting System, created under North Carolina General Statute 90-113.70-76, is managed by the North Carolina Division of Mental Health, Developmental Disabilities, and Substance Abuse Services.

Operation Medicine Drop, sponsored by Safe Kids North Carolina and state law-enforcement agencies, is a prescription take-back program designed to remove unused medications from homes. Individuals voluntarily drop off these medicines at specific collection sites during Poison Prevention Week, held annually during the third week of March.

The Governor's Institute on Alcohol and Substance Abuse is conducting Safer Opioid Prescribing events for physicians, nurses, and other health care professionals across the state. These educational sessions focus on pain management, addiction, and safer prescribing of opioid analgesic medications.

Opportunities and Challenges

The work done by the Task Force to Prevent Deaths from Unintentional Drug Overdoses and recommendations in the NCIOM's prevention action plan provide a strong foundation to develop a comprehensive plan for decreasing unintentional poisonings. To emphasize the problem, the NCIOM has chosen reduction of mortality due to unintentional poisoning as the key indicator by which to measure the success of injury prevention measures specified in the state's 2020 health objectives. To ensure a comprehensive and effective response to this growing public health problem, the North Carolina General Assembly should amend the Public Health Act §130A-1.1 to include injury and violence prevention as an essential public health service; create a permanent injury and violence prevention task force, whose charter will be to prevent and reduce injury and violence, with an emphasis on unintentional poisonings, by enhancing coding, collection, and examination of data, as well as by recommending evidence-based policies and programs, monitoring implementation, and examining outcomes; and appropriate funds, beginning in state fiscal year 2011, to implement pilot programs and other community-based activities to prevent unintentional poisoning, using evidence-based interventions or best practices [8].

In addition to the legislative actions listed above, several activities should also be fully funded and enacted. First, the Division of Public Health should create a leadership structure to oversee a coordinated public health response to the problem of fatal and nonfatal unintentional poisonings. This group would work closely with the permanent injury and violence prevention task force [11]. Second, the Carolinas Poison

Center should be promoted among North Carolina residents and health care professionals as the primary information source for appropriate responses to poisonings. The center provides immediate access to rapid assessment and triage advice for residents, as well as the only real-time access to a board-certified medical toxicologist for most physicians in the state. Third, a linked injury surveillance system should be created by the State Center for Health Statistics, in collaboration with numerous state data partners and stakeholders. This system should link to the electronic health records of the relevant data partners. Enhanced training in medical record coding should be provided, with emphasis on poisonings, using *International Classification of Diseases (ICD), Ninth Revision (ICD-9)* and *ICD-10* external cause of injury codes (ie, E-codes) [8].

Conclusion

Funding new initiatives in this area will be challenging, given the current economic downturn, but the costs of not acting will be significant. The task is made more urgent due to the increasing numbers of deaths and hospitalizations and the associated costs of medical care and loss of life. Adoption of these recommendations will begin the work needed to reverse this rapidly escalating health epidemic. NCM

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