

Poison Centers

an Information Paper

*Developed by Members of the
Poison Centers Task Force*

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The sixty poison centers in the United States play significant roles in the emergency healthcare and preparedness systems by:

- triaging and managing poisoning calls from the public;
- providing virtual case consultations to physicians and other healthcare providers;
- providing preparedness and response services to emergency responders, health care providers, public health officials, and the public during pandemics, public health emergencies and other hazards events; surveilling data to detect and monitor disease outbreaks and epidemiological trends. Poison centers have traditionally been underfunded.

The current economic crisis threatens the existence of some centers and the ability to function fully at many others. The American College of Emergency Physicians supports poison centers and recognizes the roles they play in the emergency healthcare system.

The need for poison centers and toxicology expertise is increasing, not decreasing - *Poisonings are an increasing cause of unintentional injuries and death.* Poisoning is the second leading cause of injury-related deaths in the US, having surpassed deaths from firearms in 2004.¹ (Appendix A) Studies in individual states mirror this finding.²⁻⁶ A recent analysis determined that poisonings exceeded motor vehicular accidents in 2005-2006 to be the number one cause of injury-related deaths in persons aged 34-56 years. (Appendix B) The majority of these deaths are due to unintentional poisonings; drugs were implicated in 92% of these fatalities.⁷ The rate for poisoning deaths has more than doubled from 1979 to 2006. Opioid analgesic medications are the single largest category of drugs involved, accounting for over one-third of unintentional poisoning deaths in 2007. (Appendix C) Trends indicate that the rate of poisonings will continue to rise and will become the leading cause of injury-related deaths.

Poisonings from certain prescription medications are an increasing cause of emergency department (ED) visits. Based on data from DAWN (Drug Abuse Warning Network), patients admitted to emergency departments due to nonmedical use of opioid analgesic medications increased 111%, from 144,600 to 305,900 visits during the period 2004–2008. During that same time ED visits due to nonmedical use of benzodiazepines increased 89 %, from 143,500 to 271,700 visits.⁹ As described below, a portion of these visits could be averted by calls to poison centers, thus alleviating unnecessary ED patient volume.

Poison centers are essential in the health care system and public health response to this growing problem. Poison centers provide immediate access to rapid assessment and triage advice given by nurses and pharmacists who undergo extensive training in toxicology and must pass a national certifying examination. These front-line providers are backed 24/7 by physicians with training and board certification in medical toxicology. Poison centers serve as repositories of medical toxicology expertise, assist physicians and other health care providers in diagnosis and management of poisoned patients, provide training to health care providers, perform research and establish standards for patient triage.

Current role of poison centers in the health care system - Poison centers perform two significant functions as direct providers of service to patients:

Triage calls from the public - In 2008, poison centers handled 2,491,049 human exposure cases. The majority of human exposures, 72.6%, were called in from a non-health care facility site, usually the patient's residence, and were managed on-site with no need for further medical care.¹⁰

Studies and surveys indicate that a substantial number of patients managed on-site by poison centers would seek medical care if poison centers were unavailable for consultation. In 1993 the Blodgett Regional Poison Control Center in Grand Rapids, Michigan blocked calls from two of the three area codes it serviced due to budgetary cuts. Subsequently, Blue Cross-Blue Shield of Michigan compared inpatient and outpatient poisoning-related claims from February-May, 1993 (two of three area codes blocked) to claims from February-May, 1992 (all area codes receiving full service). Outpatient claims rose by 35% and inpatient admissions rose by 16% in the two area codes without poison center services in 1993, compared to claims in 1992. Conversely, claims were stable in the one area code with service

maintained in 1992 and 1993.¹¹ An analysis of data collected after the temporary closing of the Louisiana Regional Poison Control Center in 1988 estimated that the number of poisoning cases treated medically rose by 42% in Louisiana, whereas the rate of medically treated cases remained stable in neighboring Alabama.^{12,13}

Another study examined the association between use of poison centers and poisoning-related, non-admitted emergency department visits in 14 geographically diverse states. The study found that a one percent increase in the poison center call rate for unintentional poisonings was associated with a 0.18% decrease in the rate of poisoning-related, non-admitted emergency department (ED) visits. The net savings in medical costs was calculated at \$205 per ED visit avoided, yielding a benefit-cost ratio of 1.4 *if the association is causative*. Further study is needed to determine whether a causal link exists.¹⁴

More recently, in Arizona, a survey of 600 callers managed at home by the Banner Poison Control Center in 2007 found that 70% would have sought emergency care by calling emergency medical service (EMS) (37%) or going to an emergency department (33%).¹⁵ A caller survey in North Carolina (2009) found the percentage of callers managed on-site was 76.7%, with 71.5% of these indicating they would seek further medical care were the poison center not available (Personal communication, Marsha Ford MD, Director, Carolinas Poison Center). The Children's Hospital of Michigan Regional Poison Control Center (CHMRPCC) reported managing 49.5% of calls from EMS providers at the site of the call (Personal communication, Susan Smolinske PharmD, Managing Director, CHMRPCC).

Using 2008 national data on human exposure cases managed at non-health care sites (usually home) and estimating that 70% of these callers would seek medical care if poison centers were unavailable, an estimated 1,265,951 cases currently managed solely by poison centers could potentially summon EMS, go to an emergency department or to an urgent care should poison centers cease to exist. These unnecessary uses of emergency health care would add additional strain to the emergency healthcare system.

Provide virtual regionalization of toxicology expertise by assisting physicians, EMS providers and other health care providers in the diagnosis, treatment and disposition of known or suspected poisoning cases - Physicians, pre-hospital providers, nurses, pharmacists and other health care providers call poison centers for assistance with triage, diagnosis, treatment and disposition of patients with known or suspected poisoning. In addition to assistance from specially trained Specialists in Poison Information (ie, nurses and pharmacists who undergo extensive training in toxicology and must pass a national certifying examination), consultation is often obtained from a physician medical toxicologist on-call for the poison center. In 2008, 16.14% of human exposure calls to poison centers nationwide originated from a health care facility. "Of the 598,048 cases managed in a health care facility, 295,834 (49.5%) were treated and released without admission, 93,096 (15.6%) were admitted for critical care, and 55,878 (9.3%) were admitted for noncritical care."¹⁶

For most physicians, calling the poison center provides the only access to a board-certified medical toxicologist. For emergency physicians, this access represents virtual regionalization of toxicology expertise for poisoned patients, "ensuring that the right patient gets to the right hospital at the right time and receives the right care."¹⁷

Current role of poison centers in the public health system – Poison Centers perform a number of roles in public health preparedness, response, and surveillance. They offer several advantages:

- Poison centers function 24/7 and are preparedness-ready, unlike many disaster hotlines that are activated only when events occur.
- Poison center staffs are experienced in telephone triage and in considering differential diagnoses, not just the presenting "diagnosis."
- Poison center data captures information from a population that does not go to a health care facility, a significant benefit for surveillance activities.

Public Health Preparedness, Pandemics and All-Hazards Events – Poison centers provide services to public health officials, health care providers and the public during pandemics, public health emergencies and other hazards events, including chemical, biological, radiological, and nuclear incidents. During the recent H1N1 pandemic, many poison centers fielded calls from the public and health care providers regarding the antiviral medications and the H1N1 vaccine. In so doing, these centers captured data on drug and vaccine adverse events. Poison centers are also involved to varying degrees with the Strategic National Stockpile program in their regions. Individual centers have worked with public health officials to investigate a potential ricin exposure at a postal facility, food-borne illness outbreaks, and ciguatera fish poisoning, among others.¹⁸⁻²¹

During public health emergency responses, poison centers can answer calls from the public, thus diverting these calls from health departments not staffed or technologically equipped to handle a call surge. The nationwide toll-free number is already available and publicized. Poison center staffs are experienced in telephone triage and in considering diagnoses other than toxin or chemical exposure. Many callers may be managed on-site, averting unnecessary crowding of emergency departments during these events. Poison centers have demand management capabilities including redundant computer and telephone systems and the ability to rapidly add staff that can work on secure workstations at non-poison center sites.

Future emergency preparedness and public health considerations include integration of poison centers into regionalized systems for emergency care/support, with: 1) expanded role of poison centers as sources of real-time information for the public during pandemics, public health emergencies and other hazards events; 2) provision of specialized triage capabilities for prehospital systems, including chemical/drug/toxin-specific assessment/management protocols that can be utilized automatically during routine care delivery and during hazards events; 3) expanded televideo technology for providing consultations to emergency medicine and other physicians, in order to “match the needs of injured patients to the closest hospital with the capability to provide definitive care in the most appropriate time frame”²²; 4) provision of medical toxicology expertise to train doctors, medical students and other healthcare practitioners in the response to public health emergencies. Many of the above fall within the purview of ACEP’s High Priority Provisions of the Patient Protection and Affordable Care Act of 2010, specifically Sec.3504: Design and Implementation of Regionalized Systems for Emergency Care/Support for Emergency Medicine Research, Parts 1 and 2, and Sec. 5315: U.S. Public Health Sciences Track.

Surveillance to detect and monitor chemical, biological, radiological, and nuclear incidents and outbreaks – All poison centers create and maintain electronic medical records for all exposure calls received. Specific database fields containing demographics, exposure scenarios, exposure substances and quantities, clinical effects, treatments, management, and medical outcomes are collected on each call. Cases are uploaded on average every 23 minutes to the American Association of Poison Control Centers (AAPCC) National Poison Data System (NPDS) database. The NPDS is the only near-real time source for surveillance of chemical exposures and the related health effects. Surveillance definitions run automatically for specific chemical, biological, radiological and other toxicants as well as health threats from natural and man-made disasters. Surveillance methods include cluster detection of call volume or clinical effects as well as case-based definitions. Surveillance is conducted by the AAPCC and CDC (Centers for Disease Control and Prevention) on national data as well as by poison centers serving individual states or geographic regions. When specified definition parameters are exceeded, alerts are sent to an NPDS surveillance team that monitors the signals 24/7 and investigates for outbreaks and data trends, in conjunction with the CDC.²³

Surveillance of NPDS data during public health emergencies can and has been used to “identify potential cases,” “track temporal and spatial [case] distribution”, and “characterize illness symptoms and severity.” Adjunct measures employed during these emergencies include creation of temporary substance codes on the fly to code relevant cases and geospatial mapping of caller/case sites. Examples of NPDS data surveillance during these events include tracking of: 1) carbon monoxide exposures during Hurricane Ike; 2) *Salmonella typhimurium* exposures due to contaminated peanut butter/paste; 3) levamisole-

contaminated cocaine; 4) exposures to oil, dispersants and contaminated seafood during the Deepwater Horizon oil spill.^{23,24}

Poison centers capture cases that are not seen at healthcare facilities and therefore would escape detection by surveillance systems focused on prehospital, emergency department and hospital case data. During the Deepwater Horizon oil spill event, illness reports in Florida were collected in their public health surveillance system, ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics). Ninety-four percent of those reports came from the Florida Poison Information Center Network, while only six percent were gleaned from emergency department chief complaint data.²⁵

Injury Prevention – Poison centers play key roles in injury prevention activities. Framing these roles using the modified Haddon matrix of injury prevention.²⁶ Poison centers are involved as follows:

- **Pre-event: Social environment** – In 2010 ten poison centers will receive three-year HRSA grants in 2010 to conduct social media campaigns. As an example, one state poison center proposes to reduce the rates of death and hospitalization due to unintentional opioid analgesic poisonings among a high-risk target population of Medicaid recipients. The project will identify behavioral determinants and then assess and develop strategies to change behaviors in the at-risk population.
- **Event: Physical environment (eg, home)** – Poison center educators advise parents/caretakers of children, senior citizens, and others on strategies for preventing children from accessing medications and household chemicals, methods for assuring correct administration of medications and correct storage and handling of chemicals, among other prevention techniques.
- **Post-event: Host** – Poison centers triage cases and advise treatment/management to lay people as well as physicians and other health care providers to mitigate injury that has already occurred.
- **Post-event: Agent/vehicle** – Poison centers surveil to detect problems with products and advise regulatory/governmental agencies and manufacturers of finding. As an example, one poison center investigated near-respiratory arrest in a child who had consumed plastic dots from the toy, Aqua Dots™, and reported their findings to the Consumer Product Safety Commission (CPSC). This assisted the CPSC in mandating a recall of this toy, found to be made with a chemical that was converted in the body to gamma hydroxybutyrate, the “date rape” drug.

Status of the current poison center funding and “system” and the need for full funding

Poison centers need to be recognized for the roles they play in the current health care system. ACEP should advocate for stable funding to be supplied by the major stakeholders who benefit from poison center services: federal and state governmental payers and private insurance payers. Additionally, roles for poison centers in public health preparedness and regionalization of toxicology expertise should be defined and supported by appropriate governmental and private agencies.

Funding: *Multiple poison centers are threatened with closure or severely diminished capacity to deliver services due to threatened funding cutbacks.* During the course of its work, the PCTF surveyed the 60 United States (US) poison centers regarding funding and potential funding cuts. Of the 43 centers who answered the question, “Is your poison center threatened with funding cuts for 2010”, 36 (83.7%) answered “Yes.” *State* funding was the most frequently cited funding source under threat [32 respondents (53.3%)], followed by *Institution* [14 respondents (23.3%)]. A cut in *Federal* funding was cited by six centers (10.0%). It should be noted that there is a maintenance-of-effort clause in the federal funding that requires continued state and institution funding at the same level; thus, any funding cuts in these sources will result in similar percentage cuts in federal funds.

Of the 36 centers threatened with funding cuts in 2010, half (18 centers) estimate cuts of 30% or greater. Funding cuts of this magnitude would result in loss of center services. Two centers cited threatened cuts of 100%, one center cited 90%, and two centers estimated cuts of 70%. Funding reductions of these magnitudes would result in center closures. In fact, the California system narrowly averted closure in

2009 and is uncertain about future funding; the Blodgett Regional Poison Control Center in Grand Rapids, Michigan did close in 2009.

Current sources of funding listed by the 42 poison centers responding to this survey question include: federal governmental grants/non-grants; state, governmental; state, other (eg, contract, H1N1, other hotlines); host institution; other grants not covered under previous categories; foundations; other. In the “other” category, funding sources identified include: private fund raising, donations, city taxes, United Way, preceptor services, Children’s Miracle Network (CMN) funds, pesticide reporting, speaker fees, research, industry contracts, nurse triage hotline, and the Researched Abuse, Diversion and Addiction-Related Surveillance (RADARS) System. Detailed data is found in complete survey results under Appendix D.

The adequacy of funding of poison centers is not a new concern. In 1997, the ACEP Council sought to identify some of the problems associated with funding when it adopted Resolution 21(97). The resolution called for ACEP to “perform an initial analysis and review of poison control center funding mechanisms, communicate the results with the membership, and repeat the analysis from time to time as deemed necessary by the Board of Directors.”

In a 2004 report, Forging a Poison Prevention and Control System,²⁷ the Institute of Medicine (IOM) recommended addressing the fiscal problems facing the nation’s poison control centers by having the federal government assume most or all funding responsibilities. The recommendation called for federal funding of all core activities, estimated to cost in excess of \$100 million annually at the time the report was written. This sum would only support poison center activities that were in place at that time. It was not a sum that would support a well-designed and staffed system or support growth in demand for services. As of 2010, the federal support that began in 2002 is at an all-time high of \$29-30 million; it is administered through the federal Health Resources and Services Administration (HRSA). The IOM did acknowledge that additional funding would be needed to pay for other public health services related to poisoning. The IOM’s report estimated a return on investment (ROI) of one dollar spent on poison centers saving seven to nine dollars that would otherwise be spent on medical care. The IOM estimated four million poisoning episodes occurred each year in the US, resulting in 300,000 hospitalizations, 30,800 deaths, and an “economic burden of poisoning not including costs related to alcohol deaths...[of] \$12.6 billion per year (2002 dollars).”²⁸ Five years after the release of this report, there has been little progress in acting upon the IOM funding recommendation.

System: There is no integrated poison center system in the US, although some components for an integrated system exist. Additionally, there is no national poison center that can assume calls when a regional poison center ceases to exist.

Sixty poison centers provide service to the fifty states, the District of Columbia (DC), and the US territories. The majority of states are covered by one poison center. Twelve states do not have poison centers; these states contract for services with centers in other states. Eight states are serviced by two or more centers; Texas has the largest number of poison centers, six. The four poison centers in California are organized into an integrated system. The Texas and Florida poison centers are not fully integrated but do share the same phone and data systems and can transfer and share calls and data within their respective states. The National Capital Poison Center covers the Washington Metro area (DC and contiguous areas of Maryland and Virginia). The Commonwealth of Puerto Rico has a separate poison center.

The sixty poison centers share a nationwide toll-free number, 800-222-1222. Calls are distributed geographically by area code and exchange to local termination numbers that are maintained individually by each of the 60 poison centers. At present, there is no mechanism in place nationwide for calls to automatically route from one poison center to another, in case of a surge in calls or a center’s loss of ability to handle calls, eg, loss of electrical power. On average, about 70% of the calls received at poison centers are routed through the nationwide number.

The sixty poison centers also collect defined data points and electronically transmit these data every 10 minutes to a national database, the National Poison Data System (NPDS). Four data entry programs are used by the centers to collect the data for transmittal. These programs can and do vary in capabilities. However, all have discrete fields for reporting the defined data points that must be reported to the NPDS. With the exceptions of the poison centers in California, Florida and Texas, centers cannot electronically share case data.

REGIONALIZATION (CONSOLIDATION) OF POISON CENTERS – CURRENT STATUS

When assessing the regionalization of poison centers—regionalization meaning consolidation—it is important to recognize that poison centers have already undergone significant consolidation. In 1978 there were a reported 660 poison centers in the US; today, there are 60 centers. In its 2004 report, the IOM declined to specify what an ideal number of poison centers might be, noting “decisions about the number of centers should be based on considerations of population coverage, telecommunication capabilities, and types of funding.”²⁹

The IOM Study Committee considered, but rejected, the concept of a single poison center. They found significant weaknesses with this concept. Specifically, a single center would:

- “concentrate all the [medical toxicology] expertise in one location”
- be “vulnerable to ... problems of power failures, limited surge capacity, and potential transmission lags during times of high volume.”²⁹

They also rejected the concept of a single center in each state, noting this ignored the realities of population concentration in some states and dispersment in other states.

To these concerns should be added the following

- Loss of funding sources should some centers close – host institutions, local foundations, United Way, etc., probably would not fund a center in a different state to handle calls from their state. Additionally, state funding may not be transferred or may be diminished in a similar scenario. The federal funding for closed centers would be divided among remaining centers – that was the stance of HRSA in 2009 when the four centers in California nearly closed.
- Loss of training sites for emergency medicine and other specialty residents, pharmacy residents, emergency medical service personnel, among others.
- Diminished coordination with emergency medical services
- Diminished coordination with local, state and regional public health entities
- Diminished or lost regional poison injury prevention programs

The 2004 IOM report recommended revamping the current poison center system and creating a new national network of regional poison centers that is integrated with local, state and national public health agencies. The report contended that this new regional network would allow for greater coordination between poison centers, enhance efforts to collect and analyze data on poison exposures, improve and standardize training and quality improvement, and incorporate poison centers in broader injury prevention and public health initiatives. Since their report, individual poison centers have increased coordination with public health, but there is no national network and no uniform integration into public health agencies.

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