On the Role of Poison Centers in Radiation Emergency Preparedness and Response Activities: Findings of the “Radiation Emergencies Public Health Roundtable” (Atlanta, GA—August 2012)

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Introduction

After the earthquake and tsunami that struck Japan on 11 March 2011, the ensuing Japanese nuclear power plant emergency renewed concerns among officials and citizens of the USA about contamination with radioactive material and the need for medical countermeasures (MCMs) to protect the public's health. The nation's poison centers (PCs), particularly those on the West Coast, received 400 calls requesting information about protective actions for contamination with radioactive material and exposure to ionizing radiation. Centers for Disease Control and Prevention (CDC) experts analyzed PC call data through the National Poison Data System (NPDS) in order to target communication messages effectively [1].

Poison centers are already used extensively by medical facilities, individual clinicians, and the general public to assess, triage, manage, and monitor known or suspected toxic exposures. Collectively, PCs receive more than four million exposure and information calls annually [2]. All calls are electronically reported to NPDS, a near real-time surveillance system maintained by the American Association of Poison Control Centers (AAPCC) and CDC. As noted by CDC speakers at a March 2010 Public Health Grand Rounds

session, there is a lack of sufficient radiation subject matter expertise, as well as a lack of education and training, in this topic within the public health community [3]. These shortcomings also apply to PC staff. Calls about radiation are not as frequent as calls about other topics; therefore, PC staff may lack sufficient knowledge of such topics as ionizing radiation, the health effects of radiation exposure, contamination with radioactive materials, and appropriate MCMs to treat each type of incident.

The Health Studies Branch and Radiation Studies Branch are located within CDC's National Center for Environmental Health in Atlanta, Georgia. Staff from these two branches proposed to identify and discuss the existing knowledge gaps in radiation emergency preparedness and response among PC staff by organizing an educational session for PC professionals, followed by a roundtable discussion. Organizers envisioned the roundtable as a means of initiating a continuing dialogue between PCs and other public health entities about the current and potential roles that PCs can play during a radiation public health emergency.

This paper briefly summarizes the roundtable and its main findings; a full report is available online at CDC's radiation emergencies Web portal.¹

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Methods

Roundtable organizers asked AAPCC to identify a group of PC professionals representing the spectrum of PC staff (medical toxicologists, clinical toxicologists, and poison specialists) for participation. An email announcing the roundtable was sent to AAPCC members; AAPCC leadership selected participants

¹ http://emergency.cdc.gov/radiation/pdf/Summary_Report%20Radiological_Emergencies_Public_Health_Roundtable_4-29-13.pdf

from the group of respondents. The roundtable's focus was on poison center staff; however, interested public health officials from Georgia and Alabama were invited to participate based on pre-existing relationships with roundtable organizers and an interest in radiation preparedness. At the beginning of the event, a 4-h radiation training session was delivered, covering material ranging from basic radiation physics to appropriate NPDS coding of contamination by radioactive material and exposure to ionizing radiation. This session provided a common background for the roundtable participants to start from, and was also made available as a webcast to all 57 PCs across the country. After the training session and webinar concluded, participants on site in Atlanta were split into seven small groups, with one CDC facilitator per group, for roundtable discussions that used focused discussion questions. The discussion questions were first considered by each small group individually and then revisited for additional discussion by all participants in one large group. Video and audio recordings, as well as review of participants' notes, chronicled the discussions. The authors reviewed all sources of documentation from the discussions and summarized key themes and ideas.

Results/Findings

A total of 36 individuals participated in the 2-day roundtable. Among the 36 participants were 11 medical toxicologists/medical directors (physicians), 11 clinical toxicologists/PC directors (pharmacists), and 11 poison specialists (nurses and pharmacists) who were selected by AAPCC. They represented 32 PCs that serve 37 states and the Commonwealth of Puerto Rico. In addition, three public health officials representing Georgia and Alabama participated. Including the roundtable participants, 62 people attended the live activity in Atlanta.

Important themes from the roundtable discussions are summarized in Table 1. The remainder of this section highlights some of the more important themes identified by participants.

The nation's PCs have limited experience in managing exposures to ionizing radiation, contamination with radiological materials, and resulting injuries. This limited experience is mainly attributable to the fact that both contamination with radioactive material and exposure to ionizing radiation are rare events. Poison centers in states with nuclear power plants tend to have more experience in handling such eventualities, and they may be better prepared than those without such experience to respond. However, roundtable participants from PCs that have responded to radiation-related questions feel they have only limited experience with managing radiation-associated issues.

Participants identified two factors as potentially beneficial resources for PCs dealing with radiation emergencies. The first is to establish a good relationship with the state's public health department and radiation control program. They reported variable relationships between their PCs and state public

Table 1 Key issues in radiation emergency preparedness and response identified by poison center participants in the Radiation Emergencies Public Health Roundtable (Atlanta, GA—August 2012)

1. The nation's poison centers have limited experience with managing contamination by radioactive material or exposure to ionizing radiation. Currently, few poison centers have guidelines for managing either of these conditions.
2. Poison centers expect to receive calls from the public and health care providers after a radiation emergency; calls from the media may also occur.
3. Poison center 800 call line surge capacity is currently limited by system logistics; it is based entirely on local resources, and the current capacity of the aggregate system is unknown.
4. The National Poison Data System (NPDS), a tool used for surveillance, is better suited for tracking a known radiation emergency than for detecting covert incidents. NPDS can be extremely useful for situational awareness during incidents by helping guide public health response and messaging.
5. The main role of poison centers during a radiation emergency is to provide accurate information to callers; however, PCs can also assist in several roles, including dissemination of important coordinated public health messages, caller triage and medical management, and performance of follow-up activities.
6. Poison centers should be an important partner in unified public health messaging and risk communication after a radiation emergency.
7. Poison centers can act as a resource to provide information about radiation medical countermeasure use.

health departments and radiation control programs. The second is having access to uniform guidelines and recommendations specific to management of patients with radioactive material contamination and ionizing radiation exposure. Such guidelines could include predeveloped template data collection forms containing important questions to ask as well as clinical management and triage algorithms.

Following a radiation emergency, participants believed that PCs would receive phone calls at a volume proportional to the magnitude of the incident. Calls could come from a variety of sources. Primary calls will come from the public seeking information and advice and possibly from media sources seeking information about the incident. PCs will likely also receive secondary calls from nurse advice lines, emergency departments, hospitals, and other institutions about patient management. For example, it is likely that healthcare providers will call PCs with questions about radiation MCMs (e.g., Prussian blue, potassium iodide [KI], and calcium/zinc diethylene triamine pentaacetic acid [DTPA]) because such countermeasures often are considered antidotes.

Another key theme discussed was that poison centers can serve as information resources about radiation MCMs, particularly in answering questions related to administration, side effects, dosing, interactions with other medications, and contraindications. Roundtable participants believed that definitive recommendations regarding indications for MCMs will come from sources other than PC-based toxicologists. However,

once definitive recommendations are available, PCs can distribute and provide these recommendations to healthcare professionals actively managing patients.

Participants also discussed how a radiological or nuclear incident could easily overwhelm locally available public health infrastructure, including a local PC. It was noted that the logistics for a comprehensive surge strategy among the 57 US PCs using of the nationwide toll-free number does not currently exist. Lastly, they noted that while many individual PCs have local surge plans, such plans might not be universal; hence, they believe that there is a need for more thorough integrated nationwide surge capacity planning for PCs. Table 2 summarizes next steps identified by participants for improving PC radiation emergency preparedness.

Discussion

Roundtable participants think there is a general discomfort among PC staffs concerning a lack of knowledge about radiation-related health effects and consequences. Consequently, PC staffs may desire to expand their expertise about radiation. Available evidence and experience indicates that such knowledge acquisition could be accomplished through training workshops like the one held during the roundtable and through the availability of radiation-specific guidelines and case studies. One study demonstrated that the knowledge of certified specialists in poison information significantly increased after a disaster medicine workshop covering nuclear/radiation disasters; this knowledge was retained over a 14-month study period [4]. Currently, few PCs have guidelines for managing radiation-related calls. As described by roundtable participants, developing new guidelines and incorporating them into staff training while maintaining ready availability to all PCs would be useful. Participants thought such development should be collaborative, involving AAPCC and other groups with radiation subject matter expertise.

Poison centers' existing resources and capabilities include 24-h, live healthcare professional availability; automated

regional routing using a single toll-free number; experience with risk communication to the public; medical toxicology consultation expertise; and existing relationships with state radiation control programs and state health departments. Participants believe these resources and capabilities can be used to supplement an effective public health communication strategy during a radiation emergency.

Risk communication and health messaging are recognized high priority activities in radiation emergency preparedness and response efforts [5]. Participants believed PCs would rely on public health officials to develop messaging about incidents, but that they would then help share these messages with the public. CDC has conducted a series of focus groups with members of the public to examine views and knowledge of radiation emergencies and reactions to selected communications messages [6–9]. The results of these focus groups may be useful in developing effective communication products that could be distributed by PCs.

Based on their professional experience, roundtable participants felt that PCs are well-suited for distributing coordinated public health messages, including instructions about where to seek additional assistance. For example, PCs can notify people of the need to report to community reception centers (CRCs): locations at which public health agencies and their partners can perform population monitoring (evaluation of people potentially exposed to radiation or contaminated with radioactive material) after a radiation incident. As soon as health officials make a determination to establish a CRC, PCs can then be contacted so that they can distribute such information to the public and responders.

During a radiation emergency, the national situational awareness capabilities offered by NPDS for public health surveillance can be a valuable tool for public health officials [10]. The NPDS database has national data representing the catchment areas of all 57 PCs. The system provides near real-time monitoring of call frequency and exposures reported to PCs. This capability was employed during the Japan nuclear power plant response when the database was used to identify issues raised by the general public and to create targeted public health messages to address these concerns [1]. NPDS also has been used to identify outbreaks of illness with public health significance [10]. Previous experience using NPDS for surveillance indicates that success is partly dependent on the use of the best practices for case data coding. In a recent effort, CDC and AAPCC provided optimized NPDS radiation codes. A working knowledge of these codes among many of the poison specialists has yet to be achieved, however. Ways to improve familiarity with these various coding options include the provision of more training to poison specialists and utilizing radiation-specific pop-up reminders and templates in the PC electronic medical record systems.

Poison centers routinely follow up with callers to monitor outcomes and provide further recommendations if needed. This service could be helpful in creating a database of individuals

Table 2 Key next steps for improving poison center radiation emergency preparedness and response activities identified by poison center participants in the Radiation Emergencies Public Health Roundtable (Atlanta, GA—August 2012)

1. Improve radiation health training and education for poison center personnel.
2. Consolidate and share currently available resources across organizations.
3. Develop a set of recommendations, toolkits, and public messaging FAQs for response to radiation emergencies.
4. Assess current poison center surge capacity and investigate strategies for expanding such capacity on a national level.
5. Integrate poison centers with the public health infrastructure across the country at local, state, and federal levels.

contaminated with radioactive material or exposed to ionizing radiation. For example, after being evaluated at a CRC, affected persons can participate in follow-up activities via telephone with a PC. Poison centers also can perform follow-up activities over time and potentially work with allied toxicology clinics that are part of the Association of Occupational and Environmental Clinics (AOEC). A similar procedure involving AOEC was established for follow-up activities of first responders to the 11 September 2001 attacks [11]. As identified by roundtable participants in their next steps, it is critical that PC efforts be integrated with the efforts of other response and public health agencies like state and local health departments through ongoing communication and advance planning.

A previous survey of PC directors and state epidemiologists found that collaboration between PCs and public health departments most frequently focuses on terrorism preparedness and epidemic illness reporting [12]. Some roundtable participants had concerns that the public might not think to call PCs during a radiation emergency, given the general impression of the work PCs perform. Therefore, if it is desirable as part of the public health response, experience with previous crises indicates that increasing the use of PCs could be accomplished by having other organizations (e.g., local or state health departments and federal agencies) send out messages to the public emphasizing that PCs are ready and able to answer radiation questions. An example of such promotion by other organizations occurred during the 2010 Gulf Coast Deepwater Horizon incident. The Environmental Protection Agency partnered with Gulf state PCs and released messages instructing the public to call the local PC for more information about health-related questions [13]. CDC also partnered with AAPCC to use NPDS to monitor calls related to the spill [14].

Conclusion

Consensus among attendees of this roundtable was that the nation's PCs would be involved during a radiation emergency. Poison centers are likely to receive phone calls from both the public as well as healthcare practitioners as a consequence of such an incident. Poison centers have many capabilities that can be of benefit during a public health response to a radiation incident. Participants thought the primary role of PCs would likely be to provide accurate information when answering questions from callers about radiation exposures. However, PCs will likely play other important roles including the contribution of near real-time data to NPDS, which is used in CDC's national surveillance activities. This data can be used to augment public health messaging and risk communication as well as characterize the severity of the incident. Other possible roles include assisting with caller triage and medical management, and supporting long-term follow-up activities.

Participants thought that PC staffs in general have limited knowledge and experience regarding health effects and management of contamination with radioactive material and exposure to ionizing radiation. Roundtable participants concluded that more training on these topics could improve the preparedness level of PC personnel and enhance response readiness. They noted that there are some limitations in the surge response capacity of the PC system. They also concluded that improving collaboration between PCs and local, state, and federal agencies would help create an effective public health response to radiation emergencies.

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