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Centers for Disease Control and Prevention Participation in Cobalt Magnet National-Level Radiological Exercise

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Brief Report

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Abstract

Since September 11, 2001, the Centers for Disease Control and Prevention (CDC) has increased efforts to prepare the agency and public health partners for response to potential nuclear/radiological disasters. During the week of May 16–20, 2022, the CDC participated in a national-level radiological emergency exercise, Cobalt Magnet 22 (CM22). The exercise scenario consisted of a notional, failed search mission for a radiological dispersal device (RDD, “dirty bomb”), followed by its explosion during a public event in a large US city. Testing radioanalytical laboratory capabilities during a nuclear/radiological incident was an exercise objective, and developing clear messaging on low-dose exposure and long-term health concerns was a primary output of the exercise. The CDC practiced its activation protocols, exercised the establishment of its updated Incident Management System structure for radiation emergencies, and identified critical staffing needs for this type of response.

Since September 11, 2001, the Centers for Disease Control and Prevention (CDC) has increased efforts to prepare the agency and public health partners for response to potential nuclear/radiological disasters. These efforts include providing guidance documents, training, education, and communication tools. An integral part of preparing its workforce, the CDC’s Nuclear/Radiological Training and Exercise Preparedness (TEP) Program engages staff across multiple CDC programs with a variety of specialties such as epidemiologists, clinicians, data managers, communicators, environmental health specialists, at-risk population specialists, and health physicists. During the week of May 16–20, 2022, the CDC participated in a national-level radiological emergency exercise, Cobalt Magnet 22 (CM22). The US Department of Energy (DOE) National Nuclear Security Administration conducts a series of consequence management exercises every 2–3 years. This exercise provided an opportunity for the CDC staff, state, and local planners and responders to test their Incident Management System (IMS) plans and procedures for radiation emergencies. The purpose of this study is to provide high level observations of CDC participation in the planning and conduct of the CM22 exercise, with the aim of providing valuable lessons that may be useful and applicable to other federal or state and local agencies preparing for such emergencies or exercises.

Exercise Scenario

The exercise scenario consisted of a notional, failed search mission for a radiological dispersal device (RDD, “dirty bomb”), followed by its explosion during a public event in a large US city. Residents within 3 miles of the incident had been initially asked to shelter-in-place, but the recommendation was later revised to ask those within 1 mile of the incident to shelter-in-place. Radioisotopes found at the scene were consistent with those likely to be used in an RDD, including Cobalt-60, Americium-241, and Cesium-137. Multiple injuries were confirmed at the notional site of the event. On Day 2 of the exercise, the CDC activated its IMS for response to nuclear/radiological incidents.

Extent of CDC Participation

In the year leading up to CM22, the CDC TEP Program trained and exercised several hundred CDC staff in implementing the CDC IMS for radiation emergencies. In addition, key CDC staff members led several working groups and were active participants in all planning meetings conducted by DOE exercise planners. During the week of May 16–20, 2022, approximately 477 CDC personnel provided public health scientific, technical, and programmatic leadership support through the CDC Emergency Operations Center and in the field, and virtually during the CM22 Nuclear/Radiological Functional Exercise.

Early and ongoing preparation with senior leaders across multiple CDC Centers, including the National Center of Environmental Health (NCEH) and the Centers for Preparedness and

Response (CPR), ensured their familiarity with roles and responsibilities during the response to a nuclear/radiological incident. Leaders were able to exercise these roles through active participation in the functional exercise. The questions from the leadership and their input throughout the preparedness phase and during exercise activities enabled CDC staff to better anticipate and provide support to leadership in making decisions.

Critical Staffing

The authors recognize that it is unlikely that during an initial response to a nuclear/radiological incident the IMS structure would be able to be fully staffed. However, it is imperative that IMS components identify and train staff who could fill essential roles if/when a real-world event requires a rapid response. During the exercise, we identified some key positions, in addition to those listed in the IMS, that must be considered as part of planning and training. Critical staff include liaison officers (LNOs), operations coordinators, health physicists, and radiochemistry laboratorians, all of whom are needed for a comprehensive response.

Health Physicists

An effective response to a nuclear/radiological emergency requires robust health physics expertise. The current CDC IMS plans for a nuclear/radiological response would house all the agency's health physicists in a consolidated Health Physics Cell (HPC). This was a similar approach the agency used in the previous national-level exercise[4] and proved to be an effective method to leverage the limited number of health physicists at the agency. There is a declining number and shortage of health physicists nationwide across federal, state, and local agencies. In addition to supporting the various IMS task forces and serving as Chief Science Officer to brief the IMS leadership, CDC health physicists support the activities of the groups such as the Advisory Team for Environment, Food, and Health (The Advisory Team for Environment, Food, and Health comprises the CDC, US Environmental Protection Agency, US Department of Agriculture, and the Food and Drug Administration: https://cdn.ymaws.com/www.crcpd.org/resource/resmgr/ATeam/Ateam.htm) and Nuclear/Radiological Incident Task Force (NRITF) within the National Response Coordination Center.

For this exercise, the CDC also augmented its simulated response with contractors. The National Institute for Occupational Safety and Health (NIOSH) Emergency Preparedness and Response Office has access to additional health physicists. Participation of NIOSH health physicists in the TEP program would help their seamless integration and support the agency's response in future exercises or real-life emergencies.

LNOs and Operations Coordinators

Several LNOs were embedded across the task forces and teams that comprise CDC's IMS structure to enable cross-collaboration and facilitate addressing issues and Requests for Information (RFIs). The current CDC IMS plans for nuclear/radiological response would house all the agency health physicists in 1 Health Physics Cell (HPC). The Situational Awareness (SA) Section and Worker Safety and Health Task Force (WSHTF) had LNOs within the HPC, which allowed for better collaboration during exercise conduct.

Operations coordinators address a critical need for management support and organization within each IMS task force. This includes triaging requests that come to the task forces from leadership or other task forces, ensuring those requests are addressed, scheduling meetings, and ensuring appropriate staffing and communications. For a large-scale exercise such as the one simulated in CM22, we anticipate numerous requests for information from within the agency (various task forces) and outside the agency (eg, the White House, the state agencies, HHS, and other federal agencies). The operations coordinators are needed to triage and manage the requests and help ensure timely and coordinated response.

Radiochemistry Laboratorians

One of CDC's exercise objectives was to test its radioanalytical laboratory capabilities during a nuclear/radiological incident. This was identified as a critical need because we simulated that the CDC had the only CLIA-certified (Clinical Laboratory Improvement Amendments; for more information, see www.cms.gov/regulations-and-guidance/legislation/clia) laboratory in the United States with the capacity and capability to analyze clinical (urine) samples to characterize their radionuclide content (identification and quantification). As part of the exercise, the laboratory used spiked samples to analyze and report results. One interesting inject during the exercise was the unavailability of some laboratory staff due to a simulated car accident that incapacitated several laboratory staff members. An *inject* is a term used during drills and exercises to denote an event that is introduced to a player by the control staff, representing non-playing entities, to build the exercise environment based on the exercise scenario and to drive operations-based exercise play. This inject was created to stress the already limited capacity of the CDC radioanalytical laboratory. Surge staff from other CDC laboratories were not available, as they do not have experience in or training on radiation detection instruments. Nevertheless, because the total number of urine bioassay samples were limited, the laboratory was able to analyze the samples in a timely manner and provide them to the HPC for internal dose assessment.

Field Screening and Triage of Internally Contaminated People

In a large-scale incident, when a large population may be at risk of internal contamination, it is possible (perhaps vital) to conduct field triage for internal contamination to identify and prioritize individuals with high levels of contamination who could benefit most from early medical intervention. Field triage screenings can be performed using portable handheld detectors.[7,8] Whole-body counters (WBCs) are also routinely used at national laboratories and nuclear power plants. These WBCs, if transportable, can also be used for screening and triage of internally contaminated people to provide timely information to decision makers. These types of field screening/triage do not fall within the context of CLIA regulations that cover testing human specimens for health assessment, diagnosis, or treatment (information from the Designated Federal Official, Clinical Laboratory Improvement Advisory Committee, Centers for Disease Control and Prevention, on June 26, 2022). The field screening and prioritization using radiation detectors are non-invasive and do not involve the collection of specimens. This field screening/triage does not replace analysis by an analytical laboratory. However, it can help prioritize and thus reduce the burden on laboratories and provide critical and timely information to decision makers. While the exercise of this capability was not included in the scope of CM22, it would be prudent to deploy it in future exercises in preparation for real-life radiation emergencies.

Coordinating Public Messaging

Developing clear messaging on low-dose exposure and long-term health concerns was a primary output of the exercise. One specific example was about the use of air conditioning where there is potential airborne contamination—when to turn off air conditioners and how modern units recirculate air versus introducing outdoor air. The messaging throughout the exercise was not clear on this point. Because the temperature was very high during the time of year when the exercise was conducted, exercise injects called for the development of public information regarding the risk of heat stroke (due to turning off air conditioning units in homes, offices, and other buildings) versus the health risks of exposure to radioactive contamination if outside air is introduced into buildings. Regarding the recommendation to shelter in place, the IMS Joint Information Center for the simulated response received conflicting information that prompted working with partners to clarify guidance and coordinate health messaging. CDC subject matter experts participated in mock radio and television interviews to address questions about the agency's general response posture and the use of air conditioning while sheltering in place.

Information Sharing

The most challenging aspect of this exercise play was that the CDC received limited data over the first 2 days of the exercise play. This is contrary to existing planning assumptions for response to nuclear/radiological emergencies in which environmental data and modeling projections are available to responders and decision makers within the first few hours (or sooner) after such incidents. While the CDC invested considerable resources for exercise planning, exercise participants reported receiving insufficient data and situational reports to make well-informed public health decisions. This negatively impacted internal exercise play for various task forces.

Conclusions

This exercise was valuable in the CDC's effort to prepare for response to a nuclear or radiological emergency. Leading up to the exercise, CDC planners updated the nuclear/radiological incident annex that supplements its all-hazards emergency response plans, and the IMS components developed staffing plans and standard operating procedures. The CDC practiced its activation protocols, exercised the establishment of its updated IMS structure for radiation emergencies, and identified critical staffing needs for this type of response. The exercise and training activities leading up to the exercise provided multiple opportunities to brief senior leaders on many public health issues they would be faced with addressing in such emergency scenarios. The CDC will continue to prepare its workforce and work with federal partners in its supporting role to prepare for nuclear or radiological emergencies.

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Competing interests. None.

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