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Report Outlines Medical Consequences of Radiation Exposure

CHICAGO -- The effects from radiation exposure can appear in minutes or in weeks and medical resources will likely be scarce if the radiation is from a nuclear detonation accident, according to an article posted online by *Disaster Medicine and Public Health Preparedness*, a journal published by the American Medical Association. This article, as well as all of the articles in the special issue, *Nuclear Preparedness*, is open access and can be viewed at *Disaster Medicine and Public Health Preparedness* journal's website <http://www.dmph.org>.

The article reviews the available literature on radiation injuries, describes the features of acute radiation syndrome (ARS), and looks at model-based projections of the number of people affected by the radiation exposure, what resources will be needed and what resources might actually be available.

Andrea L. DiCarlo, Ph.D., from the Radiation/Nuclear Countermeasures Program at the National Institutes of Health, and colleagues analyzed information from a simulated 10-kiloton nuclear detonation within a U.S. city, using Washington, D. C. as an example. The simulated intentional detonation suggests significant infrastructure damage to the city extending approximately two miles with estimates from almost a million to more than a million people affected. Available ambulances and hospital beds are expected to be inadequate for the number of people injured.

The authors examined the effects of ARS. "The effects of radiation are dependent on the overall dose, dose rate, radiation quality, and fraction of the body that is irradiated," they write. "Mild symptoms may develop after whole-body radiation exposures as low as 1 Gy (Gray: radiation dose). Casualties exposed to more than 2 Gy are at risk for developing significant ARS. ARS represents a constellation of signs and symptoms that occur between several minutes and several weeks after exposure. ARS primarily involves the four organ systems with the greatest acute sensitivity to ionizing radiation: hematologic (blood), gastrointestinal, cutaneous (skin), and cardiovascular/central nervous systems."

“ARS classically progresses through four clinical phases: prodrome (early stage), latency, manifest illness, and either recovery or death. The prodromal period is characterized by nausea, vomiting, fatigue, and at higher doses, autonomic instability and even loss of consciousness. The latency period is characterized by partial or complete resolution of symptoms.” The authors add that some patients who received higher doses of radiation may have “little or no latency because signs and symptoms of end-organ injury can develop within hours to days after exposure.” ARS can manifest in other organ systems, especially for patients exposed to higher doses of radiation. The authors report that some cases in the literature had respiratory, cardiovascular, liver and urogenital involvement that can develop months to years after exposure.

In conclusion the authors write: “The detonation of a nuclear device within a U.S. city would create a national need for health care practitioners to manage casualties exposed to radiation; however, only a small fraction of practitioners have either training or experience in the field of radiation injury.”

Information for medical health professionals is available from the Radiation Emergency Medical Management (REMM) website established by the Department of Health and Human Services.

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