

Is the Osteopathic Medical Profession Prepared for a Radiologic or Nuclear Incident?

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The universe of disaster scenarios includes natural (eg, tornados, hurricanes, floods, earthquakes) and human-made disasters (eg, war, civil unrest, terrorism). A *mass casualty incident* (MCI) is any event that generates more patients at 1 time than locally available resources can manage using routine procedures.¹ Communities and physicians rarely have the chance to care for patients during MCIs, although such incidents as the World Trade Center terrorist attack in New York City (2001) and hurricane Katrina and its aftermath in New Orleans (2005) are exceptions.

However, most communities and physicians have little experience with MCIs that would result from the detonation of an improvised nuclear device (IND). A nuclear detonation in a US city, whether by means of a nuclear weapon or an IND, is a catastrophe that would cause enormous loss of life and property and severely damage economic viability on a national, and potentially international, level.² The blast would trigger a sudden, overwhelming surge on the health care system, after which health care practitioners (eg, physicians, nurse practitioners, physician assistants) would have to care for hundreds of thousands of casualties whose injuries might include trauma, burns, radiation exposure and contamination, and combined injuries (eg, ionizing radiation exposure with trauma or thermal burns).

Three major issues must be addressed to enable an optimal response and recovery from radiologic/nuclear (R/N) incidents, as follows³:

■ **Lack of medical education.** Most US health care practitioners have received very little instruction about managing radiation-related injuries and illnesses in medical school or in residency training programs. Continuing medical education (CME) opportunities in radiation medicine are also uncommon. A 2012 survey of schools in the American Association of Medical Colleges⁴ revealed that very few included disaster medicine in their

core curriculum. The authors (D.M.C., S.J.P., I.A.S., and E.S.G.) have prepared a survey to be completed by April 2014 that is designed to determine whether the status is the same in osteopathic medical schools.

- **Lack of medical experience.** Because ionizing radiation incidents are exceedingly rare, most health care practitioners have little direct experience with a radiation-related injury or illness.
- **Lack of community resources.** During an MCI, health care practitioners will encounter unique challenges involving exceedingly scarce resources in an austere operational environment.

Even if educators can provide osteopathic medical students and osteopathic physicians with basic and hazard-specific disaster training, there remains no solution to the lack of experience. Also, health care practitioners must understand how their ability to practice will be seriously impaired with the sheer disruption of his or her community following a disaster such as the detonation of an IND.

The osteopathic medical community has a long history of providing leadership and advancement in day-to-day medical care and national health security. As new threats, such as terrorism or the use of weapons of mass destruction, face the United States, the osteopathic medical community must lead by example and be prepared to respond to and recover from an R/N incident. The US government's vision for health security, as described in the 2009 *National Health Security Strategy*,⁵ is built on a foundation of community resilience coupled with strong health care and emergency response systems. The capacity of the nation's communities to respond to and recover from an R/N incident will, in part, depend on the osteopathic medical community's recognition of its crucial role and its ability to navigate the very unfamiliar circumstances.

In this article, we (1) outline the issues sur-

rounding response to and recovery from R/N incidents, (2) delineate the key categories of a curriculum for educating and training osteopathic medical students and osteopathic physicians (eg, CME activities), and (3) describe impediments for osteopathic physicians related to participation in existing radiation medicine CME activities. The information provided represents the minimal education and training required of emergency responders in an R/N incident.

Medical Preparedness and Response to Radiation Incidents in the United States

Emergency response and recovery from disasters—particularly those involving chemical, biologic, radiologic, and nuclear explosive materials—require a specialized skill set. This expertise, already scarce in the allopathic community, is even more elusive in the osteopathic community, which is composed of fewer practitioners. Many resources have been directed to planning for chemical, biologic, and explosive incidents, but relatively few resources have been directed to preparedness for R/N incidents. In the past few years, federal assets have been directed to an effort to improve planning and preparedness for response to and recovery from detonation of smaller nuclear weapons because of the more immediate concern in the terrorist environment in which we find ourselves. The National Library of Medicine's Radiation Emergency Medical Management website (<http://www.remm.nlm.gov/>) serves as a repository for key response information for the public health and medical communities.

A number of registries record all reported international radiation accidents. Most of these registries—including the National Nuclear Security Administration's Radiation Emergency Assistance Center/Training Site (REAC/TS) in Oak Ridge, Tennessee—have a record of fewer than 1000 radiation incidents involving humans. According to Albert Wiley, MD, PhD, the director of REAC/TS, fewer than 600 R/N incidents with substantial medical consequences have occurred during the past 65 years (oral communication, August 2012). The incidents documented in the REAC/TS Radiation Accident Registry involve cases with 1 to sev-

eral victims and with varying severity of acute radiation syndrome, cutaneous radiation syndrome, acute local radiation injuries, and a few criticality incidents. Because the rate of these incidents is very low, most physicians have never managed a radiation injury or illness, with the possible exception of practitioners of radiation therapy. Compare this small number to the hundreds of thousands of patients who receive a diagnosis of coronary vascular disease in the United States yearly.⁶

Of note, the following persons are not generally counted by registries as radiologic casualties:

- those affected by World War II–era military use of nuclear weapons in the Pacific theater
- those who were injured in military settings, such as nuclear-powered ships
- those who experienced adverse effects from radiopharmaceutical administration and radiation therapy

To compound their lack of experience, most US health care practitioners have very little knowledge about managing radiation-related injuries and illnesses.^{7,8} Educational opportunities on this topic are scarce in both the allopathic and the osteopathic branches of medicine. Information about the topic is generally not provided in medical schools and residencies or is provided only superficially. Furthermore, there are very few CME activities on this topic available for physicians, and there is no requirement to complete this kind of CME either for board certification or state licensure.

The 2 preeminent agencies that provide CME courses related to managing ionizing radiation injuries and illnesses are REAC/TS⁹ in Oak Ridge, Tennessee (3 courses), and the Armed Forces Radiobiology Research Institute¹⁰ in Bethesda, Maryland (1 course). In all, fewer than 3000 people per year take these courses. Compounding the problem for osteopathic physicians is that many of these courses are not approved by the American Osteopathic Association (AOA) for Category 1-A CME credit. Currently, to be certified for AOA Category 1-A CME credit, 30% of the presenters in a course must (a) be osteopathic physicians or (b) be “MD’s, PhD’s, and other professionals with grad-

uate degrees” employed as full-time faculty at a college of osteopathic medicine.¹¹ (As of publication, the AOA is expected to change the requirement from 30% of presenters to 50%.) Finding instructors who meet these criteria is extremely difficult in light of the smaller population of the osteopathic medical profession compared with the allopathic community and the level of specialization that is required.

Despite these impediments, 2 CME courses exploring R/N medicine have taken place. In 2008, REAC/TS offered a 1-day course in radiation medicine to attendees that was accredited for Category 1-A CME credit, but only because 1 of the authors (D.M.C.) delivered 4 of the 8 hours of didactic material. At that time, accreditation for Category 1-A CME credit required that 50% of the presentations in a program had to be delivered by an osteopathic physician. Then, in April 2012, REAC/TS delivered a 1-day course in radiation medicine awareness at Lincoln Memorial University–DeBusk College of Osteopathic Medicine (LMU-DCOM) in Harrogate, Tennessee. Finally—expanding on the hypothesis that early training in radiation awareness will produce a better-prepared, better-rounded physician—in September 2012 REAC/TS presented a combined 2-day program with the American College of Medical Toxicology to more than 350 attendees. The program was supported by the Centers for Disease Control and Prevention’s Office of Environmental Health Emergencies and was entitled “Agents of Opportunity (AoO) for Terrorism: Toxic Radiological Materials, Toxic Industrial Materials & Toxic Industrial Chemicals.”

Radiation Medicine Curriculum for Osteopathic Physicians

All responders to and receivers of radiation incident casualties require some kind of training, as do non-health care practitioners. An understanding of the psychosocial aspects that will complicate medical care is absolutely essential for this curriculum, and this knowledge should be shared with and adopted by all health care practitioners.

The essentials of an R/N educational curriculum can be taught and assimilated in less than 8 hours, making it ideal for osteopathic medical school cur-

ricula or CME activities. There are 3 issues related to this paradigm: (1) “hands-on” instruction can optimize the provider’s ability to manage radiation illnesses but adds considerable time to training; (2) instructors must be expert level—it is extremely difficult to “train a trainer” who could suffice; (3) some topics are best taught by experts in physics, radiobiology, and risk communication rather than osteopathic physicians.

This curriculum in radiation medicine is derived from basic medical science and could easily be taught in osteopathic medical schools. The curricula would need to encompass the following items:

- physics
- ionizing radiation detection and identification equipment
- units of measure
- R/N scenarios of concern
- radiobiology: acute and delayed health effects of ionizing radiation
- diagnosis and treatment of acute ionizing radiation injuries and illnesses
- handling contamination and injured patients
- decontamination techniques and other considerations
- medical management of internal contamination
- nonradiologic injuries related to the R/N scenarios of concern
- public health issues and risk communication
- surge capacity and community resilience

Ideally, the curriculum on radiation hazards and radiation medicine should be placed in an all-hazards context, which would compare and contrast radiation medicine with other hazards. This curriculum could also be integrated into curricula of schools of allopathic medicine, nursing, and physician assistants. Such integration would build medical and public health capacity in the long term and foster a culture of preparedness. Additionally, collaboration with these schools could serve to strengthen and improve the quality of an all-hazards approach to disaster medical education.

Next Steps

Given the large proportion of osteopathic physicians who practice in primary care, it is logical that the osteopathic community should be the first line of defense in terms of training and preparedness for these serious incidents. To provide further incentive for osteopathic physicians to seek disaster-related CME, the AOA should consider supporting category 1-A CME credit for these courses. In keeping with this ideal, this month begins a series of articles covering the skeleton curriculum listed above. This first article¹² will serve as a primer of the basic science underlying radiation emergency medicine. Follow-up articles will cover terrorist scenarios of concern,¹³ basics of radiobiology,¹⁴ acute local radiation injury,¹⁵ and acute radiation syndrome.¹⁶ We believe that this series will represent a long-overdue step toward ensuring preparedness for R/N incidents. (doi:10.7556/jaoa.2014.031)

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