

FS No. 26-027-0222

## Mental Health Effects of a Radiological Emergency

### Purpose

This fact sheet provides general guidance on recognizing the signs and symptoms of psychosocial distress and provides some resources to address the psychosocial needs of people following a radiological incident. This fact sheet is intended for all responders to an incident, regardless of mental health expertise.

### Introduction

Mental health consequences of radiation disasters are unique, serious, and can be more severe and longer lasting than physical and economic consequences (Centers for Disease Control and Prevention (CDC) 2002). There have been a few large-scale incidents involving radiation such as:

- In 1979, an accidental radiation release occurred at Three Mile Island nuclear power reactor in Harrisburg, Pennsylvania. Although there has been no evidence to suggest that any residents of Three Mile Island were exposed to high enough levels of radiation to cause physiological consequences, this event led to significant mental health distress in residents nearby.
- In 1986, the meltdown and explosion of at the Chernobyl Nuclear Power Plant in Ukraine (then Soviet Union) caused 134 cases of acute radiation syndrome, approximately 50 deaths, and is attributable to several thousand thyroid cancer cases. Cleanup from this incident is ongoing as of 2022.
- In 2011, the meltdown of several nuclear reactors was caused by an earthquake and subsequent tsunami in Fukushima, Japan. Unlike Chernobyl, there were no deaths from acute radiation effects in Fukushima and no cases of acute radiation syndrome. However, 116,000 people had to be evacuated, and many elderly and hospitalized people lost their lives in the evacuation process.

Radiation is invisible, difficult to detect without specialized equipment, and not generally as well understood as chemical and biological hazards. The use of radioactive material in industrial and medical settings is always increasing in the United States, and nuclear power is seeing renewed interest as an initiative to reduce climate change. However, the emergency response community has far less experience with radiation incidents than other types of disasters. Radiation can be a cause of anxiety and stress in a community, even when there is no incident or accident involving radiation. Therefore, following past radiological incidences, mental health effects lasted longer and lingered in individuals and communities more than physical health effects did.

All incidents are different in terms of complexity and the timeline of recovery. Many disasters, such as hurricanes and tornados, have an end point where the threat is past and rebuilding can begin. Radiological disasters do not typically have a defined endpoint, so they present a unique challenge since rebuilding community structure must be done while the perceived threat remains. The CDC has identified a wide range of symptoms that may result from stress after a traumatic incident (see Table 1).

**Table 1. Signs and Symptoms of Stress that may be experienced during or after a Traumatic Incident (HHS 2002)**

| Physical                    | Cognitive   | Emotional                 | Behavioral                             |
|-----------------------------|---|---------------------------|--|
| Chest pain                  | Confusion   | Anxiety                   | Intense anger                          |
| Difficulty breathing        | Nightmares  | Guilt                     | Withdrawal                             |
| Shock symptoms              | Disorientation                                    | Grief                     | Emotional outburst                     |
| Fatigue                     | Heightened or lowered alertness                   | Denial                    | Temporary loss or increase of appetite |
| Dizziness                   | Poor concentration                                | Severe panic (rare)       | Excessive alcohol consumption          |
| Nausea/vomiting             | Memory problems                                   | Fear                      | Inability to rest, pacing              |
| Profuse sweating or Thirst  | Poor problem solving                              | Irritability              | Change in sexual functioning           |
| Rapid heart rate            | Difficulty identifying familiar objects or people | Loss of emotional control |  |
| Headaches                   |   | Depression                |  |
| Visual difficulties         |   | Sense of failure          |  |
| Clenching of jaw            |   | Feeling overwhelmed       |  |
| Nonspecific aches and pains |   | Blaming others or self    |  |

Seek medical attention immediately if anybody experiences chest pain, difficulty breathing, severe pain, or symptoms of shock (e.g., shallow breathing, rapid or weak pulse, nausea, shivering, pale and moist skin, mental confusion, and dilated pupils).

### How Soldiers and Emergency Responders Can Help Those Affected

Early intervention is key to reducing adverse mental effects in an incident. It is far more effective to intervene early to prevent social and psychosocial problems from developing than to treat them after they have become established in individuals and a community. Early intervention includes establishing a trusted source of information and making appropriate mental health services part of the overall emergency response. Even if you are not a mental health professional, HHS (2000) recommends a number of things you can provide to each age group to include:

- Preschool (ages 1-5): verbal assurance and physical comfort; bedtime routines; avoid unnecessary separation; encourage expression during play activities
- Childhood (ages 6-11): give additional attention; provide structured but undemanding chores; encourage expression of thoughts and feelings; encourage retelling of disaster event; involve child in preparation for future disasters
- Adolescence (ages 12-18): encourage physical activity; encourage participation in community rehabilitation activities; all interventions listed for the Childhood age group
- Adults: provide opportunities to discuss disaster in detail; provide more information; encourage meetings with spiritual/religious leaders; request further assistance
- Older Adults: provide strong and persistent verbal reassurance; assist in recovering possessions; assist in locating financial and medical resources

### General Advice

- The first things you can provide victims of an incident include physical safety, comfort, hope, and structure.
- Set realistic goals and prioritize tasks; ensure you are doing the same for co-workers.
- Engage in physical exercise; limit excessive junk food, caffeine, alcohol, or tobacco.
- Use time off for exercise, reading, listening to music, taking a bath, or getting a special meal to recharge.
- Talk about emotions and reactions with family and co-workers.
- Military and first responders may suspend showing emotions and seeking mental health assistance due to a sense of duty; monitoring this population may require more time and effort to acknowledge above symptoms.
- Use mass texting as a method of delivering news and inspirational messaging to the public (Longmuir 2021).
- Acknowledge and address the early signs of stress in yourself and your co-workers.
- Seek mental health care if you have persistent symptoms of distress.

### How to Request Further Assistance

- The HHS offers several resources on its Radiological Emergency Medical Management website: <https://remm.hhs.gov/psych.htm>
- Military Crisis Line (for Service members, National Guard, Reserve, and Veterans): <https://www.tricare.mil/CoveredServices/Mental/CrisisLines>
- U.S. Army Public Health Center (APHC): <https://phc.amedd.army.mil/>

### References

- Department of Health and Human Services (HHS). 2002. NIOSH Publication Number 2002-107, *Traumatic Incident Stress: information for Emergency Response Workers*. <https://www.cdc.gov/niosh/mining/works/coversheet643.html>
- HHS. 2000. HHS Publication No. ADM 90-538, *Training Manual for Mental Health and Human Service Workers in Major Disasters*, 2<sup>nd</sup> Edition. <https://www.hsdl.org/?abstract&did=4017>.
- CDC, Online Course, "Psychological First Aid in Radiation Disasters," <https://www.orau.gov/rsb/pfaird/01-introduction.html> (this website includes audio).
- National Council on Radiation Protection and Measurements. 2001. NCRP Report 138, *Management of Terrorist Events Involving Radioactive Material*.
- Longmuir C and VIO Agyapong. 2021. Social and Mental Health Impact of Nuclear Disaster in Survivors: A Narrative Review. *Behav Sci (Basel)*, 11(8):113. <https://doi.org/10.3390/bs11080113>.

The APHC's Division of Behavioral and Social Health Outcomes Practice (BSHOP) contributed to this fact sheet.