

Triage

1. Triage Following a Radiological/Nuclear Incident

Expect the following after a radiological/nuclear incident

- a. Injured and (possibly) exposed
 - b. Uninjured and (possibly) exposed
 - c. Injured and unexposed
 - d. Uninjured and unexposed
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2. Radiation Exposure (Irradiation)

- a. High doses can cause serious or life-threatening illness
 - b. Irradiation *by itself* may cause early, life-threatening adverse health effects at very high doses
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3. Combined Injury

DEFINITION: Physical, thermal, and/or chemical trauma combined with radiation exposure in doses sufficient to threaten overall survival / recovery

4. Triage during first 24 hours

- a. Consider irradiation
 - b. Treatment decisions based on
 - Physical findings
 - Adverse health effects
 - First 24–48 hours
 - Laboratory tests
 - History (medical and exposure)
 - Contamination assessment
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5. Adverse Health Effects Acute Radiation Syndrome (ARS)

- a. Caused by irradiation of whole body or a significant portion thereof
 - b. Type, severity, and onset of adverse health effects dependent on dose (i.e., amount of energy deposited in the body)
 - c. Three stages of ARS
 - Prodrome
 - Latent period
 - Manifest illness
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6. Acute Radiation Syndrome: Prodrome

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- a. Begins after exposure
 - b. Lasts 24–48 hours
 - c. Adverse health effects
 - Nausea/vomiting/diarrhea, fatigue, headache, salivary gland inflammation, erythema, fever
 - d. Onset of prodromal adverse health effects occurs more rapidly with severe ARS than with mild ARS
 - e. Nausea and vomiting is a hallmark
 - Time to emesis may be used as rough estimate of exposure and outcome
 - f. Estimation of severity of ARS following a single acute dose exposure
 - g. Onset of vomiting within 1-2 hours is highly suggestive of a poor prognosis
 - h. Rise in core body temperature can be used as a marker for exposure
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Degree of ARS	Vomiting Post Incident
Mild - Moderate	> 2 hours after
Moderate - Severe	1-2 hours
Severe	< 1 hour
Very Severe	10 – 30 minutes
Rapidly Lethal	< 10 minutes

Source: Berger, et al. [2002]. *Hospital Triage in the First 24 Hours After a Nuclear or Radiological Disaster*. REAC/TS Training Site.

<http://www.orau.gov/reacts>

Degree of ARS	Body Temp.	Onset	Incidence %
Mild - Moderate	Normal	N/A	N/A
Moderate - Severe	Increased	1-2 hours	10-80
Severe	Fever	1-2 hours	80-100
Very Severe	High Fever	< 1 hour	100
Rapidly Lethal	High Fever	< 1 hour	100

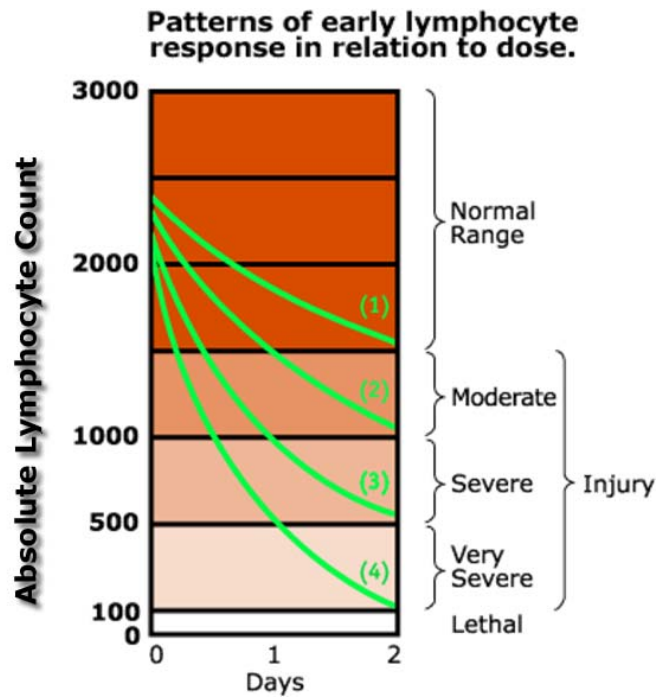
Source: *Ann Intern Med* [2005] 45(6):643-652. <http://www.annals.org>

Acute Radiation Syndrome (ARS): Prodrome		
ARS Prodrome	Manifestation of Illness	Prognosis (without therapy)
Mild	Slight decreases in blood counts	Almost certain survival
Mild to Moderate	Early signs of bone marrow damage	Highly probably survival
Moderate	Moderate to severe bone marrow damage	Probable survival
Severe	Severe bone marrow damage; slight GI damage	LD50 (Within 3.5 – 6 weeks)
Severe	Pancytopenia and moderate GI damage	Death probable (Within 2 – 3 weeks)
Severe	Marked GI damage and bone marrow damage; hypotension	Death probable (Within 1 – 2.5 weeks)
Severe	Severe GI damage; pneumonitis; altered mental status; cognitive dysfunction	Death certain (Within 5 – 12 days)
Severe	Cerebrovascular collapse; fever; shock	Death certain (Within 2 – 5 days)

Source: *Ann Intern Med* [2004] 140(12):1037-1051. <http://www.annals.org>

**7. Laboratory Testing
(Acute Radiation
Syndrome: Prodrome)**

- a. Lymphocytes
- Highly radiosensitive
 - Progressive decline in absolute lymphocyte counts provides early estimate of injury and outcome
 - Obtain baseline CBC with differential in 4-6 hours; then repeat every 6-8 hours for 24-48 hrs.



Source: Andrews, et al. [1965] *Personal Dosimetry for Radiation Accidents*. Vienna: International Atomic Energy Agency.

8. Combined Injury

- a. Prolonged time to onset of vomiting – trauma triage categories remain the same
- b. Patients having combined injury, at higher whole-body doses, should be triaged as expectant.

Conventional Trauma Triage Categories (Without Radiation Exposure)	Changes in Expected Trauma Triage Categorization Following Whole-body Radiation Exposure (Based on Time-of-Onset to Vomiting as Estimation of ARS Severity)		
	> 2 hours	1 – 2 hours	< 1 hour
	Mild	Moderate	Severe – Lethal
Delayed	Delayed	Variable*	Expectant
Immediate	Immediate	Immediate	Expectant
Minimal	Minimal	Minimal	Minimal
Expectant	Expectant	Expectant	Expectant
Absent	Outpatient monitoring	Outpatient monitoring with routine care or hospitalization as needed	

**Variability is dependent on the nature and extent of traumatic injury.*

Source: Adapted from Ann Intern Med. [2004] 140: 1037-1051.

<http://www.annals.org>

9. SUMMARY

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- a. Exposed vs. not exposed to radiation
 - b. Acute Radiation Syndrome
 - 3 stages – Prodrome onset key to triage efforts
 - c. Clinical guides for victim triage
 - Time to prodrome onset (vomiting)
 - Absolute lymphocyte count
 - d. Combined injury generally means a worse prognosis
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Source: "Radiological and Nuclear Terrorism: Medical Response to Mass Casualties", a self-study training program for clinicians, developed by the Centers for Disease Control and Prevention, 2006.

For copies of this product, email cdcinfo@cdc.gov.

To learn more about responding to a radiological incident, visit <http://www.bt.cdc.gov/radiation>.