Integrating national expertise into local, regional and national response

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Voluntary network of 51 academic medical centers, 6 blood donor centers and 7 umbilical cord blood banks
Estimated number of irradiated casualties

<table>
<thead>
<tr>
<th>Patient Category</th>
<th>Radiation Dose, Gy</th>
<th>1-kiloton Detonation</th>
<th>10-kiloton Detonation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined injuries (minimal to intensive care)</td>
<td>All doses</td>
<td>1000–3000</td>
<td>15 000–24 000</td>
</tr>
<tr>
<td>Immediate fatalities</td>
<td>All doses</td>
<td>&gt;7000</td>
<td>&gt;13 000</td>
</tr>
<tr>
<td>Radiation fallout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expectant care</td>
<td>≥10</td>
<td>18 000</td>
<td>45 000</td>
</tr>
<tr>
<td>Intensive care</td>
<td>5–10</td>
<td>19 500</td>
<td>79 400</td>
</tr>
<tr>
<td>Critical care</td>
<td>3–5</td>
<td>33 000</td>
<td>108 900</td>
</tr>
<tr>
<td>Normal care</td>
<td>1–3</td>
<td>66 000</td>
<td>70 000</td>
</tr>
<tr>
<td>Ambulatory monitoring</td>
<td>0.5–1</td>
<td>82 500</td>
<td>139 000</td>
</tr>
<tr>
<td>Epidemiologic monitoring</td>
<td>0.25–0.5</td>
<td>106 000</td>
<td>147 000</td>
</tr>
<tr>
<td>Monitoring for psychosocial well-being without other injury</td>
<td>&lt;0.25</td>
<td>&gt;150 000</td>
<td>&gt;270 000</td>
</tr>
</tbody>
</table>

* The table depicts projected casualty estimates based on a 1- or 10-kiloton detonation. Assumptions include a city with a population of 2 million people and casualties estimated on the basis of the Hazard Prediction Assessment Capability Program (HPAC), version 3.21 (Defense Threat Reduction Agency, Fort Belvoir, Virginia). Combined injuries consist of radiation injuries in addition to burns or blunt trauma.

Waselenko et al. *Annals Int Med* 2004
What kind of care will they need?

- Stem cell transplant
- Inpatient care for severe complication, ICU and/or isolation
- Inpatient treatment for infection and other complications
- Outpatient treatment for infection and other complications
- Risk stratification and surveillance only
Where will they need it?

10 miles to Holy Cross Hospital
Where will they need it?

100 miles to University of Virginia
Where will they need it?

1000 miles to Kansas University
The challenges

• >100,000 irradiated persons with some hematologic toxicity
• >30,000 with doses justifying inpatient/intensive outpatient management

The needs

• Pre-event/Just-in-time education
• Guidance for centers close to the incident (scarce resources)
• Guidance for centers farther from the event (adequate resources)
• Surge capacity
• HLA typing and stem cell product collection and distribution
What we’re doing: pre-event planning and training

- Standard Operating Procedures at each center
- Site readiness assessments
- Annual tabletop exercise
- Annual training/education requirement:
  - >2,600 RITN staff completed Basic Radiation Training since 2006
  - >2,300 medical staff have attended RITN ARS medical Grand Rounds training since 2008
  - >150 participated in REAC/TS training in Oak Ridge, TN since 2008
- User-managed inventory
What we’re doing: post-event guidance

- National guidance – online, teleconsult
- Treatment guidelines ([www.ritn.net](http://www.ritn.net))
- Template admission orders ([www.remm.nlm.gov](http://www.remm.nlm.gov))
- ASPR Scarce Resources Project
What we’re doing: Guidelines for HSCT

**Marrow injury**
- Potentially irreversible marrow injury
- Salvageable
- Minimal combined injury

**Expedited HLA typing**
- Myeloablation >14-21 days
- Available allograft
- Acceptable pre-transplant condition

**HSCT**

**RITN Treatment Support**
- Supportive care

Affected population
Radiation Dose (Gy)

- > 10 Likely fatal (in higher range)
- 6 - 10 Severe
- > 2 - 6 Moderate
- < 2 Minimal

Resource availability: Normal Good Fair Poor
Standard of care: Conventional Contingency Crisis

Expectant Immediate Delayed Expectant Immediate Expectant Immediate
Minimal Minimal Minimal Minimal Minimal

Coleman CN, Weinstock DM et al. *Disaster Med Health Prep* 2011
Myeloid cytokines with “Fair” or “Poor” resource availability

<table>
<thead>
<tr>
<th>Radiation dose</th>
<th>Radiation only or Minimal trauma</th>
<th>Moderate trauma</th>
<th>Severe trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;10 Gy</td>
<td>Expectant³</td>
<td>Expectant³</td>
<td>Expectant³</td>
</tr>
<tr>
<td>&gt; 6 – 10 Gy</td>
<td>Delayed²</td>
<td>Expectant³</td>
<td>Expectant³</td>
</tr>
<tr>
<td>≥ 2 – 6 Gy</td>
<td>Immediate¹</td>
<td>Immediate¹</td>
<td>Delayed²</td>
</tr>
</tbody>
</table>

Resource availability: Fair | Poor | Fair and Poor

<table>
<thead>
<tr>
<th>Myeloid cytokine category</th>
<th>Recommendation for G-CSF or comparable agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indicated</td>
</tr>
<tr>
<td>2</td>
<td>Indicated only if supply widely available</td>
</tr>
<tr>
<td>3</td>
<td>Not indicated</td>
</tr>
</tbody>
</table>

Coleman CN, Weinstock DM et al. *Disaster Med Health Prep* 2011
What we’re doing: surge capacity

Total patients accepted

Patients accepted/center

Davids et al.  *Biol Blood Marrow Trans* 2010
How do we integrate local networks?

Hospitals near University of Virginia
How do we integrate additional local resources?

Hotels near University of Virginia
What we haven’t done well enough: integration with local and regional response

Sharing Supplies, staff, space, knowledge

- Local public health
- Within hospital network
- Outside hospital network
- Non-RITN academic medical centers as the hub
- Non-traditional health care settings
The complexity of networks
Awareness of RITN
Distribution of expertise and surge
Esoterica – HLA-typing, stem cell transplantation, management of immunodeficiencies and graft-versus-host medications