2022

RITN Tabletop Exercise (TTX) After-Action Report/Improvement Plan Laboratory Surge

Exercise Date: June 28, 2022

EXERCISE OVERVIEW

Exercise Name	2022 RITN Tabletop Exercise (TTX)
Exercise Date	June 28, 2022
Scope	This exercise is a distance-based tabletop exercise planned for 1 ½ hours. Exercise play is limited to RITN facilities and their response partners' collective challenges and considerations for improved and effective response.
Mission Area(s)	Response
Capabilities	Healthcare and Medical Response Coordination Medical Surge
Objective	**Objective 1:** RITN hospital staff can assess the ability of their laboratories to handle a surge in demand for complete blood counts with differential, comprehensive metabolic panels, and coagulation parameters. **Objective 2:** RITN hospital staff can identify staff, equipment, and other resource needs to include supply chain disruptions. **Objective 3:** RITN hospital staff can identify medical toxicology resources available and discuss coordination between the hospital and local poison center. **Objective 4:** Assess the ability of the blood bank to meet the increase in demand for blood products.
Hazard	Radiological
Scenario	Medical surge from a distant radiological incident
Sponsor	Radiation Injury Treatment Network® (RITN) National Marrow Donor Program (NMDP) Office of Naval Research (ONR)
Participating Organizations	Allegheny Health Network Cancer Institute (Pittsburgh, PA) Barnes-Jewish Hospital (St. Louis, MO) Mayo Clinic (Rochester, MN) Medical University of South Carolina (Charleston, SC) Roger Williams Medical Center (Providence, RI) Roswell Park Comprehensive Cancer Center (Buffalo, NY)
Point of Contact	RITN Control Cell RITN@NMDP.ORG (612) 884-8276

EXERCISE SUMMARY

On June 28, 2022, RITN centers and the RITN Control Cell participated in an online tabletop exercise to describe coordination of the laboratory and outpatient surge response as well as information sharing, data systems, and supply chain disruptions following a distant radiological event. A facilitated series of exercise tasks were provided to participants for their consideration, response, and group discussion organized by the exercise scenario summary below.

Scenario Summary: The following illustrate the scenario events considered for participant discussion:

Exercise Scenario

- A 10-kiloton Improvised Nuclear Device (IND) was detonated in an urban area approximately 250 miles away from your facility. No threat of fallout and no utility interruptions.
- It is expected that a large number of people with mild to moderate trauma and those seeking evaluation for radiation exposure will self-evacuate to seek medical attention.
- Poison Control Centers (PCCs) throughout the country begin receiving large volumes of calls from people that were in the fallout zone.
- It is necessary to set up a receiving area for the outpatients and perform daily blood counts (i.e., CBCs collected and analyzed once per 24 hours).

Scenario Update

- Approximately 1,800 radiation victims have arrived in the local area, mostly self-evacuating. More expected over the next week. They require initial evaluation and blood tests; daily testing will need to occur for at least 2 weeks for many of them.
- In addition to the outpatients, approximately 500 samples are arriving daily to your laboratory for analysis from overwhelmed shelter locations closer to the blast site resulting in a total daily sample load that is nearly double the routine daily average.
- Due to the unprecedented detonation of an IND, transport of goods has been significantly slowed as inspections are increased at airports and along roadways within the U.S.
- There is a significant demand for blood products both in the immediate area and throughout the region where acute radiation injury patients are being housed. Trauma patients are also impacting total blood supplies. Volunteer donations have increased.

ANALYSIS OF CAPABILITIES

Exercise Discussion Module 1: Preparing for a Surge

Participants were tasked with responding to a series of questions at their individual facility then reporting out to the group on capabilities and actions. During the first module, two poll questions were asked of the group:

1. Does a laboratory surge plan exist for radiological incidents? **71% yes**
2. Is the local/state PCC included in RITN planning efforts? **40% yes**

Laboratory and Outpatient Surge

Facilities indicated that incident command would be established and then augmented with subject matter experts representing hematology, oncology and laboratory given the radiological scenario. Communications with local, state, and federal partners are routed through the ICS Liaison Officer to ensure the right subject matter expert is involved in conversations about resource needs, response, and information sharing.

Laboratory staff receive surge training annually or as needed. With regards to radiation training, often it is comprised of general radiation safety and does not include details specific to a RITN response (i.e., surge in laboratory samples/tests).

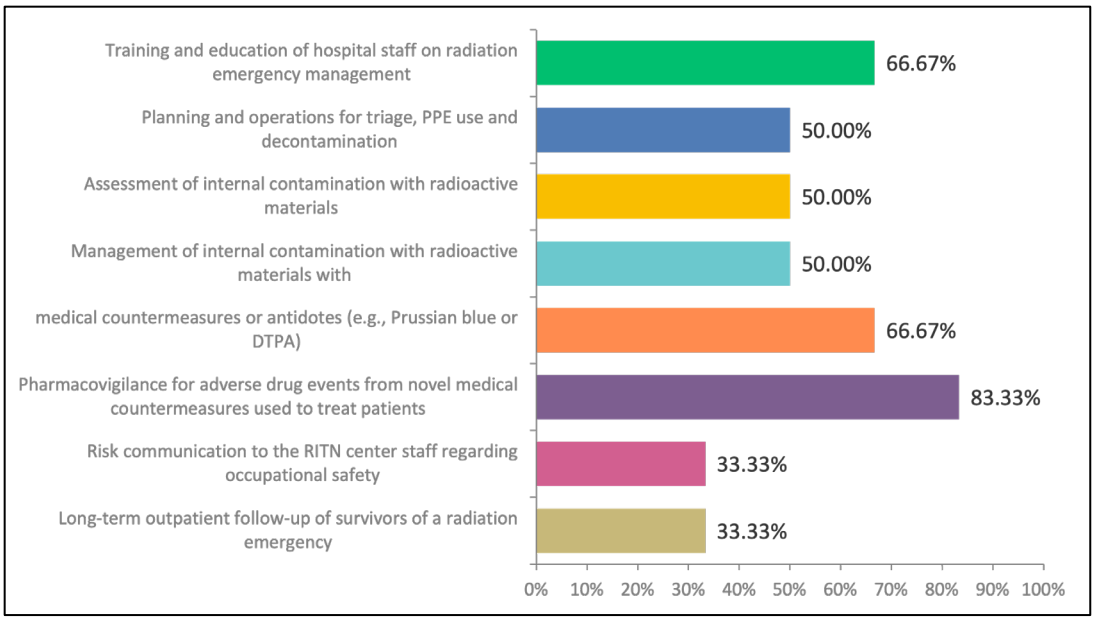
RITN hospital physicians with subject matter expertise would be available to consult with other locations where patients are receiving outpatient care (depending how far they had dispersed).

Medical Toxicologist and Poison Control Center Coordination

Hospitals were asked about the role of a medical toxicologist as it relates to RITN response plans. For example, to support activities such as training and education, triage plans and operations, the use of PPE, decontamination, assessment and management of internal contamination, long term follow up of outpatients, adverse drug events, and risk communication.

Some participating hospitals stated that a medical toxicologist or other expertise could be available to provide training on decontamination and management of radioactive materials to augment online staff training courses. There is a need to further incorporate these roles (medical toxicologist, state toxicologist) into existing RITN plans to augment the tasks currently assigned to radiation safety.

Responses provided in a survey following the exercise were as follows (N=6):



RITN hospitals in small states did not have a medical toxicologist on staff (33% of facilities responded as to having one) but this expertise is available through the regional PCC. Larger facilities such as Mayo Clinic have a medical toxicologist on staff who serves as Co-Chair of the MCI response subcommittee; this is beneficial as the individual is familiar with all surge and MCI procedures and could step into any role depending on where there was greatest demand for support. In addition, Mayo Clinic would work within their system to identify physicians, residents, and fellows with strong toxicology background to support response efforts.

Some RITN hospitals participating in this exercise would not refer calls to the PCC and prefer to set up a call center at the hospital (or affiliated facilities). It is anticipated that the demand for technical consultation would be extraordinary in this situation and surpass resources available so other hospitals would leverage PCC as a referral depending on the type of situation/question. Only 33% of participating hospitals have involved the PCC in their planning processes, and none has shared the RITN referral guidelines with PCC. Overall, coordination and relationships between the RITN hospitals and PCCs is not strong.

Laboratory Staff, Supplies, and Equipment

For surge supplies, hospitals indicated having stockpiles available within the hospital or at affiliated facilities and/or central location. A gap analysis would be conducted to understand the resources available now and what would be needed for the ongoing response, especially given

supply chain issues. Equipment is fairly static but other processes would be evaluated to see if modifications could be implemented to conserve/shift resources.

One hospital noted that partnerships with outpatient laboratories and regional sites to obtain additional supplies has been in practice since 2020 due to the real world supply chain issues.

Generally, the biggest risks to having sufficient laboratory supplies are supply chain, transportation, and storage space. Staffing for the surge was cited as an issue by some hospitals.

Strengths

The following strengths were demonstrated:

Strength 1: Over 70% of participating hospitals have a laboratory surge plan in place that includes a radiation incident.

Strength 2: Depending on the size of the RITN hospital, some indicated having a depth of technical resources (medical toxicology, radiation safety) that could support education/training, triage, use of PPE, and decontamination.

Strength 3: Hospitals have experience with supply chain issues following the COVID-19 pandemic and have strengthened relationships with local partners for resource sharing; with vendors for procurement.

Areas for Improvement

The following areas require improvement:

Area for Improvement 1: RITN hospitals should strengthen/expand their relationship with PCCs, in particular as it relates to support for a radiation incident and sharing the RITN referral guidelines.

Area for Improvement 2: Conduct an evaluation of supplies needed based on the scenario presented in this exercise to ensure a complete list of needs is outlined and the time it would take to receive specialty items (e.g., laboratory supplies).

Area for Improvement 3: Hospitals with a medical toxicologist should ensure that role is incorporated into the RITN response plans and outline specific responsibilities for this SME. Only 25% of participating facilities have incorporated the medical toxicologist into plans.

Area for Improvement 4: Consider augmenting laboratory radiation safety training with details specific to a RITN response, such as the estimated number of specimens, test types, and timelines.

Exercise Discussion Module 2: Laboratory Testing, Result Reporting and Assessment of Blood Products

This module focused on the patient arrival and need for laboratory testing, data tracking, and blood products. As above, participating hospitals were given a set of questions to respond to.

Blood Collection and Data Tracking of Results

To support increased blood collection activities, participating RITN hospitals would rely on satellite facilities, utilizing phlebotomists and nurses from individual clinics or outpatient laboratories, and the use of courier services. Generally, it seemed that blood collection staff would be sufficient for a surge by utilizing existing resources. Challenges would be getting staff into place and implementing the emergency plan, though it was recognized that this scenario affords some lead time.

With regards to data entry and result tracking, participating hospitals referenced Epic and Cerner Millennium for electronic health records, laboratory specific programs, and MyChart to communicate results back to the patient (if enrolled) as well as to the ordering physician.

At one RITN hospital, all patient blood samples/tests would be facilitated on the hospital campus and do not anticipate using outpatient shelters.

Increased Testing Demand Capabilities and Challenges

Hospitals were also asked to consider the laboratory capacity to performed increased testing throughput. The main challenges would be staffing and supplies (e.g., tubes) to both perform the tests but also the data entry required to track and document samples. If throughput capacity was exceeded, RITN facilities would reach to affiliated hospitals or core laboratories.

Sample processing capacity depended by laboratory, most indicated being able to process hundreds per hour; all were able to quantify how many laboratory tests could be performed. It was more difficult for facilities to answer the question about transitioning to and throughput for manual flow cytometry processes. This question requires more consideration.

Samples would be prioritized for testing by laboratory management in consult with the incident commander and subject matter expert (physician) input.

Blood Products

Hospitals would notify primary and secondary blood suppliers to pull these resources from other areas. The American Red Cross (ARC) would coordinate the blood donations but staffing is

anticipated to be a resource gap. All hospitals automatically/routinely irradiate blood products following collection; ARC also can irradiate donated blood.

A specific example that was shared regarding blood product coordination was by Allegheny Health Network Cancer Institute. This facilities has another RITN hospital within ½ mile of their location so would work together to determine how to distribute limited blood product resources (this has been tested in past exercises) and include ARC to create a plan. Vitalant (non-profit blood donation) is also in the area who assist with the combined solution to increase and distribute blood products.

HLA Typing

HLA typing determinations are performed by the medical team using established criteria. Participating hospitals agreed that they would not type distant relatives, rather only siblings, parents and children. Outside companies would provide the typing kits and NMDP could conduct typing on site for the related doners.

One RITN hospital stated that blood samples are stored for 6 months so future HLA typing would not be an issue. Alternatively, another hospital responded that they do not store patient samples for future, potential HLA typing. Instead there is the capacity to perform the test in coordination with LabCorp (high resolution) or for low resolution testing to be done in house.

Strengths

The following strengths were demonstrated:

Strength 1: Hospitals had sufficient resources to draw upon for blood collection in this surge response.

Strength 2: The networks of affiliated hospitals and outpatient facilities are well defined and could be drawn upon as a resource to respond to a significant testing surge.

Strength 3: All participating hospitals were able to quantify their laboratory throughput in a 24 hour period; additionally they were able to describe the decision makers involved if there was a need to prioritize samples should volume exceed capacity.

Areas for Improvement

The following areas require improvement:

Area for Improvement 1: Hospitals expect challenges with staffing and supplies to perform laboratory testing and data entry associated with sample tracking. Planning efforts should evaluate what other staff can be drawn upon to support this portion of the operation.

Area for Improvement 2: Staffing to support an increase in blood donations is expected to be a challenge. Using this scenario, continue to evaluate how to augment staffing for this purpose.

Area for Improvement 3: Hospitals did not consistently archive patient blood samples for possible future HLA typing. If space permits, it may be valuable to do so for a certain period of time (e.g., 3 months, 6 months) in case the patient condition deteriorates, requiring transplant.

APPENDIX A: IMPROVEMENT PLAN

This improvement plan template has been developed specifically for the RITN centers participating in the 2022 RITN Tabletop Exercise conducted on June 28, 2022. RITN centers can utilize this table to organize the opportunities for improvement to augment and develop their own corrective actions. The improvement plan is intended to strengthen the response of RITN hospital core capabilities identified in this report.

Core Capability	Issue/Area for Improvement	Corrective Action	Capability Element[1]	Primary Responsible Organization	Organization POC	Start Date	Completion Date
Core Capability 1: [Capability Name]	1. [Area for Improvement]	[Corrective Action 1]					
		[Corrective Action 2]					
		[Corrective Action 3]					
	2. [Area for Improvement]	[Corrective Action 1]					
		[Corrective Action 2]					

[1] Capability Elements are: Planning, Organization, Equipment, Training, or Exercise.

APPENDIX B: EXERCISE PARTICIPANTS

Participating Organizations	
Allegheny Health Network Cancer Institute	Salman Fazal
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Barnes-Jewish Hospital	Jason Parmentier
Barnes-Jewish Hospital	Wendy Reid
Barnes-Jewish Hospital	Jason Campbell
Barnes-Jewish Hospital	Cindy Ingold
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Barnes-Jewish Hospital	Jo Ellen Jennermann
Barnes-Jewish Hospital	Diane Sempek
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Mayo Clinic	David Seering
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Mayo Clinic	Elizabeth Armstrong
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Roger Williams Medical Center	Peter Marsiglia
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Roswell Park Comprehensive Cancer Center	Melinda Klubek
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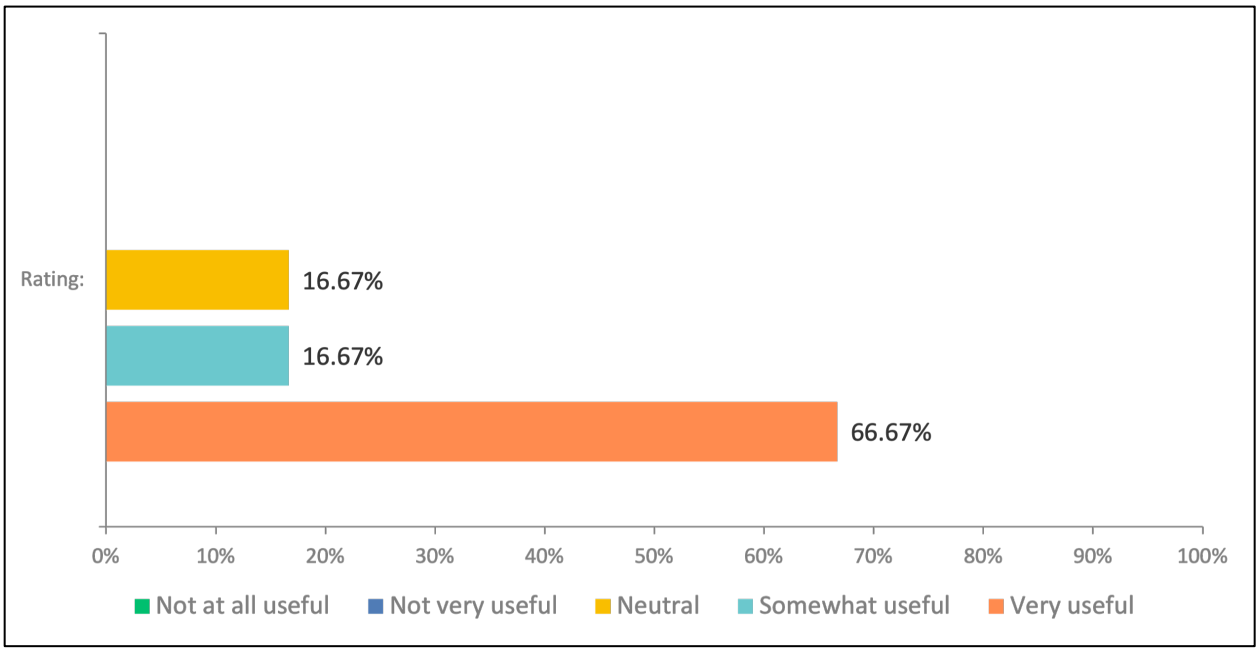
Roswell Park Comprehensive Cancer Center	Rose Kumpf
Roswell Park Comprehensive Cancer Center	Christopher Stone
Roswell Park Comprehensive Cancer Center	Jason Shultz
Roswell Park Comprehensive Cancer Center	Lisa Privitere

APPENDIX C: PARTICIPANT FEEDBACK

RITN Centers were asked to provide feedback via an online questionnaire following the exercise. The comments below are not in any particular order and are provided unedited to avoid intent changes.

Note: The average rating provided by the participating RITN centers regarding the usefulness of this exercise was 4.5 (out of 5.0). Number of responses = 6.



APPENDIX D: ACRONYMS

Acronym	Term
AAR	After Action Report
ARC	American Red Cross
CBC	Complete Blood Count
HLA	Human Leukocyte Antigens
ICS	Incident Command System
IND	Improvised Nuclear Device
NMDP	National Marrow Donor Program
NDMS	National Disaster Medical System
ONR	Office of Naval Research
PCC	Poison Control Center
RITN	Radiation Injury Treatment Network
TTX	Tabletop Exercise