2022

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

Exercise Date: July 12, 2022

EXERCISE OVERVIEW

Exercise Name	2022 RITN Tabletop Exercise (TTX)
Exercise Date	July 12, 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	Banner University of Arizona Medicine (Tucson, AZ) Children's Hospital of Alabama (Birmingham, AL) Children's Hospital of Philadelphia (Philadelphia, PA) Children's Hospital of Wisconsin/Froedtert (Milwaukee, WI) Emory University Hospital (Atlanta, GA) Greenville Memorial Hospital (Greenville, SC) Temple University Hospital (Philadelphia, PA) University of Wisconsin Health (Madison, WI)

Point of Contact	RITN Control Cell RITN@NMDP.ORG (612) 884-8276

EXERCISE SUMMARY

On July 12, 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? **55% yes**
2. Is the local/state PCC included in RITN planning efforts? **42% yes**

Laboratory and Outpatient Surge

Facilities indicated that incident command would be established and then augmented with subject matter experts given the radiological scenario. Communications with local, state, and federal partners regarding the surge response would follow established procedures (e.g., portal for local/county healthcare coalition).

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). Radiation Safety Officers or Nuclear Medicine are available to provide just-in-time training in an event such as this.

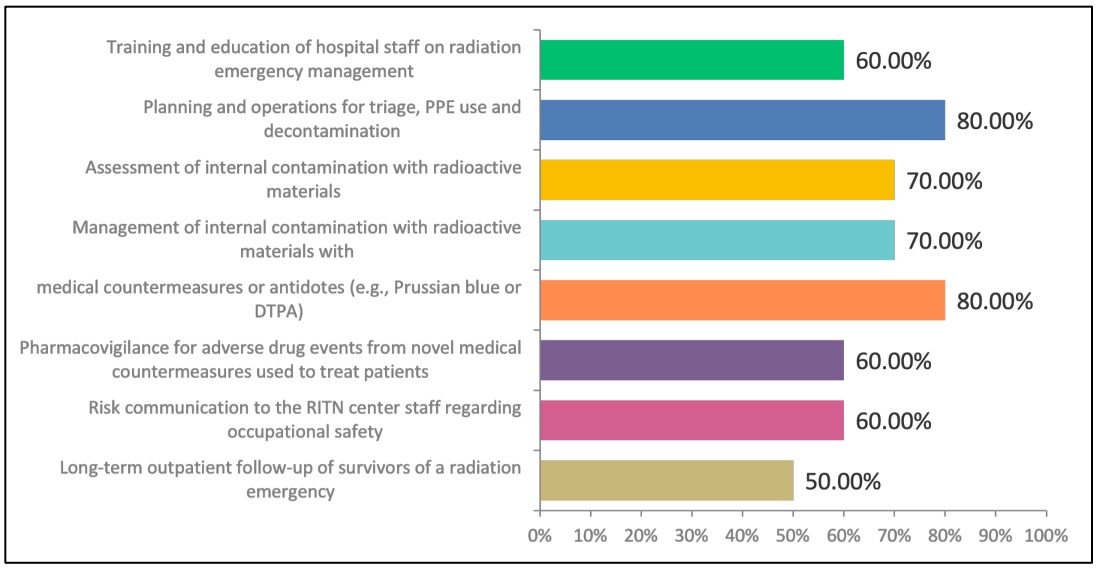
RITN hospital physicians with subject matter expertise would offer telephonic consultation as possible given the situation and associated staffing demands.

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.

All participating hospitals stated that they have at least one medical toxicologist available that could support a RITN response with assistance from the radiation safety officer, trained EMTs or other expertise within affiliated university programs/residencies. However, nearly all hospitals (90%) indicated that the medical toxicologist is not integrated into the RITN planning efforts. The functional response role that hospitals felt their medical toxicologist could take in a RITN response are outlined in Figure 1 below; most frequently mentioned were PPE, triage, decontamination, and administration of medical countermeasures.

Figure 1.



Depending on the degree of surge, the majority (80%) of hospitals would rely on the PCC to handle incoming calls and consultations. In the case of Children's Hospital Alabama, the PCC is housed at the hospital so it is considered an important resource. Emory also stated that the PCC is formally integrated in RITN response planning; however of the participating hospitals 60% have not shared the RITN referral guidelines with the PCC. While relationships with the PCCs were demonstrated, the formalized process for sharing RITN guidelines and directing patients to the appropriate level of care during a disaster requires more attention.

Laboratory Staff, Supplies, and Equipment

For surge supplies, hospitals indicated having stockpiles available within the hospital or at affiliated facilities and/or central location. Blood collection supplies (phlebotomy, plastics) would be of biggest concern, as well as red blood cells. Supply and/or staffing needs would also be requested through the local healthcare coalitions or state level.

Laboratory staffing would be of concern; however facilities can activate additional laboratory teams/departments/affiliated facilities in anticipation of the sample surge. Several participants also indicated identifying other areas of the facility and/or buildings on campus that could be utilized to expand operations. At least one participating hospital has a network of laboratories including independent laboratories that are already sending samples to day to day and have a process in place for the outsourcing of testing (i.e., CBCs) and receiving results.

Strengths

The following strengths were demonstrated:

Strength 1: Over half (55%) of participating hospitals have a laboratory surge plan in place that includes a radiation incident.

Strength 2: Hospitals are familiar with emergency response plans to request staff and supply resources from affiliated organizations or to escalate the request to the healthcare coalition or state level following established protocols.

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 to help with phone consultations.

Area for Improvement 2: More formally integrate medical toxicologists into the RITN planning efforts, for example to support PPE, triage, decontamination, and administration of medical countermeasures.

Area for Improvement 3: 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 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

RITN hospitals indicated having plans in place to support outpatient blood draws and would rely upon models used during the COVID-19 pandemic such as paramedics at the outpatient areas to perform sample collection, pre-established/dedicated couriers to transport samples, reliance on clinical laboratory assistants, and mobile phlebotomists.

Patients have to be registered and assigned a physician to create a record in Epic which would be used for internal reporting. For outpatient facilities without Epic, an IT effort would be necessary to establish a connection to electronically report laboratory results to the physician (or it could be faxed, emailed or provided hardcopy).

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 for patient registration and sample tracking.

Supplies would be more of a challenge than staff or space, most laboratories have stockpiles of supplies (e.g., one has 100+ days at a distribution center) but realize the supply chain fragility. At one of the participating RITN hospitals have space to increase – for some tests up to 40%. At least one other hospital can staff the laboratories to maintain 24/7 operations if needed. Regarding staff, those that would be most crucial to the increased testing operation were people for registration, support, and blood collection.

Sample processing capacity depended by laboratory, ranging from 1500-2000 per day depending on the test to near 30,000 per day. It was more difficult for facilities to answer the question about transitioning to and throughput for manual flow cytometry processes (although one hospital responded that approximately 300 differential tests could be done per day). This question requires more consideration.

Samples would be prioritized for testing based on severity of illness, similar to COVID-19 testing, and existing protocols would be modified to expedite priority samples for this situation. Patient condition would also be evaluated over time to determine who could come off daily blood collections to reduce the numbers.

Blood Products

Hospitals would notify primary and secondary blood suppliers to obtain blood product resources from other areas. The American Red Cross (ARC) would coordinate the blood donations but staffing is anticipated to be a resource gap. RITN hospitals have the ability to irradiate blood onsite, but also can request that it be irradiated by the supplier prior to delivery.

For blood products, RITN hospitals, in partnership with the American Red Cross, would stagger donations. A steady, ongoing source is needed over weeks to months for this type of patient surge.

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.

There is a place to archive samples for future HLA testing but it did not appear this was a current practice.

Strengths

The following strengths were demonstrated:

Strength 1: Hospitals would leverage models developed during the COVID-19 pandemic to respond to the surge in outpatient blood collection such as using paramedics, clinical laboratory assistants, and mobile phlebotomists for sample collection as well as dedicated couriers for sample transport.

Strength 2: Hospitals have protocols in place to expedite priority samples for testing; these would just need to be modified for the criteria related to radiation injury patient condition.

Strength 3: All participating hospitals recognized the need to stagger blood donations in order to maintain a steady supply for weeks to months.

Areas for Improvement

The following areas require improvement:

Area for Improvement 1: Use this planning scenario to consider methods for how results would be reported to the hospital physician from outpatient settings that are not part of the electronic health record system. This can include IT solutions or manual processes.

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

Area for Improvement 3: While partnerships with independent laboratories (e.g., LabCorp) exist, it may be valuable to discuss specific attributes of a radiation emergency and outpatient testing response with these partner labs.

Area for Improvement 4: Hospitals did not report archiving 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	
Banner University of Arizona Medicine	Ann Peterson
Banner University of Arizona Medicine	Julie Pryor
Banner University of Arizona Medicine	Michael Frithsen
Banner University of Arizona Medicine	Marcus Sharp
Banner University of Arizona Medicine	Cera Wilson
Banner University of Arizona Medicine	Shannon Koza
Banner University of Arizona Medicine	Jeffrey Pu
Banner University of Arizona Medicine	Grace Weiss
Banner University of Arizona Medicine	Jeff Ashbeck
Banner University of Arizona Medicine	Lexie Smith
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Emory University Hospital	Ziad Kazzi
Emory University Hospital	Wade Miles

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Greenville Memorial Hospital (Prisma Health)	Danny Dobbs
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Greenville Memorial Hospital (Prisma Health)	Jeanne Towery
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Temple University Hospital	Margaret Bellerjeau
Temple University Hospital	Peter Abdelmessieh
Temple University Hospital	Daniel Rudolph
University of Wisconsin Health	Peiman Hematti
University of Wisconsin Health	Julie Thiry
University of Wisconsin Health	Steve Haskell
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University of Wisconsin Health	Brad Cords
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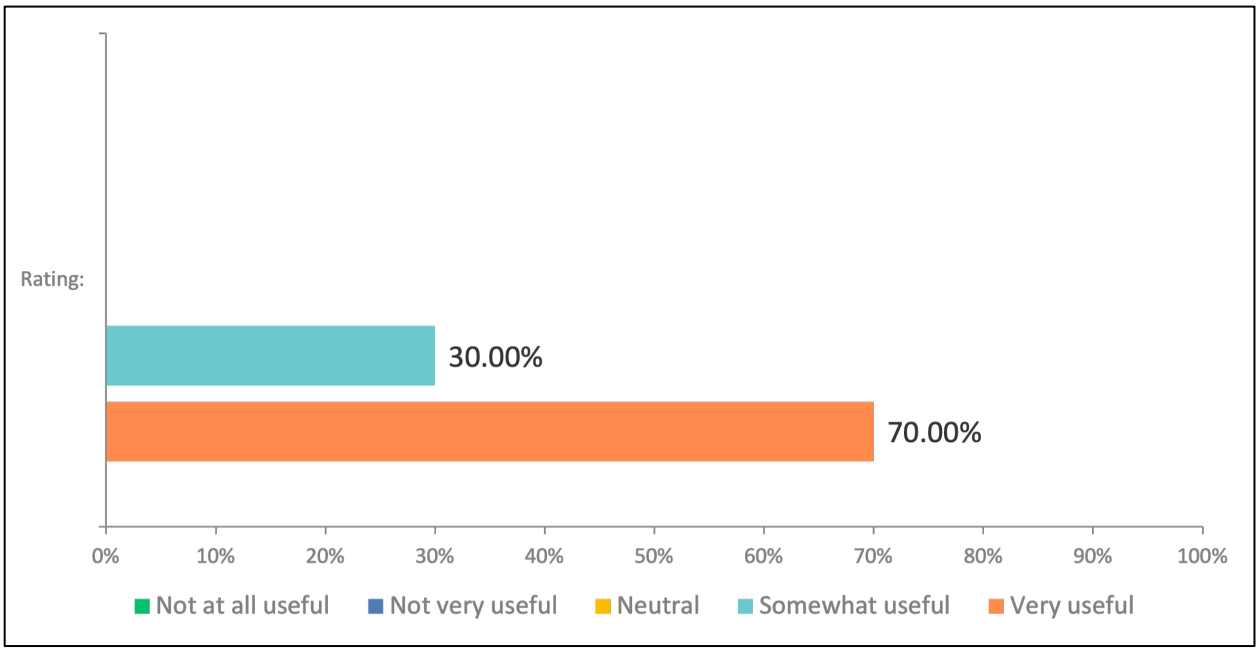
APPENDIX C: PARTICIPANT FEEDBACK

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 4.7 (out of 5.0). Number of responses = 10.



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