2019

RITN Tabletop Exercise (TTX) After-Action Report/Improvement Plan Medical Focus

Exercise Date: June 19, 2019
Report Date: July 19, 2019

EXERCISE OVERVIEW

Exercise Name	2019 RITN Tabletop Exercise (TTX)
Exercise Date	June 19, 2019
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	Public Health & Medical Services
Objective	**Objective 1:** Medical staff are able to describe their approaches used for hematopoietic cell transplantation (HCT) in patients who appear to have received myeloablative doses of radiation.
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	Children's Hospital of Alabama Children's Hospital of Wisconsin Cincinnati Children's Hospital Medical Center (conducted on own) Froedtert Memorial Lutheran Hospital (Wisconsin) Massachusetts General Hospital M.D. Anderson Cancer Center (Texas) Northwell Health - Northshore University Hospital (New York) Salt Lake City – LDS Hospital (Utah) Seattle Cancer Care Alliance (Washington) Shands Hospital at the University of Florida

	South Carolina – Greenville Health System University of Alabama at Birmingham University of Chicago University of Kansas Medical Center (conducted on own)
Point of Contact	RITN Control Cell RITN@NMDP.ORG (612) 884-8276

EXERCISE SUMMARY

On June 19 2019, RITN centers and the RITN Control Cell participated in an online tabletop exercise to describe treatment approaches for patients with acute radiation syndrome (ARS) following patient arrival to the hospital from 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 Ground Truth

- A 10-kiloton Improvised Nuclear Device (IND) was detonated in a major metropolitan area.
- The blast occurred at least 500 miles away from your facility and there is no concern of fallout affecting your location.
- RITN Control Cell staff begins to monitor the situation and start sending out daily Situation Reports (SitReps).
- All centers are requested to submit daily Healthcare Standard (HCS) capabilities matrix.

Day 6

- The National Disaster Medical System (NDMS) issues activation protocol for your region and the local Federal Coordinating Center (FCC) establishes a Patient Reception Area (PRA) and expects patients to start arriving in the next 24-48 hours.

Day 9

- The first NDMS aircraft evacuating patients with radiation only injuries arrives at the PRA. NDMS officials expect there will be multiple aircraft a day arriving for the next several days. Facilities able to provide specialized care for ARS patients are asked to accept as many as possible.

ANALYSIS OF CAPABILITIES

Exercise Discussion Module: Patient Treatment

Participants were asked to select one of the patients below (pediatric or adult) and respond to a series of questions regarding treatment.

Pediatric Patient

- 9 year-old male with no comorbidities who received an estimated 8 Gy dose of fallout radiation over a two hour period. No additional injuries were sustained.
- He began G-CSF treatment three days after the exposure, which has been continued daily.
- He has normal renal, liver and other organ functions and remained afebrile since day 13 when he was started on broad-spectrum antibiotics.
- He developed 2nd degree skin burns that have now resolved.
- Peripheral blood WBC count has been <0.1 since day seven and he is dependent on platelet transfusions.
- HLA typing of the patient and his 12 year-old brother confirmed that they are HLA matched. The brother accompanied the patient to your center.
- An unrelated donor search was also initiated, but by day 21 after detonation, no matching donors have been identified.
- On day 19 after detonation, bilateral bone marrow aspirates were performed and show aplastic marrow. He remains profoundly pancytopenic.

Adult Patient

- 33 year-old male with no comorbidities who received an estimated 8 Gy dose of fallout radiation over a two hour period. No additional injuries were sustained.
- He began G-CSF treatment three days after the exposure, which has been continued daily.
- He has normal renal, liver and other organ functions and remained afebrile since day 13 when he was started on broad-spectrum antibiotics.
- He developed 2nd degree skin burns that have now resolved.
- Peripheral blood WBC count has been <0.1 since day seven and he is dependent on platelet transfusions.
- HLA typing of the patient and his 37-year old brother that they are HLA matched. The brother accompanied the patient to your center and is willing to donate.
- An unrelated donor search was also initiated, but by day 21 after detonation, no matching donors have been identified.
- On day 19 after detonation, bilateral bone marrow aspirates were performed and show aplastic marrow. He remains profoundly pancytopenic.

<u>Determination for HCT (21 days post-detonation)</u>

Three hospitals utilized the pediatric patient profile and 11 addressed the module questions using the adult patient profile. The question as to whether Hematopoietic Cell Transplantation (HCT) would be performed on the patient 21 days post-detonation was considered and all hospitals except for 2 would proceed with HCT at that time. For those that would not, more time would be waited before performing the transplant (i.e., 28 days) to see if the patient would recover and marrow assessments would be repeated within the week. During the exercise discussion, several facilities stated that they would not wait as long as 21 days to proceed with HCT.

It was also noted that more information about the patient symptoms would be important in making determinations for treatment and transplant; the range between 6 Gy and 8 Gy exposure can be very different so knowing the patient symptoms would drive whether to do transplant at day 21 or to wait additional time to see if the patient could recover.

The group was also asked what preparative regimen (if any) would be given if proceeding with HCT. The responses were as follows:

- Fludarabine (Flu), possibly serotherapy depending on stem cell source
- Flu-Cytoxan-ATG (follow severe aplastic anemia protocol)
- ATG (anti-thymocyte globulin)
- ATG-Cytoxan or Flu-Cytoxan (Cy)

Some facilities determined that they would not be likely to use a preparative regimen because with such a high dose of radiation initially (from blast) the patient already may have significant toxicity.

When asked the question as to whether the donor brother's bone marrow or peripheral blood stem cells (PBSC) would be used for HCT, the majority (11) would use bone marrow with 3 hospitals preferring to use PBSC (especially if the OR was not available). There were mixed responses about using in T cell depletion prior to transplantation due to the fact that the T cells were already sufficiently depleted or that the ATG used in the conditioning regimen would serve to provide some *in vivo* depletion. Some hospitals would consider other agents for depletion based on the patient presentation and in consultation with experts.

The scenario introduced that the brother was matched for one haplotype and the group was asked whether this would affect the choice of donor, cell product, or conditioning. Responses were as follows:

- Consider unrelated donor, if feasible
- Prefer parent donor, if available
- Look for younger donors in the patient's family, if none proceed with brother and use Flu-Cy as conditioning regimen with post-transplant Cytoxan (all indicated using Cy as post-treatment regimen per the standard haplotype protocols)
- Proceed with brother if no other donor, still use bone marrow
- A cord blood transplant was considered by one hospital but this would take time to obtain so determination to use a family member

The brother's age (64 years old) would not change the approach for most hospitals with the exception of three which would use PBSC rather than marrow either for faster engraftment or if the surgical risk for marrow harvest were high. The majority said that as long as the brother is healthy enough to withstand a marrow donation this would remain the approach.

Strengths

The following strengths were demonstrated:

Strength 1: Teamwork and collaboration (leveraging expertise across a number of disciplines) that enabled confident decisions on approach for treating the patient.

Strength 2: Ongoing participation in the RITN exercises has built strong internal plans and awareness of the preparedness and response aspects; also RITN exercises provide resources and guidelines that build capability.

Strength 3: Overall, there was consistency in the approach to the patient profiles to include the determination to proceed with HCT, the type of cells used for transplant, and rationale for proceeding with the haplotype brother as a donor.

Areas for Improvement

The following areas require improvement:

Area for Improvement 1: While able to make determinations on patient care in the exercise discussion scenario, hospitals recognized that there would be staffing, resource, or education/training gaps to effectively care for a number of patients arriving with transplant needs. It is recommended that individual facilities continue to revise plans, expand staff awareness of the RITN scenario, and functionally test capacity (e.g., BMT bed decompression, laboratory capacity, and allocation of limited resources) incorporating the findings from this exercise.

Area for Improvement 2: Staff awareness of radiation risks remains a concern for some hospitals. Offer education opportunities to both medical and support staff such as administrative and environmental services, for example:

- Conduct and promote RITN trainings (http://ritn.net/training/) and consider downloading to have access in the event that infrastructure goes down.
- Radiation Emergency Assistance Center/Training Site (REAC/TS) training for medical personnel (https://orise.orau.gov/reacts/capabilities/continuing-medical-education/default.aspx)

APPENDIX A: IMPROVEMENT PLAN

This improvement plan template has been developed specifically for the RITN centers participating in the 2019 RITN Medical Focus Tabletop Exercise conducted on June 19, 2019. 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	
Children's Hospital of Alabama	Melissa Wallace
Children's Hospital of Alabama	Melissa Espinoza
Children's Hospital of Alabama	Stacy Flanagan
Children's Hospital of Alabama	Jamie Davidson
Children's Hospital of Alabama	Hilary Haines
Children's Hospital of Alabama	Rooke Gage
Children's Hospital of Alabama	Shereene King
Children's Hospital of Alabama	Fred Goldman
Children's Hospital of Alabama	Sarah Beth Benton
Children's Hospital of Alabama	Dennis Blass
Children's Hospital of Alabama	Joe Chewning
Children's Hospital of Alabama	Madison Williams
Children's Hospital of Wisconsin	Katherine Worzalla
Children's Hospital of Wisconsin	Jason Liu
Children's Hospital of Wisconsin	Kathy Jodarski
Children's Hospital of Wisconsin	Leo Kaiser
Children's Hospital of Wisconsin	Todd Senglaub
Children's Hospital of Wisconsin	Walter Longo
Children's Hospital of Wisconsin	Yan Zhan
Froedtert Memorial Lutheran Hospital	Steve Konings
Froedtert Memorial Lutheran Hospital	Titi Tieu
Froedtert Memorial Lutheran Hospital	Peter Lawinger
Froedtert Memorial Lutheran Hospital	Emilie Aschenbrenner
Massachusetts General Hospital	Danielle Bernier
Massachusetts General Hospital	Yi-Bin Chen
Massachusetts General Hospital	Stacey Chung
Massachusetts General Hospital	Craig Cochran
Massachusetts General Hospital	Kendra Connolly
Massachusetts General Hospital	Adrienne Daigle
Massachusetts General Hospital	Jennifer D'Alotto
Massachusetts General Hospital	Rona Earl
Massachusetts General Hospital	Eric Hanson
Massachusetts General Hospital	Nicole Hartford
Massachusetts General Hospital	Mark Leone
Massachusetts General Hospital	Laura Listro

Participating Organizations	
Massachusetts General Hospital	Donna McEachem
Massachusetts General Hospital	Jacquelyn Nally
Massachusetts General Hospital	Susan O'Donnell
Massachusetts General Hospital	Erika Rosato
Massachusetts General Hospital	Natalie Rosenlieb
Massachusetts General Hospital	Thomas Spitzer
Massachusetts General Hospital	Lee Ann Tata
Massachusetts General Hospital	Laura White
Massachusetts General Hospital	Roni Woodds
Massachusetts General Hospital	Mark Leick
M.D. Anderson Cancer Center (University of Texas)	Kathie Nemeth
M.D. Anderson Cancer Center (University of Texas)	Billie Harvey
M.D. Anderson Cancer Center (University of Texas)	Wendy Austin
M.D. Anderson Cancer Center (University of Texas)	Adam Timko
M.D. Anderson Cancer Center (University of Texas)	Priti Tewari
M.D. Anderson Cancer Center (University of Texas)	Todd Pickard
M.D. Anderson Cancer Center (University of Texas)	Richie Ehlers
M.D. Anderson Cancer Center (University of Texas)	Marian Von Maszweski
M.D. Anderson Cancer Center (University of Texas)	James Yao
M.D. Anderson Cancer Center (University of Texas)	Laura Comer
M.D. Anderson Cancer Center (University of Texas)	Joyceann Musel Winn
M.D. Anderson Cancer Center (University of Texas)	Brian Bednarski
Northwell Health	Eileen Fitzgerald
Northwell Health	Sobi Mathar
Northwell Health	Jordan Butler
Northwell Health	Suhui He
Northwell Health	Madeline Galler
Northwell Health	Deborah Dobrzneki
Northwell Health	Mukesh Tiwari
Northwell Health	Cindy Gomez
Northwell Health	Jane Hans
Northwell Health	Wei Xu
Northwell Health	R. Bayer
Northwell Health	J. Chi
Northwell Health	Michele Quintana
Northwell Health	Julane Haynes
Northwell Health	Lu Zhang

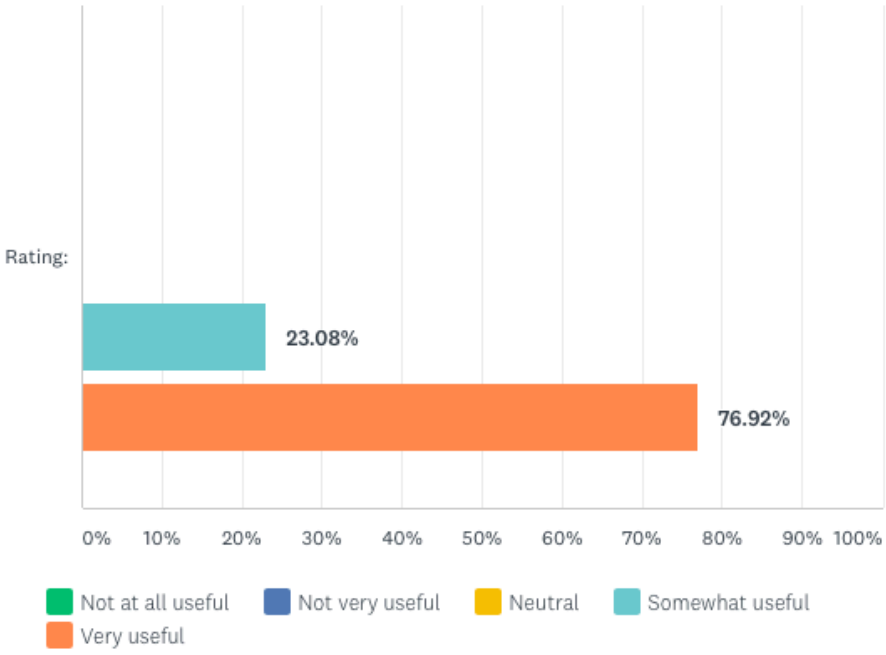
Participating Organizations	
Northwell Health	Patrice Keenan
Northwell Health	Samrah Ahmad
Northwell Health	N Forte-Arnold
Salt Lake City – LDS Hospital	Ben Briggs
Salt Lake City – LDS Hospital	Regan Healy
Salt Lake City – LDS Hospital	Dapnish Hoda
Salt Lake City – LDS Hospital	Melissa Parra
Salt Lake City – LDS Hospital	Linda Meaux
Salt Lake City – LDS Hospital	Karen Armatage
Seattle Cancer Care Alliance	Danica Little
Seattle Cancer Care Alliance	Timothy Ehling
Seattle Cancer Care Alliance	Christy Satterlee
Seattle Cancer Care Alliance	Terry McDonnell
Seattle Cancer Care Alliance	Rusty Thurman
Seattle Cancer Care Alliance	Sam Elgan
Seattle Cancer Care Alliance	Kristie Logan
Seattle Cancer Care Alliance	Lisa Getzendance
Shands Hospital (University of Florida)	Carey Hudson
Shands Hospital (University of Florida)	Kristy Dugat
Shands Hospital (University of Florida)	Ashley Richards
Shands Hospital (University of Florida)	Shelby Hendrix
Shands Hospital (University of Florida)	Vincent Romand
Shands Hospital (University of Florida)	Leigh Ann Webb
Shands Hospital (University of Florida)	John Hiemenz
Shands Hospital (University of Florida)	Nicki Santerfit
Shands Hospital (University of Florida)	Sonja Weimar
Shands Hospital (University of Florida)	Danielle Obermeier
Shands Hospital (University of Florida)	Stacy Mills
Shands Hospital (University of Florida)	Teale Andreason
Shands Hospital (University of Florida)	Brooke Adams
Shands Hospital (University of Florida)	Amy Pazzalia
Shands Hospital (University of Florida)	Vivian Cozatt
Shands Hospital (University of Florida)	Federico Rodriguez Quezada
Shands Hospital (University of Florida)	Kendall Gibson
Shands Hospital (University of Florida)	Natalie Dotson
Shands Hospital (University of Florida)	John Wingjard
South Carolina – Greenville Memorial Hospital	Brad Seidel

Participating Organizations	
South Carolina – Greenville Memorial Hospital	Jim Brook
South Carolina – Greenville Memorial Hospital	Marisa High
South Carolina – Greenville Memorial Hospital	Thomas Allen
South Carolina – Greenville Memorial Hospital	Patrick Marine
South Carolina – Greenville Memorial Hospital	Sara Roman
South Carolina – Greenville Memorial Hospital	Suzanne Fanning
South Carolina – Greenville Memorial Hospital	Elizabeth Cull
South Carolina – Greenville Memorial Hospital	Saeeda Chowdhury
South Carolina – Greenville Memorial Hospital	Jorden Brodway
South Carolina – Greenville Memorial Hospital	Kristen Kolleda
South Carolina – Greenville Memorial Hospital	Melissa Simpson
South Carolina – Greenville Memorial Hospital	Jessica Stumpf
University of Alabama – Birmingham	Diana Tate
University of Alabama – Birmingham	Melinda Rodgers
University of Alabama – Birmingham	Bob Shepard
University of Alabama – Birmingham	Tiffany Hayes
University of Alabama – Birmingham	Sharon Jones
University of Alabama – Birmingham	Natalie McRae
University of Alabama – Birmingham	Daniel Peavey
University of Alabama – Birmingham	Donna Salzman
University of Alabama – Birmingham	Nel Pritchett
University of Alabama – Birmingham	Zhuo Tao
University of Alabama – Birmingham	Pam Shepard
University of Alabama – Birmingham	Rebecca Howard
University of Alabama – Birmingham	Vivian Diggins
University of Alabama – Birmingham	Binita Parekh
University of Alabama – Birmingham	Marisa Marques
University of Alabama – Birmingham	Jimmy Smith
University of Alabama – Birmingham	Courtney Hebert
University of Alabama – Birmingham	Bill Mayfield
University of Chicago Medical Center	Flongtao Liaz
University of Chicago Medical Center	Mylove Mortel
University of Chicago Medical Center	Elingel Aguada
University of Chicago Medical Center	Shannon Parikh
University of Chicago Medical Center	Aleja Norton-Abad
University of Chicago Medical Center	Michele Nassim

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 4.77 (out of 5.0). Number of responses = 13.



	NOT AT ALL USEFUL	NOT VERY USEFUL	NEUTRAL	SOMEWHAT USEFUL	VERY USEFUL	TOTAL	WEIGHTED AVERAGE
Rating:	0.00% 0	0.00% 0	0.00% 0	23.08% 3	76.92% 10	13	4.77

Based on discussions today, please briefly describe the 1 or 2 strengths demonstrated by your organization's ability to respond to a radiation mass casualty incident as described in this exercise scenario.	
Children's Hospital of Alabama	*Smaller team size allowed for discussion of varying opinions. While all didn't see it the same way, they were able to consider each other's opinion and discuss benefits vs risks. Multiple disciplines to be involved.*
Children's Hospital of Wisconsin	*Being a combined pediatric and adult program allows us to treat families-parents and sibs. Also allows us to draw upon each other's expertise and resources.*

Based on discussions today, please briefly describe the 1 or 2 strengths demonstrated by your organization's ability to respond to a radiation mass casualty incident as described in this exercise scenario.	
Cincinnati Children's Hospital Medical Center	*Great teamwork Excellent organization/planning*
Froedtert Memorial Lutheran Hospital (Wisconsin)	*Because we are a combined program we have the ability to draw on each other's resources and expertise.*
Massachusetts General Hospital	*Committed group of MGH MDs, RNs, Social workers, cell processing staff, ambulatory and pathology staff present. We were able to describe how a person who had radiation exposure would have been treated. Our Disaster Medicine representative described the Emergency Response plan for the hospital and answered many questions after the WebEx was completed. Although we have never experienced an incident like the scenario, people felt confident that we would be able to engage a plan to care for incoming patients. The BMT MDs are consistent in their approach to how to treat a patient like in the scenario and are supportive of our role as an RITN center.*
M.D. Anderson Cancer Center (Texas)	*We have a wonderful group of transplant physicians that know how to deal with pancytopenia and marrow failure who are able to treat this type of casualty patient very effectively and swiftly. We also have an abundance of resources in house like GCSF, blood products, qualified ancillary personnel for effective treatment.*
Northwell Health (New York)	*We did discuss, as a group, that these exercises have provided us with resources and references that have assisted us in developing an overall plan to respond to a radiation mass casualty incident. We have observed that depth of our knowledge has increased as we continue to run through these exercises and that other departments in the hospital have become more familiar with RITN activities.*
Salt Lake City – LDS Hospital	*Ability to discuss scenario in timely fashion and get consensus on treatment*
Seattle Cancer Care Alliance	*SCCA has an incredible depth of transplant knowledge with over four decades of experience. We have extensive experience managing neutropenic patients in the outpatient setting given that much of our transplant population remain outpatient throughout both auto and allo transplants.*

Based on discussions today, please briefly describe the 1 or 2 strengths demonstrated by your organization's ability to respond to a radiation mass casualty incident as described in this exercise scenario.	
Shands Hospital (University of Florida)	*A strength that we have is an interconnected medical and pharmacy department.*
South Carolina – Greenville Health System	*Clinical integration of Bone Marrow Transplant and Oncology staff with ancillary and support departments to create a comprehensive approach towards reaching multiple specialty care patients and for the long-term care. Physician collaboration with other specialties for the care of this type of patients is in place, and facilitation of continued patient care parameters (both in-patient and out-patient) are set.*
University of Alabama at Birmingham	*Our strengths include our varied , multidisciplinary teams and our ability to work together. We have an excellent emergency management team who practice these things daily. We have a strong stem cell lab and transfusion medicine and apheresis department..*
University of Chicago	*Every year when we meet for this exercise we reaffirm that our providers were confident in their ability to come up with their approach to treating the patient*
University of Kansas Medical Center	*Our program has been involved with RITN for over ten years. Many of our staff have been involved with prior TTX's and are familiar with the scenarios. Our center is overall invested in RITN - from BMT to emergency management to Radiation safety / Health Physicist.*

Based on discussions today, please briefly describe the 1 or 2 challenges demonstrated by your organization's ability to respond to a radiation mass casualty incident as described in this exercise scenario.	
Children's Hospital of Alabama	*The inability to accurately know the details of things such as exposure.*
Children's Hospital of Wisconsin	*Resource limitations, especially in the area of medical expertise to care for these types of patients. Additionally, cell processing lab limitations.*
Cincinnati Children's Hospital Medical Center	*Management of persons travelling in addition to patient management of patients displaced by casualties*
Froedtert Memorial Lutheran Hospital (Wisconsin)	*We had very good discussion during the 30 minutes prep time. During this time we identified that many of our limitations would be Cell Processing Lab resources both time and expertise.*

Based on discussions today, please briefly describe the 1 or 2 challenges demonstrated by your organization's ability to respond to a radiation mass casualty incident as described in this exercise scenario.	
Massachusetts General Hospital	*As with any center, we would have to make some very serious decisions about how to continue to care for the patients already in the hospital and how we would accommodate the influx if there were a radiological event. Because we have a strong Disaster Medicine program, we would be able to focus in on the specific type of patients being transferred in. We would have to make difficult choices in terms of resources available and how to determine how to distribute. Example discussed today: cytokine stimulating drugs.*
M.D. Anderson Cancer Center (Texas)	*We need to get the whole hospital aware and on-board to ensure we have the support we would need if this were to occur. Right now we only have pieces in place.*
Northwell Health (New York)	*A challenge would be overcoming staff concerns "in real time" that these patients do not pose a health threat to providers. Right now all of these scenarios are theoretical.*
Salt Lake City – LDS Hospital	*More detail on patient's complications following radiation exposure*
Seattle Cancer Care Alliance	*Lack of data as to how the patient's exposure was determined.*
Shands Hospital (University of Florida)	*Challenges would be making sure we have the appropriate staff to perform the acquisition of cells.*
South Carolina – Greenville Health System	*Currently operating at very high census numbers in both the Oncology and BMT units, the ability to rapidly discharge the current patient population could be potentially challenging. Identification of tertiary locations for these types of patients in the inpatient setting is needed to be explored. Additional credentialed BMT staff would be useful for continued high-census in the unit care. This would allowed sustained operations at 100% capacity,*
University of Alabama at Birmingham	*Challenges include not knowing the condition of the patient after such a large dose of radiation. It would be helpful to have a standard for prep in this case. Also, it is hard to believe the patient had no other side effects after such a large dose. Also, it would be hard to coordinate multiple unexpected transplants in regard to OR time, pheresis time, HLA turnaround time, etc.*

Based on discussions today, please briefly describe the 1 or 2 challenges demonstrated by your organization's ability to respond to a radiation mass casualty incident as described in this exercise scenario.	
University of Chicago	*Deciding on the treatment of the patient was strong. The overall hospital coordination of the patient would be more challenging*
University of Kansas Medical Center	*Our biggest question from this TTX was about the brother of the victim. He accompanied the patient on the flight to our city - we wondered if he was in the same city as the nuclear detonation and was he exposed too potentially. We also briefly discussed the outcomes of prior transplants from nuclear exposure (Fukushima) and how those transplants were rejected. This was an extremely small number of patients (I believe two).*

List and briefly discuss elements to address for future RITN exercises.	
Children's Hospital of Alabama	*We thought this exercise was much more thoughtful than previous that required triage of many patients.*
Children's Hospital of Wisconsin	*Availability of outside resources available to RITN hospitals.*
Cincinnati Children's Hospital Medical Center	*Scenario didn't address whether/why the matched sibling donor had been exposed to radiation Scenario did not address patients with both significant trauma AND radiation exposure*
Froedtert Memorial Lutheran Hospital (Wisconsin)	*We would love to hear more in the future about how centers would be able to increase their CPL capacity without impacting their current patients.*
Massachusetts General Hospital	*This question should have been in the situation manual so it could be discussed ahead of time. Ethical issues such as the potential for rationing supplies and services in an event where everything potentially becomes limited in supply.*
M.D. Anderson Cancer Center (Texas)	*We thought the exercise went well and liked that it was shorter as easier to fit in everyone's schedules. However, by splitting the medical and Emergency Mgmt it felt like you did not get the whole picture of RITN and the incident. By having them combined as in the past, you get the whole scenario and have all the departments involved which is better.*

List and briefly discuss elements to address for future RITN exercises.	
Northwell Health (New York)	*Perhaps simulating through video presentation different scenarios on different days of a radiation mass casualty incident. Questions could be posed around those different time frames including setting up a command center.*
Salt Lake City – LDS Hospital	*Addition of one or two more scenarios. Keeping the exercise under one hour is extremely helpful.*
Seattle Cancer Care Alliance	*We liked the focused exercise and would suggest in the future separate focused exercises around emergency management, communication and supply chain issues for example. This would allow us to bring together focus groups around these issues. These could be done sequentially or in separate sessions.*
Shands Hospital (University of Florida)	*Maybe more options for accessing cord blood during a time like this?*
South Carolina – Greenville Health System	*A recommendation would be to have facilities conduct internal notification procedures and start up procedures (i.e. real-time bed reporting, and how they would disposition their existing population when centers are operating at 100% occupancy).*
University of Alabama at Birmingham	*Our center thoroughly learned from this exercise. Our team was also much more engaged. So future focused exercises would be great. I do need to offer a complaint. The screen did not have the question side bar and we could not find it anywhere. I called the tech line and got the voicemail, which was full! Other than that, this was an excellent exercise.*
University of Chicago	*Initial intake of patient and support services*
University of Kansas Medical Center	*In most TTX's, we deal with a small number of patients that we need to treat - would it be beneficial to have a TTX where a center has to respond to several hundred incoming patients? It would force centers to confront head-on a more realistic scenario where they would have to operate under potentially austere conditions.*

APPENDIX D: ACRONYMS

Acronym	Term
AAR	After Action Report
ARS	Acute Radiation Syndrome
ATG	anti-thymocyte globulin
BMT	Bone Marrow Transplantation
Cy	Cytoxan
FCC	Federal Coordinating Center
Flu	Fludarabine
G-CSF	Granulocyte-Colony Stimulating Factor
Gy	Gray
HCS	Healthcare Standard
IND	Improvised Nuclear Device
NMDP	National Marrow Donor Program
NDMS	National Disaster Medical System
ONR	Office of Naval Research
PBSC	Peripheral Blood Stem Cell
PRA	Patient Reception Area
REAC/TS	Radiation Emergency Assistance Center/Training Site
RITN	Radiation Injury Treatment Network
SITREP	Situation Report
TTX	Tabletop Exercise
WBC	White Blood Cell