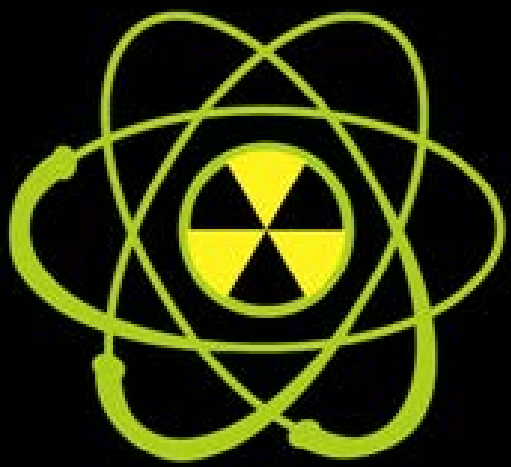
2019

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

Exercise Date: August 7, 2019
Report Date: September 5, 2019



EXERCISE OVERVIEW

Exercise Name	2019 RITN Tabletop Exercise (TTX)
Exercise Date	August 7, 2019
Scope	This exercise is a distance-based tabletop exercise over 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	Allegheny Health Network - West Penn Hospital (Pittsburgh, PA) Children's Mercy Hospital – Kansas City (KS) Franciscan Health St. Francis Hospital (Indianapolis, IN) Oishei Children's Hospital (Buffalo, NY) Roswell Park Comprehensive Cancer Center (Buffalo, NY) Strong Memorial Hospital (Rochester, NY) Thomas Jefferson University Hospital (Philadelphia, PA) University of California – Davis Hospital (Davis, CA) University of Maryland – Greenebaum Cancer Center (Baltimore, MD) University of Mississippi Medical Center (Jackson, MS)
Point of Contact	RITN Control Cell RITN@NMDP.ORG (612) 884-8276

EXERCISE SUMMARY

On August 7, 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>

All hospitals reported that they would proceed with Hematopoietic Cell Transplantation (HCT) 21 days post-detonation (all but two utilized the adult profile above), and though the decision would be made at that time there would be another 1-2 weeks before the transplant occurred so the patient's marrow would be assessed again to assure that there was not spontaneous recovery.

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

- Cyclophosphamide + ATG (anti-thymocyte globulin)
- Cyclophosphamide + ATG + Fludarabine (Flu)

- Flu + ATG
- ATG + Cytoxan (Cy) (aplastic anemic patients)
- Cy + Flu
- Flu + Busulfan (FB2)

All participating hospitals would use bone marrow for the transplant with the exception of two that would utilize peripheral blood stem cells (PBSC) and if ATG is included in the preparative regimen this would act to deplete T cells *in vivo* so hospitals would not require any additional T cell depletion.

Hospitals were asked about the brother who is matched for one haplotype and regarding the age as to whether this would change their choice of donor, cell product, or conditioning. In the case of the adult patient, all hospitals would keep the brother as the donor choice unless the brother was an unsuitable donor or had co-morbidities that precluded transplant. Several would opt for using PBSCs rather than marrow in this donor scenario and indicated that they may attempt to identify a younger donor. Those that utilized the pediatric patient would proceed with the brother; age was not an impact. Most would modify the conditioning regimen to Flu-Cy-ATG if the haplotype brother were the donor and all indicated adding Cy post-transplant as GVHD (Graft vs Host Disease) prophylaxis.

Children's Mercy Hospital (Kansas City) and Roswell Park Cancer Institute utilized the pediatric patient profile. Children's Mercy cited several additional challenges in caring for pediatric transplant patients, for example: obtaining consent for the pediatric transplant patients if they parents are not available, how to place the donor and patient if the parents are not there due to the fact that they could not be in the same room, difficulty if the body size of the donor varies greatly from the child, and the potential for needing to use cord blood which may or may not be available.

Strengths

The following strengths were demonstrated:

Strength 1: There was agreement across all participating hospitals to proceed with the HCT, the majority would use the same cell type (marrow) and proceed with the haplotype brother as the donor (as long as no co-morbidities) with minimal changes to the regimen.

Strength 2: This exercise served as an opportunity for hospitals to convene diverse internal teams (some to include both pediatric and adult BMT programs), multiple facilities, and/or emergency management partners from the community in order to discuss medical response for arriving ARS patients from a distant IND.

Areas for Improvement

The following areas require improvement:

Area for Improvement 1: It was recognized at several of the hospitals that capacity to take a significant number of patients requiring transplant (as described in these patient profiles) would be very limited. Further planning and exercises to build capacity and develop strategies to prioritize care and resources and/or leverage neighboring hospitals is recommended.

Area for Improvement 2: Pediatric hospitals recognized challenges in unaccompanied minors requiring transplant and this requires further discussion, decision making and/or guidance (best practices) as to how to proceed. Plans and training should include the decisions/course of action for these patients so that all are able to proceed with care in a uniform way during a response. Nationwide pediatric RITN hospitals may want to share plans and reach consensus on the care of unaccompanied children requiring transplant.

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 August 7, 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	
Allegheny Health Network – West Penn Hospital	Dayna Rodich
Allegheny Health Network – West Penn Hospital	Gary Ciampanelli
Allegheny Health Network – West Penn Hospital	Mary Kovac
Allegheny Health Network – West Penn Hospital	Jim Hasson
Allegheny Health Network – West Penn Hospital	Trish Taranto
Allegheny Health Network – West Penn Hospital	Luann Gord
Allegheny Health Network – West Penn Hospital	David Lau
Allegheny Health Network – West Penn Hospital	John Lister
Allegheny Health Network – West Penn Hospital	Abby Schmidt
Allegheny Health Network – West Penn Hospital	Lori Stover
Allegheny Health Network – West Penn Hospital	Keri Tyler
Allegheny Health Network – West Penn Hospital	Charlene Briedenbaugh
Allegheny Health Network – West Penn Hospital	Cynthia Garcia
Allegheny Health Network – West Penn Hospital	Salman Falal
Allegheny Health Network – West Penn Hospital	Leslie Geier
Allegheny Health Network – West Penn Hospital	Dawn Wentley
Allegheny Health Network – West Penn Hospital	MaryAnn Raible
Allegheny Health Network – West Penn Hospital	Jennifer Onda
Allegheny Health Network – West Penn Hospital	Gina Hajour
Allegheny Health Network – West Penn Hospital	Mo Patel
Children's Mercy Hospital (Kansas City)	Robin Carroll
Children's Mercy Hospital (Kansas City)	Pat Parton
Children's Mercy Hospital (Kansas City)	Gabe Metzler
Children's Mercy Hospital (Kansas City)	Ibrahim Ahmed
Children's Mercy Hospital (Kansas City)	Nance Burchell
Children's Mercy Hospital (Kansas City)	Bruce McFarland
Children's Mercy Hospital (Kansas City)	Matthew Soule
Erie County Department of Health (with Roswell)	Thomas Harvey
Franciscan Health	Jeff Morgan
Franciscan Health	Kara Soloman
Franciscan Health	Anand Tandra
New York State Department of Health	Patrick Byrne
New York State Department of Health	Johnny Tolbert
New York - Veterans Administration Emergency Management	Jeremie Dellapenta
Oishei Children's Hospital	Heidi Cober

Participating Organizations	
Oishei Children's Hospital	Julie Comella-Higgins
Oishei Children's Hospital	Desiree Duman
Oishei Children's Hospital	Sharon Hewson
Oishei Children's Hospital	Paige Hollingsworth
Oishei Children's Hospital	Timothy Komacki
Oishei Children's Hospital	Susan LaRuche
Oishei Children's Hospital	David McKnight
Oishei Children's Hospital	Bridget Newsom
Oishei Children's Hospital	Christina Ostwald
Oishei Children's Hospital	Matt Kaufman
Oishei Children's Hospital	Victoria Dante
Oishei Children's Hospital	Marissa Henning
Roswell Park Comprehensive Cancer Center	Barbra Bambach
Roswell Park Comprehensive Cancer Center	Rose Bell
Roswell Park Comprehensive Cancer Center	Eileen Duman
Roswell Park Comprehensive Cancer Center	Nicole Gerber
Roswell Park Comprehensive Cancer Center	Jennifer Harrington
Roswell Park Comprehensive Cancer Center	Richard Harvey
Roswell Park Comprehensive Cancer Center	Megan Herr
Roswell Park Comprehensive Cancer Center	Rose Kumpf
Roswell Park Comprehensive Cancer Center	Lisa Privitere
Roswell Park Comprehensive Cancer Center	Kathleen West
Roswell Park Comprehensive Cancer Center	Joanne Becker
Strong Memorial Hospital	Anne McKenna
Barbara Ann Karmanos Cancer Institute	Jane Liesred
Strong Memorial Hospital	Tom Fountaine
Strong Memorial Hospital	Michael Becker
Strong Memorial Hospital	Connie McMullen
Strong Memorial Hospital	Sharon Swift
Strong Memorial Hospital	Elizabeth Wensel
Thomas Jefferson University Hospital	John Wagner
Thomas Jefferson University Hospital	Shelley Burcat
Thomas Jefferson University Hospital	Jill Cristiano
Thomas Jefferson University Hospital	Edward Jasper
University of California – Davis Hospital	Allison Smith
University of California – Davis Hospital	Charles Schafer
University of California – Davis Hospital	Linda Kroger

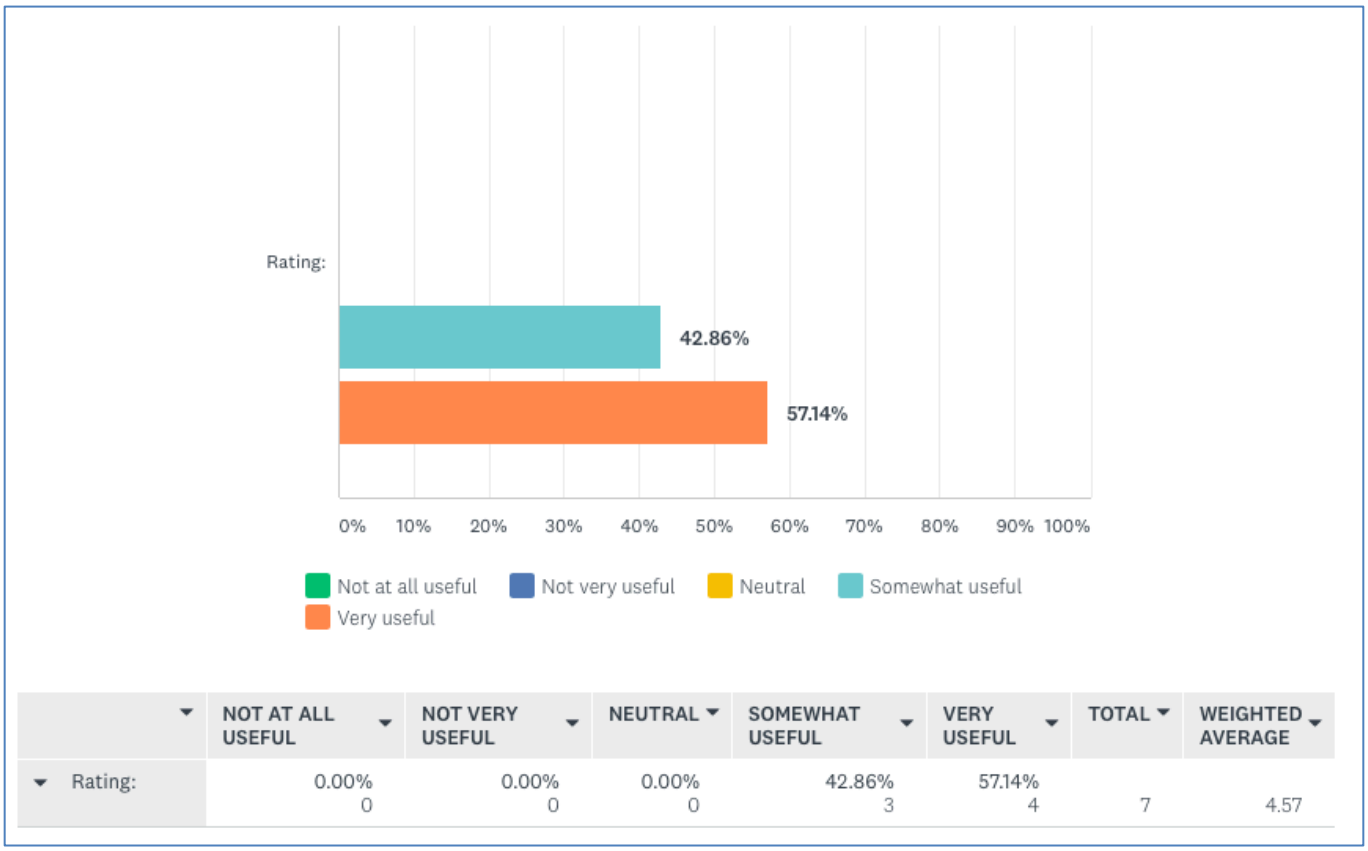
Participating Organizations	
University of California – Davis Hospital	Rasmus Hoeg
University of California – Davis Hospital	Enrique Esparza
University of California – Davis Hospital	Emily Rostel
University of Maryland Medical Center – Greenebaum Cancer Center	Lewis Robinson
University of Maryland Medical Center – Greenebaum Cancer Center	Natalie Gahras
University of Maryland Medical Center – Greenebaum Cancer Center	Elizabeth Hutnick
University of Maryland Medical Center – Greenebaum Cancer Center	Clarissa Saba
University of Maryland Medical Center – Greenebaum Cancer Center	Sharon Hancock
University of Maryland Medical Center – Greenebaum Cancer Center	Lisa Malick
University of Maryland Medical Center – Greenebaum Cancer Center	Chrisina Boorel
University of Maryland Medical Center – Greenebaum Cancer Center	Justin Lawson
University of Maryland Medical Center – Greenebaum Cancer Center	Stanley Whitley
University of Maryland Medical Center – Greenebaum Cancer Center	Craig Savageau
University of Maryland Medical Center – Greenebaum Cancer Center	Haman Alkulch
University of Maryland Medical Center – Greenebaum Cancer Center	Linda Ridge
University of Maryland Medical Center – Greenebaum Cancer Center	Ashley Martinetti
University of Maryland Medical Center – Greenebaum Cancer Center	Robert Miller
University of Maryland Medical Center – Greenebaum Cancer Center	Aaron Rapoport
University of Maryland Medical Center – Greenebaum Cancer Center	Simone Dawins-Jenkins
University of Maryland Medical Center – Greenebaum Cancer Center	Rebecca Stecher
University of Maryland Medical Center – Greenebaum Cancer Center	Laura Hearson
University of Maryland Medical Center – Greenebaum Cancer Center	Kim Pererson
University of Maryland Medical Center – Greenebaum Cancer Center	Suzanne Cowperthwaite
University of Maryland Medical Center – Greenebaum Cancer Center	Tom McVittie
University of Maryland Medical Center – Greenebaum Cancer Center	Tracy Douglas
University of Maryland Medical Center – Greenebaum Cancer Center	Kerry Sue Mueller
University of Maryland Medical Center – Greenebaum Cancer Center	Isabel Jackson
University of Maryland Medical Center – Greenebaum Cancer Center	Kathleen Ruchle
University of Mississippi Medical Center	Wendy Arinder
University of Mississippi Medical Center	Mary Kendall Gibson
University of Mississippi Medical Center	Ben Farris
University of Mississippi Medical Center	Elicia King
University of Mississippi Medical Center	Svjaya Komar
University of Mississippi Medical Center	Teaza Holman
University of Mississippi Medical Center	Katie Williams
University of Mississippi Medical Center	Rebecca Dukes
University of Mississippi Medical Center	Gail Megason

Participating Organizations	
University of Mississippi Medical Center	Mary Grace Bass
University of Mississippi Medical Center	Lisa Honeycutt
University of Mississippi Medical Center	Susan Johnson
University of Mississippi Medical Center	Jason Smith
University of Mississippi Medical Center	Jennifer Rouse
University of Mississippi Medical Center	Melissa Robertson
University of Mississippi Medical Center	Ginga Caldwell

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 4.57 (out of 5.0). Number of responses = 7.



	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	42.86% 3	57.14% 4	7	4.57

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.	
Franciscan Health St. Francis Hospital	*Trained and ready staff. Vast experience BMT*
Roswell Park Cancer Center	*Ability to bring together two different facilities, as well as NY State, Erie County and WNY emergency services to cooperate for pediatric care. Clinical expertise in pediatrics was represented well.*

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.	
Thomas Jefferson University Hospital	*Large experience with haplos and post dli cy for conditioning allowing faster engraftment then with bone marrow and less GVHD then conventional allografts*
University of California - Davis	*1. we have excellent clinical team that is up to date on the latest research 2. we have a health physics department to assist in JIT education*
University of Maryland	*Willingness and desire to strengthen knowledge around a radiation mass casualty was demonstrated by the attendees. This is a stepping stone to improve understanding about such a response.*
University of Mississippi Medical Center	*We discussed both adult and pediatric patients in the scenario. It was the first time in a long time that we have had both programs in the room. We were able to discuss both sets of populations effectively and have raised questions about our regimen vs the one in ARS. We also had radiation oncology present who gave great in sight to what the damages the amount of radiation would cause to the patient.*
Western Penn Hospital	*Fully integrated emergency management response within our health system. Our program's internal historical data supports the approach to medical management of these casualties.*

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.	
Franciscan Health St. Francis Hospital	*This was not a mass casualty incident. Not a challenge.*
Roswell Park Cancer Center	*Coordination necessary between using two facilities in caring for pediatric patients in our city. Separation of parent and child who may have both been exposed and whether they could both be admitted to same facility*
Thomas Jefferson University Hospital	*Handling large volumes of patients limited bed availability and have no experience with pediatric patients.*

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 California - Davis	*We have a small BMT unit. We could only realistically do 1 additional BMT patient per week at the most and that would be if we had other patients.*
University of Maryland	*With any mass casualty response, resources can be quickly depleted.*
University of Mississippi Medical Center	*The set up of the scenario really is not "realistic" in nature. Thinking there would be a donor close by or that they were not exposed to the same radiation as the brother is not an ideal situation, but overall was a good exercise.*
Western Penn Hospital	*Identification of acceptable donors, especially haploidentical related donors. Identification of "walking wounded" and screening of such potential.*

List and briefly discuss elements to address for future RITN exercises.	
Franciscan Health St. Francis Hospital	*Interaction between different hospital departments and community resources given a mass casualty incident.*
Roswell Park Cancer Center	*HIPAA. Consenting issues for underage patients that may not arrive with a parent. Psychosocial supports needed for underage patients.*
Thomas Jefferson University Hospital	*Nonhematopoietic toxicities that could be fatal especially radiation pneumonitis*
University of California - Davis	*A logistics exercise would be very useful.*
University of Maryland	*Have a "real" national mass casualty response "drill".*
University of Mississippi Medical Center	*Discussions on if the parents of the children are dead who will assume responsibility if emergent transplant is necessary, but the child/patient is 13.*
Western Penn Hospital	*We liked the new format for this exercise. Addition of second option for planning purposes for this exercise is appreciated.*

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
GVHD	Graft vs Host Disease
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
RITN	Radiation Injury Treatment Network
SITREP	Situation Report
TTX	Tabletop Exercise