Principles of Business Continuity

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Conflicts of Interest

- Not related to this topic
  - Co-founder of Infondrian, LLC
    - Gap fund and Iowa based Grant to Infondrian
    - NIH phase I and phase II STTR grants
  - Various TG, committees, leadership positions in AAPM, ASTRO
- Related to topic
  - IHE-RO

Overview

- What is Business Continuity Management (BCM)
  - Event Lifecycle
  - Criticality and Severity
  - BC Lifecycle
- Patient Oriented BCM
  - Application to Radiotherapy
  - Physician Input

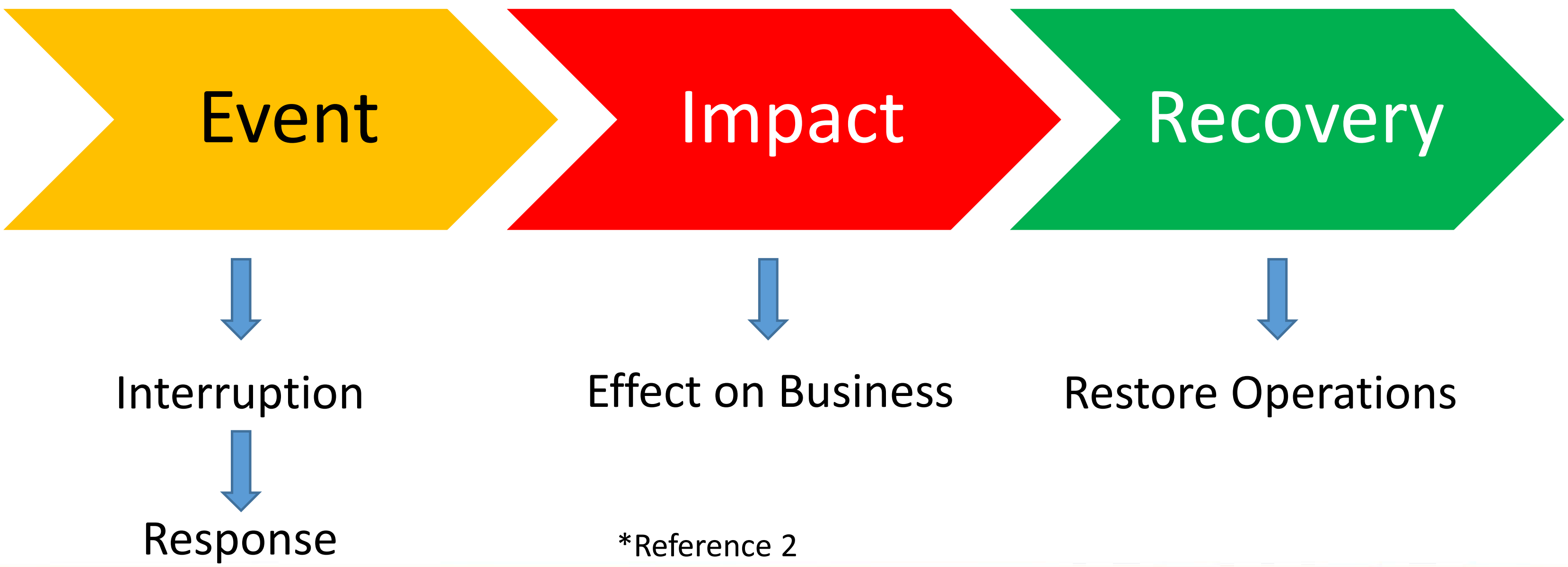
Main References for this talk

- Waters, Jamie. "The Business Continuity Management Desk Reference," Leverage Publishing, 2010.
- Several Definitions, Figures, and Tables from this reference are included in this talk
- Red Journal Volume 100, issue no. 4

Business Continuity Management – what is it?

Manage the disruptions that prevent one from achieving the business goals	*Keep the enterprise running from a	Manage the lifecycle of an event
	• Business perspective • Financial perspective • End-user / interested parties' perspective • Internal processes • *reference 1 – ISO 22301	

Event Life Cycle*



*Reference 2

Event

Anything that can disrupt business operations

Similar to a Failure Mode in FMEA

Should prompt a planned response – e.g. how do I continue a patient's treatment?

Event Scenarios

Loss of Technology

Loss of a Building

Denial of Access to a building

*Loss of Staff

*Loss of a Supplier

*Some of these have longer lead times for responding, e.g. the loss is not immediate, you have some notice when an employee decides to leave

Business Impact Analysis (BIA)

Understand the effect of the event upon the business

Similar to an Effect in FMEA

Recovery

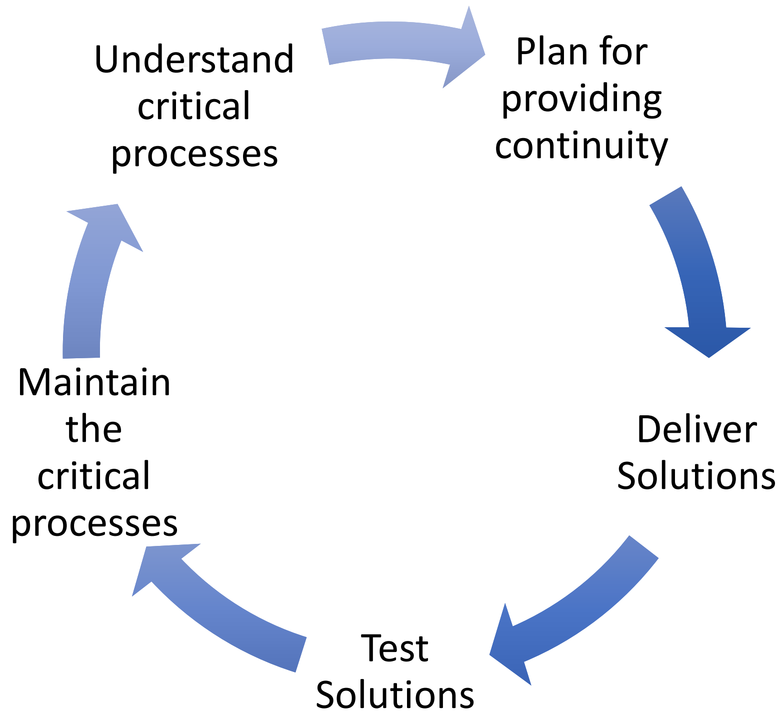
Restore what was affected by the interruption	• E.g. Patient Treatment – complete its delivery
Understand why the event happened	• Root Cause Analysis • Or prospectively – Fault Tree Analysis
Reduce the likelihood of the event happening again	• Hazard Mitigation

Recovery Objectives

Recovery Time Objective	Recovery Point Objective
• How quickly a system must be made available after it fails • How quickly can we resume treatments?	• The maximum amount of data loss that can be tolerated • The maximum number of treatment fractions missed that can be tolerated?

*Business Continuity Process life cycle

"Ensure critical activities are performed no matter what..."



This is a form of continuous improvement.

Reference 2

Background to do BCM

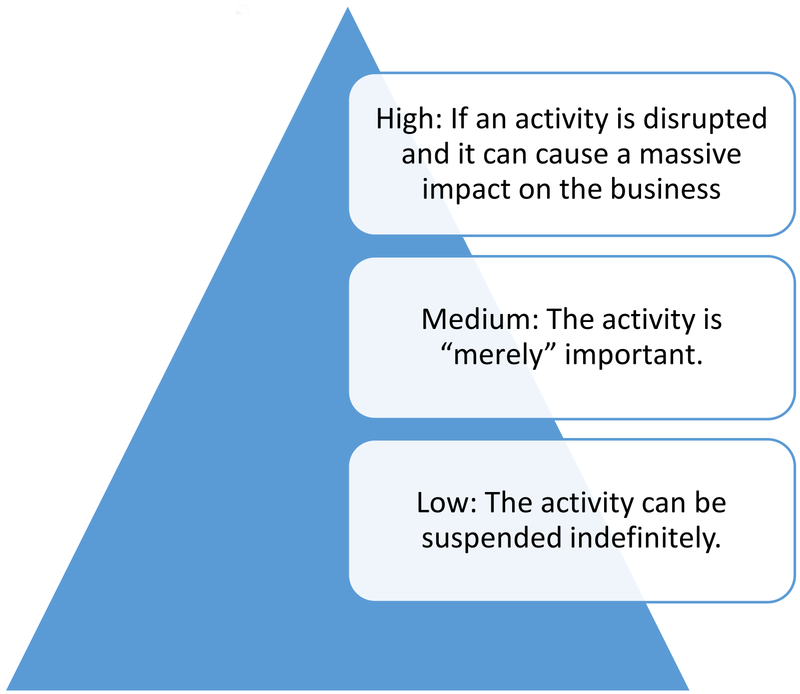
- similar to TG100 in a way
- Effects evaluated in terms of business continuity
- RISK MANAGEMENT EXPERIENCE* is very helpful

*Reference 3

Two Key Concepts in BCM

1. Criticality – of activities	2. Severity – of disruption	Concepts are related and can be mapped to each other
• If the activity is disrupted, what is its impact? • How important is the activity to the business • Need to develop some scheme for criticality levels	• How significant is the event? • Need a measure of severity – severity levels	• Map severity levels to criticalities

Criticality - categories



Example Criticality Levels

Level	Description
0	Non-stop continuous operation
1	Recovery within 2 hours
2	Recovery within 4 hours
3	Recovery within 12 hours
4	Recovery within 24 hours
5	Recovery within 48 hours (about 2 days)
6	Recovery between 2 days and a week
7	Recovery between a week and a month
8	Recovery not required. To be reviewed if more than 4 weeks

Severity Levels

Severity	Description
Critical	Significant risk to the continued operation of the whole enterprise
Severe	Significant risk to the continued operation of a business division or geographic region
Major	Risk to the continued operation of a major function, system or key location
Significant	Risk to the continued operation of a secondary site, function or system
Minor	Risk to the continued operation of a team, minor process or system
Non-Critical	Risk to non-critical activities, systems or individuals

Severity / Criticality Mapping

Severity	Criticality Level
Critical	0-2 (Recovery Time Objective < 4 hours)
Severe	0-2 (Recovery Time Objective < 4 hours)
Major	2-4 (Recovery Time Objective < 24 hours)
Significant	4-5 (Recovery Time Objective < 48 hours)
Minor	5-6 (Recovery Time Objective < 1 week)
Non-Critical	6-8 (Recovery Time Objective > 1 week)

BCM - planning

ANSWER THIS QUESTION:

- what do you need to do if your activities are stopped in order to get them started again?

Analyze event lifecycle for various types of events

- Need to brainstorm the events
- For each event determine the impact
  - THE impact depends on your business goals
- For each impact determine how to recover
- Note that these also depend on the activity

Radiation Therapy – "Business" Goals

Continuity of care for the patient

Very Broad View

Interfraction / Intrafraction

Broad View

Perspective of the Patient	Management of Recurrent Disease
	• Information from Prior RT • Transfer of Care

Interfraction / Intrafraction

Clinic Perspective	Patient Perspective:
• Linac uptime • IT infrastructure uptime • Is everything in place to treat the patient?	• how does this impact the patient's outcome?

Subject of this session

Criticality Levels in Radiotherapy?

CRITICALITY LEVELS are patient dependent

Primary GOAL
CURE the curable

Secondary GOAL
PALLIATE severe pain

Time is of the essence; curative patients may become incurable

Patient Dependent Criticality Levels for treatment activities

Level	Description
0	Emergency patient – bleeding? SVC?
1	Curable BID patient with aggressive disease; Palliative patient in severe pain without other means of palliation.
2	Curable QOD patient with aggressive disease
3	Curable patient that could become palliative if they miss 3 fractions in a week
4	Palliative patient with tolerable pain
5	Recovery not required. Other non-radiation methods of palliation

These roughly map to the required recovery times from an event, e.g., Linac Down.

Continuity of Internal Processes

IDENTIFY

- MINIMUM RESOURCES FOR EACH PROCESS
- CRITICAL CLINICAL WORKFLOWS

Events – classified* - by extent of impact

Disaster	System Wide	Regional	Local
• Failure of multiple critical resources	• Failure of single critical resource • affects all patients and operations of the department	• Failure of one of several of a critical resource	• Failure of a resource specific to a patient

*This is my own classification – it helps prioritize business continuity planning

Prioritize BC Plan Development

Consider events that affect the most patients (Severity)	Consider the likelihood of the event (Occurrence)	Develop plans to respond to the most severe and likely events.
• Disasters • IT infrastructure • Linac Failure	• Are Ransomware attacks more likely than a flood?	• Plans should consider the workflows that will be affected the most • Plans should also consider realistic recovery times

Consider outcomes first, causes second

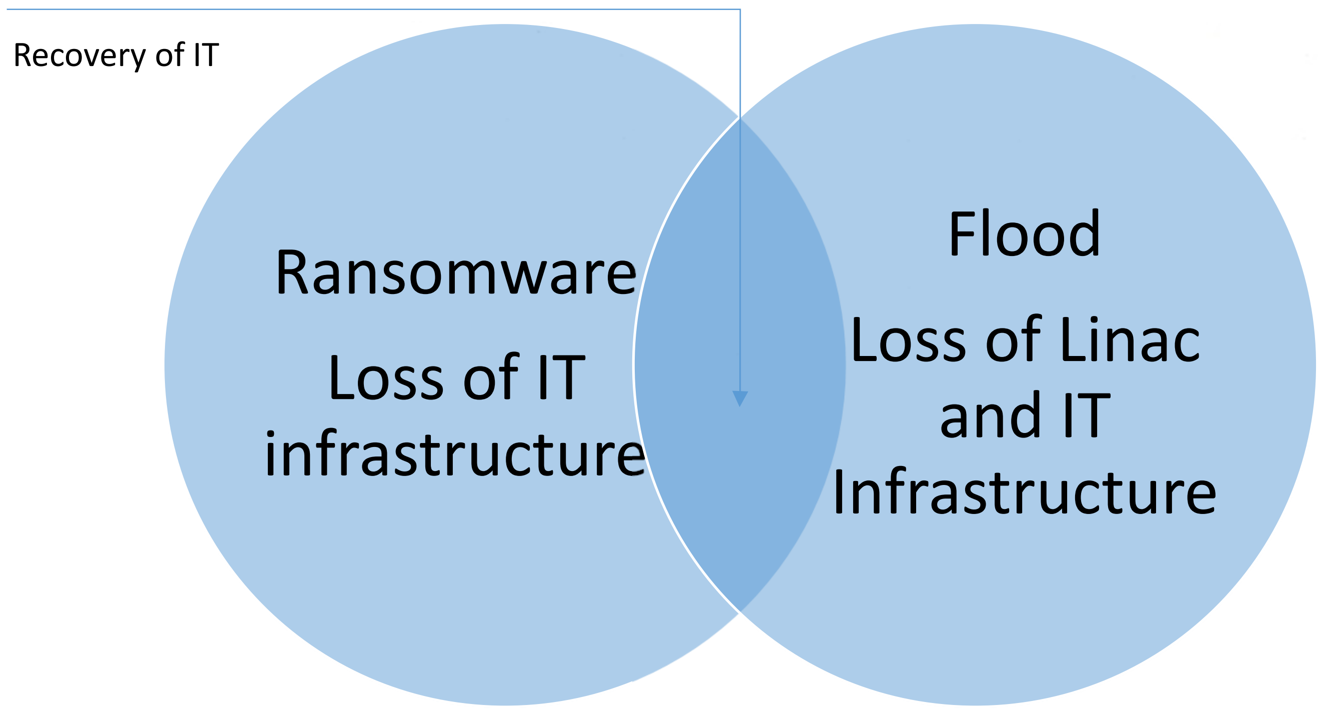
There can be several causes leading to the same outcome

- Example: outcome = Data Loss. Causes: Ransomware, Floods, Fire….

The response to, and preparedness for, the outcome largely depends on the outcome, not so much the cause

- Example:
- IT infrastructure not available
- Response – switch to failover site
- Causes – ransomware, disaster

Parts of Response Plans can be shared - maybe



Critical Workflows / States

CRITICAL – from the viewpoint of the department goal	Patients under treatment	Patients in planning with aggressive disease
• PROVIDE BEST QUALITY CARE – WORK TOWARDS CURE	• Curative, at risk of not being curative if treatment interrupted • Palliative, without other means of pain control	• Need to start right away

Example Critical Resources

Derived from Critical workflows	Linear Accelerator	Know the modality and energy that is used for the majority of patients	6 MV Higher energy photon
	Data Source for treatment parameters	Could be Aria or Mosaiq	
		Could be a DICOM File	
	Therapists – you can't turn on the machine without them!		
Note that you also need resources to respond to the disruption	Leadership – someone to coordinate the response		

Know your processes.
Which ones are important?
What would disrupt these processes?

Process Improvement

Treatment Planning

IMRT QA

Treatment Delivery

Peer Review

Linac QA

Treatment Management

Documentation

EXAMPLE EVENTS – Loss of an Office

Steam Pipe Leak in a radiation oncologist's office

Impact

- delays in physician's work
- Similar to the impact of a loss of staff.

Response:

- (1)Relocated the oncologist's workspace
- (2) moved back everything once repairs to office were complete

Example Event – Loss of Staff

SNOWSTORM → ROADS BLOCKED → Reduction in available staff

- reassign staff
- postpone less critical activities

Example Events – Loss of Technology

TrueBeam went down

- Didn't know when it was going to be back up
  - Supply chain issues for parts
- OBJECTIVE WAS FOR PATIENTS TO GET AT LEAST 2 FRACTIONS THAT WEEK.

COMMENT: SOMEWHAT AD HOC RESPONSE.

Comment on Extreme Downtime

- Down to one machine
- Our recovery plan kept changing.
- Several replans made, but not used.

This prompted the development of a policy specific to machine downtime and the decision making involved in the replanning.

Example of high priority event: Ransomware

High likelihood.

Large Impact.

- Affects almost all processes.
- Spreads over network.
  - Stop it as soon as it is recognized.
  - Can affect the entire hospital

To be discussed by other speakers in this session

Business Continuity is Continuity of Patient Care

Requires MD input

State the recovery objective in the patient's chart

- E.g., patient should not miss more than x fractions per week
- Or patient should finish by original final treatment date
  - May have to treat on the weekend

Consider different scenarios

- A machine goes down, but at least another machine is available
- IT infrastructure unavailable
- Clinic not available (fire, flood)

EDITORIAL

Radiation Therapy in a Time of Disaster

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This edition of the Red Journal was inspired by the sheer accumulation of recent disasters around the world and our acknowledgment that, in a time of climate uncertainty, terrorism, and an aging electrical grid, we are each and all vulnerable. We are presenting this collection not to pass out easy answers but in hopes of starting a conversation about how these events affect our profession and our patients. Sharing experiences and recommendations is a necessary first step on our path to preparation.

Int J Radiation Oncol Biol Phys, Vol. 100, No. 4, pp. 832−833, 2018

https://doi.org/10.1016/j.ijrobp.2017.12.001

Volume 100, no.4 of the Red Journal has a collection of experiences with providing continuity of care to patients in the midst of disasters.

Puerto Rico: After María

Angélica Pérez-Andújar
Published in issue: March 15, 2018
p834-835

Radiation Oncology in the Face of Natural Disaster: The Experience of Houston Methodist Hospital

Matthew Mireles, Ramiro Pino, Bin S. Teh, Andrew Farach, Adrienne Joseph, E. Brian Butler
Published in issue: March 15, 2018
p843-844

Radiation Oncology and Related Oncology Fields in the Face of the 2011 "Triple Disaster" in Fukushima, Japan

Akihiko Ozaki, Masaharu Tsubokura
Published in issue: March 15, 2018
p845-848

Our Role in Radiation Disaster Preparedness

Andrew L. Salner
Published in issue: March 15, 2018
p849-850

When Disaster Strikes: Mitigating the Adverse Impact on Head and Neck Cancer Patients

Sue S. Yom, Paul M. Harari
Published in issue: March 15, 2018
p838-840

Natural Disasters and the Importance of Minimizing Subsequent Radiation Therapy Interruptions for Locally Advanced Lung Cancer

Michael C. Roach, Cliff G. Robinson, Jeffrey D. Bradley
Published in issue: March 15, 2018
p836-837

Role of Overall Treatment Time in the Management of Prostate Cancer Patients: How to Manage Unscheduled Treatment Interruptions

Howard M. Sandler
Published in issue: March 15, 2018
p841-842

Business Impact Analysis and Recovery for Radiotherapy: Analyze the outcomes. How is tumor control affected?

Locally Advanced Lung Cancer (Red Journal V100 no 4)

A recent analysis of 14,154 patients in the National Cancer Database with stage III non-small cell lung carcinoma (NSCLC) treated with concurrent chemotherapy and fractionated radiation therapy showed that treatment delays during radiation were significantly associated with inferior overall survival (1).

The median overall survival for treatment without break versus prolonging treatment by 1 to 2 days, 3 to 5 days, 6 to 9 days, and >9 days was 22.7 months, 20.5 months, 17.9 months, 17.7 months, and 17.1 months, respectively (P<.0001).

"…RadiationTherapy Oncology Group studies, which showed a 2% increase in the risk of death for each day of treatment prolongation in patients with inoperable stage II or III NSCLC treated with concurrent chemotherapy and fractionated radiation therapy in the 1990s (2). "

1. McMillan MR, Ojerholm E, Verma V, et al. Radiation treatment time and overall survival in locally advanced non-small cell lung cancer. *Int J Radiat Oncol Biol Phys* 2017;98:1142-1152.
2. Machtay M, Hsu C, Komaki R, et al. Effect of overall treatment time on outcomes after concurrent chemoradiation for locally advanced non-small-cell lung carcinoma: Analysis of the Radiation Therapy Oncology Group (RTOG) experience. *Int J Radiat Oncol Biol Phys* 2005;23:667-671.

Head and Neck (Red Journal V100 no 4)

In practical terms, for patients who have received only 1 week (approximately 10 Gy) of radiation and then a 2- to 3-week break or longer, the tumor impact of the initial 10 Gy is essentially lost. In such cases, we would recommend delivering the full prescription dose of 60-70 Gy without reduction once the patient is able to resume therapy. On the other hand, when patients have received more than a few weeks of treatment and then undergo treatment interruption, there may be value to consider accelerated and/or hyperfractionated schedules to try to maintain the overall total treatment time, if feasible to deliver (22, 23).

A less preferred alternative is to simply deliver the remaining standard fractions when delivery becomes possible again. In this case, the anticipated loss in tumor control may be substantial, because a break of 1 week may be associated with an absolute reduction in the local control rate of 10-14% (1, 6)

1. Fowler JF, Lindstrom MJ. Loss of local control with prolongation in radiotherapy. *Int J Radiat Oncol Biol Phys* 1992;23:457-467.

6. Bese NS, Hendry J, Jeremic B. Effects of prolongation of overall treatment time due to unplanned interruptions during radiotherapy of different tumor sites and practical methods for compensation. *Int J Radiat Oncol Biol Phys* 2007;68:654-661.

22. Dale RG, Hendry JH, Jones B, et al. Practical methods for compensating for missed treatment days in radiotherapy, with particular reference to head and neck schedules. *Clin Oncol (R Coll Radiol)* 2002;14:382-393.

23. Hendry JH, Bentzen SM, Dale RG, et al. A modelled comparison of the effects of using different ways to compensate for missed treatment days in radiotherapy. *Clin Oncol (R Coll Radiol)* 1996;8:297-307.

Prostate (Red Journal V100 no 4)

For treatment delays <1 week, no need for corrective action would be required. For longer delays, one might consider that androgen ablation, if being used along with RT, might mitigate the adverse impact of treatment delays and thus patients who received ADT might tolerate longer breaks in OTT, perhaps safely for up to 2 weeks. For those receiving RT alone and for whom a long break is anticipated because of natural disasters or other unforeseen issues, such as major machine downtime, one might consider starting ADT for its cytostatic effect.

In addition, one might consider increasing the overall dose of RT. For example, the data of Thames et al (3) suggest that each additional 2-Gy fraction adds roughly 5% to biochemical control, and thus an overall 6% negative impact of a 1-week treatment delay might be overcome by 1 or 2 additional treatment fractions if safely deliverable. Finally, one might consider, once treatment resumes, an acceleration in the remaining treatment in an attempt to minimize OTT with either selected twice-daily fractionation, such as 6 fractions in 5 days, or a moderate increase in the dose per fraction, as in recent hypofractionation experiences.

Practical Radiation Oncology (2019) 9, 305-321

See table 3 – how do you compensate for the missed treatments?

Special Article

Lessons Learned From Hurricane Maria in Puerto Rico: Practical Measures to Mitigate the Impact of a Catastrophic Natural Disaster on Radiation Oncology Patients

Hiram A. Gay MD [a,*], Roberto Santiago MD [b], Betty Gil MD [c], Carlos Remedios MD [d], Pedro J. Montes MS, DABR [e], Javier López-Araujo MD, DABR [b], Carlos M. Chévere MD [f], Winston S. Imbert MD [g], Julia White MD [h], Douglas W. Arthur MD [i], Janet K. Horton MD, MHS [j], Reshma Jagsi MD, DPhil [k], Rachel Rabinovich MD [l], Sushil Beriwal MD, MBA [m], Akila Viswanathan MD, MPH, MSc [n], Beth A. Erickson MD, FACR, FASTRO, FABS [o], Ramesh Rengan MD, PhD [p], David Palma MD [q], Billy W. Loo Jr, MD, PhD [r], James A. Kavanaugh MS [a], Jeff Bradley MD [a], Sue S. Yom MD, PhD, MAS [s], Paul M. Harari MD [t], Omer Lee Burnett III, MD, FAWM [u]

Table 3 Compensate: Step 4 of PCOC, assuming a 2-3 week delay in radiation therapy

Cancer	Clinical scenario	Impact of gap	Recommendations
NSCLC	Locally advanced, postoperative	Low	Restart therapy when possible. Given that these are usually patients with concern for microscopic disease who have already received (or are receiving) chemotherapy, the impact of a treatment break and concerns about tumor repopulation are lower than those for patients with gross disease.
	Locally advanced, definitive	High	Restart these patients sooner than the postoperative patients. **Concurrent chemotherapy group:** Recommend restarting with standard fractionation. If the patient has a prolonged delay, consider adding a cycle of chemotherapy at a systemic dose during the treatment break. **RT alone group:** RT-alone group (or sequential chemoRT group). Consider modest hypofractionation of no more than 2.53 Gy per fraction to a total dose of 63.25 Gy without chemotherapy and **no** highly conformal treatment techniques.[27] For highly conformal image guided/intensity modulated RT techniques, consider 60 Gy in 15 fractions without chemotherapy.[28] Consider these schedules especially for larger or more aggressive tumors.
SCLC	Limited stage	Very high	Restart thoracic as soon as possible (even midcycle) and preferentially switch to twice a day per Turrisi.[29] Consider following curative chemoradiation regimens of 40 Gy in 15 fractions,[30] 40 Gy in 16 fractions,[31] or 42 Gy in 15 fractions,[32] or 39.9 Gy in 15 fractions.[33] The potential advantage of these schedules is that the dose constraints are usually easily met (cord <36 Gy; V18<37%). A patient who had a few fractions followed by a long break often can safely receive this schedule upon restart with an acceptable composite plan.
	Extensive stage	Very high	If the delay caused deferment of prophylactic cranial irradiation or consolidative thoracic RT, decide on a case-by-case basis.
Head and neck	1 wk (~10 Gy) of RT, followed by a 2-3 wk break or longer	High	The tumor impact of the initial 10 Gy is essentially lost. Deliver the full prescription dose of 60-70 Gy without reduction once the patient is able to resume therapy.[21]
	Received more than a few weeks of treatment, followed by a treatment interruption	High	Consider accelerated and/or hyperfractionated schedules to try and maintain the overall total treatment time.[21]
	Received substantial radiation dose and then an extended treatment break (on the order of months)	Very High	Surgical salvage. If not feasible, consider full-dose reirradiation despite the known higher risk for late-normal tissue toxicity. In this challenging situation, only treating the gross disease while avoiding elective regions is warranted.[21]
Uterine cervix	Definitive	High	Consider adding approximately 5 Gy per wk with 3-dimensional image-based brachytherapy for each week of radiation duration beyond 7 weeks, respecting the organ-at-risk tolerance doses. This must be carefully weighed against the doses that the organs at risk will receive by adding this extra dose to the tumor.[34] For a 2-3 week interruption, strive for a minimum of 50.4 Gy instead of 45 Gy to the pelvis. Do not recommend twice a day or other altered schedule (weekend or otherwise). Do not discount any previously given dose. The use of LDR instead of HDR brachytherapy would eliminate any need for electricity. If HDR is available only, the physician can admit the patient to the hospital and administer multiple sequential HDR treatments up to twice a day to complete the therapy in a shorter period of time. Use of 4 fractions of 700 cGy rather than 5 fractions of 500-600 cGy can also be considered. Starting the brachytherapy during the course of external beam is feasible,[35] but external beam should not be given on the same day as brachytherapy. No treatment break should be given between external beam and brachytherapy.
B	Postoperative	Moderate	Consider adjuvant vaginal cylinder brachytherapy.
Breast	Breast-only treatment	Low	Do not change the whole-breast dose in the setting of a treatment break (continue the original 42.56 Gy in 16 fractions or 50 Gy in 25 fractions). The boost portion of the treatment dose gets adjusted as follows: • Initial treatment plan did not include a sequential boost to the lumpectomy cavity PTV: 10 Gy in 5 fractions boost. • Initial treatment plan included a sequential boost to the lumpectomy cavity PTV: Add one 2 Gy fraction per week missed up to 66 Gy; alternatively, a 2.3 Gy × 5 boost. If the intended boost was to 66 Gy, increase the dose up to 70 Gy, and consider reducing the volume to the highest risk region.
	Chest wall after mastectomy	Low	Similar to above, but substitute lumpectomy cavity PTV for mastectomy scar PTV.
	Regional nodal (supraclavicular, axillary, internal mammary chain) with breast or chest wall	Low	Dose is adjusted to a maximum of 50 Gy in 2 Gy fractions.
Prostate		Very low	For treatment delays <1 wk, no need for corrective action. ADT may safely mitigate delays up to 2 weeks. For patients receiving RT alone for whom a long break is anticipated, consider starting ADT. For patients not undergoing ADT, 1-2 conventional fractions may compensate for a 1-wk break if normal tissue tolerance allows. Accelerating treatment to 6 fractions per wk (1 twice-daily treatment per wk) or switching to a moderately hypofractionated course may help compensate for treatment gaps.[23] When hypofractionating, maintain an equal or slightly higher EQD2 for the tumor using an α/β ratio of 1.5 without exceeding the EQD2 of normal tissues using an α/β ratio of 3.

Recommendations are very specific to the clinical scenario

NSCLC locally advanced, postop vs definitive

SCLC limited vs extensive stage

Head and Neck – dependence on when interruption happens

Uterine Cervix – Definitive vs postop

Breast – site? Chest wall? Nodes?

Prostate

Planning for a Disaster

Houston Methodist Experience – lessons learned

1. Ensure you have a plan in place to deal with the loss of key utilities at home and your facility.
2. If your facility is in an area that floods and your department is in the basement, ensure there is a flood mitigation plan in place (eg, flood gates).
3. Where feasible, twin your machines to minimize the need to rerun plans if you lose a machine owing to loss of cooling or other issues.
4. Ensure that you plan for an extended disaster. Our personnel had homes that were livable but were without power for 3 weeks' duration.
5. These times are psychologically and physically difficult, and encouragement and support are needed for the members of the department; never underestimate the power of good morale.
6. One can never truly predict when a disaster will occur; we had 3 serious events in 16 years. Our goal is to be perpetually prepared because we cannot predict whether a disaster will occur in any given time period.
7. You need to be aware of the psychological and physical impacts on your team and help guide them through the event. "Leadership at the front lines" is critical.
8. Maintain a positive attitude: You will recover!
9. Communication is essential to the leadership of your department, and coordinating your plan with that of your facility is vital to ensure your operation resumes as quickly as possible.
10. Protect your power generators from flooding.
11. Ensure that you have a process in place to back up your patient data.

HEALTH-FITNESS

Conference aims to close radiation treatment gaps in disasters

Jim Ware StarNews Correspondent

Published 6:00 a.m. ET July 16, 2019 | Updated 12:57 p.m. ET July 15, 2019

View Comments

Dr. Michael Papagikos, a radiation oncologist with New Hanover Regional Medical Center, is pictured with a linear accelerator, which is used for external beam radiation treatments. [PHOTO COURTESY OF NEW HANOVER REGIONAL MEDICAL CENTER] *Wilmington StarNews*

It didn't take long for New Hanover Regional Medical Center to get its radiation oncology program back on track after Hurricane Florence's initial blows in September, but flooding and closed roads kept some cancer patients from receiving scheduled treatments.

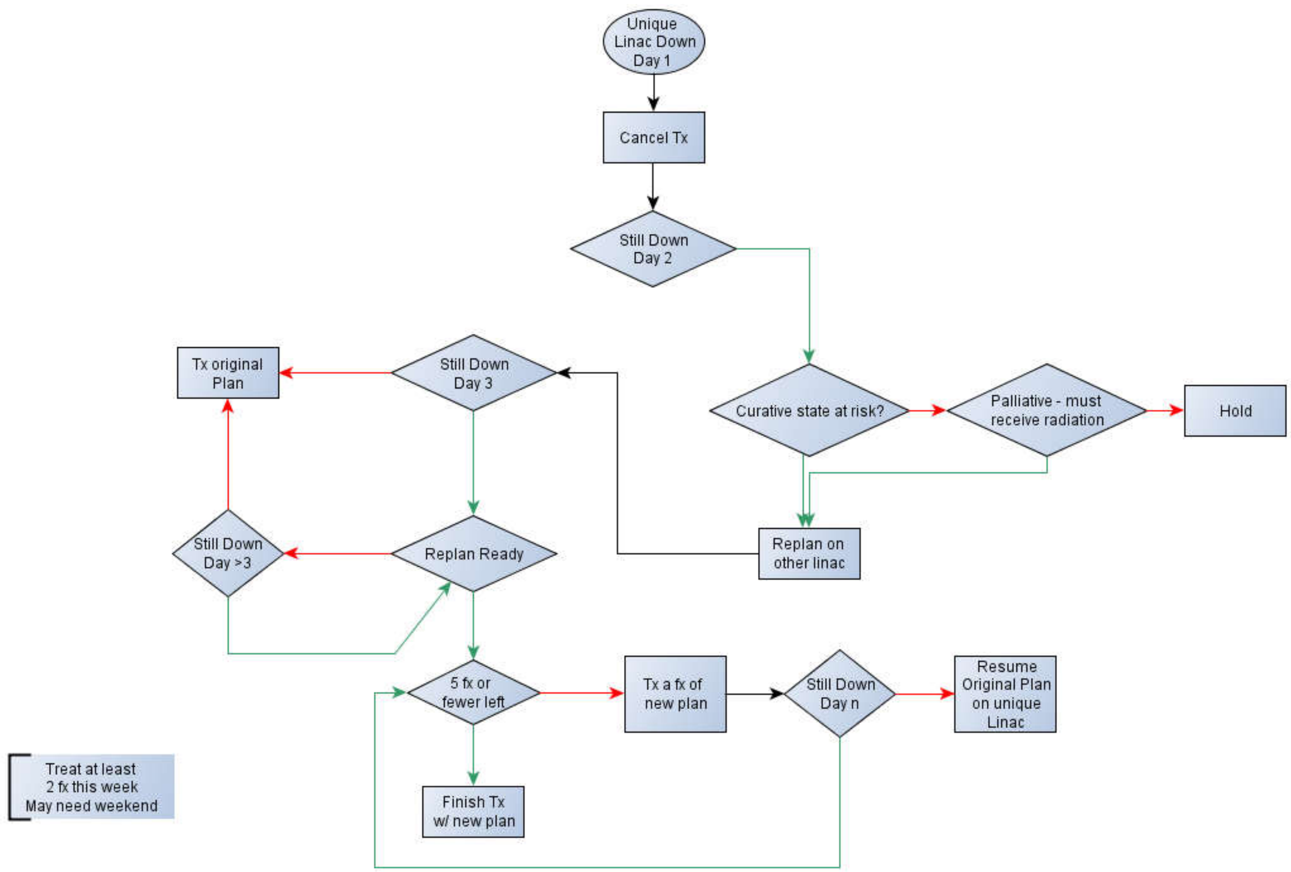
While interruption of a treatment plan might not be critical in some fields, it can have a negative impact on the effectiveness of radiation therapy for patients, said Dr. Michael Papagikos, a radiation oncologist at NHRMC.

"When Hurricane Florence came in, we had a significant gap interruption in our patients' treatment," Papagikos said. "Through a lot of hard work and dedication of our staff and through the collegiality of the North Carolina radiation oncology community, we were able to get a number of our patients transferred out and have their care resumed at outside facilities until we were back up and running."

Advances in Radiation Oncology – Letter to the editor – university of Vermont Larner College of Medicine (2021 V6, Carl Nelson etal)

- Patients triaged
  - Immediate resumption based on tumor biology and anticipated effects of tx delays
  - 3 Groups:
    - Squamous cell cancer (H&N, cervical, anal)
    - Non-Squamous cancer with concurrent chemoradiation
    - Tumors with slower cell repopulation (breast, prostate, benign brain tumors)

Example of treatment continuity process – decision is per patient. Scenario requiring replanning



IT Disaster Recovery (DR)

Part of Business Continuity Plan

Recovery times normally > 4 hours; typically, 8-12 hours.

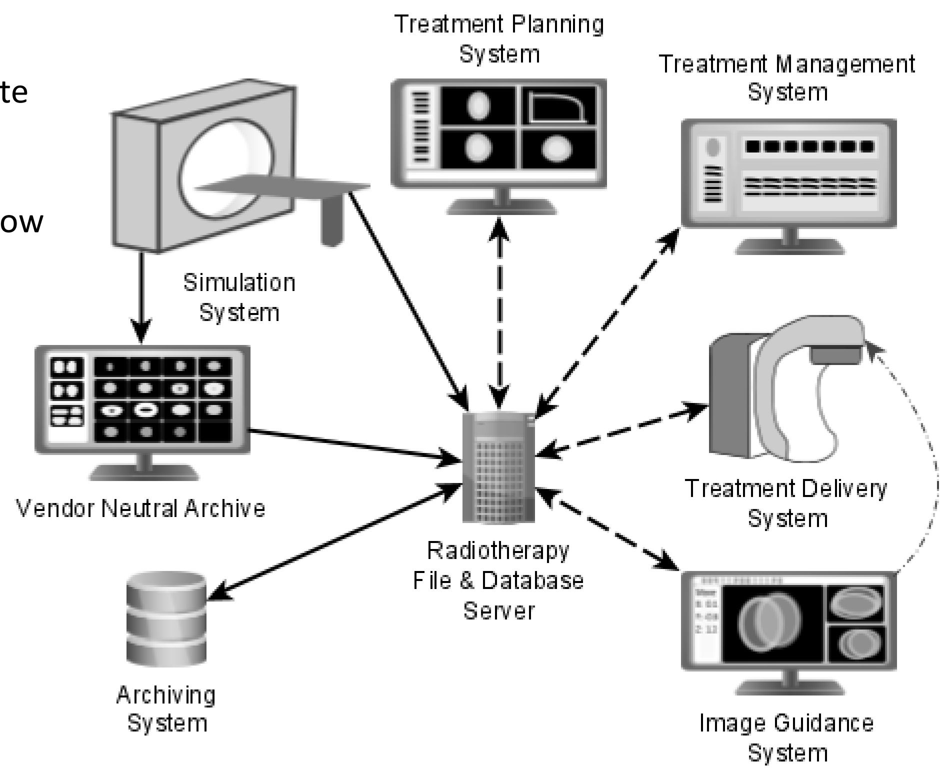
- Recovery Point? No more than a day's worth of generated data?
- From a patient viewpoint, this is at least one missed fraction (2 if BID).

MAKE A DATA FLOW DIAGRAM

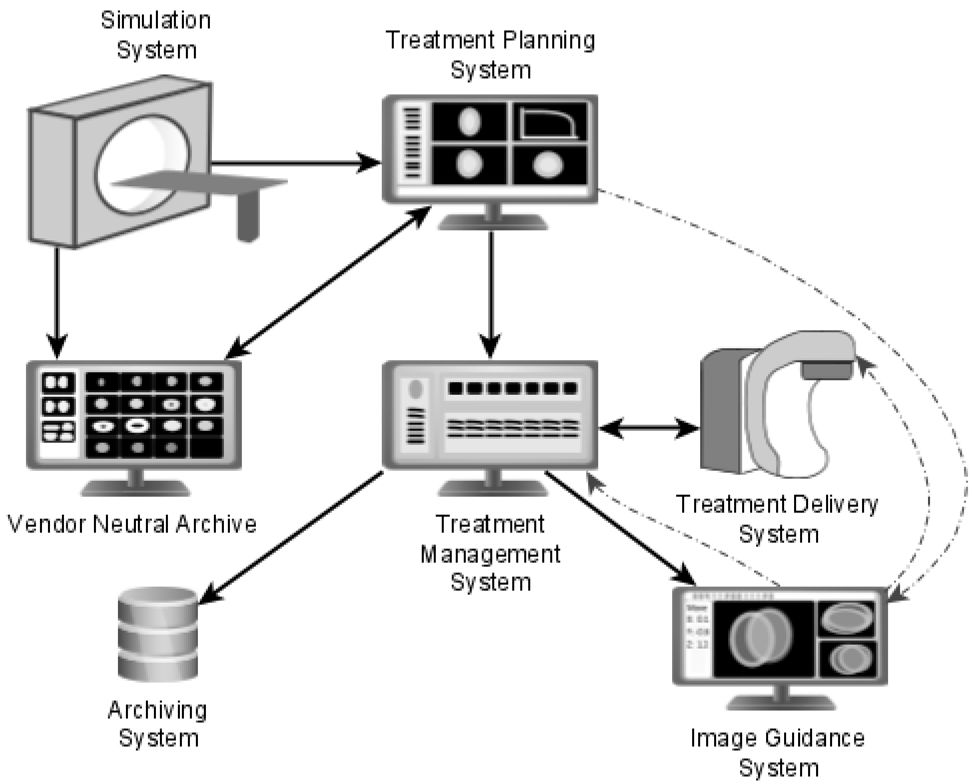
Add IP addresses

Identify network(s) in the route from one device to another.

Perform a tracert for each arrow in the diagram.



Report of TG201. Centralized Data repository.



Report of TG201. Distributed Data repository.

IT DR Planning

- Duplicates of data sources?
- Mirror site(s)?
- How often is the data duplicated?
- Alternative routing between devices?
- Topics from last 2 speakers in session

Conclusion

- Business Continuity is Continuity of Care
- Business Impact Analysis: Impact on Patient Outcomes
- Plan for
  - Equipment being Down (Linacs, CT, etc)
  - Data unavailable for treatment
  - Network unavailable (loss of communication amongst devices)
  - Disaster – long term unavailability
    - Partner with other clinics
    - Safe copy of treatment data

PLUG FOR IHE-RO

- Integrating the Healthcare Enterprise – Radiation Oncology
- Use Case: Radiation Oncology Treatment History
  - Addresses continuity of patient care
- Encourage your vendors to participate
- Volunteer (Planning Committee)

References

- (1) The International Organization for Standardization. "ISO 22301, Security and resilience — Business continuity management systems — Requirements," 2nd edition, 2019.
- (2) Waters, Jamie. "The Business Continuity Management Desk Reference," Leverage Publishing, 2010.
- (3) Zawada, Brian. "The Business Continuity Operating System," Gravitas Press, 2021
- (4) – Red Journal, Volume 100 no 4 – several articles in special section on disasters
- (5) – Gay, Hiram, et al. "Lessons learned from Hurricane Maria in Puerto Rico," Practical Radiation Oncology (2019) 9, pp 305-321.