RO•ILS®

RADIATION ONCOLOGY
INCIDENT LEARNING SYSTEM

*Sponsored by ASTRO and AAPM*

CLARITY PSO
A Patient Safety Organization

# QUARTERLY REPORT
## PATIENT SAFETY WORK PRODUCT

### Q3 2017
JULY 1, 2017 – SEPTEMBER 30, 2017

CLARITY PSO,
a Division of Clarity Group, Inc.
8725 West Higgins Road • Suite 810 • Chicago, IL 60631
T: 773.864.8280 • F: 773.864.8281
www.claritypso.com

CLARITY PSO © 2018 ALL RIGHTS RESERVED

# TABLE OF CONTENTS

RO-ILS® RADIATION ONCOLOGY INCIDENT LEARNING SYSTEM
Sponsored by ASTRO and AAPM

CLARITY PSO
A Patient Safety Organization

# AGGREGATE REPORT CARD – Q3 2017

*July 1, 2017 – September 30, 2017*

| METRIC | AGGREGATE CURRENT QUARTER | AGGREGATE HISTORICAL SUM |
|---|---|---|
| **Reported Events** | **365** | **4057** |
| Therapeutic Radiation Incidents | 51 | 951 |
| Other Safety Incidents | 61 | 349 |
| Near Miss | 81 | 1082 |
| Unsafe Conditions | 49 | 918 |
| Operational/Process Improvement | 123 | 757 |
| **Most Commonly Identified Workflow Step Where Event *Occurred*** | **Treatment Planning:** 32% (116/365) | **Treatment Planning:** 28% (1124/4057) |
| **Most Commonly Identified Workflow Step Where Event was *Discovered*** | **Treatment Delivery Including Imaging:** 33% (119/365) | **Treatment Delivery Including Imaging:** 28% (1150/4057) |
| **Most Commonly Identified Treatment Technique** | **3-D:** 32% (116/365) | **3-D:** 24% (981/4057) |
| **Most Commonly Identified Dose Deviation for Therapeutic Radiation Incidents/Other Safety Incidents that Did Not Effect Multiple Patients** | **≤5% Maximum Dose Deviation to Target:** 27% (29/107) | **≤5% Maximum Dose Deviation to Target:** 61% (537/877) |

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# ANALYSIS & COMMENTARY

## INTRODUCTION

This quarterly report contains case studies derived from events submitted to RO-ILS: Radiation Oncology Incident Learning System® during the third quarter of 2017. The report is separated into three featured themes: difference between physician's intent and the dosing pattern being used, errors made during emergency on-call treatments and the value of speaking up when something seems wrong. Each of these sections contain interconnected focus topics that highlight an overall theme of learning and improvement of patient safety and quality within radiation oncology through the use of RO-ILS. To further promote the intentions of this program—shared learning—an anonymous survey link is included in the report to collect and aggregate workflow information surrounding the communication of prescriptions and gather suggestions for mitigation strategies. The responses will be summarized and disseminated in the Q4 2017 Report. More information is included on page 4.

## Featured Theme I: Difference between physician's intent and the dosing pattern being used

The Radiation Oncology Healthcare Advisory Council (RO-HAC) continue to receive and review a number of events in which it was discovered during treatment that the dose per fraction and number of fractions being used was different than the physician's actual intent. The most notable case of this type seen this quarter was another instance of a planner who wrote the prescription for the physician to sign.

**Case 1:** Planner Wrote the Prescription for the Physician to Sign

The physician's intent was 300 cGy x 12 fractions to 3,600 cGy, but the plan was generated for 180 cGy x 20 fractions. The planner prepared the formal prescription for physician approval. The discrepancy was discovered after 9 treatments when the physician saw the patient on weekly management and did not observe the expected tumor regression. The physician also noticed that the accumulated dose was not a multiple of 300.

**Contributing factors in this case included:**

- Lack of clear documented communication

The need for clear, timely, documented communication within radiation oncology is no different than any other discipline of medicine. Miscommunication or the lack of communication standards for prescriptions has been linked to suboptimal outcomes in radiation therapy. The physician's radiation prescription not matching the care intended or care delivered has been a recurring theme from multiple RO-ILS quarterly reports (Q1 2015, Q3 2015, Q4 2015 and Q3 2016).

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

**Actions and Recommendations:**

- Standardize prescriptions
- Regulate the process (including who writes the prescription and when)

Standardizing the elements of a prescription for radiation therapy was recently addressed by an ASTRO white paper (Evans et al., 2016). The issue here is standardizing the process for creating the prescription. In order to have clear and unambiguous communication of the physician's intent, the workflow should begin with the physician using one sanctioned prescription document or planning directive prior to treatment planning commencing. Other indications of intent, either written such as a consult note or unwritten such as a phone call, should not be interpreted by a planner as an instruction to be acted upon, although a discrepancy with the formal prescription could well be a reason to raise a question.

The ACR-ASTRO Parameter for Radiation Oncology and ASTRO's Accreditation Program for Excellence (APEx®) states that the radiation oncologist prescribes the radiation treatment course and the dosing pattern. These directives are in no other radiation oncology team members' scope of practice, including the medical dosimetrist nor physicist. *Safety is No Accident* states that the directive information "including total desired dose to all targets and OARs, fractionation, treatment modality, energy, time constraints and all other aspects of the radiation prescription are recorded in a written or electronic format and must be provided by the radiation oncologist prior to the start of treatment planning" (ASTRO, 2012).

According to "Standardizing Dose Prescription: An ASTRO white paper", the formal treatment prescription should include, at a minimum, these elements in this order:

1. Anatomic treatment site
2. Method of delivery
3. Dose per fraction (in cGy)
4. Number of fractions
5. Total dose (in cGy)

A comprehensive prescription will include additional components, such as:

- Prescription point or volume
- Treatment schedule and frequency
- Treatment planning objectives
- Imaging guidance

One way to address the communication of prescriptions is to mandate a departmental policy that the physician is the only individual authorized to write the formal prescription. Adjustments to the type and method of radiation treatment delivery, energy or other elements that can change during planning could be made by the medical dosimetrist or physicist and subsequently approved by the physician, but the initial drafting of the prescription

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

must be done by the responsible physician. The dose per fraction, number of fractions and total dose should only be written by the physician in a well-defined location so that the planner, the plan checkers and the therapists unambiguously understand what should be in the plan and delivered to the patient.

In order to better understand the communication of prescriptions, RO-ILS would like to collect and aggregate workflow information surrounding the communication of prescriptions and gather suggestions for mitigation strategies. To participate, please complete the following confidential and anonymous survey: https://www.surveymonkey.com/r/RO-ILSQ32017ReportSurvey. This short survey, comprised of fewer than 10 questions, will be open from January 18 to February 20, 2018. When completing the survey, do not include any protected health information (PHI). This survey is not intended to collect identifying information about the person or institution but gives the survey participant the option to provide contact information for follow-up. The results will be managed by Clarity PSO and aggregate information will be included in the Q4 2017 RO-ILS Report.

## FEATURED THEME II: ERRORS MADE DURING EMERGENCY, ON-CALL TREATMENTS

Emergency, on-call treatments are susceptible to error. In a stressful situation with less support than normal, it is easier to make simple mistakes that reach the patient.

**Case 2:** Misread Caliper

In one case reported this quarter, a patient requiring emergency whole brain treatment was overdosed by 28 percent on two weekend treatments because the caliper was misread and the therapist used a mid-head separation of 30 cm in the monitor unit (MU) calculation. The caliper had two scales that incremented in different directions. The error was discovered the next Monday when the formal plan was done. One response made by the facility was to replace all the calipers with a type with only one scale.

**Contributing factors in this case included:**

- Error associated with performing an infrequent task

**Actions and Recommendations:**

- Reasonability check for monitor unit calculation

There are many errors that can occur in these situations. Examples of three common mistakes include:

- calculating to the wrong depth (e.g., to the full separation instead of half)
- calculating to the wrong distance (e.g., SSD setup instead of SAD)
- calculating to the wrong dose (e.g., with each of two fields given the full dose instead of half)

As this event demonstrates, it is hard to anticipate every eventuality. A simple method of doing a reasonability check for the MU calculation for emergency treatments can reduce the likelihood of error.

For example, one facility has a procedural pause form for emergency treatments. A section of that form is included below. This is only an example and would need to be adapted for any facility.

*Example of procedural pause form for emergency treatments:*

Confirm verbally the following key elements of the treatment:

- Patient identification is correct?
- Anatomy being treated is correct?
- Dose per treatment is correct?
- Dose per field is correct?
- Setup and calculation are SAD (laser on patient) or SSD (laser at tabletop)?
- MU per field is reasonable?
- Expected MU = (dose per field) x (ratio to dose from table) = (  ) x (  ) = _____
- Expected MU/Calculated MU = (  ) / (  ) = _____ (acceptable range: 0.9 to 1.10)

For a single field at 100 SSD (e.g. PA spine for a typical field size [8x14]) at 6 MV:

| Depth (cm) | 5 | 6 | 7 | 8 |
|---|---|---|---|---|
| MU/cGy ratio | 1.16 | 1.22 | 1.28 | 1.35 |

For a single field at 100 SSD (e.g., PA spine for a typical field size [8x14]) at 18 MV:

| Depth (cm) | 5 | 6 | 7 | 8 |
|---|---|---|---|---|
| MU/cGy ratio | 1.03 | 1.07 | 1.10 | 1.16 |

For parallel opposed fields treated SAD (e.g., whole brain for a typical field size [24x18]) at 6 MV:

| Depth (cm) | 6 | 7 | 8 | 9 |
|---|---|---|---|---|
| MU/cGy ratio | 1.01 | 1.04 | 1.08 | 1.11 |

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

## FEATURED THEME III: THE VALUE OF SPEAKING UP WHEN SOMETHING SEEMS WRONG

This quarter's events included several near misses in which a treatment error was prevented by someone recognizing that something seemed unusual and spoke up or otherwise acted. In some cases, the issue had either not been recognized by others; or it had but the individual(s) did not stop to investigate.

**Case 3:** Incorrect Boost Volume Drawn

A breast patient had the boost volume incorrectly drawn over the clips in the axillary surgical site. The therapist realized that the shift instructions put the electron boost field away from the surgical scar on the breast and called for the physician to check the setup.

**Case 4:** Planning Origin Not Set to Tattoos

A prostate patient had shift instructions to move >10 cm posterior and >45 cm inferior from the tattoos to the isocenter. On first treatment, therapists questioned this and called in the dosimetrist. The planning origin had not been set to the tattoos. These large shifts had not been questioned by the therapists or the physicists who had done the pre-treatment chart checks.

**Case 5:** Incorrect Electron Field Output Factor

An electron field output factor was measured by physics and reported to be 38 percent less than the planning system prediction. This low factor was not questioned by the physicist who did the measurement, the planner or the second checker. A different physicist, working with another of the patient's plans, noticed the discrepancy and had the treatment postponed a day so the factor could be re-measured, which came out within 2 percent of the prediction.

A factor in many of these cases is "expectation bias," a type of cognitive bias in which an individual or group is expecting to observe a certain effect and therefore is biased towards observing or "seeing" it. All humans are susceptible to cognitive biases but awareness of these predispositions can help identify errors. To support good decision making "ask questions that would disprove, rather than confirm, your current hypothesis" (Klein 2005). After a safety event, ask if expectation bias played a role in the error. If so, be sure to select "expectation bias" as a contributing factor in the RO-ILS portal.

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

3. Procedural issues
   a. Failure to detect a developing problem or appreciate its nature/importance
      - ☐ Environmental masking (e.g. noise or obscuring interference)
      - ☐ Distraction and loss of attention
      - ☐ Lack of information
      - ☐ Expectation Bias (e.g. expecting to observe a certain effect and therefore being biased toward seeing it)

Critical to patient safety, if something seems incorrect or out of the ordinary, stop and investigate. It's entirely possible that your insightful observations and conclusions have surfaced in the minds of others. For various reasons, others may be unwilling to speak up. By speaking up, you set an example and encourage others to voice their observations and question others' work. You may just prevent an error from reaching the patient, like the three individuals in the above cases studies did.

## References

Evans SB, Frass BA, Berner P, et al. Standardizing dose prescriptions: An ASTRO white paper. *Pract Radiat Oncol* (2016) 6, e369-e381. https://www.astro.org/Patient-Care/Clinical-Practice-Statements/Standard-Prescription/

American College of Radiology. ACR-ASTRO Practice Parameter for Radiation Oncology. 2014. https://www.acr.org/-/media/ACR/Files/Practice-Parameters/radonc.pdf?la=en

American Society for Radiation Oncology, AAMD, AAPM, etc. *Safety is No Accident.* Reston, VA: ASTRO; 2012. https://www.astro.org/uploadedfiles/main_site/clinical_practice/patient_safety/blue_book/safetyisnoaccident.pdf

Klein JG. Five pitfalls in decisions about diagnosis and prescribing. BMJ (2005) 330(7494)L 781-783.

## Resources

American Association of Medical Dosimetrists. About. 2017. https://www.medicaldosimetry.org/about/scope-of-practice/

American Association of Physicists in Medicine. Professional/Education/Science Policies. 2011. https://www.aapm.org/org/policies/details.asp?id=317&type=PP

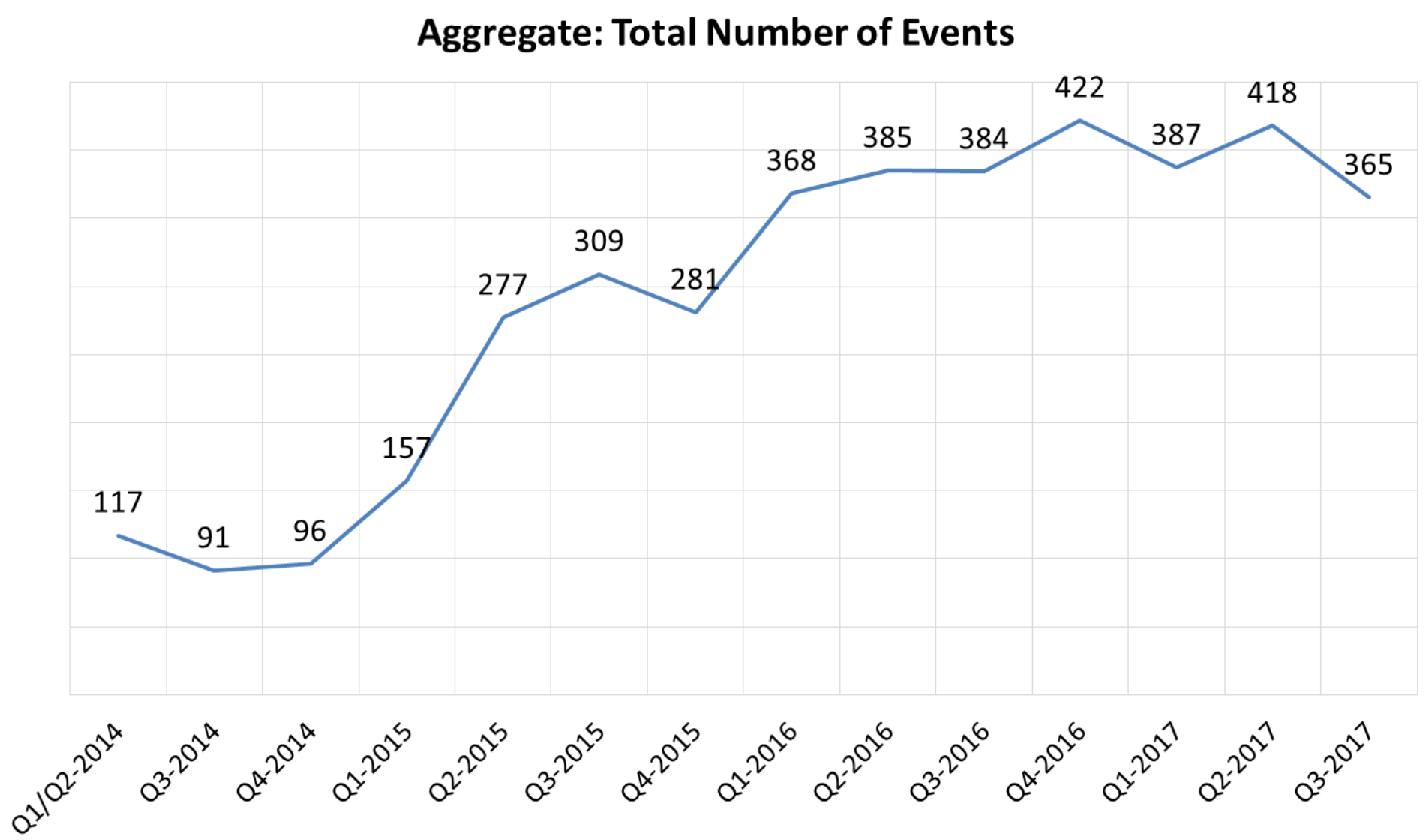
American Society for Radiation Oncology. ASTRO Accreditation Program for Excellence. 2017. https://www.astro.org/Accreditation.aspx

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

McDermott PN and Orton CG. The Physics and Technology of Radiation Therapy. 2010. Medical Physics Publishing, Madison, WI.

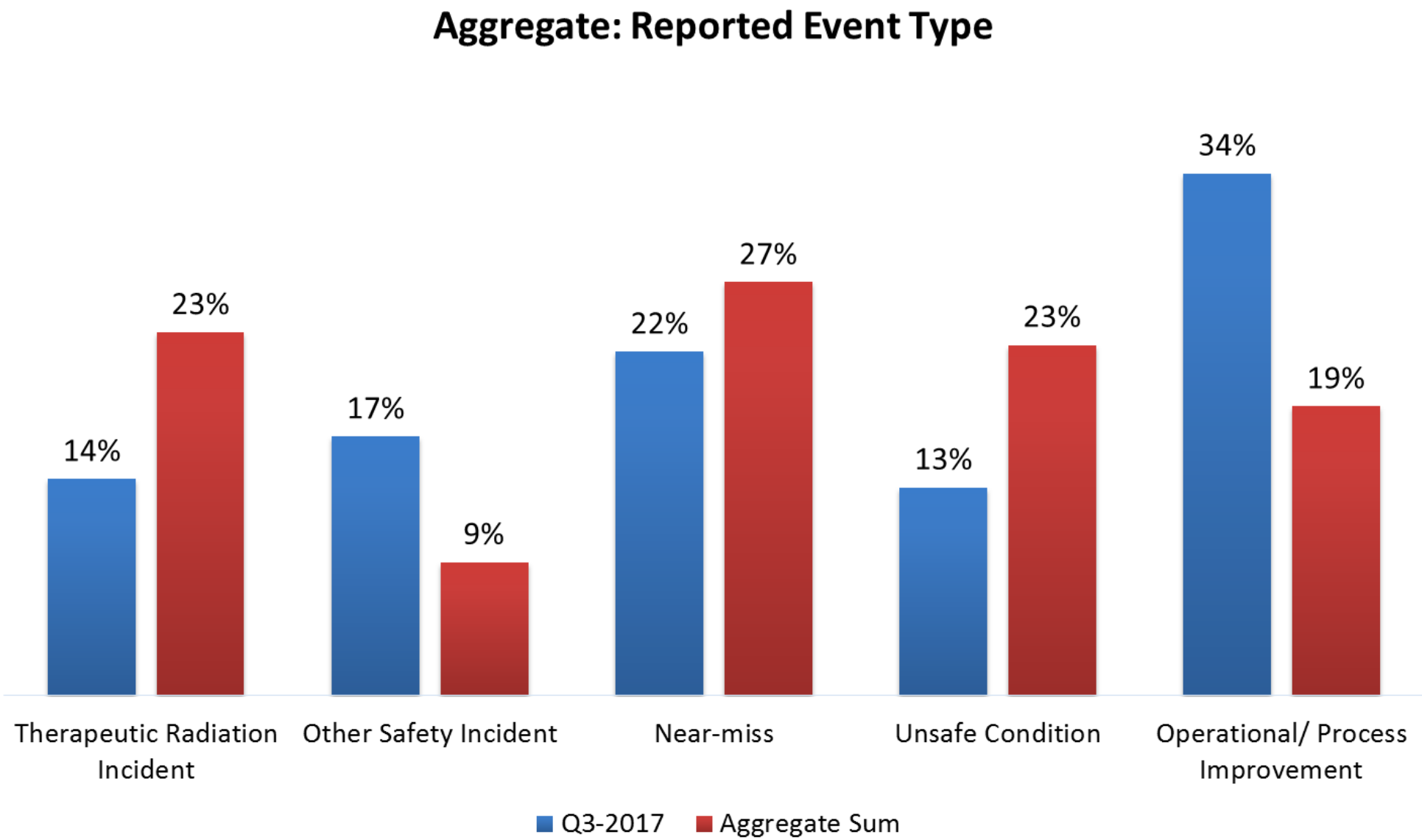
Kusano AS, Nyflot MJ, Zeng J, et al. Measurable improvement in patient safety culture: a departmental experience with incident learning. *Pract Radiat Oncol.* 2013; 5(3): e229-e237.

# AGGREGATE ANALYSIS GRAPHS



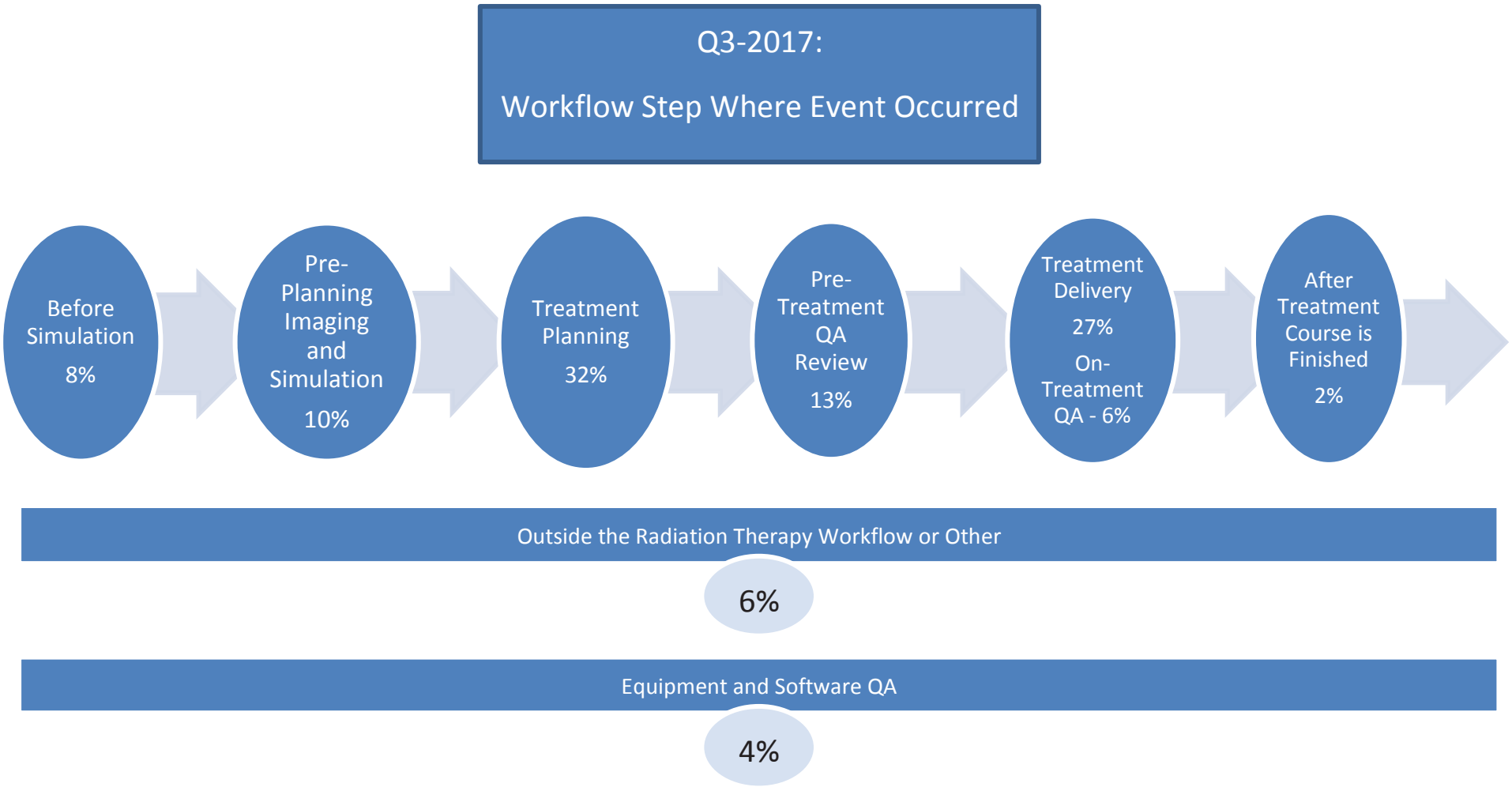

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# AGGREGATE ANALYSIS GRAPHS | continued



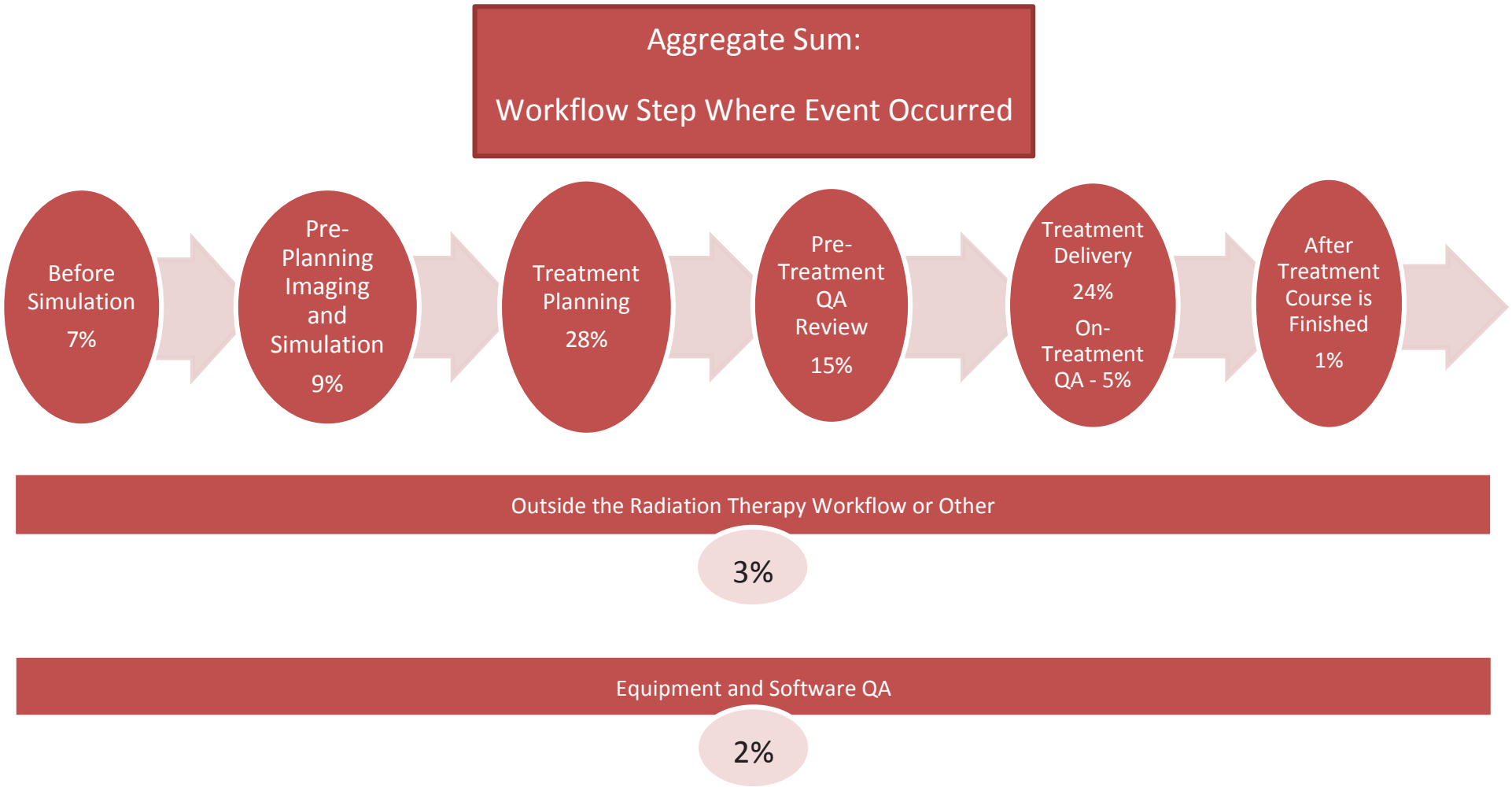

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# AGGREGATE ANALYSIS GRAPHS | continued



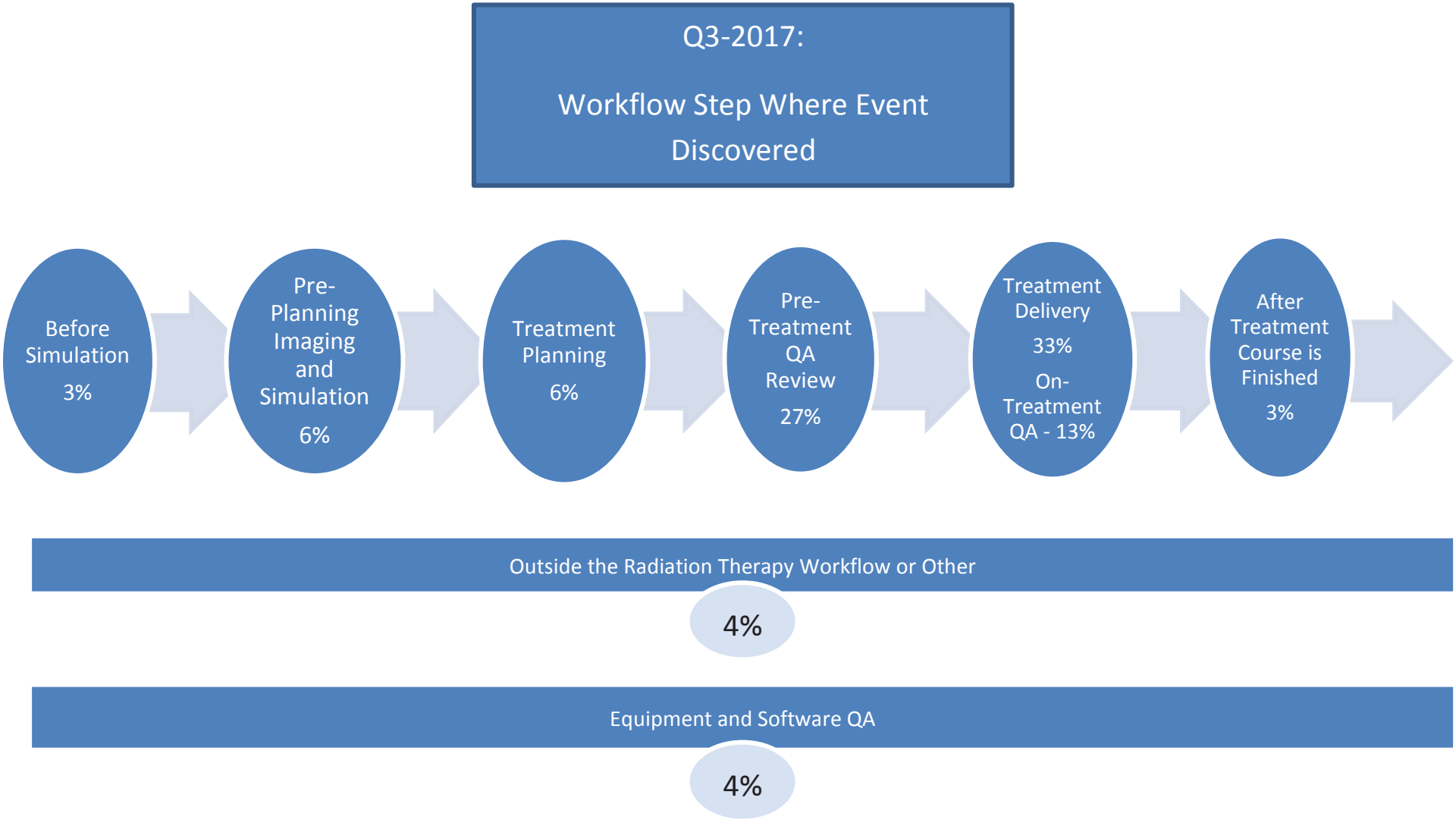

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# AGGREGATE ANALYSIS GRAPHS | continued



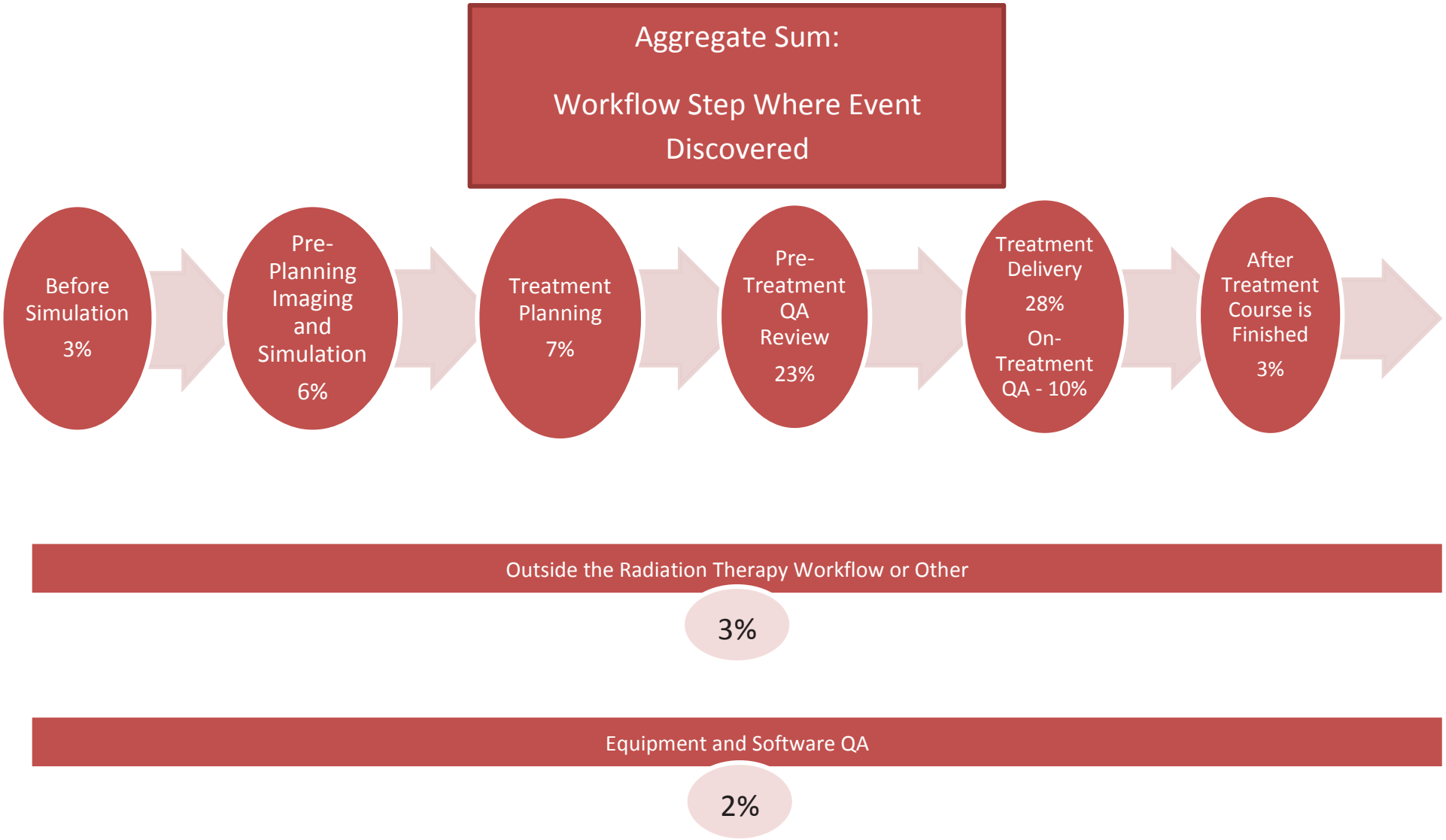

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# AGGREGATE ANALYSIS GRAPHS | continued



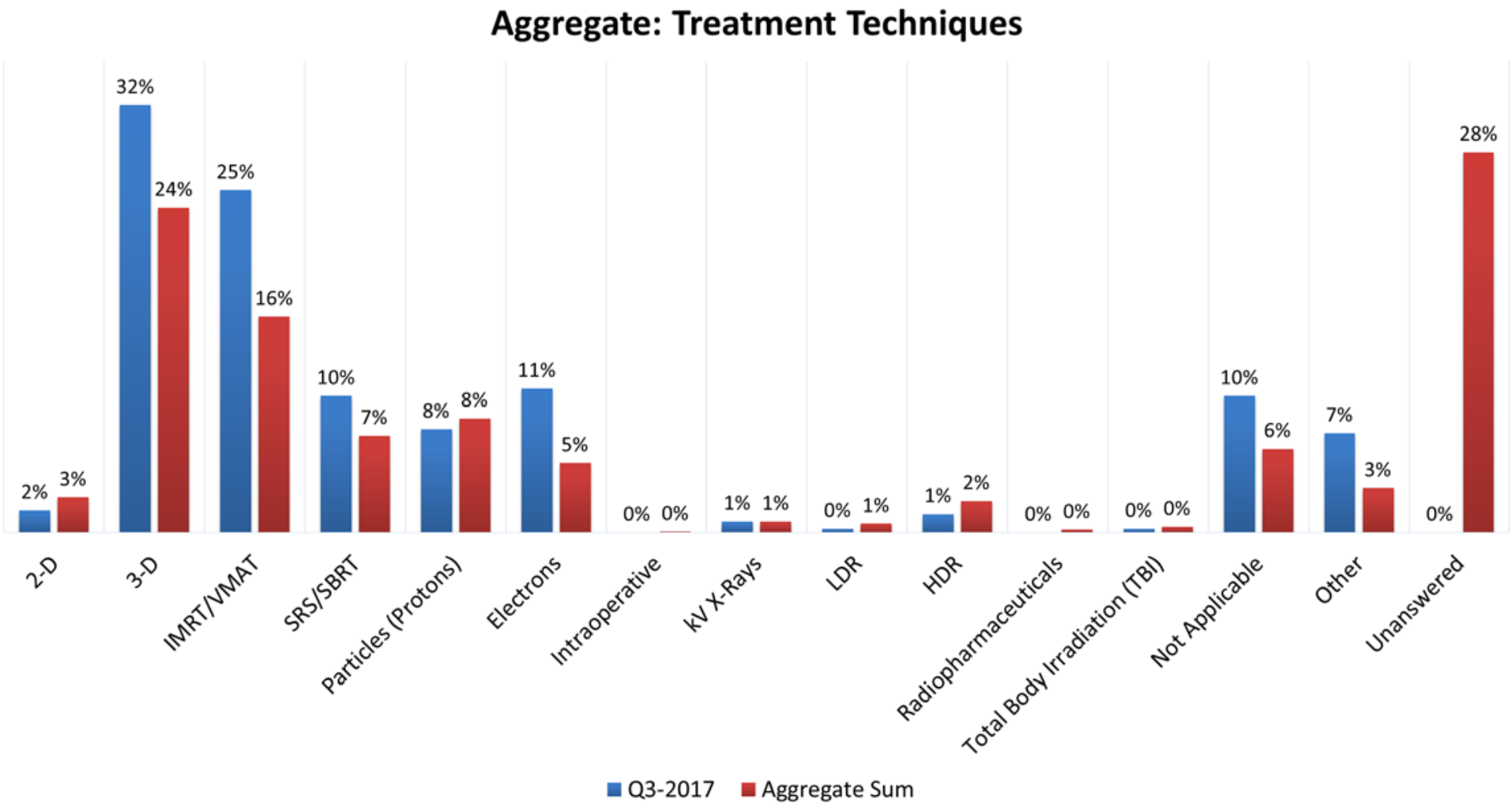

CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# AGGREGATE ANALYSIS GRAPHS | continued




CLARITY PSO © 2018 ALL RIGHTS RESERVED. 

# AGGREGATE ANALYSIS GRAPHS | continued




CLARITY PSO © 2018 ALL RIGHTS RESERVED. 