# **Quality Assurance Metrics**



Bruce Thomadsen

University of Wisconsin Madison



#### Disclosures

I am the president of the non-profit Center for the Assessment of Radiological Sciences, and organization dedicated to improving the safety of radiotherapy.

## Learning Objectives

To understand the concepts of metrics with respect to quality assurance.

#### Perspective

Only the unknown frightens men. But once a man has faced the unknown, that terror becomes the known.

Antoine de Saint-Exupery

From http://www.brainyquote.com/

### More Perspective

- There are known knowns. These are things we know that we know.
- There are known unknowns. That is to say, there are things that we know we don't know.
- But there are also unknown unknowns. There are things we don't know we don't know.
- Donald Rumsfeld, February 2002
- Quoted on Brainyquote.com

#### Why Do We Want Metrics

Without metrics we can't measure (well, duh)
With respect to QA, metrics should tell how good you are doing.

But how good at doing what?

Knowing others is wisdom, knowing yourself is enlightenment.

Lao Tzu

### Metrics and QA

With respect to QA, there are three manifestations of metrics:

- 1. Metrics in QA
- 2. Metrics on QA metrics
- 3. Metrics on the use of metrics

### Metrics in QA

- Metrics in QA are those measures you use to give confidence that things are right. Some examples include:
  - Daily checks of a linear accelerator beams,
  - Checks of a brachytherapy treatment plan using test indices,
  - Second MU calculations for a linac treatment.
- More on this in the next presentation.

#### Metrics in QA - 2

- These measures serve to interrupt the procedural flow if something does not look quite right.
- They only work if there are some accepted limits that initiate action.
- For example, if the morning dose check on a linac falls outside of 3% of the expected, treatments should wait until the discrepancy is addressed.

## Metrics in QA - 3

The limits may be different above and below the expected.

 The limits often are graded based on the discrepancy. (Example from AAPM Third-party Brachytherapy Source Calibration report)

$\geq 10\%$ but <100% of order, or	$\Delta S_K \leq 3\%$	Nothing further.
batch measurements of individual	$5\% \ge \Delta S_K > 3\%$	Investigate source of discrepancy or increase the sample
sterile strands, cartridges or		size.
preloaded needles	$\Delta S_K > 5\%$	Consult with manufacturer to resolve differences or
		increase the sample size. For assays performed in the
		operating room, consult with the radiation oncologist
		regarding whether to use the measured source strength or
		to average with the manufacturer's value.

### Metrics in QA - 4

They also only work if there are procedures for what to do if the metric fails.

They also only work if the procedures are followed.

#### Metrics on QA Metrics

- Okay, this sounds like we are getting a little convoluted now, but we really are not.
- All this means is that the effectiveness of the metrics should be measured: Do they do the job?
- Does the suite of measurements performed in the morning on a linac actually give information on all the parameters you think need to be covered?

#### Metrics on QA Metrics - 2

Does the measurement have the sensitivity to actually check the quantity, for example, can a brachytherapy calculation 10 cm from an applicator catch the likely treatment planning errors?
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Is the measurement stable enough to give the information you think it is?

■ Is the metric more stable than the process?

■ Statistical process control may be useful to assess this.

### Metrics on QA Metrics - 3

- Does the measurement ever catch a problem?
- If yes, following *this* metric gives pointers on where to look to increase quality, efficiency, effectiveness and safety.
- If no, is the test worth doing?
  - Certainly, if it checks for a problem with severe consequences.
  - Maybe not if it just gives you a good feeling (although that should not be underrated).

#### Metrics on the Use of Metrics

- This gives information on how often or how completely a QA metric is used.
- Examples:
  - Is a time out called for every treatment?
  - Are all patients discussed in conference?
  - For what fraction of eye plaques is a second time-out calculation performed?

### Metrics on the Use of Metrics - 2

- Some metrics are unlikely to be neglected, such as an HDR brachytherapy unit QA.
- Some seem to be more of a problem nationally, for example checking all linac patients' charts at the required frequency in your policy.

### **Practice Quality Improvement**

- Metrics on the use of metrics serve as one measure of your practice quality.
- As part of your PQI program, you can record your metrics metric and work at improving it over time.
- Metrics on the use of metrics also highlights those metrics that may have a problem in use, are difficult or inconvenient to use or give the impression to users that they are ineffectual.

#### **Data for Metrics**

Going back to the second class of metrics, metrics on the metrics, we need data on the effectiveness of metrics.

- For what metrics we want in the first place, we need data on what items need to be covered by QA metrics.
- In short, we need failure data and recovery data.

- Information on failures and recovery mostly comes from radiotherapy incident reporting systems.
   Such systems gather information on events – failures that affect patients – and that data can highlight where in processes QA steps could be needed.
- The systems also gather information on close calls, which gives clues as to what QA intercepts errors.

Reporting systems need data!

- That data comes from clients of the system entering reports of incidents.
- The data is also needed for determining your QM program using the mythical TG-100 approach, which is risk based. We need to know the risks and that comes from the data.

- Aside from being altruistic, reporting systems directly benefit you.
- When you have an incident event or close call the reporting system helps you analyze the causes and generate actions that can not only prevent *that* given incident but other types of incidents by fixing latent errors (jargon, sorry).

Also, any information sent to or received from the organizations running the reporting systems is protected from legal discovery should their be a law suit involving the case.

This is covered under the Patient Safety Act of 2005, forming the classification of Patient Safety Organization, PSO.

### An Additional Benefit

The PSOs will also help you work through a TG-100 analysis of a process and develop your QM program.

There are 2 reporting systems for radiotherapy:
 Center for the Assessment of Radiological Sciences (CARS), Radiotherapy Reporting and Analysis System, and

 ASTRO, Radiation Oncology • Incident Learning System.

### Summary

- In QA there are:
- 1. Metrics that are the QA measures
- 2. Metrics on the quality of the metrics
- 3. Metrics on the use of metrics
- All are important to you in your practice.
- Data comes from reporting systems; Participate in one.