AAPM Spring Clinical Meeting: 8th March 2015

Quality in Medical Physics and Beyond.

Peter Dunscombe

University of Calgary

Disclosure

Peter Dunscombe

Director, TreatSafely, LLC

Director, Center for the Assessment of Radiological Sciences.

Occasional Consultant to IAEA and Varian.

Objectives

Å To explore the concept of quality in radiotherapy.

Å To describe Donabedian's dimensions of quality.

Å To examine selected quality indicators in the U S, Europe and developing countries.

Å To take a peek the AAPM's Safety Profile Assessment results.

Quality in Medical Physics and Beyond

Quality

Donabedian

Medical Physics Quality

Radiotherapy Program Quality

Bottom Lines

Quality in Medical Physics and Beyond

Quality

Donabedian

Medical Physics Quality

What is Quality?

Radiotherapy Program Quality

Evidence for Quality?

Information about Quality?

Bottom Lines

What constitutes Quality?

Quality in Medical Physics and Beyond

Quality

Donabedian

Structure

Process

Outcome

Medical Physics Quality

Radiotherapy Program Quality

Bottom Lines

Quality in Medical Physics and Beyond

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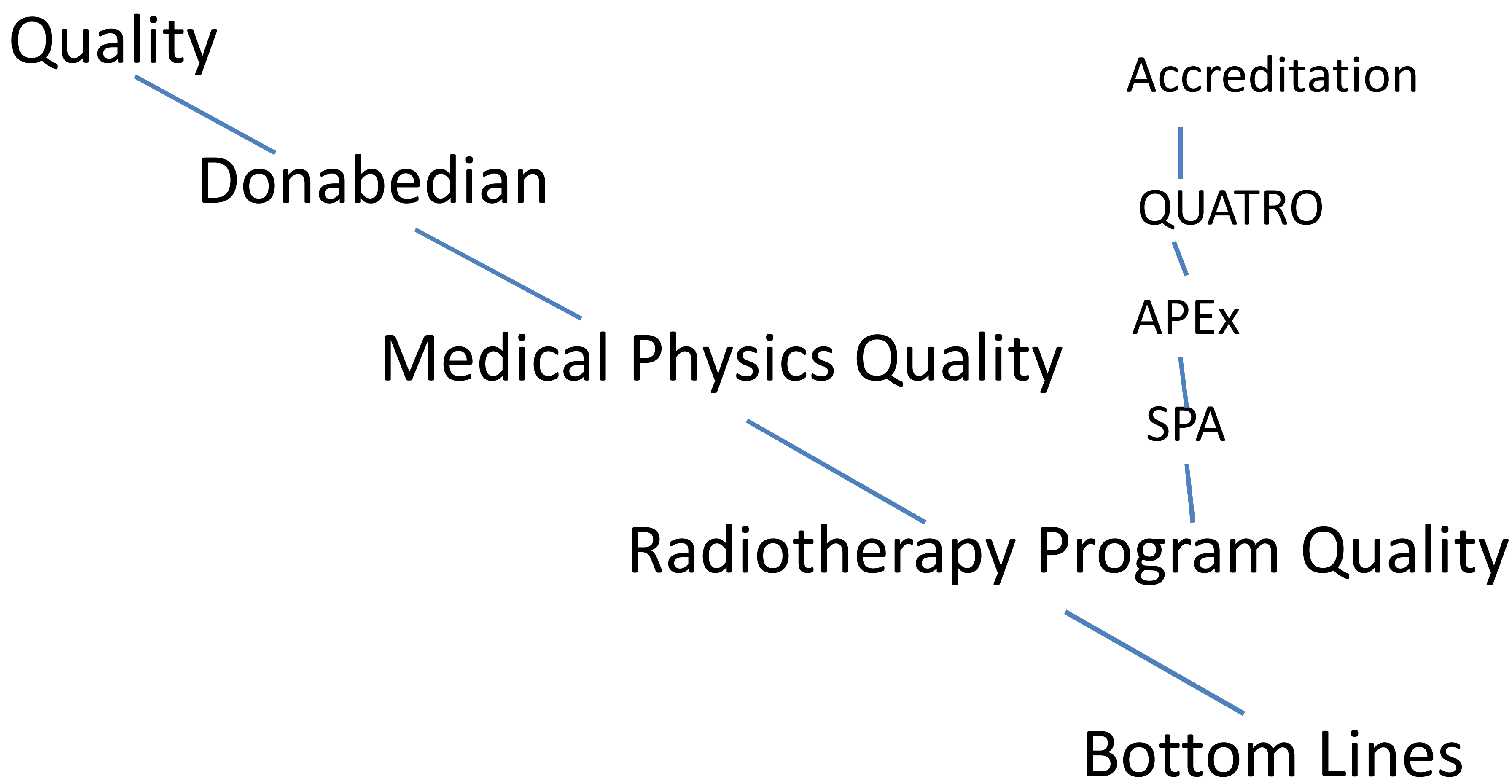
Quality in Medical Physics and Beyond



Quality in Medical Physics and Beyond

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What constitutes Quality?

What is Quality?

- **Quality** of care is defined as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.

- Institute of Medicine. Volume 1. Committee to Design a Strategy for Quality Review and Assurance in Medicine, Institute of Medicine. Lohr, K. ed. Medicare: A Strategy for Quality Assurance. Washington, D.C.: National Academy Press,1990

Quality in Radiotherapy

Å The degree to which radiotherapy is consistent with current professional knowledge

- The prescription is appropriate, i.e. evidence based.
- The prescription is delivered within consensus determined tolerances.

Quality in Medical Physics and Beyond

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Evidence for Quality

QA makes a clinical trial stronger: evidence-based medicine in radiation therapy

Weber D, Tomsej M, Melidis C, Hurkmans C. Radiotherapy and Oncology 105 (2012) 4-8

- Analyzed 9 prospective clinical trial reports of violations and outcomes.
- Major deviation rates from 11.8% to 48%
- Major deviations (n=22) included:
  - Excessive or incomplete tumor coverage.
  - 90% isodose surface not encompassing the planning target volume.
  - Total delivered dose of ±10% of prescribed randomized dose.
  - The use of block margins >5 cm.

Evidence for Quality

QA makes a clinical trial stronger: evidence-based medicine in radiation therapy

Weber D, Tomsej M, Melidis C, Hurkmans C. Radiotherapy and Oncology 105 (2012) 4-8

"These QA data stemming from prospective clinical trials show undisputedly that non adherence to protocol specified RT requirements is associated with reduced survival, local control and potentially increased toxicity."

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Information about Quality?

Quality Assessment in Oncology

Jeffrey M. Albert, M.D., and Prajnan Das, M.D., M.S., M.P.H.

Measuring the Quality of Care in Radiation Oncology

James A. Hayman, MD, MBA

Quality Indicators in Radiation Oncology

Jeffrey M. Albert, MD, MPH, and Prajnan Das, MD, MS, MPH

Quality in Radiotherapy

Å The degree to which radiotherapy is consistent with current professional knowledge

- **The prescription is appropriate, i.e. evidence based.**

- The prescription is delivered within consensus determined tolerances.

Information about Quality?

Å That safety in radiotherapy matters is self-evident.

Å We will explore the relationship between quality and safety.

Å If we can convince ourselves that quality and safety are largely different ways of looking at the same issue, i.e. the best outcome for the patient, then we can apply the recommendations for safer radiotherapy to quality radiotherapy.

Quality in Radiotherapy

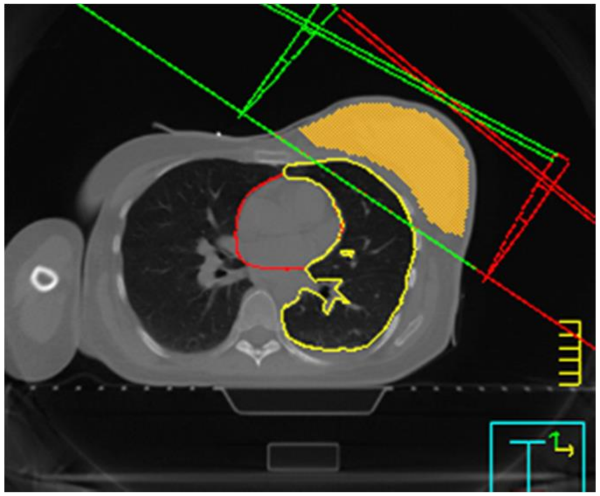
Å The degree to which radiotherapy is consistent with current professional knowledge

- The prescription is appropriate, i.e. evidence based.
- **The prescription is delivered within consensus determined tolerances.**

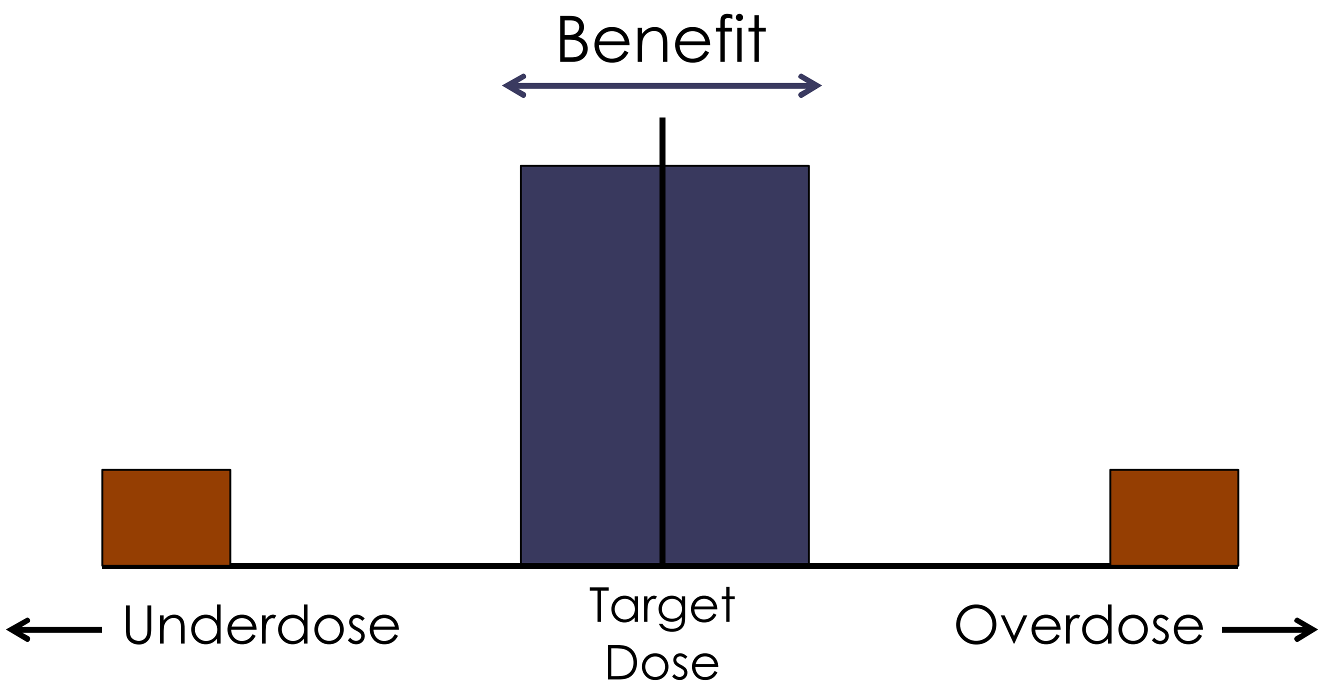
Quality in Radiotherapy

To explore this let's just look at the technical aspects of radiation therapy:

Is the prescription delivered within consensus determined tolerances?



Quality in Radiotherapy

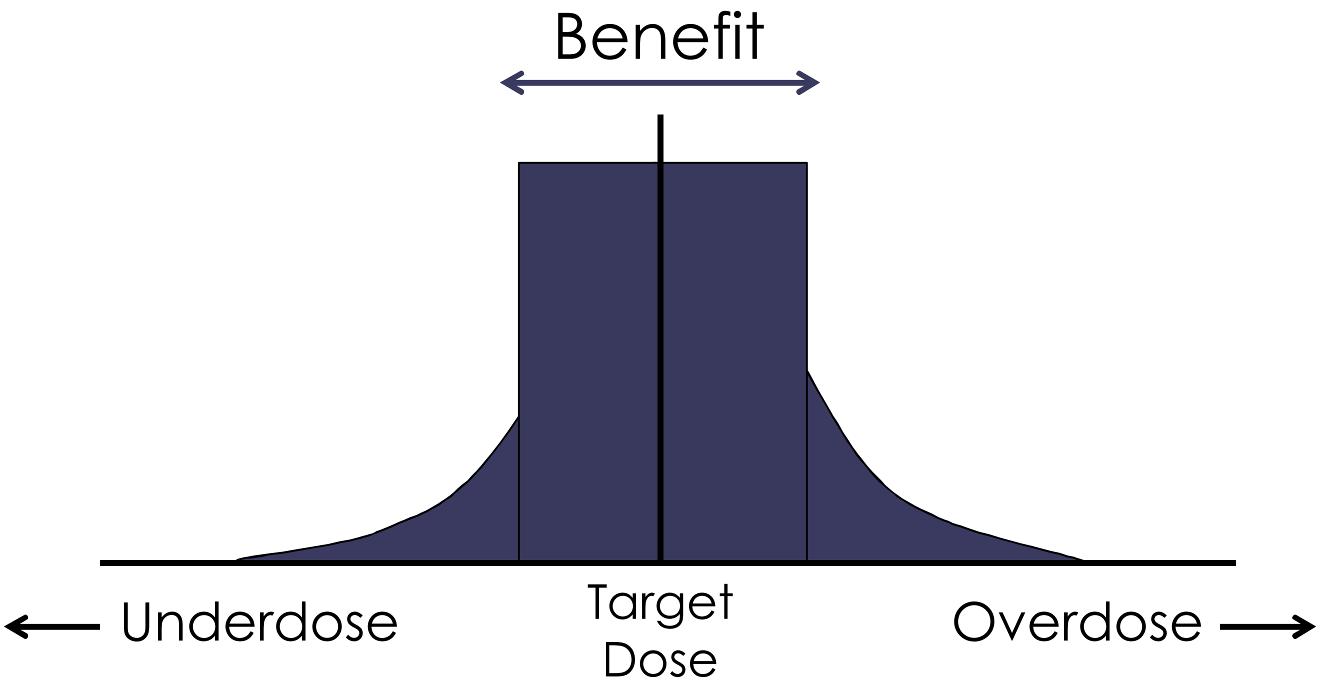


Our preferred world view: all patients receive beneficial treatments?

Or reframed following the NYT articles: **almost** all patients receive beneficial treatments **with a miniscule number subject to harm?**

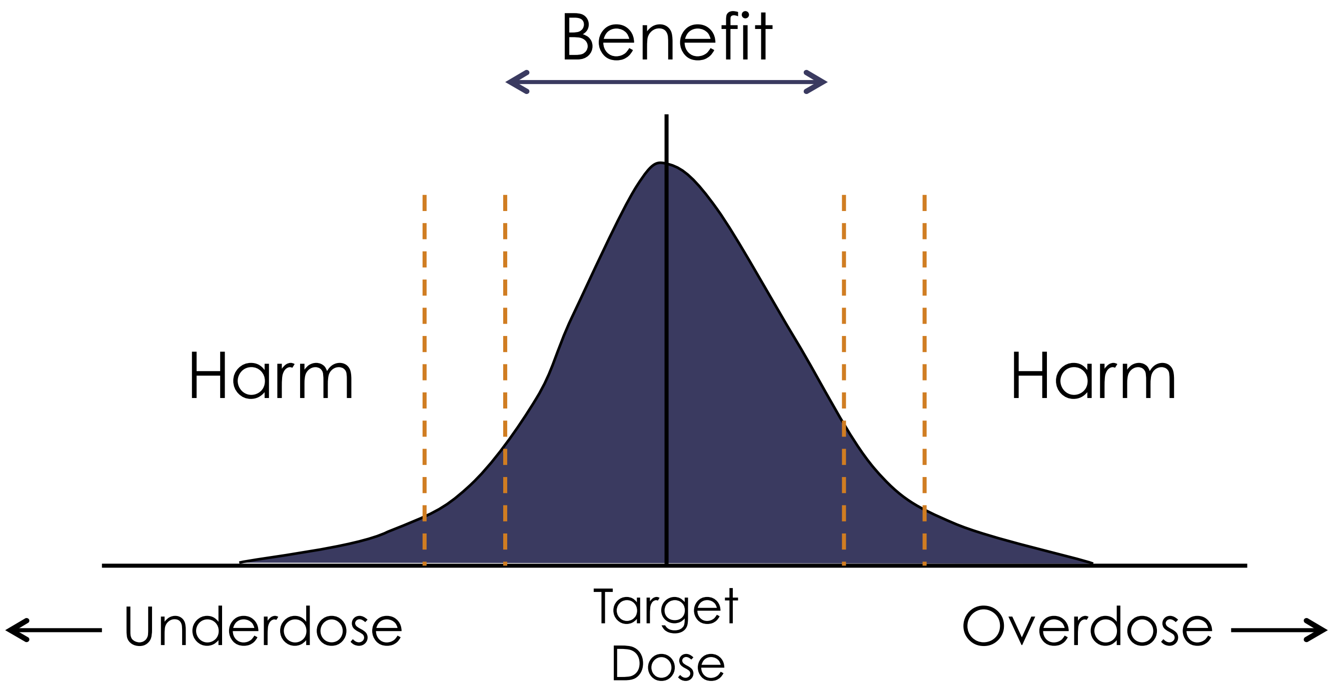
Information about Quality?

Quality in Radiotherapy



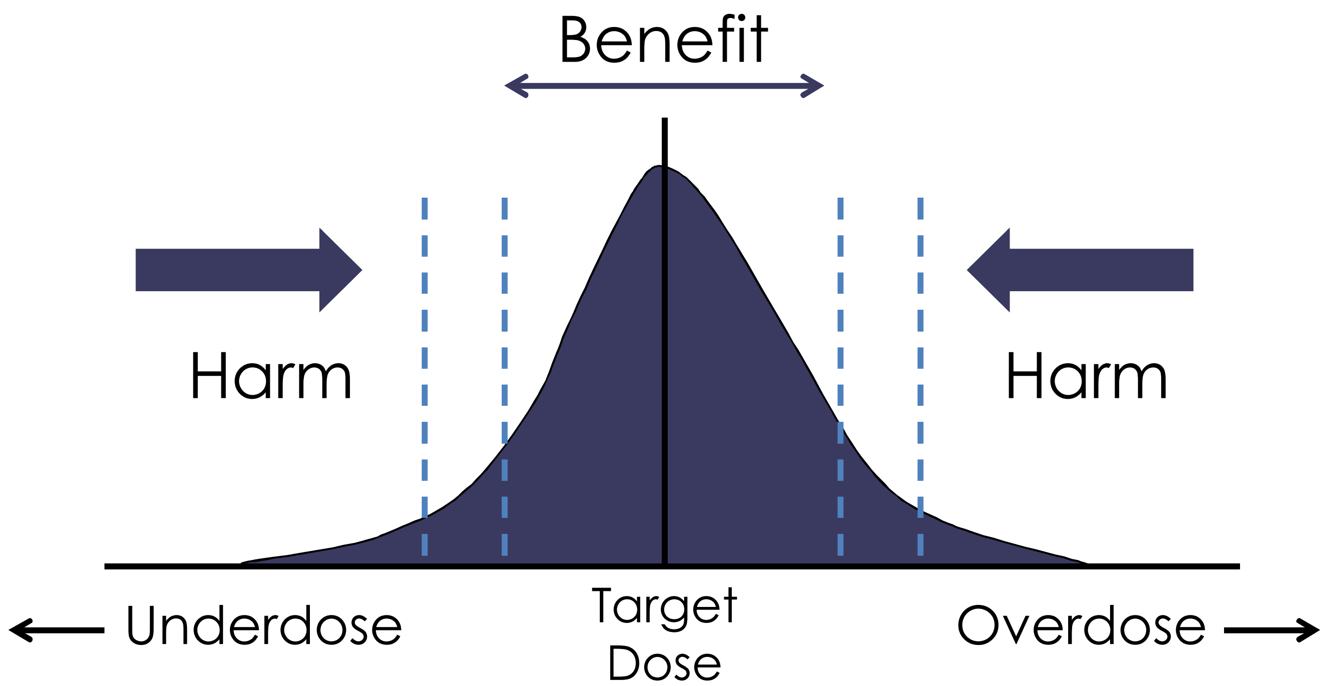
Or is this more realistic: there's a continuous distribution from beneficial treatments to harmful treatments?

Quality in Radiotherapy



If you believe this distribution there is no clear demarcation between quality radiotherapy and unsafe radiotherapy. Unsafe conditions can be viewed as a major compromise of quality.

What are we trying to accomplish?



Information about Quality?

Information about Quality?

So, if you accept the relationship between quality and safety we can adopt many of the measures aimed at improving safety to improve quality too.

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Bottom Lines

What constitutes Quality?

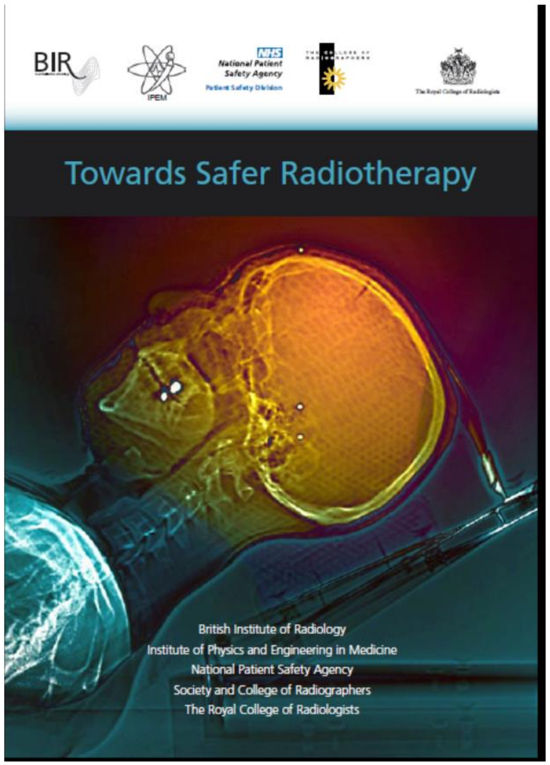
frontiers in
ONCOLOGY

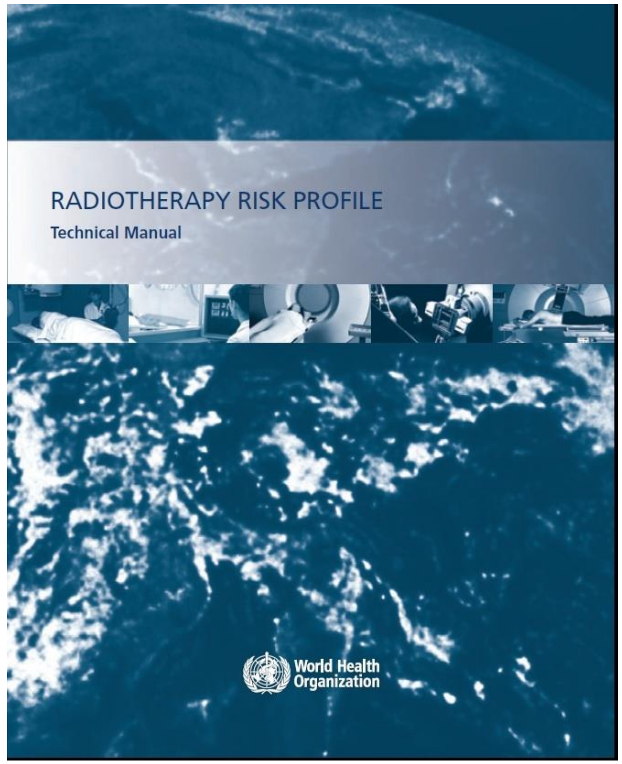
REVIEW ARTICLE
published: 28 September 2012
doi: 10.3389/fonc.2012.00129

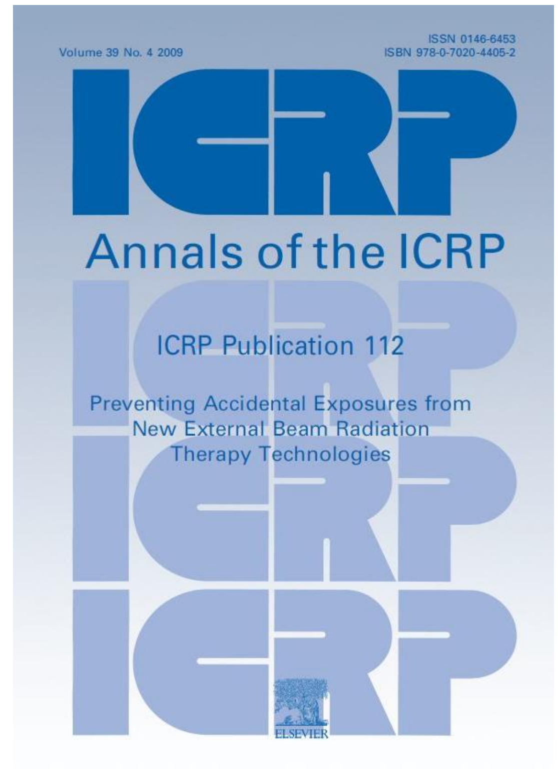
Recommendations for safer radiotherapy: what's the message?

Peter Dunscombe*

Department of Oncology, University of Calgary, Calgary, AB, Canada







What constitutes Quality?

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Recommendations for safer radiotherapy: what's the message?

Peter Dunscombe*

Department of Oncology, University of Calgary, Calgary, AB, Canada

Report	Advice
Towards safer Radiotherapy	*37*
Radiotherapy Risk Profile	*15*
Preventing Accidental …..	*15*
Hendee and Herman	*20*
Heirarchy of Actions	*19*
ASTRO	*6*
TG 100	*5*
Total	117

frontiers in
ONCOLOGY

REVIEW ARTICLE
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Recommendations for safer radiotherapy: what's the message?

Peter Dunscombe*

Department of Oncology, University of Calgary, Calgary, AB, Canada

Training (7)

Staffing/skills mix(6)

Documentation/SOP (5)

Incident Learning System (5)

Communication/questioning (4)

Check lists (4)

QC and PM (4)

Dosimetric Audit(4)

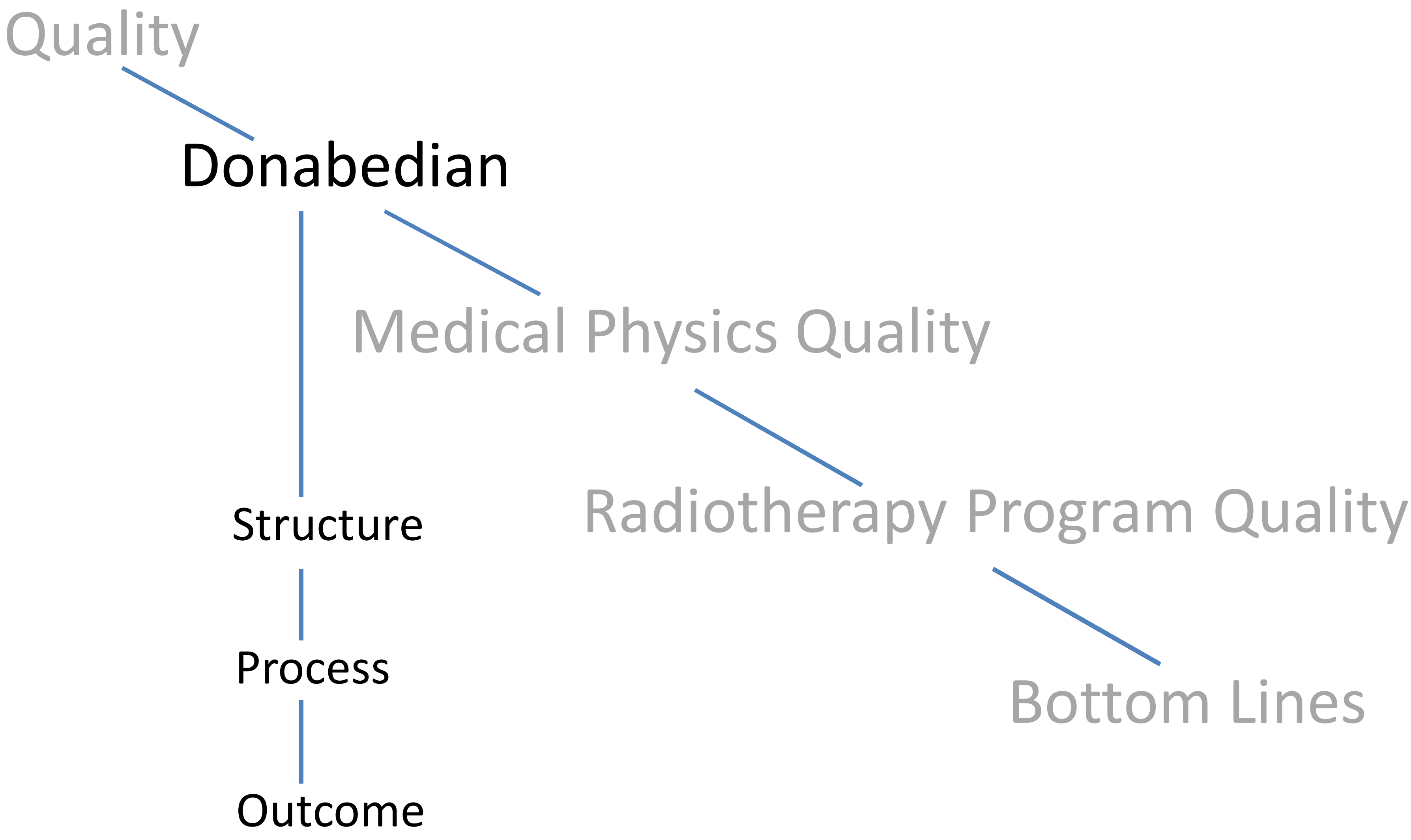
Accreditation (4)

Minimizing interruptions (3)

Prospective risk assessment (3

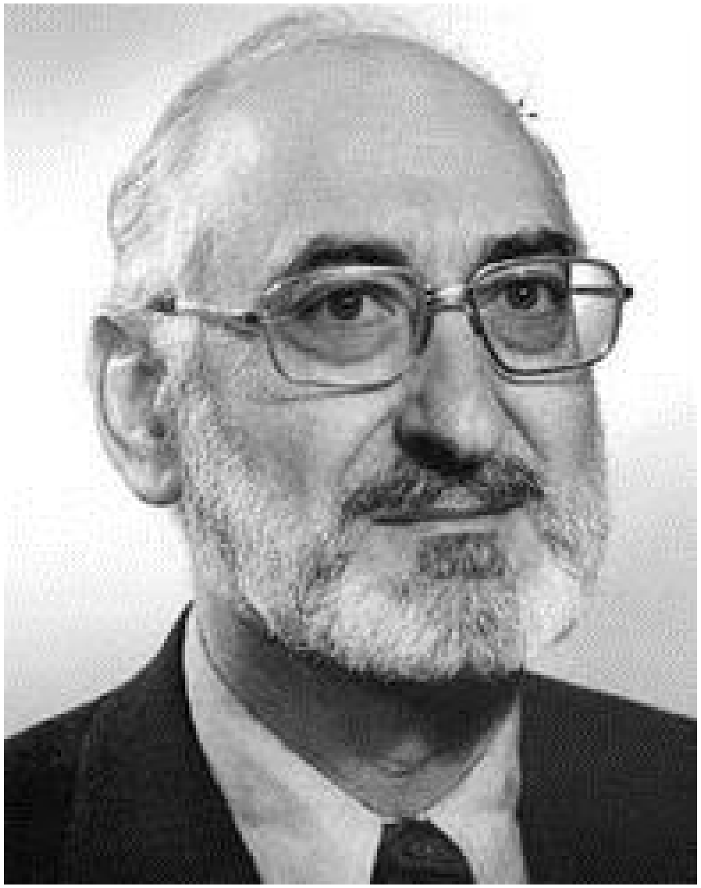
Safety Culture (3)

Quality in Medical Physics and Beyond



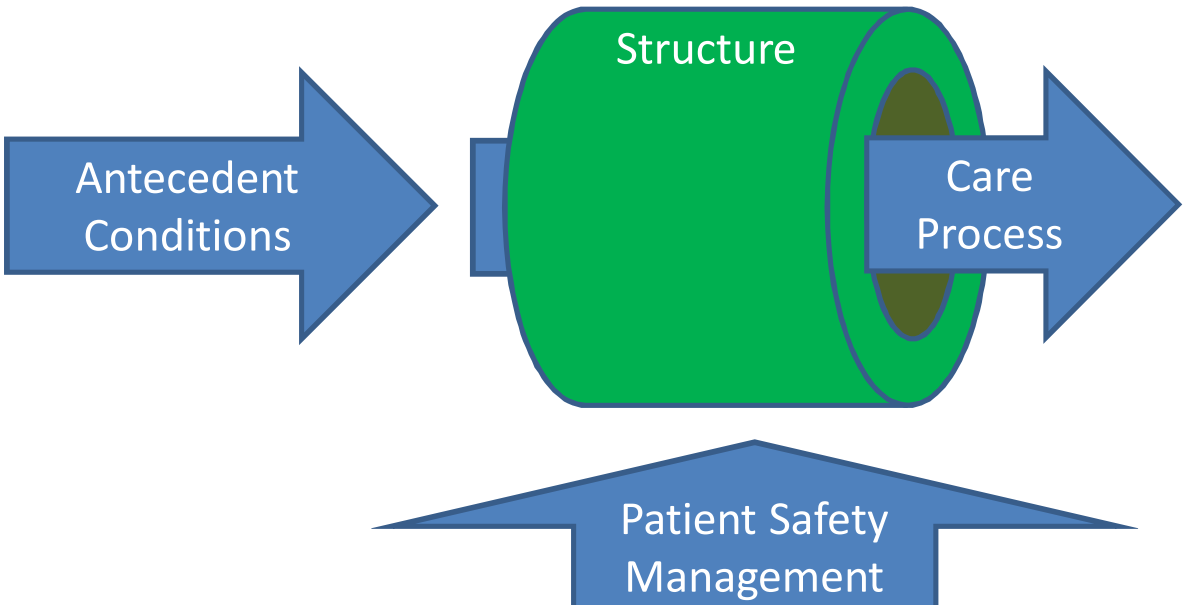
Donabedian’s Outcomes Model

- Å University of Michigan 1961-2000
- Å Founder of the study of quality in health care.
- Å Coined the term “outcomes” to refer to patient follow-up assessment.
- Å Modeled quality based on structure, process, and outcome.



Donabedian's Outcomes Model

- **Structure:** all factors affecting care delivery.
- **Process:** all actions making up healthcare.
- **Outcome:** all effects on patients or populations.



Adapted from Battles 2003.

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Structure

Å The necessary, but not sufficient, fundamentals of an organization for the delivery of quality.

Å Fundamentals need to be present irrespective of volume.

Å Providing an adequate structure is a management function.

Structure

Examples of structural fundamentals are:

Å Equipment: e.g. calibrated linac inventory.

Å Staffing: appropriate numbers/ competence

Å Documentation: current and high quality

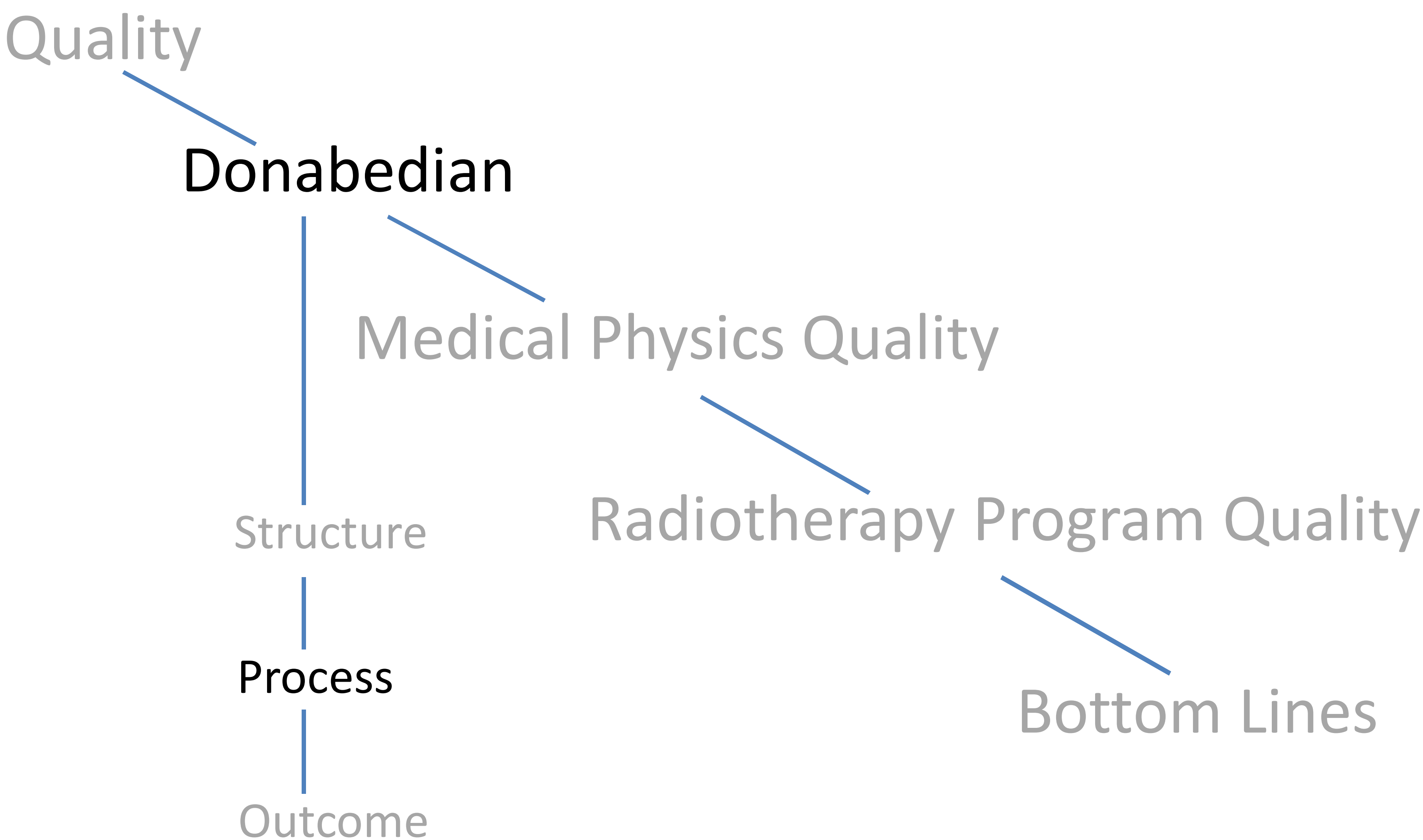
And

Å Radiation Safety Committee.

Å Staff continuing professional development program.

Å Safety Culture.

Quality in Medical Physics and Beyond



Process

Å Processes happen within the structure and are focused on individual units (patients or equipment).

Å # processes is volume dependent.

Å Processes are carried out by front line staff.

Process

Examples of processes are:

Å Controlling the quality of a particular linac.

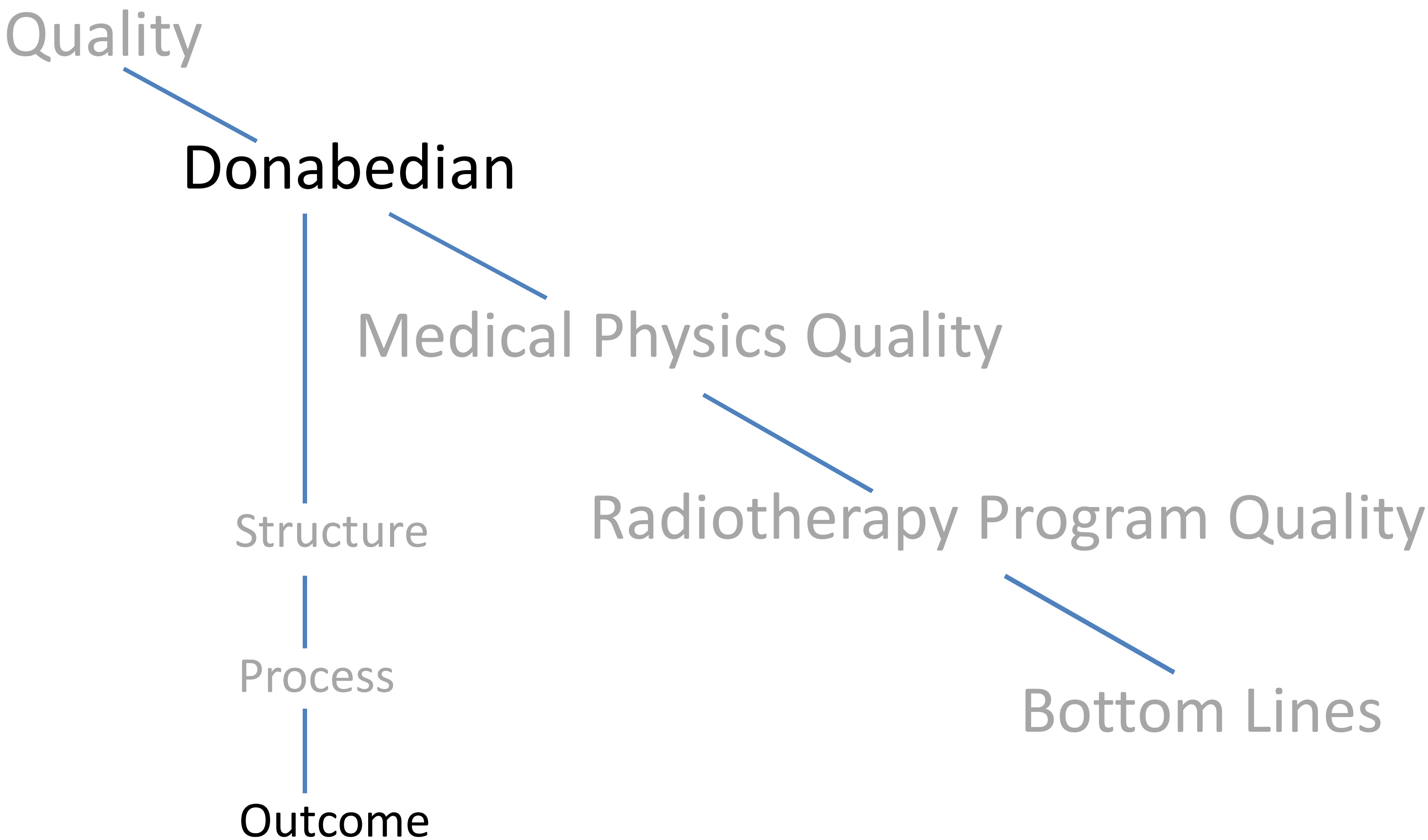
Å Verifying the dose for an IMRT patient.

And

Å Planning a treatment for a patient

Å Delivering a treatment to a patient.

Quality in Medical Physics and Beyond



Outcome

Å Measures of the effectiveness of the system

Å Outcomes can be patient related or *organizational*

Patient Related Outcomes

Examples of Patient Related Outcomes are:

Å Survival.

Å Quality of life.

Å Re-admissions.

Å Patient satisfaction.

Organizational Outcomes

Examples of Organizational Outcomes

Å Postal dosimetry (IAEA program).

Å IROC Houston (formerly RPC) phantom results.

And

Å Misadministrations.

Å Participation in advanced training

Å Publications.

Å Accreditation recommendations.

Organizational Outcomes

Examples of Organizational Outcomes

Å Postal dosimetry (IAEA program).

Å IROC Houston phantom results.

Organizational outcomes should be used in a feedback loop to improve the structure and process dimensions of quality.

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Bottom Lines

Global treatment machine inventory

Low and middle income countries* encompass 82% of the world's population and experience 57% of the world's cancer cases.

One treatment machine per 1.4 x 10^6 inhabitants.

*GNI per capita ≤ $12,745 per annum

Clin Onc **27** (2015) 107-114

European treatment machine inventory

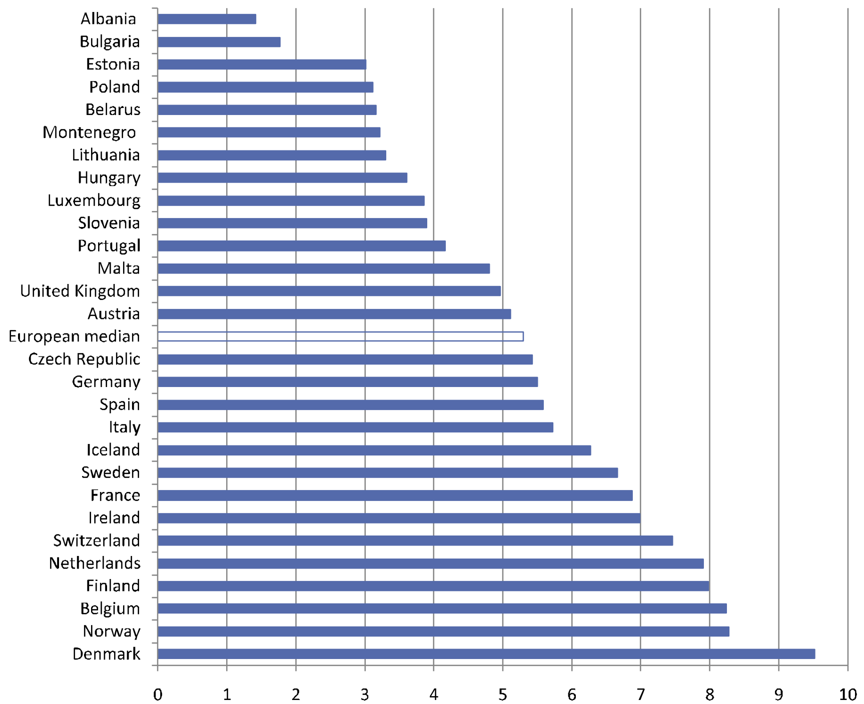


Fig. 2. Histogram showing the average number of radiotherapy treatment machines (MV units) per million inhabitants in 28 European countries.

Radiotherapy and Oncology **112** (2014) 155-64

US treatment machine inventory

An Elekta presentation at ESTRO in 2012 stated that there were 12 machines per 10^6 Inhabitants in the US.

Treatment machine inventory

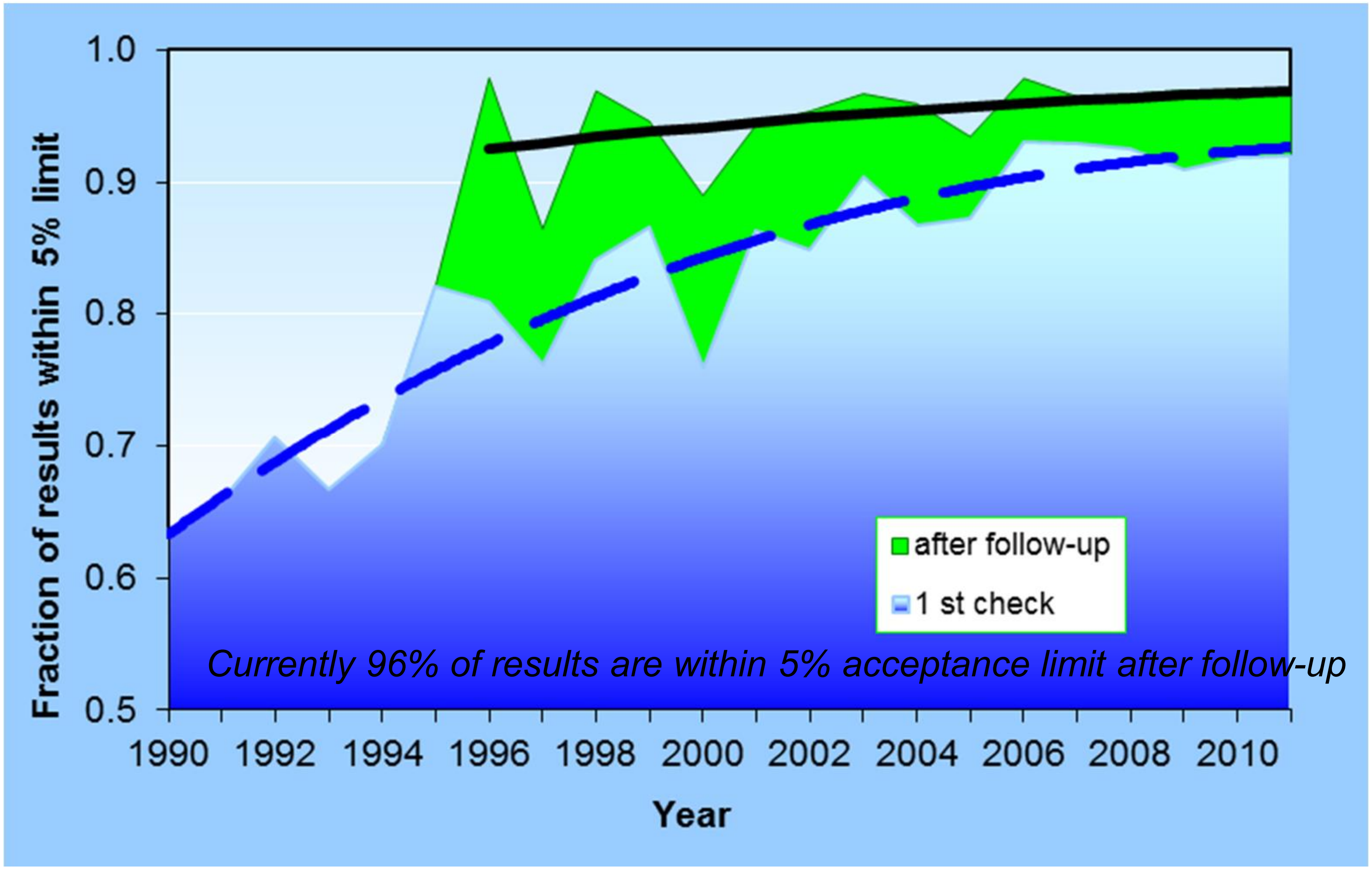
- Global (LMIC): 1.4 machines per 10^6 inhabitants
- Europe: 5.3 (median) machines per 10^6
- US: 12 machines per 10^6

Treatment machine inventory

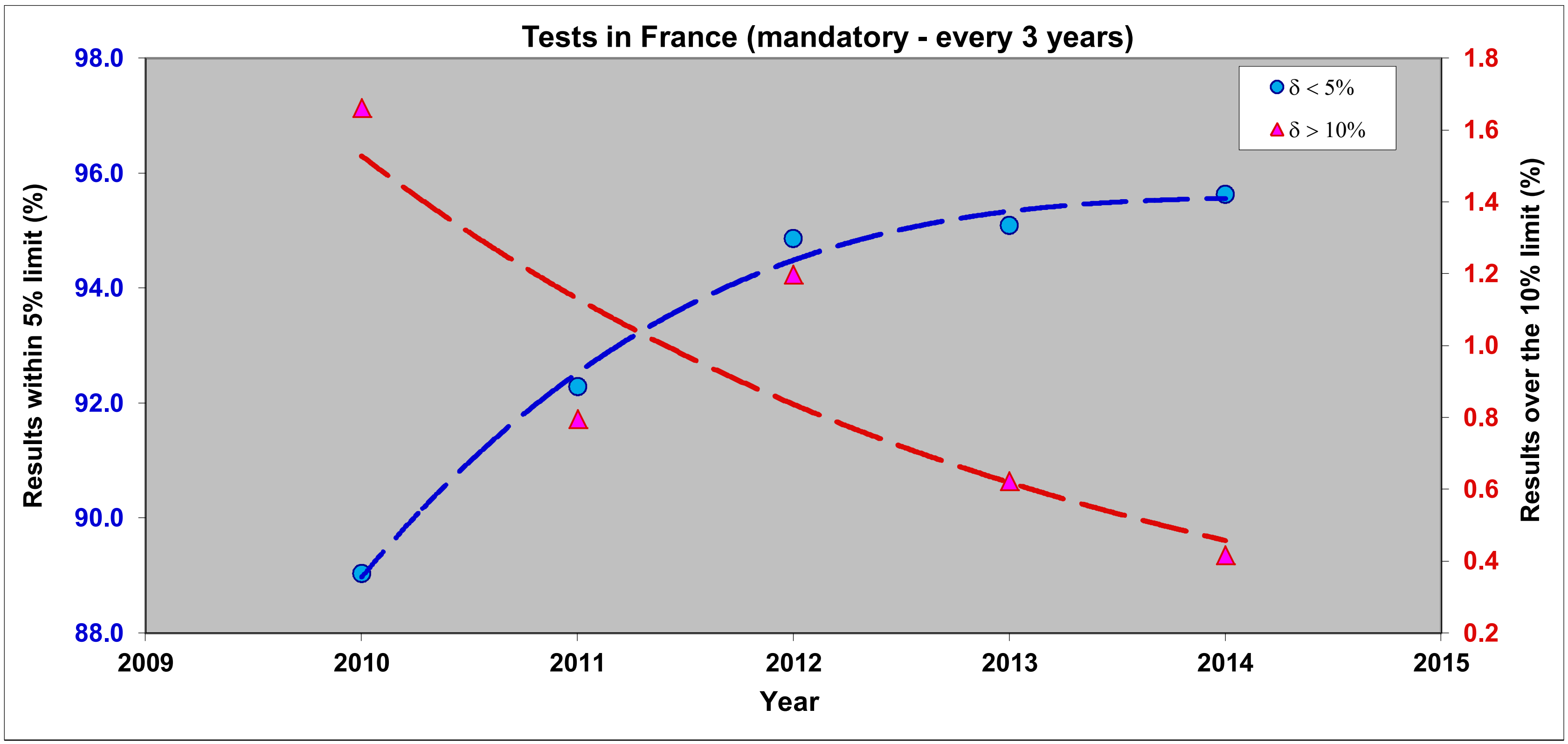
- Global (LMIC): 1.4 machines per 10^6 inhabitants
- Europe: 5.3 (median) machines per 10^6
- US: 12 machines per 10^6

But, availability ≠ access

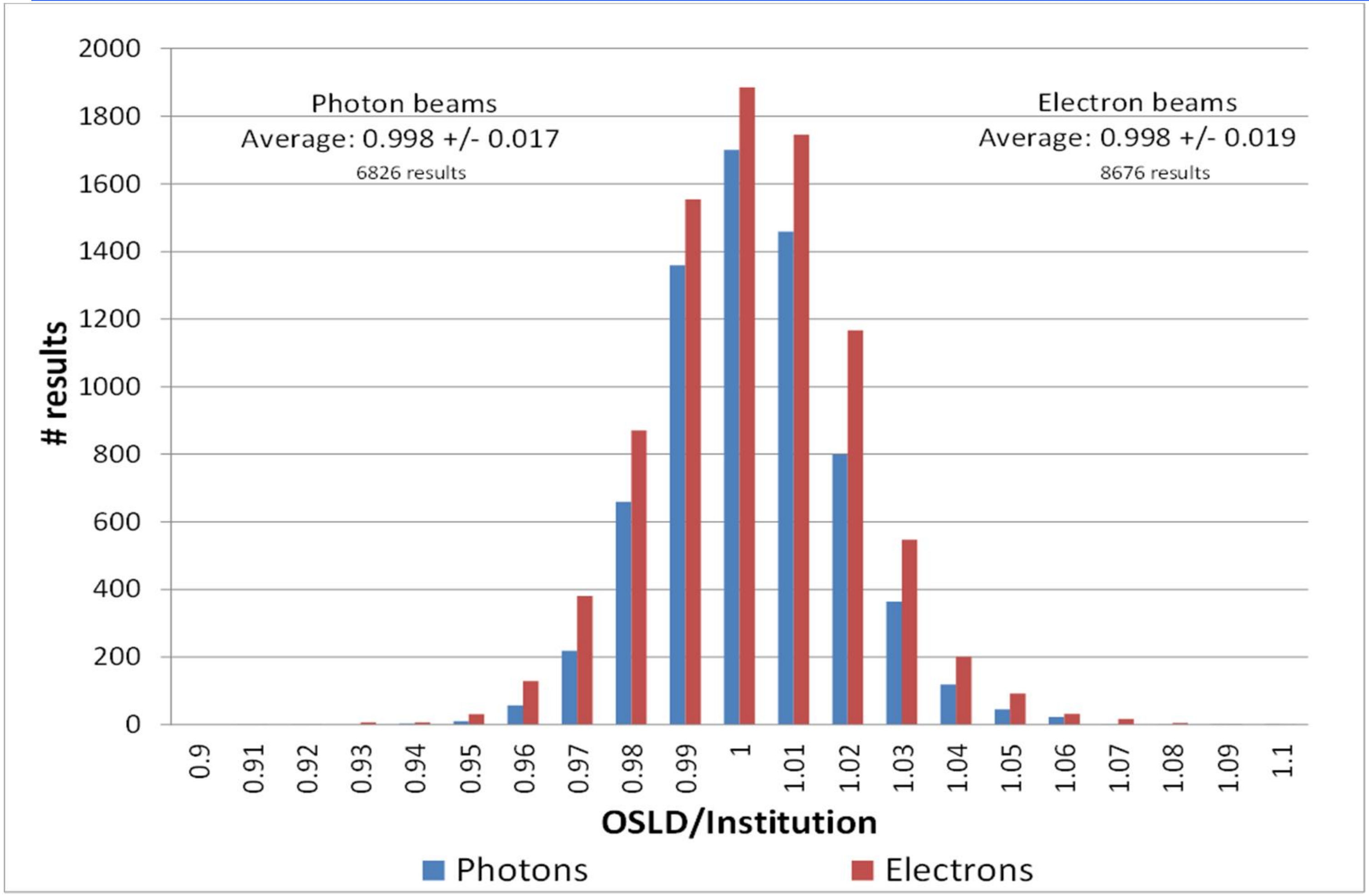
Global (IAEA) machine calibration accuracy



European (France) machine calibration accuracy



US (IROC) machine calibration accuracy

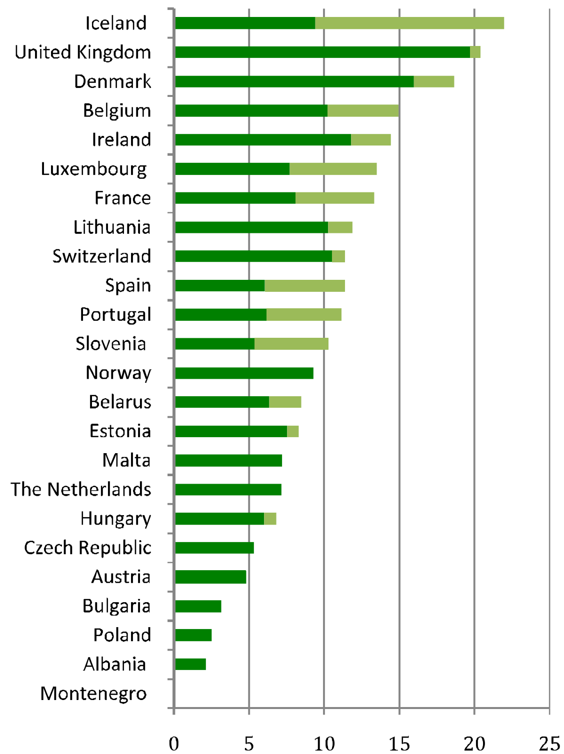


Global Medical Physics staffing

- Data from the DIRAC (IAEA) database – probably an underestimate.
- DIRAC (LMIC)*: 0.6 physicists per 10^6 population

*GNI per capita ≤ $12,745 per annum

European Medical Physics staffing



b. MPs and DOs per million inhabitants
MP: dark green – DO: light green

Radiotherapy and Oncology. 112 (2014) 178-86

U S Medical Physics staffing

- U S population: 320 x 10^6
- AAPM Therapy Physicists: 4200
- 13 Medical Physicists per 10^6 inhabitants

Medical Physics staffing

Å Global (LMIC): 0.6 physicists per 10^6 population

Å Europe: 11 physicists per 10^6 population

Å U S: 13 physicists per 10^6 population

Medical Physics staffing

Å Global (LMIC): 0.6 physicists per 10^6 population

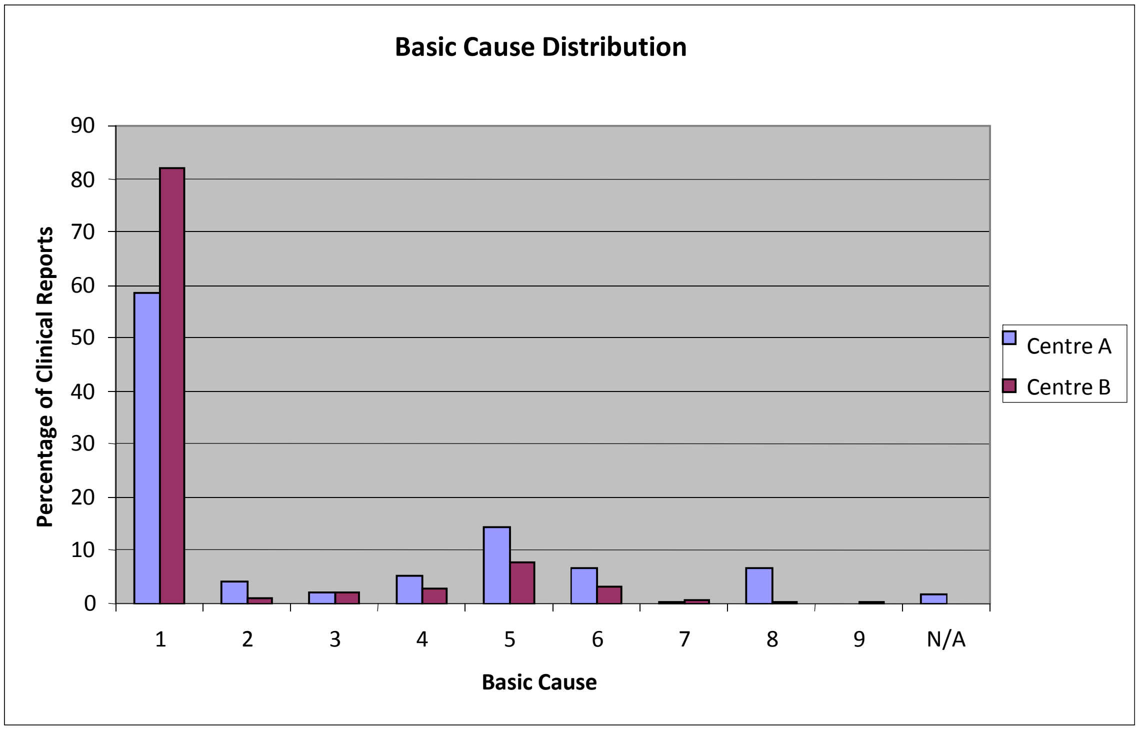
Å Europe: 11 physicists per 10^6 population

Å U S: 13 physicists per 10^6 population

But, quan􀆟ty ≠ quality

Medical Physics: Structure: Documentation

A comparison of the relative frequencies of Basic Causes of Incidents in two centres.



1 Standards/Procedures Practices
2 Materials/Tools/Equipment
3 Design
4 Planning
5 Communication
6 Knowledge/Skill
7 Capabilities
8 Judgment
9 Natural Factors

Medical Physics: Structure: Documentation

Most documented processes from 114 Safety Profile Assessment surveys

Clinical Performance Indicator	**#**
68. Patient identification is verified prior to each treatment.	91
77. Physics chart checks are performed weekly.	87
63. An initial physics plan review is completed consistent with the appropriate guidelines.	82
64 Pre-treatment patient-specific dose verification performed	81
51. Patient identity is verified before simulation.	80
75. Staff maintains visual and audio contact with patients throughout treatment.	80
70. The staff acquires portal imaging and/or isocenter images in accordance with published guidelines.	80
91. A physicist performs a final chart check.	78
76. Physicians routinely review localization images.	76
78. Physicians perform weekly treatment management visits.	77

Medical Physics: Structure: Documentation

Least documented processes from 114 Safety Profile Assessment surveys

Clinical Performance Indicator	#
56. Import of complementary imaging for planning includes verification of patient orientation.	32
47. Curative Intent cases undergo multidisciplinary review to determine treatment options.	32
55. Site and side are verified with a secondary source document at the time of planning.	36
73. The physician treatment directive specifies motion management strategies to be used where appropriate.	37
60. The impact of previous radiation treatments on the current treatment plan is evaluated by both the planner and the physician.	39
57. Electronic transfer of patient information from simulation to planning system is verified for each patient.	39
59. The physician communicates patient-specific planning goals to the treatment planning team.	40
80. Prescription revisions are communicated to the involved team members at time of revision.	44
58. Patient information is verified for all data used for treatment planning.	45
49. The staff adheres to a guideline for managing IV contrast reactions.	46

Medical Physics: Structure

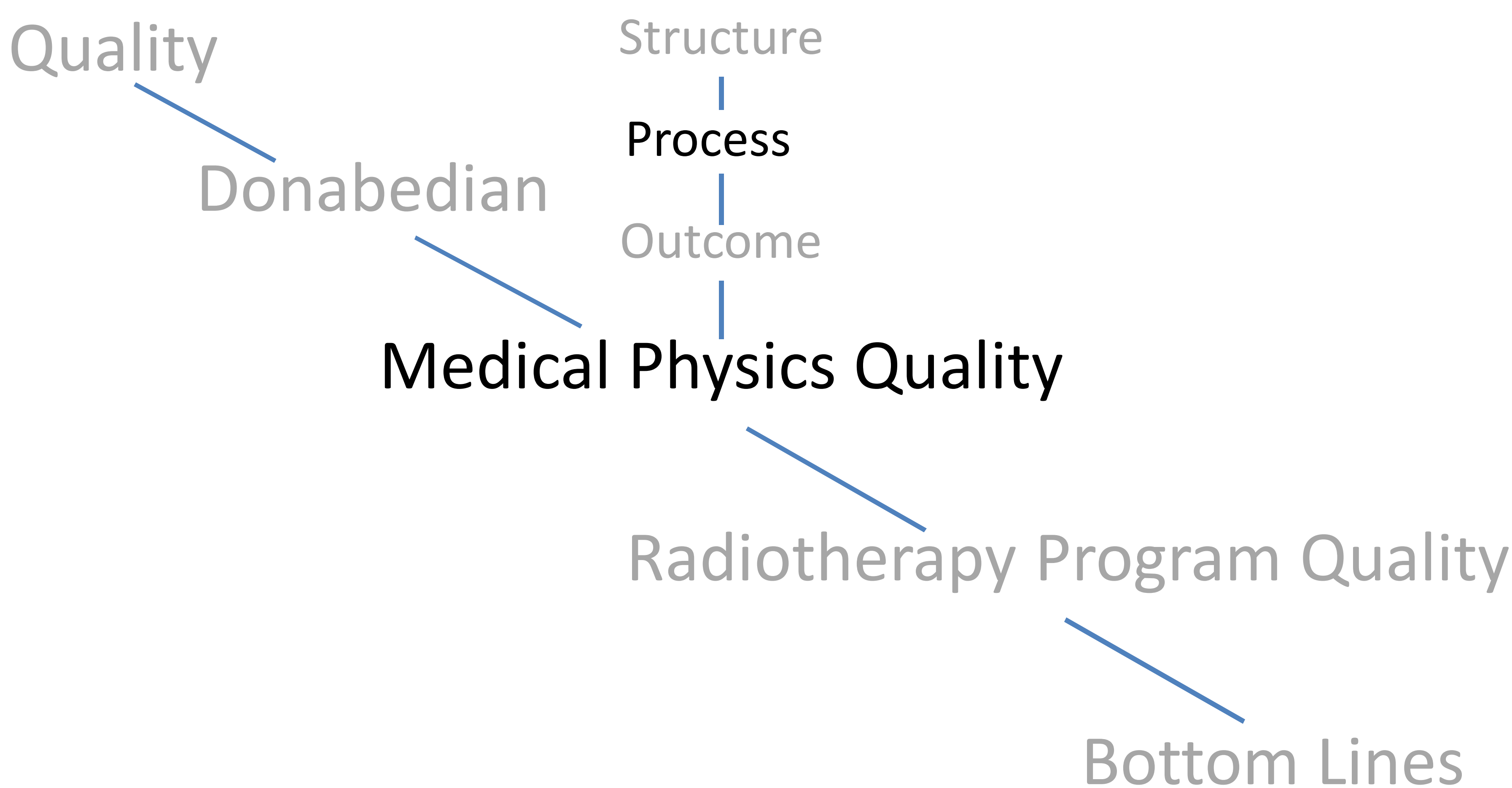
Opportunities for improvement

Å Equipment: More emphasis on machine calibration at commissioning?

Å Staffing: More accessible approaches to training and skill development?

Å Documentation: Boilerplate documents?

Quality in Medical Physics and Beyond



Medical Physics: Process: IMRT

RPC/IROC H & N Phantom Results

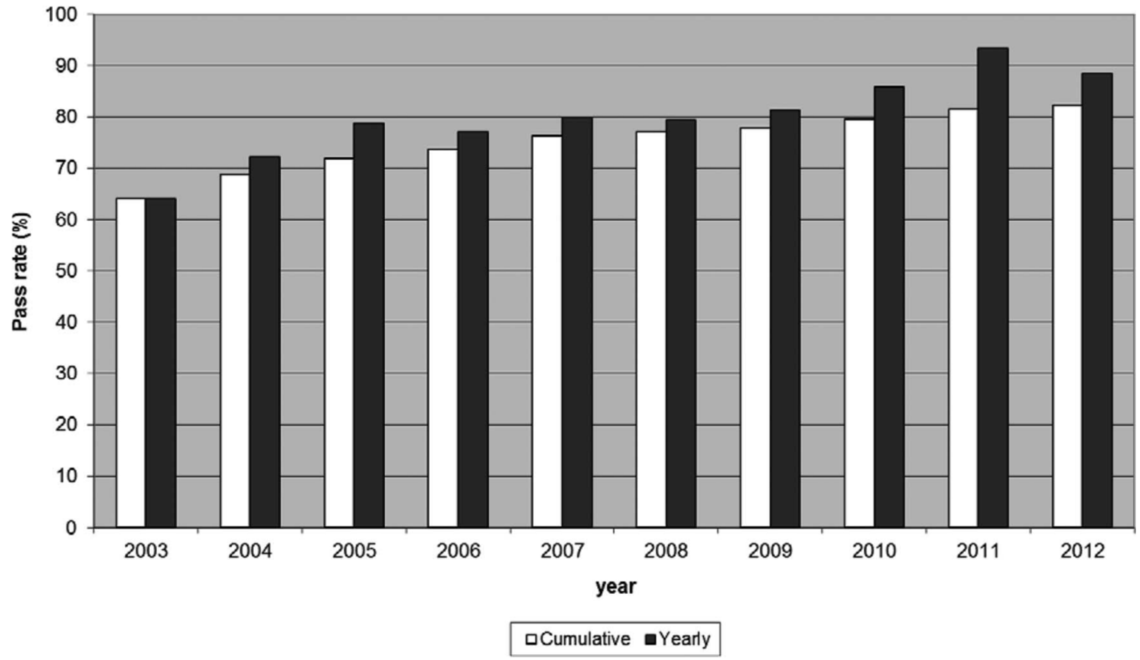


FIG. 2. Cumulative and yearly passing rate over time.

7% and 4mm

Med Phys **40,** 022101 (2013); doi: 10.1118/1.4773309

Medical Physics: Process: IMRT

“The most common acceptance criteria and published actions levels therefore have insufficient, or at least unproven, predictive power for per-patient IMRT QA.”

Per-beam, planar IMRT QA passing rates do not predict clinically relevant patient dose errors

Nelms BE, Zhen H, Tome WA. Med Phys 38 (2011) 1037 – 1044

“The results of this study raise questions on the efficiency of IMRT patient specific checks in detecting important errors for the treatment outcome.”

Relating dosimetric outcome to compliance with patient specific quality control in IMRT

Rangel A, Dunscombe P. Radioth Oncol 99 (Suppl 1) (2011) S512

Medical Physics: Process

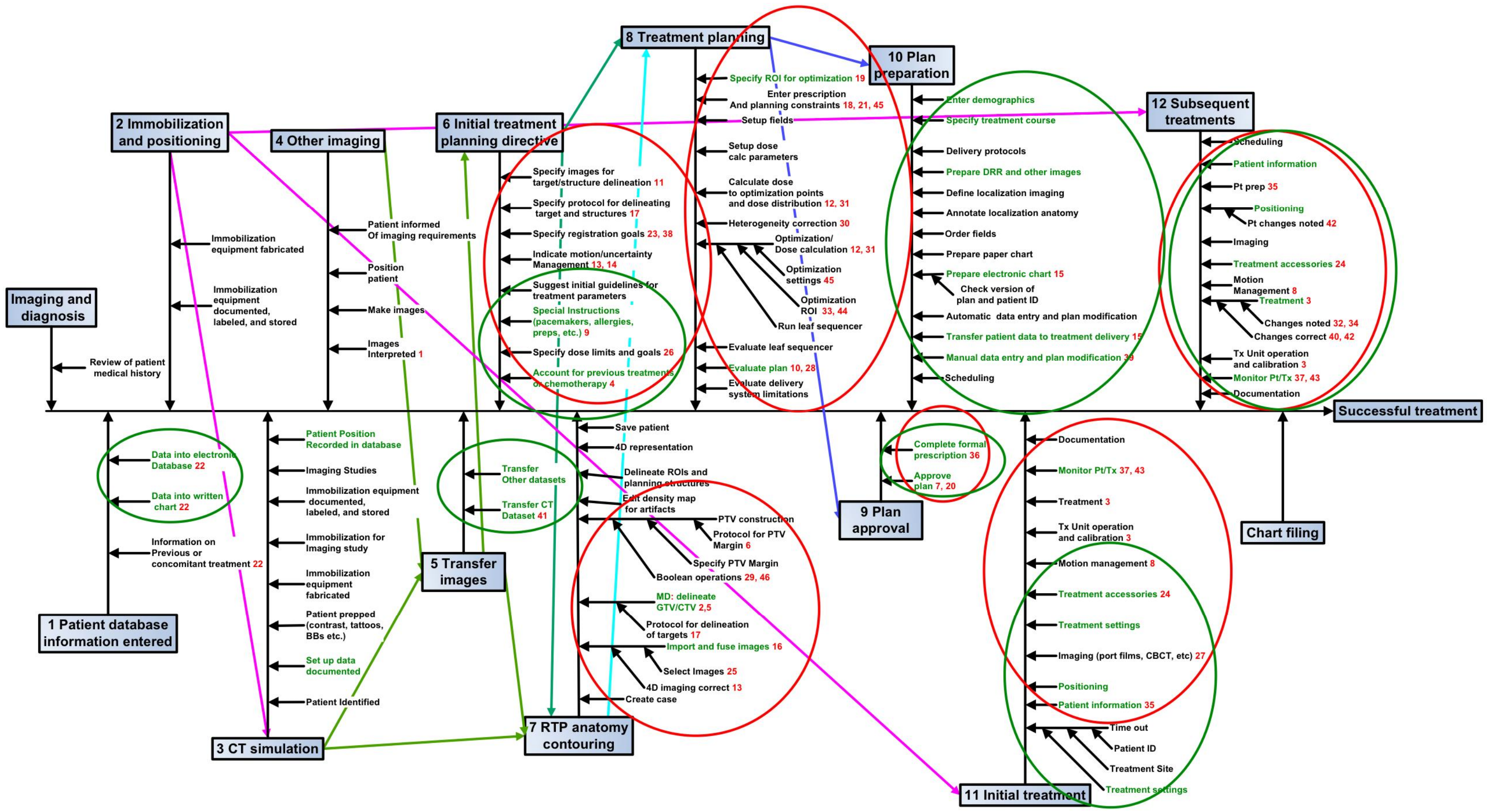
Opportunities for improvement

Å Better understanding of process issues: TG-100

Å Standardization: MPPG, i.TS

Å More research into the connection between outcomes and QA.

Medical Physics: Process: TG 100



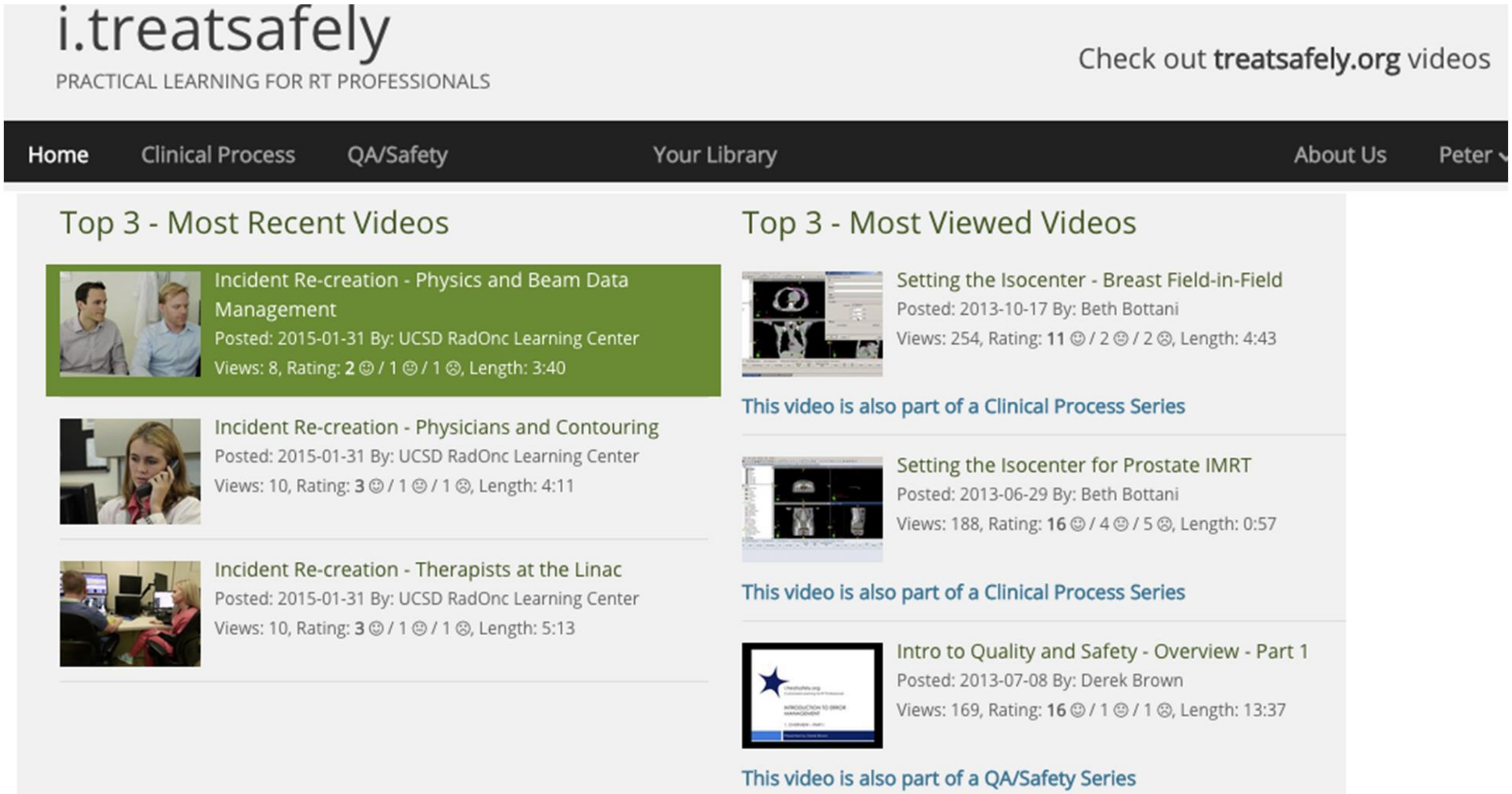
Medical Physics: Process: MPPG

JOURNAL OF APPLIED CLINICAL MEDICAL PHYSICS, VOLUME 15, NUMBER 1, 2014

AAPM Medical Physics Practice Guideline 2.a: Commissioning and quality assurance of X-ray–based image-guided radiotherapy systems

Task Group Authors: Jonas D. Fontenot, Hassaan Alkhatib, Jeffrey A. Garrett, Andrew R Jensen, Steven P. McCullough, Arthur J. Olch, Brent C. Parker, Ching-Chong Jack Yang, Lynne A. Fairobent, AAPM Staff

Medical Physics: Process: i.treatsafely



Quality in Medical Physics and Beyond

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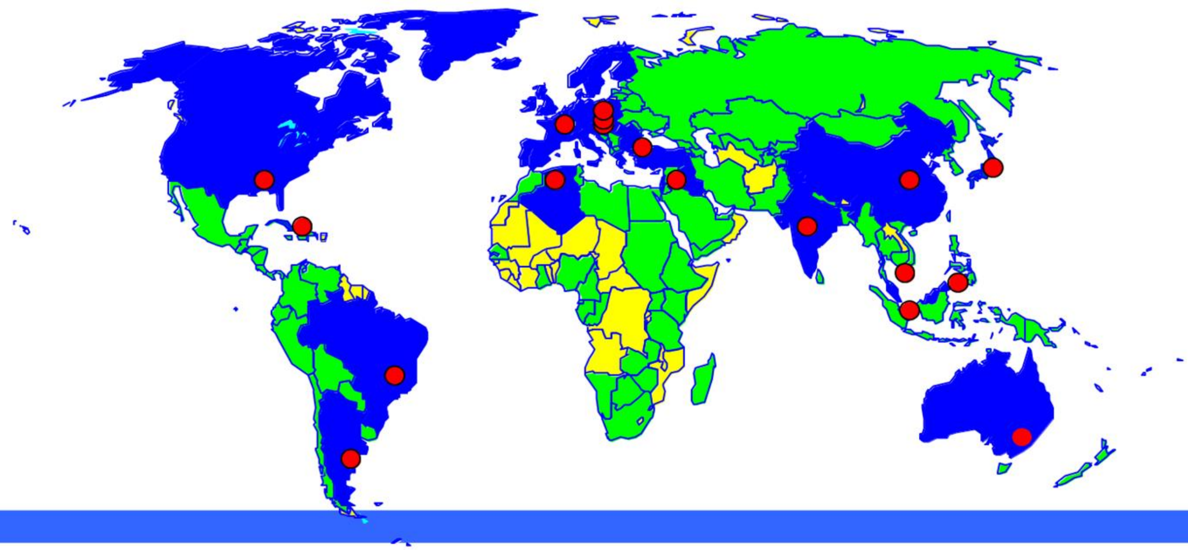
Bottom Lines

Spring Clinical Meeting, March 2015

Medical Physics: Outcome

Since 1969 the IAEA Dosimetry Laboratory has provided dosimetry audits to 2,150 radiotherapy centres in low and middle income countries. This required 11,000 sets of TLDs



Medical Physics: Outcome

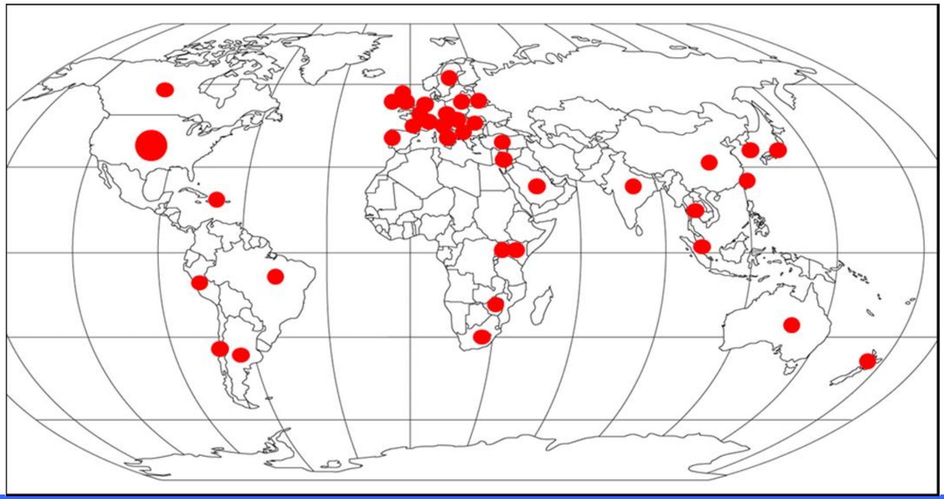
Å IROC Houston worldwide monitoring

ï 3,237 distinct RT sites in database

ï 63% (2,046) monitored beam calibration

Å~14,000 – 15,000 beams annually

ï 33% (1,055) performed IMRT E2E phantom audit



Medical Physics: Outcome

We appreciate that among the about 1000 European centres, 70% at least have external dosimetry audits performed by national or international organisms.

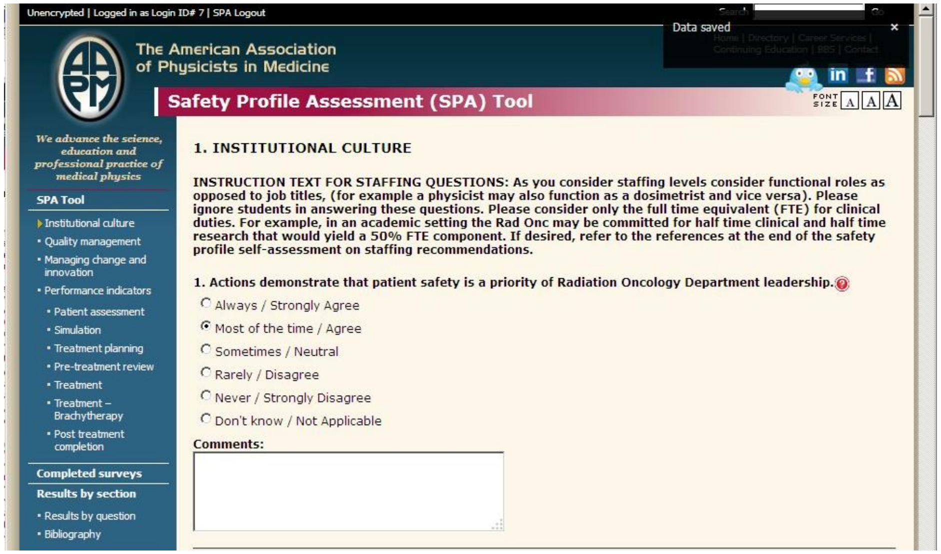
Attila VERES

Equal-Estro

Medical Physics: Outcome

Å An external audit of radiation output is performed annually on all therapeutic beams: 94/114

Å An external audit of radiation output is performed prior to clinical implementation of new treatment delivery equipment: 72/114



1.Strongly Agree | 2. Agree | 3. Neutral | 4. Disagree | 5. Strongly Disagree

Machine Physics: Outcome

- Global: >25% of centers monitored by IAEA
- Europe: 70% of centers monitored.
- U S (per IROC Houston database):
  - 1628 institutions monitored by IROC Houston
  - 793 institutions monitored by RDS

Medical Physics: Outcome

Opportunities for improvement:

Å Greater participation in dosimetry audits, particularly at commissioning?

Å More comprehensive (non-reference conditions) dosimetry audits.

Å Physics peer review.

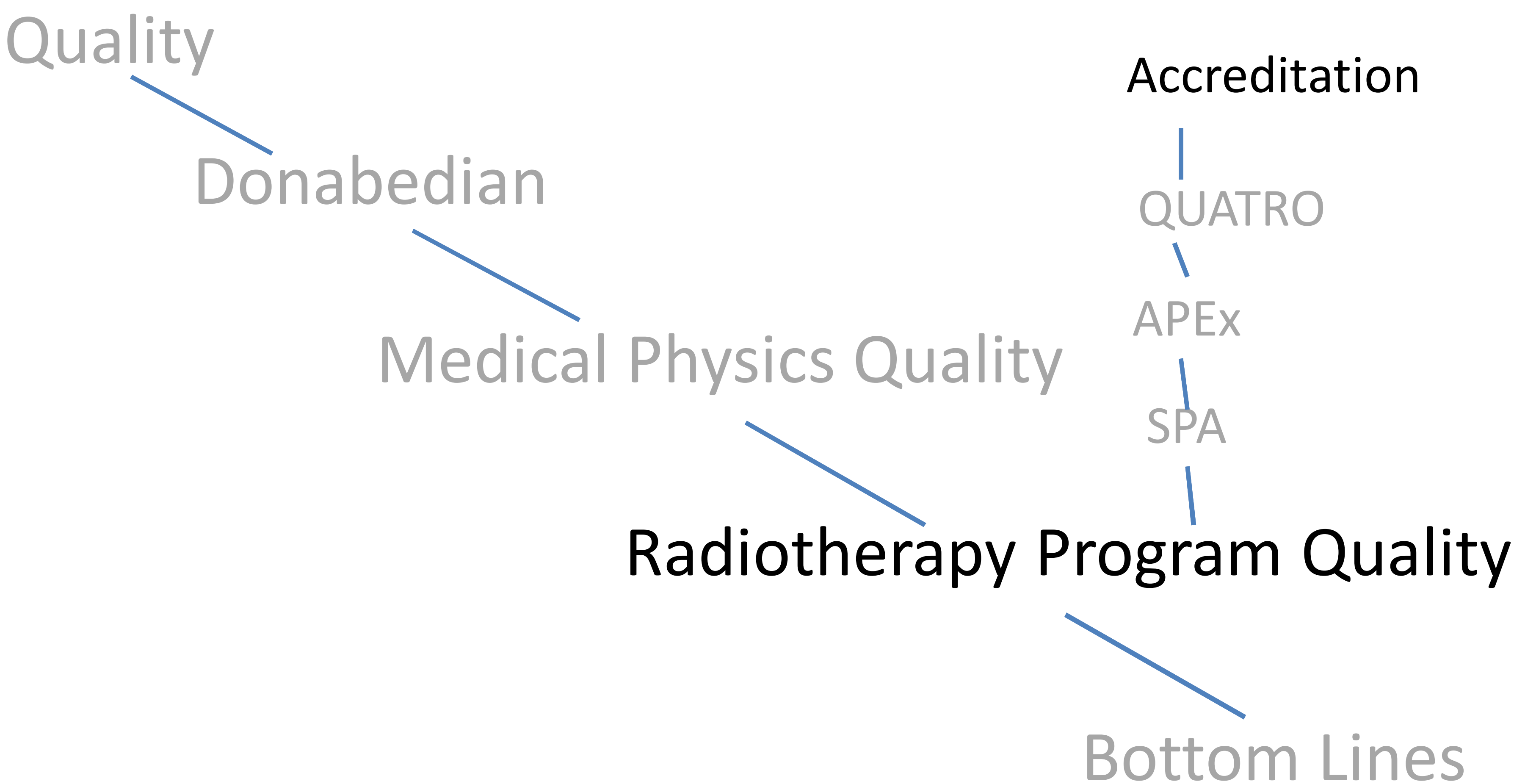
Medical Physics: Outcome

JOURNAL OF APPLIED CLINICAL MEDICAL PHYSICS, VOLUME 6, NUMBER 4, FALL 2005

AAPM Task Group 103 report on peer review in clinical radiation oncology physics

Per H. Halvorsen,[1] Indra J. Das,[2] Martin Fraser,[3] D. Jay Freedman,[4] Robert E. Rice III,[4] Geoffrey S. Ibbott,[5] E. Ishmael Parsai,[6] T. Tydings Robin Jr.,[7] and Bruce R. Thomadsen[8]

Quality in Medical Physics and Beyond



Spring Clinical Meeting, March 2015

Quality standards in radiation medicine

Holly Donaldson MPH [a], Jeffrey Cao MD [b], John French MSc [c], Caitlin Gillan MEd [d,e], Michael Milosevic MD [d,e], Catarina Lam MBA [e], Peter Dunscombe PhD [f,*]

Data Source	Document and Website Link	Country/Region
American College of Radiation Oncology (ACRO)	Radiation Standards Medical Physics (external beam therapy)	United States
American College of Radiology (ACR)	Practice Guideline For Radiation Oncology	United States
Canadian Partnership for Quality Radiotherapy	Quality Assurance Guidance for Canadian Radiation Treatment Programs	Canada
European Commission Guideline on Clinical Audit	European Guidelines on Clinical Audit for Medical Radiological Practices (Diagnostic Radiology, Nuclear Medicine and Radiotherapy)	Europe
IAEA (Quality Assurance Team for Radiation Oncology (QUATRO)	Comprehensive Clinical Audits of Diagnostic Radiology Practices: A Tool for Quality Improvement [1]	International
National Cancer Review Programme Manual for Cancer Services (NCAT)	Manual for Cancer Services 2008: Radiotherapy Measures (Version 2)	United Kingdom
Royal Australian and New Zealand College of Radiologists (RANZCR)	Tripartite Radiation Oncology Practice Standards	Australia, New Zealand

Practical Radiation Oncology 4 (2014) 208=2014

Quality standards in radiation medicine

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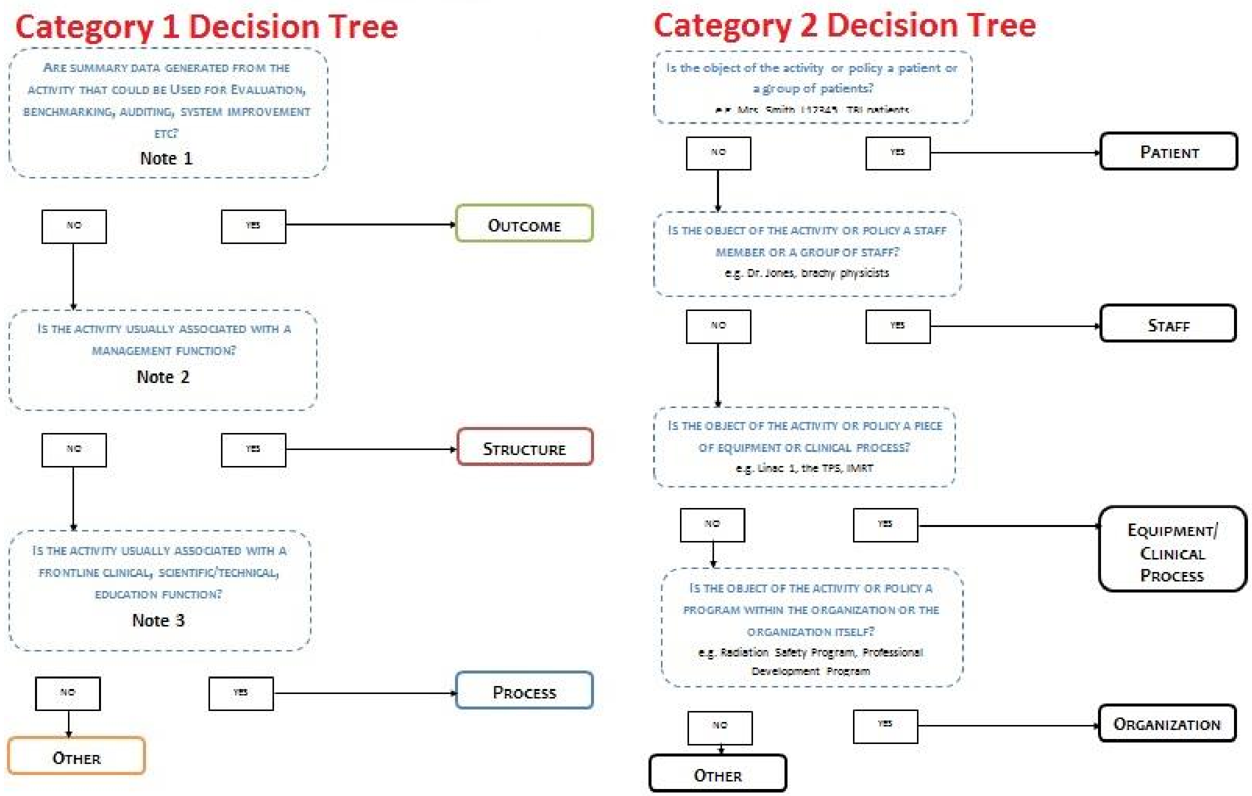


Quality standards in radiation medicine

Holly Donaldson MPH [a], Jeffrey Cao MD [b], John French MSc [c], Caitlin Gillan MEd [d,e], Michael Milosevic MD [d,e], Catarina Lam MBA [e], Peter Dunscombe PhD [f,*]

Å 7 accreditation/auditing protocols

Å 5 evaluators

Å 454 indicators/standards

Structure: 64%

Process: 26%

Outcome: 10%

Practical Radiation Oncology 4 (2014) 208=2014

Quality in Medical Physics and Beyond

Quality

Donabedian

Medical Physics Quality

Radiotherapy Program Quality

Accreditation

QUATRO

APEx

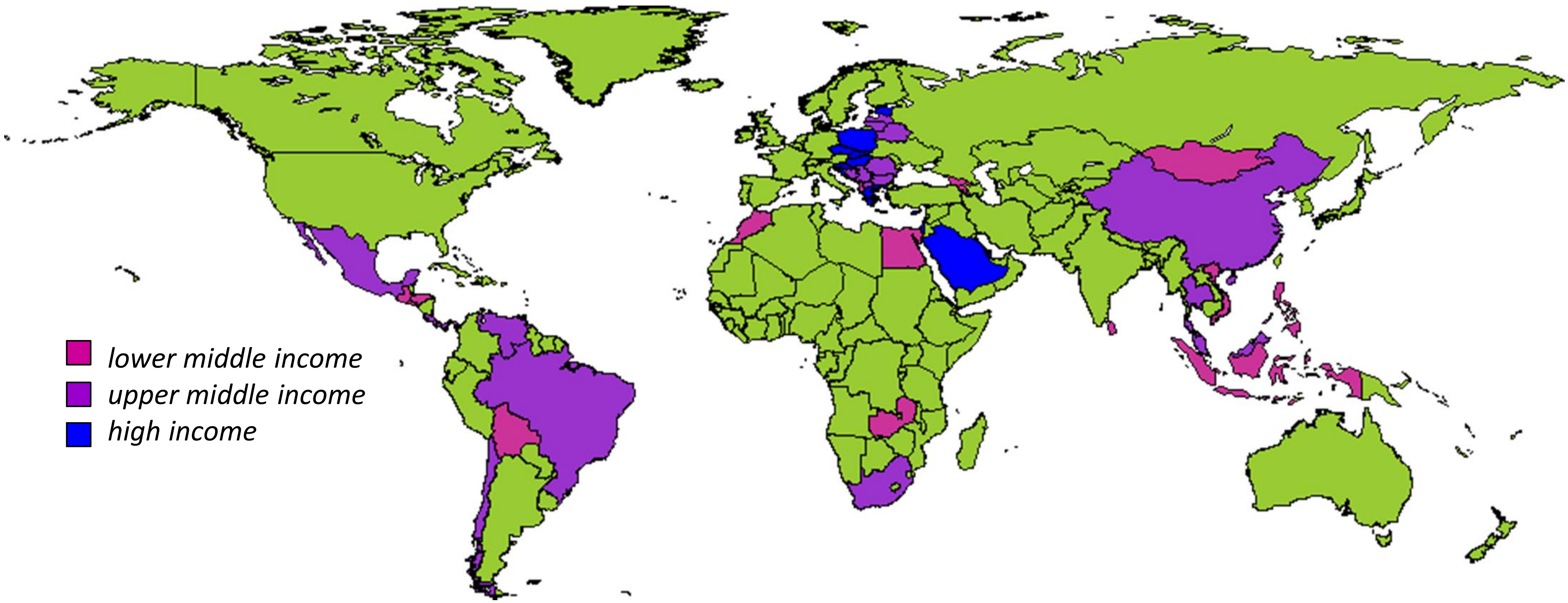
SPA

Bottom Lines

QUATRO audit procedures

- Auditors: RO, MP, RTT
- Typically 5 days per RT centre
- Entrance briefing
- Assessment: tour of facility, staff interviews, review & evaluation of procedures and documentation, measurements, tests, observation of practical work
- Exit briefing: feedback to the department, preliminary recommendations, questions, discussion.

QUATRO missions



Å Training of auditors and regional QUATRO workshops in all regions

Å 70 QUATRO missions to date: Africa – 6; Asia ï 18; Europe ï 30 + 3 re-audits; Latin America ï 13

QUATRO audit procedures

Audit criteria	Adequacy	Comments	Summary
Quality manager roles and responsibilities	☐ ☐ ☐ ☐ Y NI N NA		***Important quality improvement initiatives would be:*** — Recommendation 1; — Recommendation 2; — Etc. ***QUAADRIL guideline references:*** (Cut and paste the pertinent QUAADRIL guidelines into the summary to support the recommendations.)
Quality assurance committee	☐ ☐ ☐ ☐ Y NI N NA		
Quality assurance committee records	☐ ☐ ☐ ☐ Y NI N NA		
Quality management activity coverage	☐ ☐ ☐ ☐ Y NI N NA		
Quality management staff	☐ ☐ ☐ ☐ Y NI N NA		
Quality manual or equivalent	☐ ☐ ☐ ☐ Y NI N NA		
Quality manual review process	☐ ☐ ☐ ☐ Y NI N NA		

QUATRO: selected preliminary results

Å 30 audits – mainly Eastern Europe

Å 742 recommendations (7-83)

Frequent recommendations

Å more or replacement machines

Å education, training, development

Å quality management

Å documentation

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Radiotherapy Program Quality

Bottom Lines

RT Program Quality: APEx

Radiotherapy Program Quality: APEx

RT Program Quality: APEx

Standard 12: Quality Management of Treatment Procedures and Modalities

The radiation oncology practice (ROP) operates a comprehensive quality management program and safe practices for each treatment procedure and modality.

The ROP's comprehensive quality management program for each treatment procedure and modality:

12.1 Is consistent with American Association of Physicists in Medicine (AAPM) or equivalent body standards of practice for:

- **12.1.1 External beam radiation therapy dosimetry, mechanical, safety and respiratory management checks.**
- **12.1.2 Brachytherapy dosimetry, mechanical and safety checks.**
- 12.1.3 Quality assurance of measurement equipment.
- 12.1.4 Acceptance testing, clinical commissioning and clinical release.
- 12.1.5 End to end dosimetric system testing.
- 12.1.6 Simulation dosimetry, mechanical, safety and respiratory management checks.

ACR/ASTRO Audits

At the Miami Meeting, Dr. Tripuraneni reported that

ÅSince 1986 only 240 out of 2000 US Radiation Therapy facilities were accredited.

ÅOnly two States actually require accreditation with a third one thinking about it.

ÅA major cause of failing to satisfy accreditation criteria was inadequate QA on the treatment planning system.

ÅThis system has now been discontinued.

Quality in Medical Physics and Beyond

Quality

Donabedian

Medical Physics Quality

Radiotherapy Program Quality

Bottom Lines

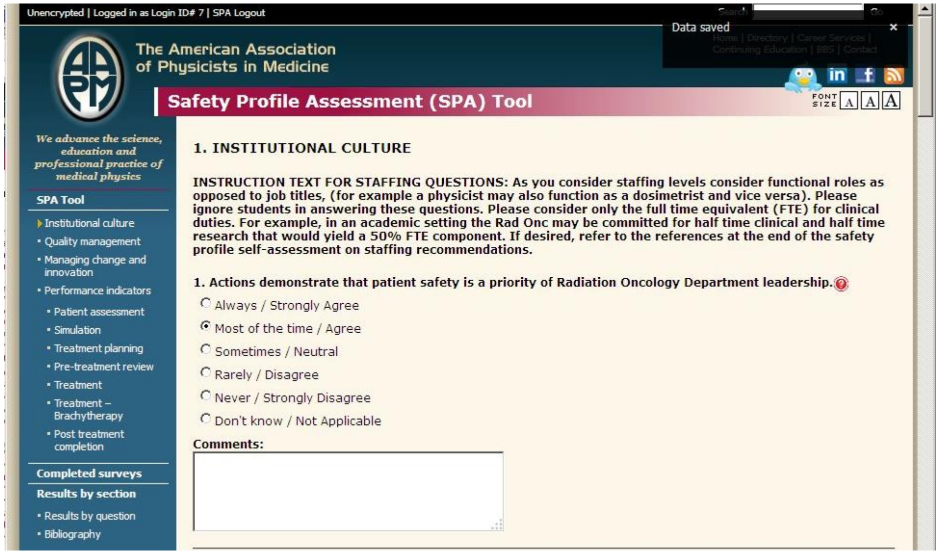
Accreditation

QUATRO

APEx

SPA

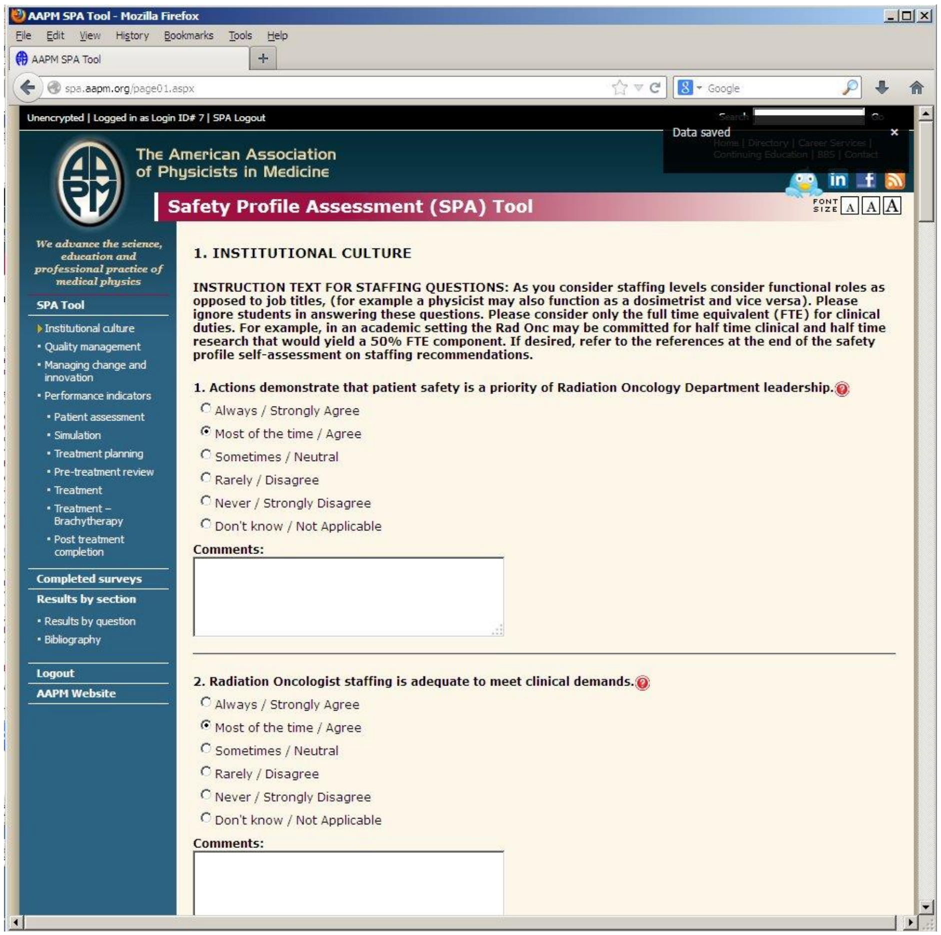
Safety Profile Assessment



SPA is a **S**afety **P**rofile self **A**ssessment Tool developed by the AAPM's Work Group on the Prevention of Errors in Radiation Oncology.

spa.aapm.org

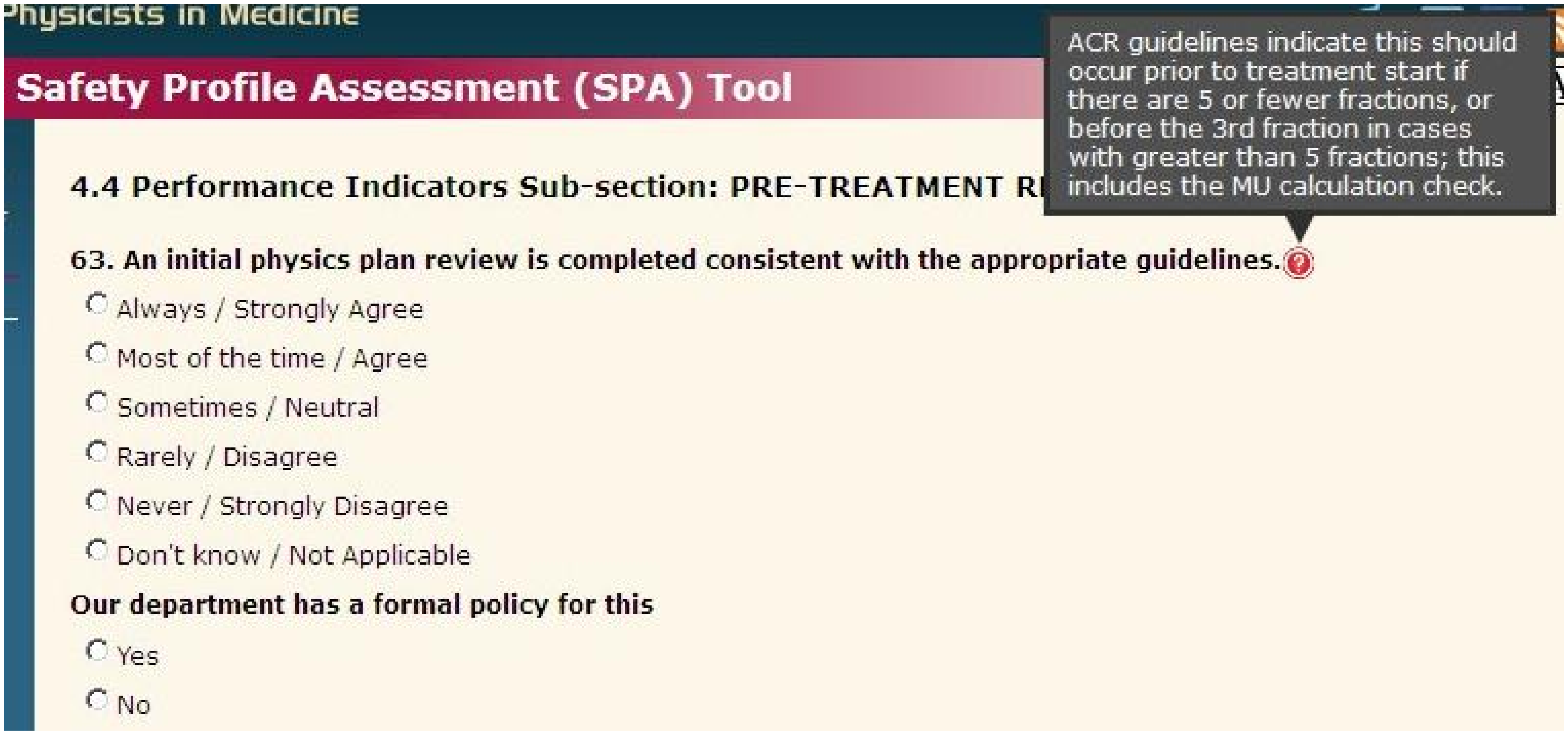
Safety Profile Assessment



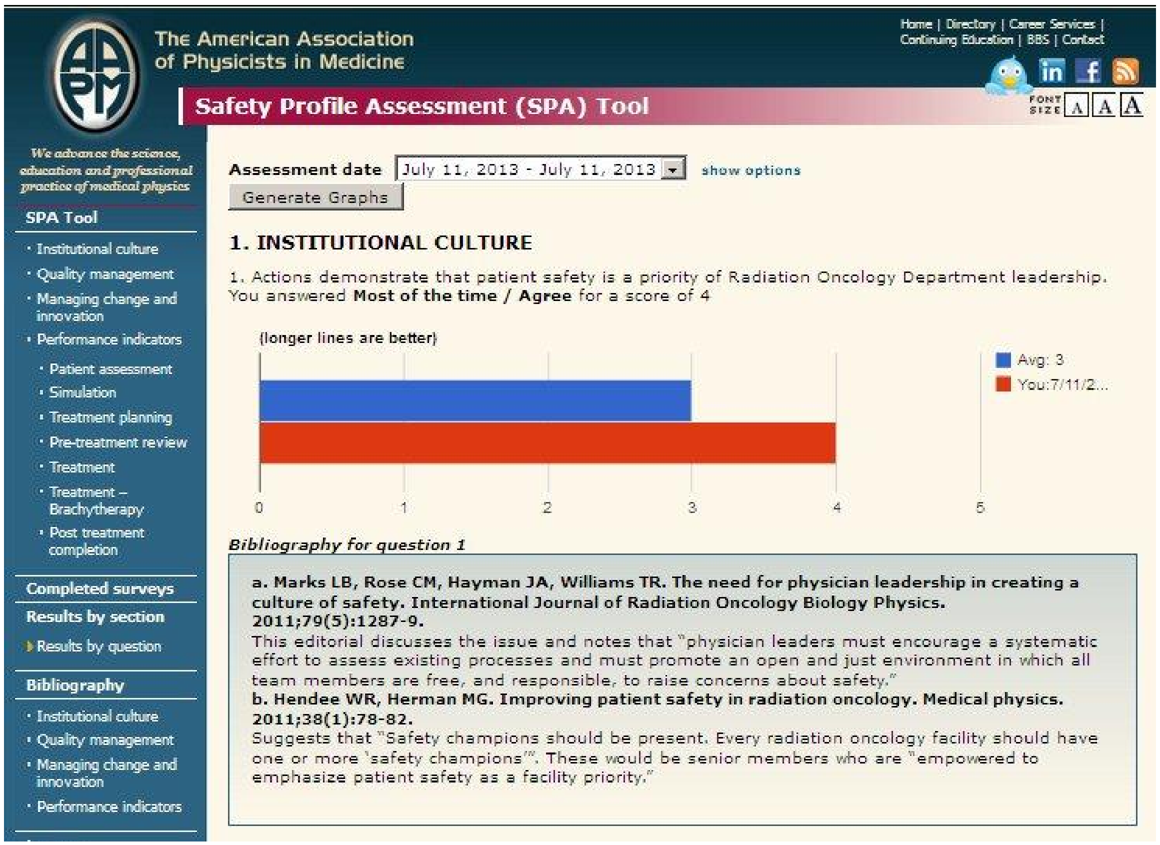
4 topic areas
92 questions

- Institutional culture
- Quality management
- Managing change and innovation
- Performance indicators

Safety Profile Assessment

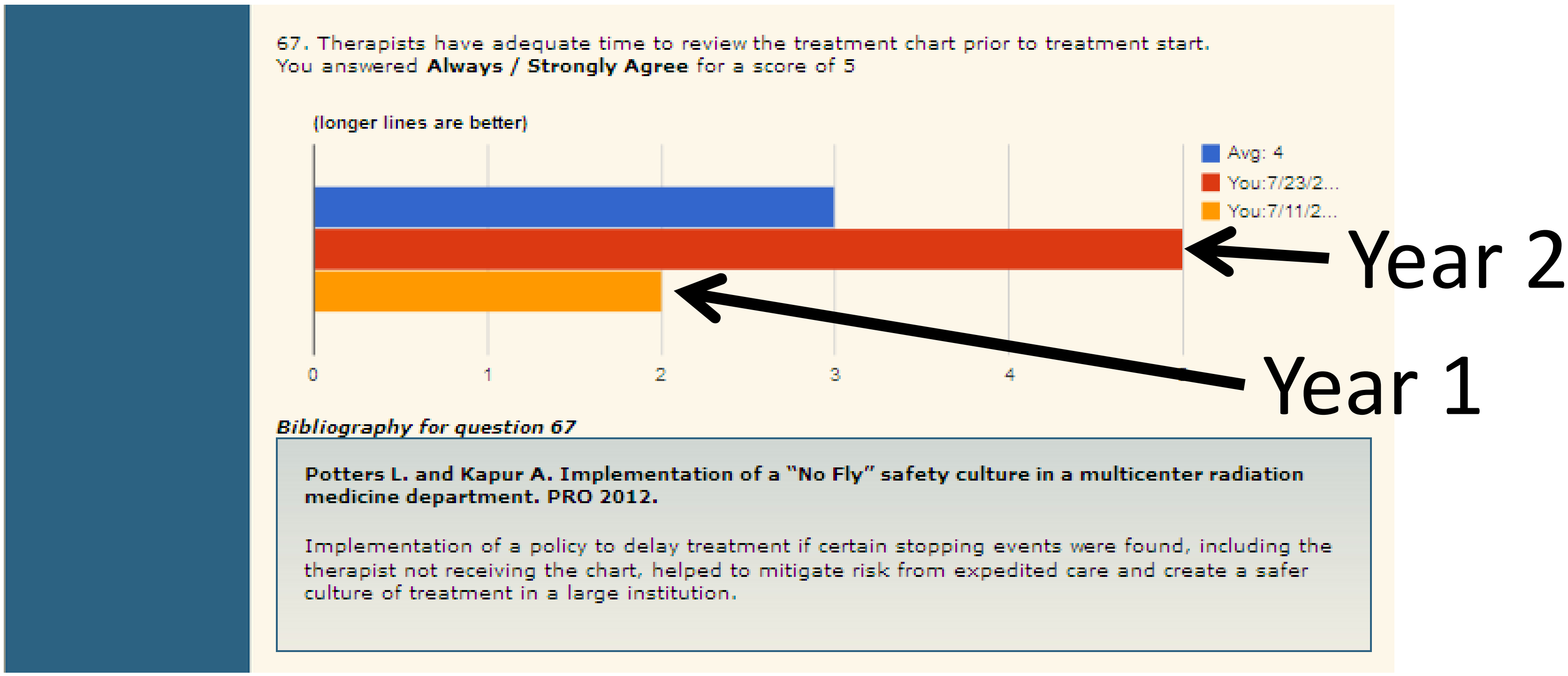


Safety Profile Assessment



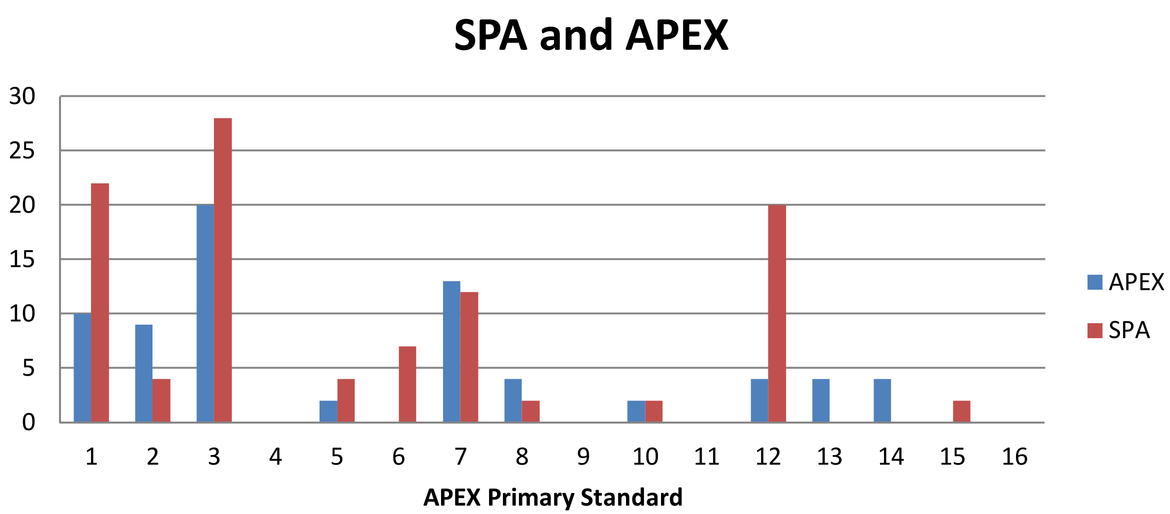
- View results by question
- Compare to others

Safety Profile Assessment



Tracking improvement over time

SPA results



1. Patient evaluation, care coordination, follow-up
2. Treatment planning
3. Patient specific safety interventions
7. Culture of safety
12. Quality management

SPA results

Highest compliance from 114 Safety Profile Assessment surveys

Performance Indicator	AVG	Sec
31. Dosimetry equipment is calibrated every two years by an accredited dosimetry calibration laboratory.	1.03	II
64. Pre-treatment patient-specific dose verification is performed for the following treatment modalities: b. IMRT QA	1.06	IV
85. The Authorized User approves the plan and written directive before treatment. (brachytherapy)	1.11	IV
75. Staff maintains visual and audio contact with patients throughout treatment.	1.12	IV
26. Pre-clinical validations are performed for: a. Treatment delivery systems	1.13	II
83. The source strength is verified prior to clinical use. (brachytherapy)	1.14	IV
86. The location of the source(s) is verified immediately after treatment. (brachytherapy)	1.14	IV
63. An initial physics plan review is completed consistent with the appropriate guidelines.	1.17	IV
77. Physics chart checks are performed weekly.	1.18	IV
51. Patient identity is verified before simulation.	1.19	IV

1.Strongly Agree 2. Agree 3. Neutral 4. Disagree 5. Strongly Disagree

SPA results

98

Lowest compliance from 114 Safety Profile Assessment surveys

Performance Indicator	AVG	Sec
52. A time out is performed at simulation.	2.23	IV
20. Standard operating procedures for safety-critical clinical processes are reviewed regularly.	2.25	II
79. Therapists perform weekly chart checks.	2.27	IV
24. Clinical staff competencies are reviewed regularly.	2.29	II
38. An independent review of commissioning results is performed prior to implementation of new clinical systems and processes.	2.32	III
90. A therapist performs a final chart check.	2.33	IV
39. Potential risks associated with the introduction of new clinical systems and processes are assessed prior to implementation.	2.34	II
65. Physician peer review of new treatment plans occurs within the first week of treatment.	2.43	IV
15. The Radiation Oncology Department formally reviews reports of near-misses.	2.59	I
13. Clinical staff submits written reports of near-miss incidents.	2.72	I

1.Strongly Agree 2. Agree 3. Neutral 4. Disagree 5. Strongly Disagree

Quality in Medical Physics and Beyond

Quality

Donabedian

Medical Physics Quality

Radiotherapy Program Quality

Bottom Lines

Bottom Lines: Structure

✔Nationally, no shortage of machines.

✔Opportunities exist to ensure calibration accuracy.

? Independent validation at commissioning

✔Nationally, no shortage of medical physicists.

✔Opportunities to upgrade education and skills.

? More effort required on documentation (SOPs)

Bottom Lines: Process

✔TG-100 will help focus on process.

✔Medical Physics Practice Guidelines should help standardize processes.

? Less *craftsman* and more *equivalent actor*.

(More emphasis on following SOPs.)

? More research on the relationship between QA/QC and patient outcome.

Bottom Lines: Outcome

✔APEx provides an independent assessment of some dimensions of quality.

✔AAPM's Safety Profile Assessment is an accessible, low resource QI tool.

? More emphasis on physics peer review.

? Medical Physicists need to get more involved in developing and promoting the quality agenda.

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