Supporting the Small Practice: Advice for the Consulting Physicist

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President, Upstate Medical Physics

Objectives

- How to
  - Come up to speed on a wide range of scanner types
  - Leverage your experience from one site to others
  - Build relationships that encourages your client to seek your input on protocols
  - Address protocol problems once you find them, particularly if the site isn't willing to pay for support

Outline

- What is a consultant?
- Scope of the project
- Benefits and Challenges for the Consultant
  - Technical
  - Operational
  - Professional
- Recommendations (Advice)

Who is a consultant?

- 33 year old pregnant (18 weeks) female presents with severe headaches and labored breathing
- ER physician orders CT scans
  - Head
  - Chest (r/o PE)
- OB/GYN consult
- Neurologist consult
- Radiologist consult
- Medical Physics consult

Who is a consultant?

- **Main Entry: con·sul·tant**
- **Pronunciation: \kən-'səl-tənt**
- **Function: *noun***
- **Date: 1697**
- **1 :** one who **consults** another
  2 : one who gives professional advice or services **:** expert

http://www.merriam-webster.com/dictionary/consultant

Who is a consultant?

- According to traditional medical use of the term, “consultant” is not the patient’s primary care provider but has expertise that contributes to patient care
- According to dictionary, we are all consultants
- All medical physicists are “consultants”
- Issues for FTE hospital staff medical physicists may be somewhat different
- FTE Staff Medical Physicists share much in common with “consultants”

Technical Benefits, Challenges

- Diversity of manufacturers and models
  - Use same process as when starting ACR CT support
  - Start with one or two sites and CT scanners
  - Allow extra time to refine the process
    - Consider reduced or no-charge at first
  - Choose receptive site (management, personnel, schedule)
  - Form and lead the **CT Protocol Review Committee**
  - Build your own scanner-specific protocol table
    - Use AAPM “CT Protocols” resources
  - Pilot the project and identify success milestones

Scope of Protocol Review project

- Obtain grassroots support – find an on-site ***Champion***
- Present the case to decision makers
- Lock down all protocols, subject to approval
- Form **"CT Protocol Review Committee"**
  - Radiologist, CT Technologist, Medical Physicist
- Start with Perfusion and Pediatrics
- Review clinical considerations, dose, protocol details
- Generate recommendations (trial solutions)
- Meet monthly and re-evaluate (Doug Pfeiffer)
- Evaluate more protocols
- Document process and results

Sample Protocol Sheets

LOWER EXTREMITY KNEE WITHOUT IV CONTRAST (9.11)
INDICATION: FRACTURE AND OSSEOUS ANATOMY EVALUATION OF KNEE

(BONE SURVEY)	CTDI		
NO IV CONTRAST	QXI	64	16
Series 1: Scout	14 1.5	16 52	13.5

Group 1: Lower extremity KNEE without IV contrast

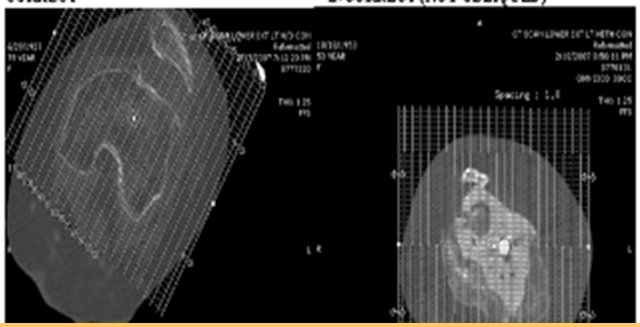
Injection:	None
Scan Delay	None
Scan Method:	Helical, fastest tube rotation time available
Starting Location:	1 cm above patella
Ending Location:	2 cm below the knee joint
Thickness / Speed	1.25 / 39.37
Interval:	0.625 mm
kV	120
Smart mA	Smart mA
Recon Type (Algorithm)	Standard
Noise index	25

Group1 recon 2 sorting Bone 1.25 thickness, interval 0.625

*Note if there is significant metal use knee prosthesis protocol

Use recon 2 for reformatted images with 1.0 mm slice thickness. Sagittal and coronal images should be performed off the axial images. These should be obliqued to the orientation of the distal femur, see below.

CORRECT INCORRECT (NOT OBLIQUED)



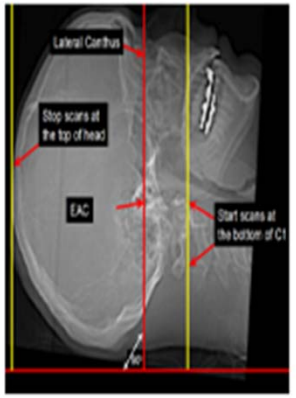
Adult Head: Routine (Helical Mode) (Protocol # 1.1)

Billing:
1. CT Head without, or with, or without and with
2. Contrast if used

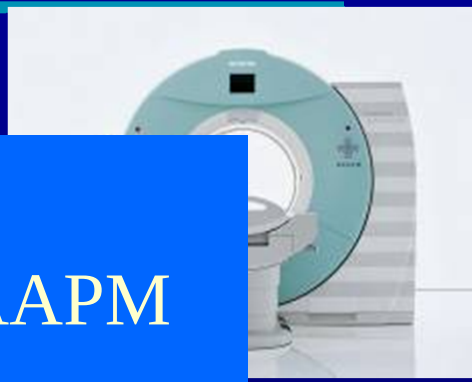
Setup:
1. Supine, AP and lateral scouts, gantry angle
2. Indications for Helical or axial mode
3. Patient Positioning:
4. Scan range (bottom of C1 and scan through the top of the head)

DFOV: Preferred 20 cm (Range 18-22)

Contrast:
1. Specify volume, concentration, type, rate and time
2. Specify when to begin scanning



Diversity of Manufacturers – Models



- Opportunity and challenge
- Start with data from this Summit (AAPM web site)
- Use other web and Mfr resources
- Start your own database – *and grow it!*
  - "At another site with this scanner, we did…"
- Network with other medical physicists

Create a list of "rules of thumb"

- kV
  - 120 kVp for average adults
  - 100 kVp for small adults
  - 80 – 100 kVp for peds
  - 140 kVp for very large adults
- Change kVp to maintain noise
  - If increase from 120 – 140 kVp, reduce mAs by 40%
  - Reduces patient dose by about 20%
  - Increasing 120 – 140 kVp to reduce streaking artifacts (shoulders and hips)

Update these frequently. I know that we will after this Summit!

Adapted from Frank Ranallo, PhD

Create a list of "rules of thumb"

- ImageThickness
  - Thinner slices produce better axial resolution with less partial volume effect
  - Thinner slices require more mAs for equivalent noise
- Image Recon Incrementation
  - For axial, slice incrementation = slice thickness
  - For helical, best z-axis resolution may be achieved at recon interval = ½ thickness

Adapted from Frank Ranallo, PhD

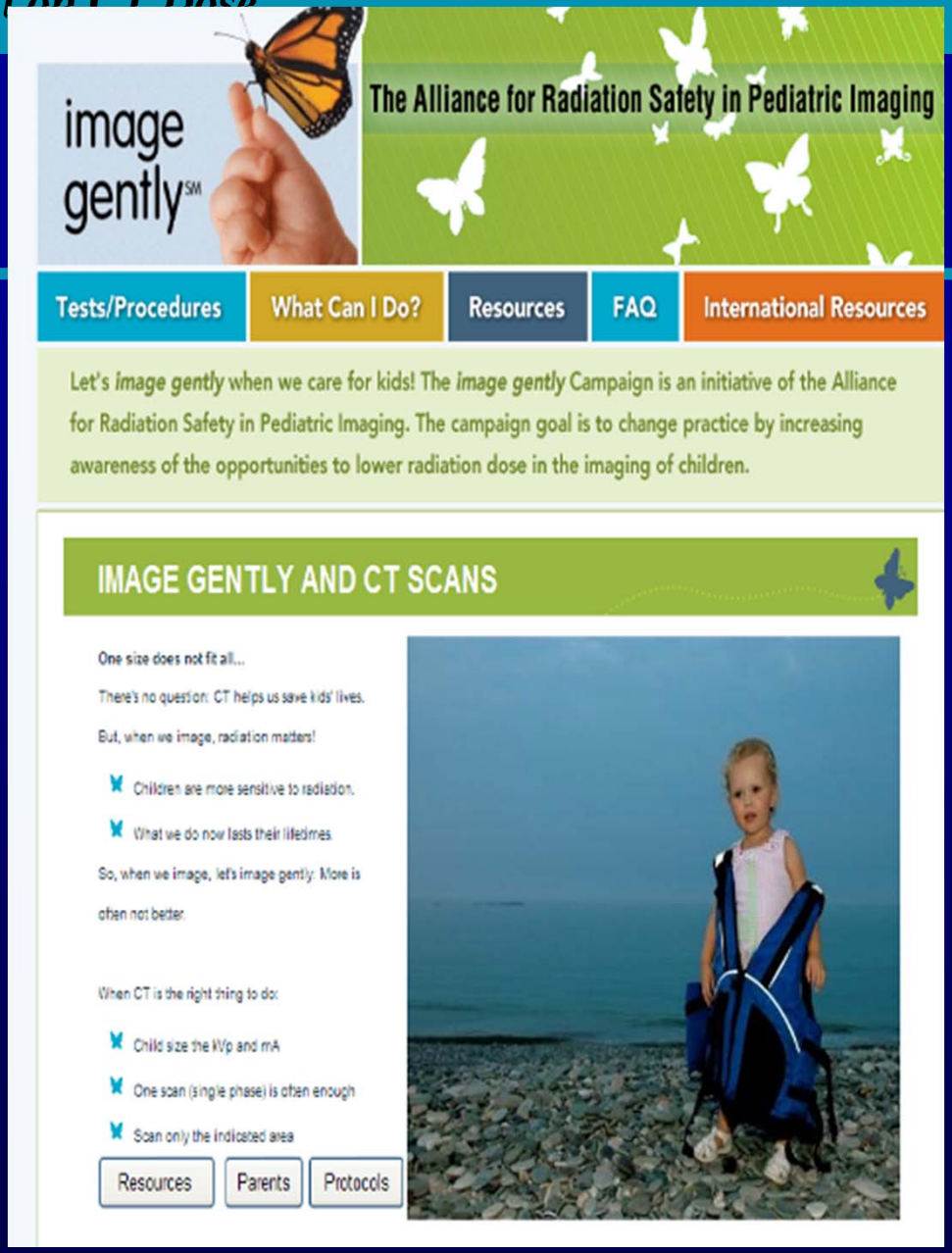
Create a list of "rules of thumb"

- Pitch
  - Pitch <1 improves image quality, less helical artifact
  - Pitch >1 gives faster anatomical coverage (less motion)
  - Motion is important for breath hold, peristalsis, etc.
  - On newer scanners in manual mode, consider
    - lower pitch,
    - adjust rotation time needed for coverage/motion,
    - adjust mA for proper dose
  - Automatic mode, adjust noise index (reference mAs)
    - Increase pitch to reduce scan time
    - Check maximum mA

Adapted from Frank Ranallo, PhD

How do we prepare?

- Study each manufacturer's features, terms, quirks
  - We engaged an experienced CT physicist to consult with us in January 2010
  - You have the benefit of this Summit!
- Improve your understanding of clinical needs
  - We engaged an experienced CT radiologist to consult with us in March 2010
- Use AAPM resources
  - More updates to come….
- Use web based resources



http://www.pedrad.org/associations/5364/ig/index.cfm?page=614

CT - WHAT CAN I DO?

RADIOLOGISTS TECHNOLOGISTS PEDIATRICIANS MEDICAL PHYSICISTS PARENTS

Whatever role you play in caring for children, you can **pledge** to image gently.

- Different members of the imaging team and members of the community play different roles in using the *image gently* philosophy to ensure that CT scans in children are performed in the best way possible.
- Every care setting is unique.

We suggest you read the recommendations for your role below **AND** scan the others to best implement the changes in your practice to child-size the CT scan protocols at your site.

Pediatric radiologists from across the country have volunteered and stand ready to speak to you or your staff.

Contact us.

Protocol Recommendations

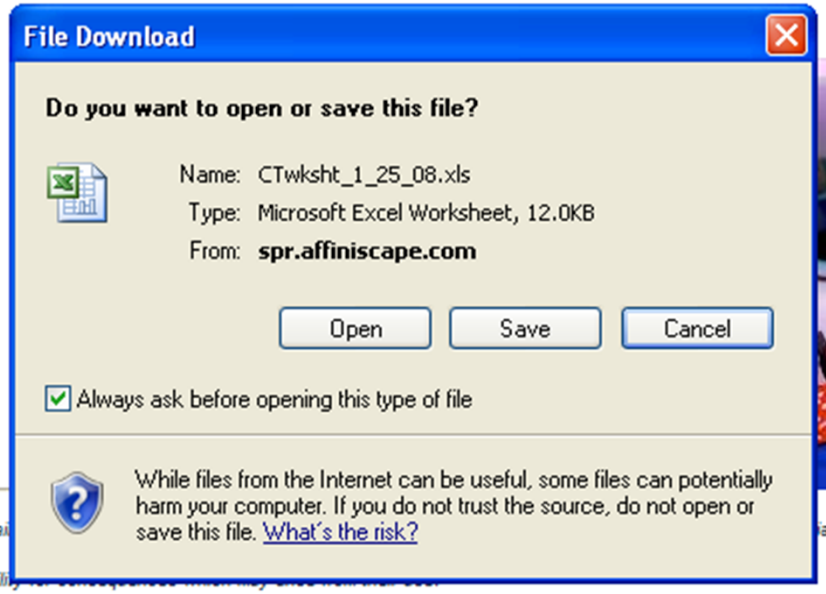
Worksheet

Radiologists

Technologists

Medical Physicists

Parents



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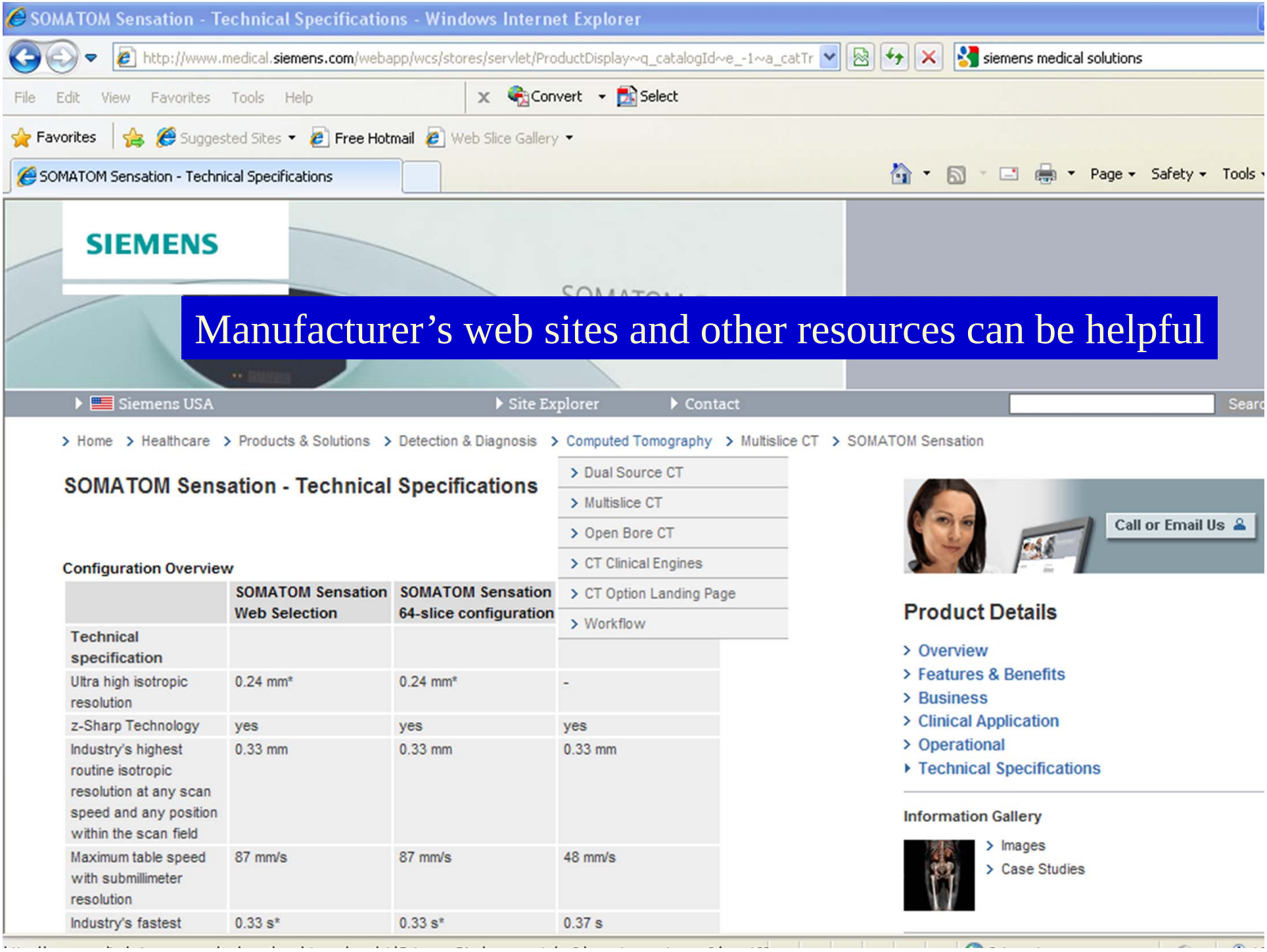
http://spr.affiniscape.com/associations/5364/ig/index.cfm?page=368

Image Gently – mAs Reduction Factors for Peds

	kVp	mA	Time (sec)	Pitch Abdomen	Pitch Thorax
Abdomen Baseline:	120	200	0.5	1	1

		Abdomen		Thorax	
PA Thickness (cm)	Approx Age	mAs Reduction Factor (RF)	Estimated mAs = BL x RF	mAs Reduction Factor (RF)	Estimated mAs = BL x RF
9	newborn	0.31	31	0.29	29
12	1 yr	0.36	36	0.34	34
14	5 yr	0.61	61	0.57	57
16	10 yr	0.71	71	0.63	63
19	15 yr	0.77	77	0.69	69
22	small adult	0.91	91	0.84	84
25	med adult	1.0	100	0.93	93
31	large adult	1.33	133	1.21	121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CT Clinical Engines
CT Option Landing Page
Workflow
Call or Email Us
Configuration Overview
SOMATOM Sensation Web Selection
SOMATOM Sensation 64-slice configuration
Technical specification
Ultra high isotropic resolution
0.24 mm*
0.24 mm*
-
z-Sharp Technology
yes
yes
yes
Industry's highest routine isotropic resolution at any scan speed and any position within the scan field
0.33 mm
0.33 mm
0.33 mm
Maximum table speed with submillimeter resolution
87 mm/s
87 mm/s
48 mm/s
Industry's fastest
0.33 s*
0.33 s*
0.37 s
Product Details
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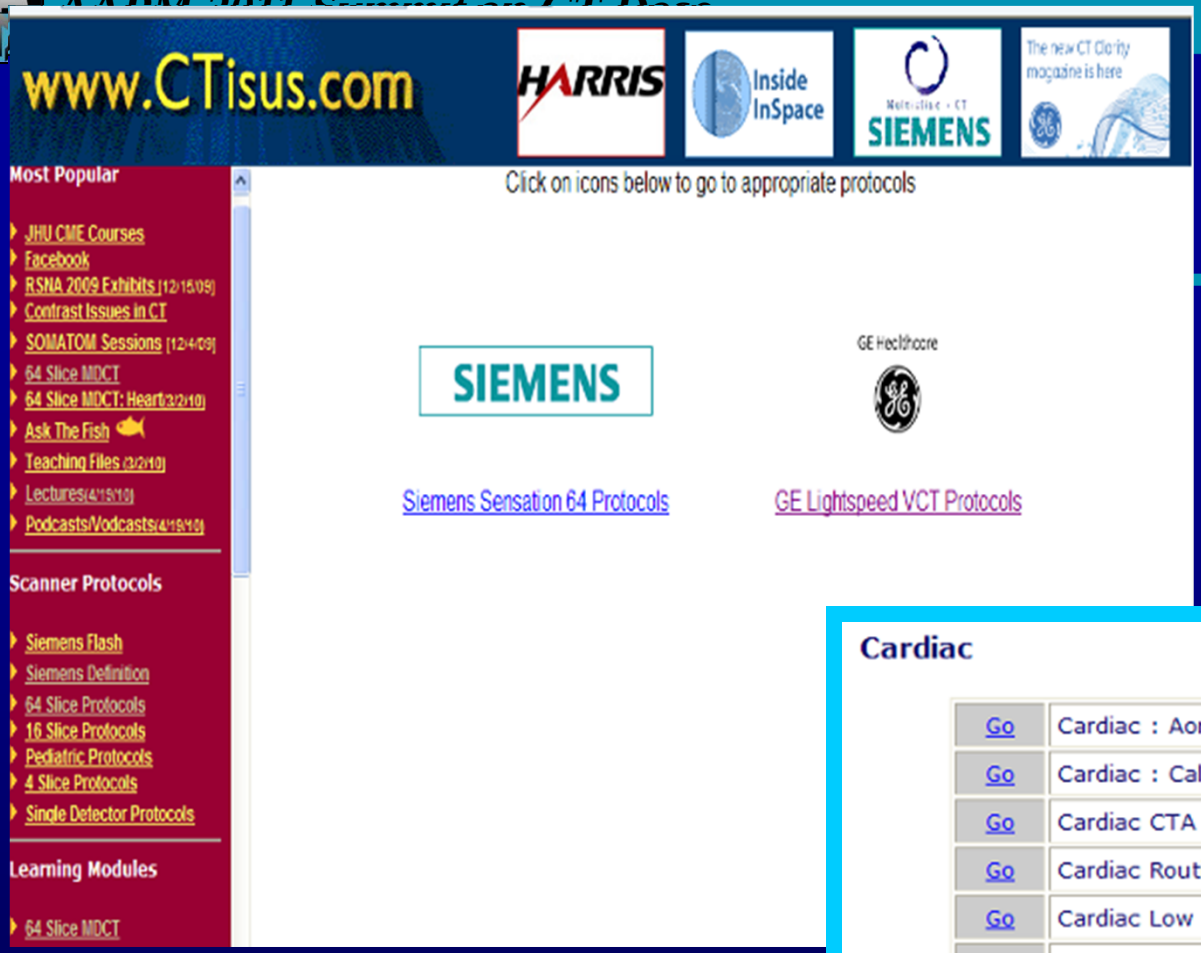
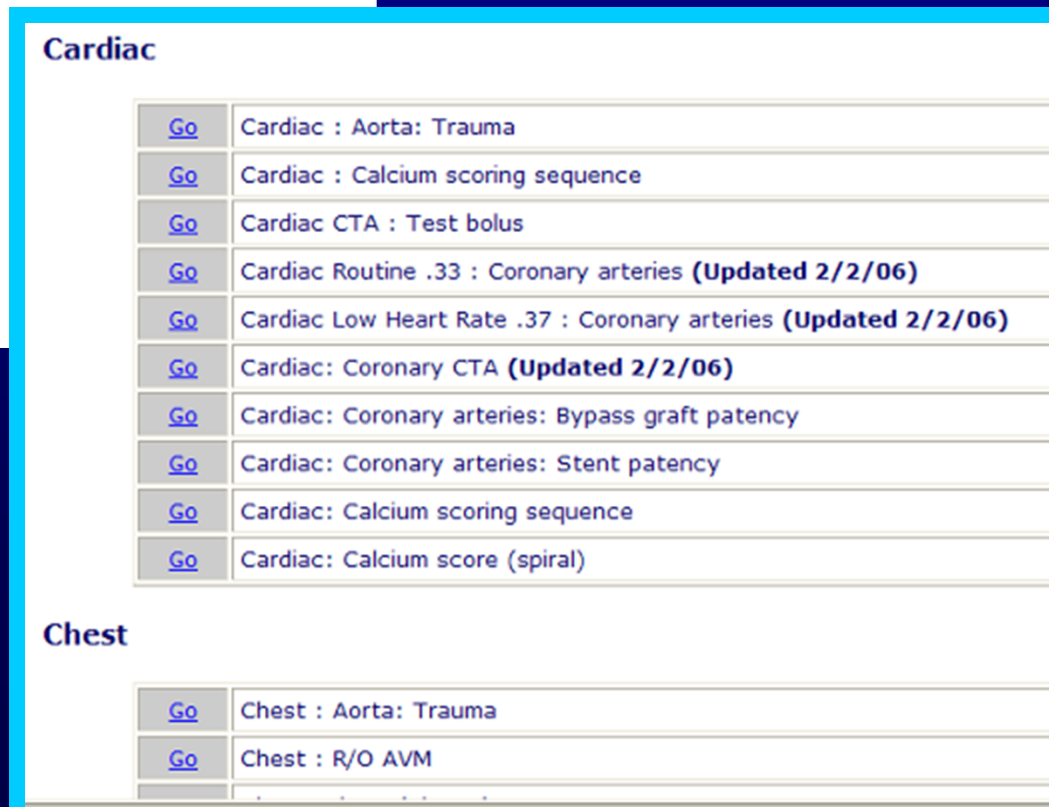




Cardiac

Go	Cardiac : Aorta: Trauma
Go	Cardiac : Calcium scoring sequence
Go	Cardiac CTA : Test bolus
Go	Cardiac Routine .33 : Coronary arteries **(Updated 2/2/06)**
Go	Cardiac Low Heart Rate .37 : Coronary arteries **(Updated 2/2/06)**
Go	Cardiac: Coronary CTA **(Updated 2/2/06)**
Go	Cardiac: Coronary arteries: Bypass graft patency
Go	Cardiac: Coronary arteries: Stent patency
Go	Cardiac: Calcium scoring sequence
Go	Cardiac: Calcium score (spiral)

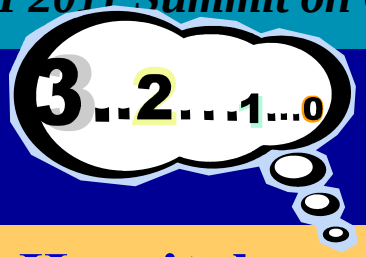
Chest

Go	Chest : Aorta: Trauma
Go	Chest : R/O AVM

http://www.ctisus.com

Operational Benefits, Challenges

- Daunting size of this project
- Requires
  - Significant institutional will
  - Significant resources
  - Significant cooperation
- Could potentially be largest patient benefit
  - From Image quality, Dose and ALARA perspectives
- Process/results useful for
  - Professional development
  - Marketing in a competitive environment (sites and MP)



Do the math – How many protocols are there?

Hospital	Small	Med	Large
	16	16	64
Head	16	16	18
Ear	5	4	8
Soft Tissue	1	4	8
Spine	2	9	10
Ortho (Extrem)	2	2	31
CTA	3	11	15
Cardiac	0	0	6
Chest	7	17	12
Abdomen	13	23	15
Pelvis	2	2	6
Total	44	88	131

Obstacles

- "There is no $ in the (dept operating) budget"
- "CT schedule is full all the time"
- "We will irritate referring MD's"
- "No radiologist is willing to spend the time"
- "All radiologists will never agree to standardization"
- "Technologists are too busy"
- "All protocols are fine" (set by manufacturer)
  - (Ignorance is bliss)
- "No regulatory requirement"

- **Who is a consultant?**
- **Benefits - Challenges**
  - **Technical,**
  - **Operational**
  - **Professional**

Benefits to the medical physicist

- Make a difference
- Professional development
  - Expand our technical and clinical understanding
  - ABR MOC
- Become “essential” and not easily replaced by others without this understanding
- Build relationships with RT’s and Radiologists
- Increased visibility
  - to staff, radiologists, management, administrators
- Create and refine a new MP service “product”

Costs to the medical physicist

- Time, travel (labor intensive project)
  - On-site monthly meetings
  - On-going project
  - Documentation of recommendations
  - Telephone calls as project progresses
- $ (may be difficult to receive optimal compensation)
  - Consider as a partial “loss leader”
    - Professional growth
    - Future new service offering (growth)
- Do we have the staff?
  - Consider residents, physics assistants for data collection (R&F, CR, etc.)
  - Use senior CT experienced physicists and residents for this project

Building Relationships

- Need to sell the concept of CT protocol review - Champion
- Natural progression from ESE and ESER (R&F)
- RSO or Supervising Radiologist (TJC) is responsible for patient doses
- State regulations may soon specify CT Dose Review
- Medical physicist must commit to, and truly be
  - Available for consultation
  - Knowledgeable (technically, clinically) or willing to learn
  - Willing to participate as a team member
  - Invest the ongoing effort to make this work
  - Step beyond the "testing" comfort zone and truly "consult"
    - Recall experience with mammography technique charts

Motivations for Radiologist

- Patient Care (General)
- Useful when answering questions (specific patient)
  - "We have reviewed all of our protocols …."
- ABR MOC
- Risk Management
- Communication with referring physicians
  - Marketing: "We are doing this new project…"
- TJC Sentinel Alert

TJC Sentinel Alert

The Joint Commission
Sentinel Event Alert

A complimentary publication of The Joint Commission

Issue 47, August 24, 2011

Published for Joint Commission accredited organizations and interested health care professionals, *Sentinel Event Alert* identifies specific types of sentinel events, describes their common underlying causes, and suggests steps to prevent occurrences in the future.

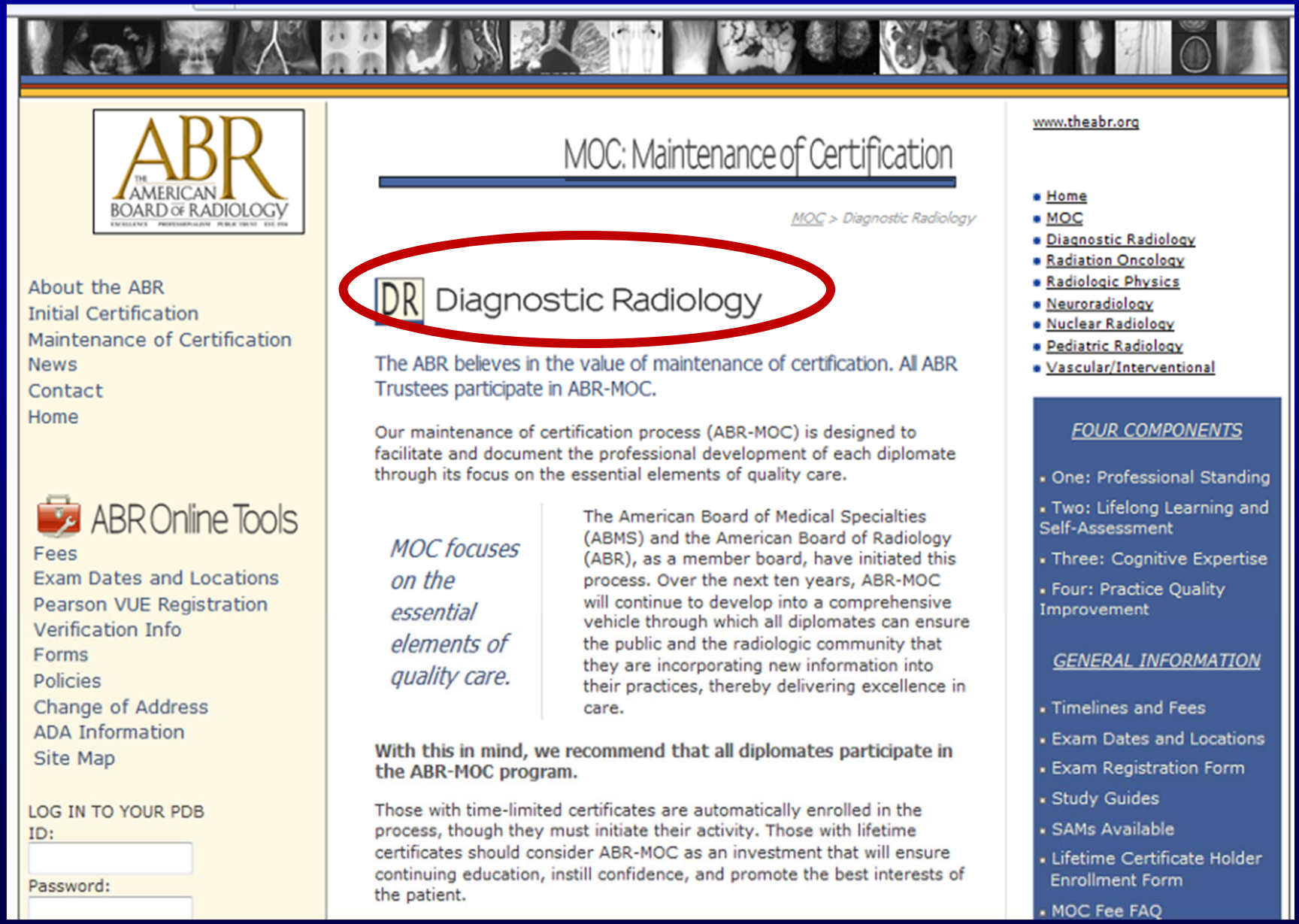
Accredited organizations should consider information in an Alert when designing or

Radiation risks of diagnostic imaging

Diagnostic radiation is an effective tool that can save lives. The higher the dose of radiation delivered at any one time, however, the greater the risk for long-term damage. If a patient receives repeated doses, harm can also occur as the cumulative effect of those multiple doses over time.[1,2,3] Conversely, using insufficient radiation may increase the risk of misdiagnosis, delayed treatment, or, if the initial test is inadequate, repeat testing with the attendant exposure to even more radiation.[4] The risks associated with the use of ionizing radiation in diagnostic imaging include cancer, burns and other injuries.[1,5,6,7] X-rays are officially classified as a carcinogen by the World Health Organization's International Agency for Research on Cancer, the Agency for Toxic Substances and Disease Registry of the Centers for Disease Control and Prevention, and the National Institute of Environmental Health Sciences.[1]

"Right Dose"

- 6. Radiologists should assure that the proper dosing (sic) protocol is in place for the patient being treated.
- 7. Institute a process for the review of all dosing (sic) protocols either annually or every two years to ensure that protocols adhere to the latest evidence.



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MOC: Maintenance of Certification

MOC > Diagnostic Radiology

DR Diagnostic Radiology

The ABR believes in the value of maintenance of certification. All ABR Trustees participate in ABR-MOC.

Our maintenance of certification process (ABR-MOC) is designed to facilitate and document the professional development of each diplomate through its focus on the essential elements of quality care.

MOC focuses on the essential elements of quality care.

The American Board of Medical Specialties (ABMS) and the American Board of Radiology (ABR), as a member board, have initiated this process. Over the next ten years, ABR-MOC will continue to develop into a comprehensive vehicle through which all diplomates can ensure the public and the radiologic community that they are incorporating new information into their practices, thereby delivering excellence in care.

With this in mind, we recommend that all diplomates participate in the ABR-MOC program.

Those with time-limited certificates are automatically enrolled in the process, though they must initiate their activity. Those with lifetime certificates should consider ABR-MOC as an investment that will ensure continuing education, instill confidence, and promote the best interests of the patient.

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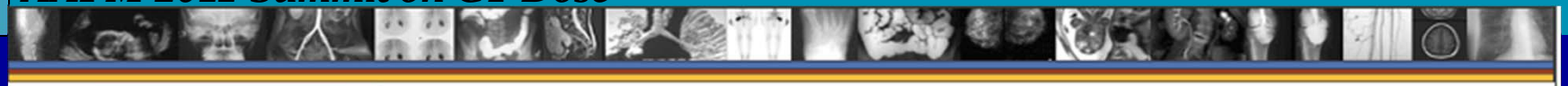
- Neuroradiology
- Nuclear Radiology
- Pediatric Radiology
- Vascular/Interventional

FOUR COMPONENTS

- One: Professional Standing
- Two: Lifelong Learning and Self-Assessment
- Three: Cognitive Expertise
- Four: Practice Quality Improvement

GENERAL INFORMATION

- Timelines and Fees
- Exam Dates and Locations
- Exam Registration Form
- Study Guides
- SAMs Available
- Lifetime Certificate Holder Enrollment Form
- MOC Fee FAQ



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MOC: Maintenance of Certification

MOC > Radiologic Physics > PQI > Diagnostic Guidelines

RP Radiologic Physics

PQI Guidelines: Diagnostic Radiologic Physics

Project Examples

- 1. Category: Safety for Patients, Employees and the Public
- 2. Category: Safety for Patients, Employees and the Public
- 3. Category: Practice Guidelines and Standards

These examples address some of the many possibilities for individual PQI projects. Other PQI options are available including participation in a peer review of a self-assessment report or activity within a qualified national project sponsored by a society.

1. Category: Safety for Patients, Employees and the Public
Project: Monitoring of Dose Indices for Lumbar Spine Radiography

BACKGROUND:
With Computed Radiography (CR) it is quite likely that patient exposures will increase since there are little imaging consequences of overexposure. In addition, the monitoring of this process is more difficult as there are no "waste films."

OBJECTIVE:
To establish a program to monitor exposure indicators and assure that they are as low as reasonably achievable.

PROGRAM:
The Dose Index parameters will be monitored for all Lumbar Spine Radiographs. These will be tracked and reviewed with the Supervisor and overseeing Radiologist.

PROCEDURES:

- Metrics

1. Develop software to extract Dose Indices from DICOM Headers
2. Using archived examinations, establish the mean and standard deviation for these indices over the last two years

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FOUR COMPONENTS

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- One: Professional Standing
- Two: Lifelong Learning and Self-Assessment
- Three: Cognitive Expertise
- Four: Practice Quality Improvement
  - President's Message
  - PQI Reading
  - PQIs Available
  - Diagnostic Guidelines
  - Therapy Guidelines
  - Nuclear Guidelines

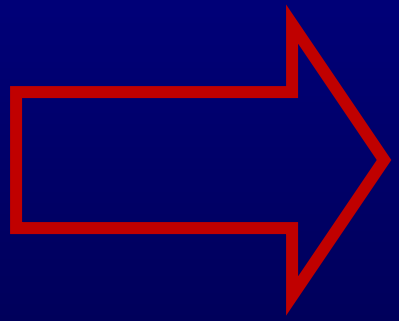
ADDITIONAL INFORMATION

- Timelines and Fees
- Exam Dates and Locations
- MOC Policies
- SAMs Available
- PQI Reading Resources

PQI Physics Guidelines

- Diagnostic
- Therapeutic
- Nuclear

PQI:
Practice Quality Improvement



MOC: Maintenance of Certification

MOC > Diagnostic Radiology > PQI > PQI Guidelines

DR Diagnostic Radiology

Guidelines for PQI Projects

Projects in five project areas listed below could be designed by individual radiologists, radiology practice groups or departments, institutions, healthcare systems, or by professional societies. Every radiologist participating may receive PQI credit for the project. (Some projects may offer CME credit as well, through the normal CME approval process.) Because the key competencies to be addressed through PQI projects include systems-based practice, practice-based learning and improvement, and interpersonal/communication skills, it is strongly encouraged that others involved in the provision of care to radiology patients be incorporated into the project team.

Projects selected to meet the practice quality improvement (Part IV) requirement of the ABR's Maintenance of Certification (MOC) program should:

- Be relevant to your practice
- Be achievable in your practice setting
- Produce results that are suited to repeat measurement during your MOC cycle
- Be reasonably expected to bring about quality improvement

PQI Projects broadly conform to the following template. The appropriate steps within a PQI Project are:

1. Select a topic area in which you would like to see your practice improve, and within it, decide on a challenge that is relevant to your practice
2. Decide what specifically you will measure to assess current performance and future improvement, and create a data collection form to record the measurements (if one does not already exist)
3. Make a baseline measurement in an appropriate number of cases drawn in an unbiased manner
4. Analyze results
5. Identify the potential root causes of error or suboptimal performance
6. Develop a written improvement plan

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  - PQI Reading Resources
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  - President's Message

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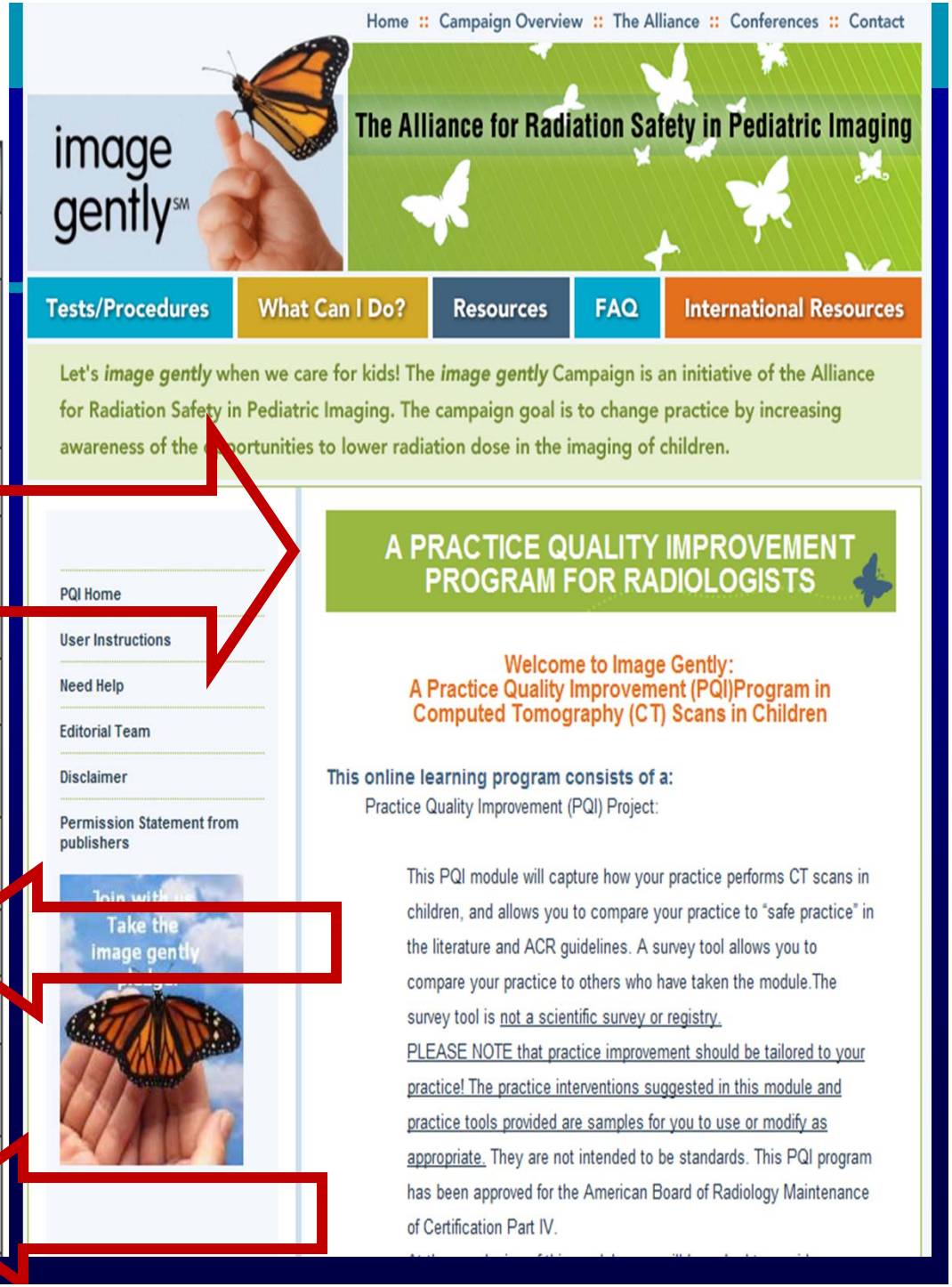
Available PQI Projects and Templates

Key: = project = template

Type	Title	Org	Date Qualified	Abstract
	*CT Colonography Registry	ACR	01/30/2008	N/A
	Performance of VCUG Examinations; Safety, Quality of Care; Practice Guideline *template available only to SPR members	SPR	03/11/2008	N/A
	Universal Protocol/ Procedural Pause	RQ	08/11/2008	N/A
	Intravenous Iodinated Contrast Extravasation During Computerized Tomography	SUR/ ACR	10/22/2008	N/A
	Fluoroscopy Dose Recording	SIR	02/04/2009	N/A
	Prospective Analysis for Radiation Dose Reduction	SIR	02/04/2009	N/A
	Patient Safety Improvement Program (PSIP)	ABMS	09/22/2008	N/A
	Chest CT Radiation Safety	ARRS	12/31/2008	N/A
	RADPEER	ACR	04/17/2009	RADPEER examples
	National Mammography Database	ACR	08/03/2009	N/A
	Image Gently: PQI in safety for children undergoing CT scan	Cincinnati Children's Hospital & SPR	04/17/2009	N/A




RQ Radiology Quality - Windows Internet Explorer
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Google
Convert
Select
Favorites
Suggested Sites
Web Slice Gallery
RQ Radiology Quality
Page
Safety
Tools
RQ
Radiology Quality
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Sign U
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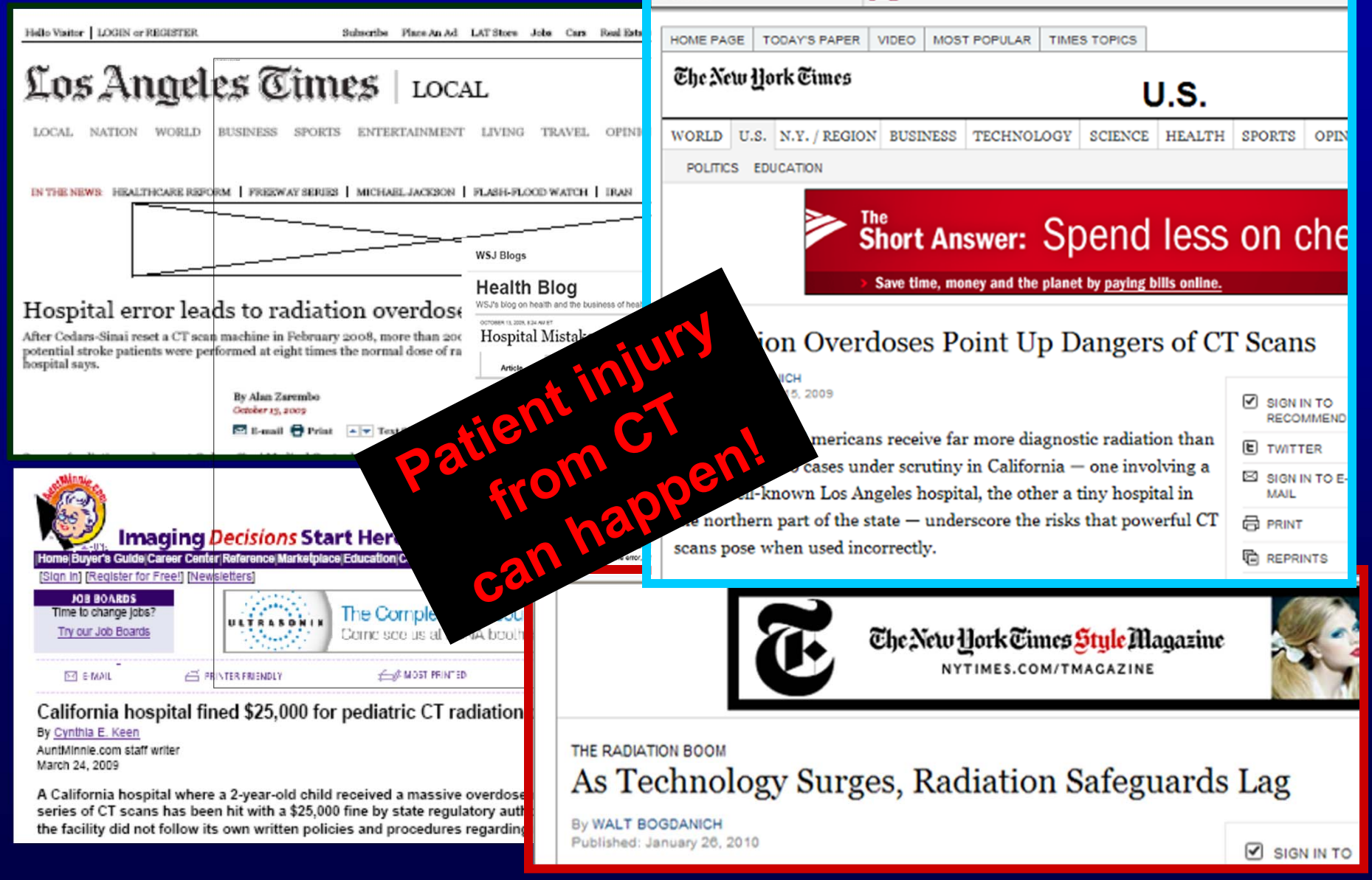
Radiology Practice Quality Improvement Projects
Who is this site meant to help?
This site is for Radiologists undergoing Maintenance of Certification (MOC) by the American Board of Radiology (ABR).
We provide free, easy projects that help you complete and document compliance with MOC Part IV, Practice Quality Improvement (PQI) requirements.
What's the big deal?
You need to be actively working on a project every year.
You need to keep documentation to prove it, in case you are audited.
Completing a project in a single year or over a few years and then stopping is not allowed.

No one wants to be Front-Page Headlines



Building relationships

- Build on past successes
  - ACR CT Accreditation (3 protocols)
  - Image Gently
  - ESE analysis
  - CR Exposure index (s-number, LgN, EI, etc.)
- Start with CT technologist and Radiologist
- Remind others of Congressional hearings
  - Statements from AAPM, ACR, etc.
- FDA position April 20, 2010

Initiative to Reduce Unnecessary Radiation Exposure from Medical Imaging

FDA is launching a collaborative *Initiative to Reduce Unnecessary Radiation Exposure from Medical Imaging*, with a focus on the types of imaging procedures that are associated with the highest radiation doses: CT, fluoroscopy, and nuclear medicine.

FDA White Paper (Executive Summary) states:

- …two principles of radiation protection: appropriate *justification* for ordering and performing each procedure, and careful optimization of the radiation dose used during each procedure.
- These types of imaging exams should be conducted only when medically justified.
- When such exams are conducted, patients should be exposed to **an optimal radiation dose – no more or less than what is necessary** to produce a high-quality image.
- In other words, each patient should get **the right imaging exam, at the right time, with the right radiation dose.**

Salesmanship 101

- Why should facilities engage in protocol review
  - Quality Patient Care
  - Risk Management
  - Patients are already asking “What is my dose from CT”
    - Would be helpful to respond “We are engaged in an ongoing review process to assure ALARA?”
  - Potentially emerging (or new interpretations of) **regulations** and **accreditation requirements**
  - MP Consider “no charge” first client while you are learning
  - Reference this success to other clients

*Salesmanship 101 – **Decision makers***

- Radiology Manager
- RSO
- Radiation Safety Committee
- Hospital Administrators
- Risk Management
- Hospital Board of Directors

*Salesmanship 101 – **The Project***

- Why should facilities engage in protocol review
- Quality Patient Care
- Risk Management
- Patients are already asking "What is the dose from CT" (Consumer Reports)
- Would be helpful to respond "We are engaged in an ongoing review process to assure ALARA"
- Potentially emerging regulations, accreditation requirements or interpretations

The Joint Commission
Sentinel Event Alert
Issue 47, August 24, 2011

Addressing contributing factors to eliminate avoidable radiation dosing (sic)

There are actions that organizations can take to eliminate avoidable radiation. First, staff should be aware of the contributing factors to, and activities that can help eliminate, avoidable radiation doses, which include: …….

- Knowledge regarding typical doses.
- Clear protocols that identify the maximum dose for each type of study.
- Consulting with a qualified medical physicist when designing or altering scan protocols.
- Communication among clinicians, medical physicists, technologists and staff.

“Right Dose”

6. Radiologists should assure that the proper dosing (sic) protocol is in place for the patient being treated.

7. Institute a process for the review of all dosing (sic) protocols either annually or every two years to ensure that protocols adhere to the latest evidence.

8. Investigate patterns outside the range of appropriate doses. Track radiation doses from exams repeated due to insufficient image quality or lack of availability of previous studies to identify the causes. Address and resolve these problems through education and other measures.

Personnel to Support Project…

	Concerns	Authority			
		Time	$$$	Staff	MDs
CT RT (Spvsr)	**Pt care, standardization**	✓	?	✓	?
Radiology Mgr	**+ operating budget**	✓	✓	✓	?
Radiologist	**Pt care, standardization, Referring MDs, legal**	✓	?	?	✓

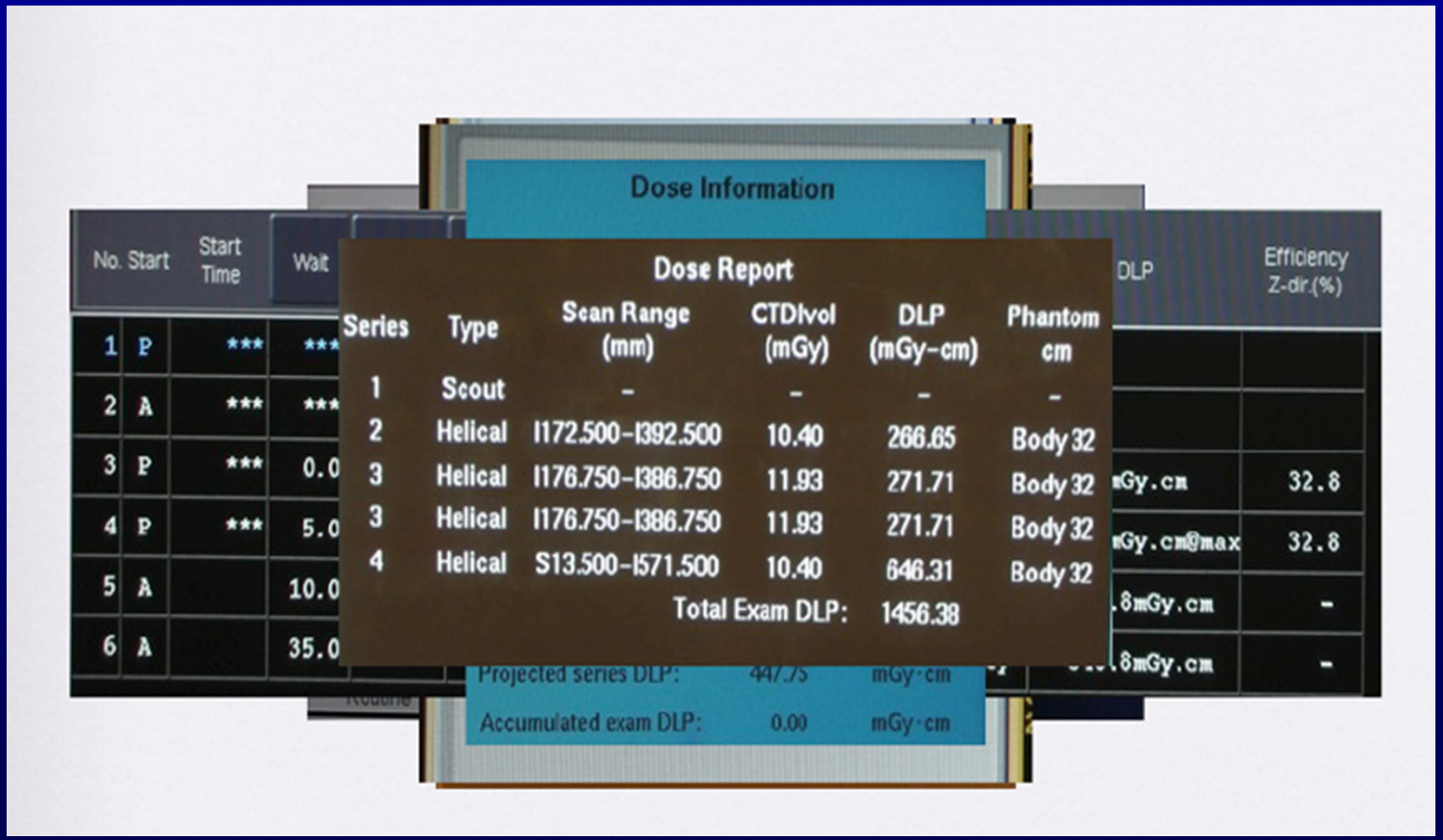
Essential *Personnel to Support Project…*

	Concerns	Authority			
		Time	$$$	Staff	MDs
CT RT (Spvsr)	**Pt care, standardization**	✓	?	✓	?
Radiology Mgr	**+ operating budget**	✓	✓	✓	?
Radiologist	**Pt care, standardization, Referring MDs, legal**	✓	?	?	✓
RSC - RSO	**Avoid incidents; compliance**	?	?	?	✓
Admin	**Avoid incidents;**	✓	✓	✓	?
Risk Mgmt	**Publicity; Legal**	✓	✓	✓	?
Brd of Directors	**Publicity, personal legal risk**	✓	✓	✓	?

Final  *of advice…*

- Teaching technologists is win-win
  - How their scanner works
  - Meaning of CTDI and DLP displays
  - Set trigger levels
- Carefully document process and recommendations

Teaching CT Technologists about Dose Info



Adapted from Doug Pfeiffer, MS

How to present/document recommendations

- **Observation:** *The default __ protocol was initially set for __, for which (dose, image quality) may not be optimal. These have been discussed with the CT Protocol Review Committee*
- **Recommendation:** *Consider modifying the protocol ___ to improve (dose, image quality) as documented in Committee Minutes. Dr. Rogers to assess clinical acceptability. Notify Committee members if problems are reported.*
- **Caution:** *Changing default protocols without team consensus could compromise patient care (image quality and dose).*

If facility isn't willing to pay for more support…

- **Added Caution:** *Changing default protocols without a medical physics consultation could compromise patient care.*
- ***CTDI displays are not patient dose displays*** *and can be complex to interpret. Without further medical physics consultation regarding changes, we are unable to assess the potential for patient injury due to excessive radiation exposure.*

*If site is unwilling to **start** paying for support…*

- **Added Caution:** *This report of routine medical physics service is limited to evaluation of image quality and dose for specific protocols specified in the ACR CT accreditation program (routine head, abdomen and pediatric abdomen).*

- *We have not been engaged to participate in an overall review of facility protocols.* ***Hence, we are unable to assess the potential for patient injury due to excessive radiation exposure from protocols we have not been retained to evaluate.***

Summary

How to

- Come up to speed on a wide range of scanner types
- Leverage your experience from one site to others
- Build relationships that encourages your client to seek your input on protocols
- Address protocol problems once you find them, particularly if the site isn't willing to pay for support

Thank you!