Medical Physics Practice Quality Improvement Guidelines

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Outline

• Introduction
• PQI Review
• ABR Guidelines
• Project Types
• Project Ideas (Diagnostic, Therapy, and Teaching)
• Conclusion
Introduction

• Practice Quality Improvement (PQI) is Part IV of the ABR MOC program

• Although the goal is obvious, the specifics are less obvious for physicists.

• For Physicians a primary ingredient might relate to Peer Review
  – However in most cases this is a constant ongoing process
Introduction

• For Physicists Peer Review can be an ingredient, but from a different point of view.

• One question relates to the term “Practice.”

• Quality is one of the mainstays of a physicists duties, but there is always room for improvement
  – A common thread in discussions is that “this is what we do all day”
    but the idea is to have constant improvement and show that we are doing this by adding some systematic process to our duties

• PQI is a process
Caveat

• The ideas expressed herein are my ideas based on my understanding

• Projects suggested are again my formulations of ideas mentioned to me by others and my own ideas
PQI Process -- Broad Outline

• Year 1 of Cycle:
• SDEP

Education in PQI (Metrics, processes, evaluation)
Become familiar with tools (Many different methods to look at processes)

AAPM has sponsored such sessions and will repeat as necessary.
Such sessions will be captured in The Virtual Library (VL)

(Search in VL for PQI will provide a number of possibilities)

Example: AAPM annual meeting of 2012
Jennifer Lynn Johnson  (Fishbone, Pareto Charts)
Todd Pawlicki
The American Board of Radiology perspective on maintenance of certification: Part IV: Practice Quality improvement in radiologic physics.


This reference has a comprehensive reference list including reading material on PQI itself.

It contains ideas of Projects that cover the different areas.
References

• Very Pertinent reference is The ABR web site.
• It is good to check the Web Site periodically, as there are updates made regularly.

• Go the ABR web site and click on MOC and Medical Physics or use the link below.

• \texttt{http://www.theabr.org/moc/moc\_rp\_landing}

For Information on Part IV, the following is a direct link with examples of projects

• \texttt{http://www.theabr.org/moc-rp-comp4}
PQI Process

- Select Project and metrics
- start data collection
  - A noteworthy point is that metrics is a part of a project
- Analyze data
- Create improvement plan
- Evaluate again
PQI Process

• Basic idea is a continuous process of improvement

• In actuality, physicists are performing PQI related duties continuously.

• Main difference is formalization of project and quantification with a metric
PQI Process

• What if no Improvement is Demonstrated?
• Perhaps the Project demonstrates that the aspect of the practice investigated is good.
• No penalty for this, assuming that the project is meaningful
  main idea is documentation with metrics
  most important is to be involved in a PQI program
Project Basics
ABR Guidelines

• Project relevant to patient care
• Project relevant to diplomate’s practice
• Project must have identifiable metrics and/or measurable endpoints
• Project must include an action plan to address plans for improvement and perform new measurements to assess progress and/or improvement
Areas for Projects

• Five General Areas for Projects

1. Safety for patients, employees, and the public
2. Accuracy of analyses and calculations
3. Report Turnaround times and communication issues
4. Practice Guidelines and Standards
5. Surveys
General Competencies

There are core competencies that have been defined by ACGME/ABMS/ABR that would be part of the project

1. Practice knowledge
2. Patient Care
3. Interpersonal and communication skills
4. Professionalism
5. Practice-based learning and improvement
6. Systems-based practice

Broad categories, but any project would easily embody one or more of these
Projects

- **Type I**
  - Individuals, practice groups, departments, institutions, or health care systems
- Do not require qualification by The ABR
- Documented by Diplomate as to participation with an Annual Update and attestation through on-line Personal Data Base
- Subject to audit
Group Projects

• A project may be within the Department, so that this is a group effort. This is acceptable, have to show participation as an individual

• A project may involve a Practice Group which is similar to a Department

• So individual can be part of a group project
Projects

- Type II
  - Generated by Societies
- Formal reassessment to document improvement
- Assessment of adherence for an individual participating
- Includes development of central data-bases for future benchmarking
- Advanced qualification of such projects by The ABR
- Completion attested by the Society to The ABR.
Practices

• For Imaging Physicists somewhat complicated
• Academic or Community Hospital Staff
  – May be part of a group or may be an individual
• Consultant
  – Practice will cover many different institutions
  – More individualized
• Different Modalities
  – Nuclear, Diagnostic Radiology, MRI
  – Each has unique concerns
Examples

• Look at some examples of possibilities for Individual Projects and Group Practices

• Some of these are based on the White Paper in Medical Physics reference given earlier

• Others are based on personal ideas and ideas suggested by others

• Will provide examples
  – Imaging based
  – Therapy based
  – Teaching

• These are being offered as guides, only!!!!!!
Examples

- There are probably many areas in your practice that you have thought that it would be good to monitor.
- PQI is a good impetus to do such projects.
- In a group practice within a Radiology Department there are good projects on dose, techniques, etc.

could involve radiology residents, and radiologists as a group practice.
Examples for Individuals -- Safety

• Radiation Safety is a big Issue
• CT
  – Protocols are preset for a given technique, but problems occur at high and low body habitus (and pediatric)
  – Choose a dominant technique like abdomen-pelvis
  – Monitor technique in cases of low and high body habitus.
    (Choose a periodic time to check over a period)
    Get residents and techs help find cases.
  – Look at technique actually used (which would relate to Patient Exposure). Compare to expected, or reasonable.
  – Measure % of cases that difficulties are found. Monitor noise and dose.
  – Initiate corrective measures, (update technique chart, technologist education)
  – Recheck
Safety -- CT (Consultant)

- Verify techniques at sites covered
- Compare doses to Databases (ACR)
- Help setup improvements as needed at sites
- Monitor change at next inspection
- Determine if additional assistance is needed
- Quantify distribution

- Determine distribution of dose among sites
- Summarize
Safety -- Angiography

- Program for monitoring high patient exposures
- Program for capturing necessary data (fluoro time, radiation exposure measure as output from the unit)
- Monitor on a periodic basis.
- Note percent of time these values are recorded.
- Choose subset and spot check accuracy (%)
- Institute Improvements
- Remeasure
• Safety guides are in place. Perhaps there are still issues. Check limited access restrictions and safety program.

• Verify that access to Magnet is controlled after hours and restrictions for environmental services in place.

• Monitor break downs in process.

• Monitor number of incidents.

• Modify guidelines as needed.

• Recheck
Safety -- Nuclear Medicine

• Radiation Badge Monitoring of Personnel
  – Although this is part of Radiation Safety Committee, look to reduce levels
  – Monitor badge readings of individuals
  – Determine the average within the group (cardiac related versus general)
  – Assist in improvements
  – Remeasure
Safety -- PET

- Related to the previous is Exposure to personnel in PET

- There are several issues, dosing and contact with patients

- A number of people have looked at the injection process and commercial automatic systems.

- In actuality a majority of exposure is related to patient positioning.
  - Monitor doses for technologists and habits.
    - Perhaps while moving the gantry, use the hand closest to patient to control the gantry (this will put one a step back.
    - Determine if there are specific activities related to a particular tech; for example a female tech may have to help female patients more with dressing
    - Observe habits and suggest changes.
Patient Exposure Safety

• Implement Dose Tracking/management system
  Join ACR CT Dose registry
  Set up a system for all modalities

• Verify results once on line.

• Monitor for continual performance

• Use results to identify problem areas -- Implement fixes

• Remeasure

Once set up and running well, others can manage and maybe periodic checks to see if any issues
Accuracy and Analysis of Results

- PET -- SUV
- Monitor accuracy of SUV calibration on a regular basis (e.g. quarterly)
  - Calibrations are performed on a regular basis but may not be verified
- Set a metric for range (+/- 5% ???)
- Assist with means to improve
- Remeasure

- Good possibility for a consultant to monitor variation in an area (Compare values and distribution). Try to reduce variation.
CR Reader Calibration

• Measure the CR index according to Vendor (e.g. S# for Fuji) for all units

• Verify set to standard value

• Recheck after 3 months, and note variations

• Determine stability, reset as necessary

• Set up QC Techs to monitor

• Verify that program progresses and variation improved.
Repeat Analysis -- Nuclear Medicine

• Set up a program with techs to monitor repeats
  – Repeats due to technical issues
  – Rejects
  – Incomplete studies
  – Misadministration

• Set up a system to record all incidents for different groups

• Determine root cause
  – (example claustrophobia and not completing an exam)
  – Pain from length of time lying under a camera

• Monitor and institute improvements

• Remeasure and follow improvement
Report Turnaround Times, Communication Issues

- Good project for the Consultant Physicist
- Measure time between survey date and report sent
- Analyze for any inefficiencies, develop improvement
- Remeasure
Practice Guidelines and Standards for Equipment Checks

• Good model for individual and Societal
• A number of standards available
  – ACR
  – AAPM
• Compare how your work fits the standard.

• Good model for acquiring national data
• Good model for determining frequency of certain checks
• National survey?
MRI Annual ACR Testing

- New ACR Manual for MRI accreditation
- Verify procedures compared to manual
- Implement
- Recheck
• CT Quality control Committee

• Committee of Techs, Radiologists, Physicist
• Random selection of 20 cases from previous month
• Different Body group each month
• Images are scored for:
  – technical parameters
  – Image quality
  – Dose -- gives a representative selection of patients to check techniques
Surveys

• Satisfaction Surveys (administration, physicians)
  – Accessibility
  – Responsiveness
  – Report timeliness
  – Satisfaction

• Use survey to implement an improvement plan

• Institute new plan, remeasure

• Individual, Group, or National
Peer Review

• Could participate in a Peer Review of practice individually (someone could look at the overall program)
  – On site or off site

• Would produce recommendations

• Provide impetus for correction/follow up

• A system like this was thought of in the early stages of PQI, which morphed into the Therapy Societal PQI.
Societal PQI for Therapy

- *(Under Education, Maintenance of Certification, PQI)*
- Select Specialty Section
- Select Therapy
- Currently one Possibility
  - Radiation Oncology Practice Review
My Baseline Evaluation - Radiation Oncology Practice Review

Please answer the following questions.

1. Is there a clearly documented procedure for annual calibration, monthly QA, and daily output checks? (TG40 can be used as a guideline)
   - No Record (Full TG51 not performed within the past year)
   - Incomplete or Partial Records (Not all monthly or daily procedures performed or documented)
   - Full Records

2. Is there documentation that indicates all physics instrumentation calibration and maintenance was performed in accordance with nationally recommended intervals?
   - No Record
   - Incomplete or Partial Records
   - Full Records

3. Is there documentation that treatment machine(s) output calibrations are verified by an independent method? (RPC/RDS TLD, independent physicist's calibration)
   - No Record
   - Incomplete or Partial Records
   - Full Records

4. Are there records to indicate geometric precision and mechanical integrity have been evaluated according to TG40 guidelines and intervals?
   - No Record
   - Incomplete or Partial Records
   - Full Records

5. Is there a documented procedure to verify Treatment Planning System output and Monitor Unit calculations?
   - No Record
   - Incomplete or Partial Records
   - Full Records
Step 1

- Fill out Baseline
- Submit Evaluation
- Check Evaluation
  - Select My Evaluations
- Each Evaluation will have an ID
- Will be noted as a Baseline or Follow up
6. Select 'Baseline Summary and Improvement Plan Development'
7. Select ‘Develop’ to add specific improvement steps to Baseline questions and save. Include dates for implementation and follow-up.
Follow up

- Once plan is developed, can **EXPORT** to Word for records

(Although data will be maintained by the AAPM, Diplomates should print out Baseline and Follow-up evaluations for documentation of meeting Part IV, Maintenance of Certification.)

- At a predetermined time (minimum 1 month), perform a Follow-up evaluation.

- On the ‘My Evaluations’ page, Baseline and Follow-up evaluations can be compared. Generally, an improvement (higher score) should be seen. Keep in mind, that multiple Baseline and Follow-up evaluations can be performed.
Therapy -- New Procedures

• Implement new TG protocol (e.g. TG 142)

• Track timely completion of all QAs

• Evaluate after 6 months

• Make improvements (maybe adjust schedules to account for clinical issues)

• Remeasure
Therapy -- Accreditation

- Group project
- Initiate ACR accreditation
- Could Evaluate timeliness of following guidelines
- Other metrics could be set up
Therapy -- Review Techniques

- Example -- review image guidance
- Compare results of image fusion as initially set up by therapists and approved by physicians
- Record shifts noted
- Note discrepancies
- Optimize settings, institute retraining
- Remeasure
Therapy -- Checks

- Example -- Chart checks

- Perhaps some patients are not scanned on a regular basis

- Chart checks may be missed

- Determine frequency of missed checks

- Implement improvement

- Remeasure
Therapy

- TBI patients treated with lateral fields using compensators
- Look at results for diode patient measurement and optimize compensator calculation to reduce need to change thickness after treatment starts
- Analyze group of patients and compare calculated with actual thicknesses used
- Modify calculations
- Remeasure to assess effectiveness of changes
Teaching

• Efforts under way to formalize a document for use for teaching evaluation
• Compare evaluations over a period and note areas for improvement
• Make changes
• Look at evaluations again over a period of time and compare to previous.
• Obviously each class is unique but are looking for trends.
Summary

• Many possibilities
• Examples presented are personal thoughts and suggestions from others

• Work is being performed already
• Need to formalize process and follow up
• Benefits to field of imaging and personal satisfaction

• Most important -- start a project and follow up