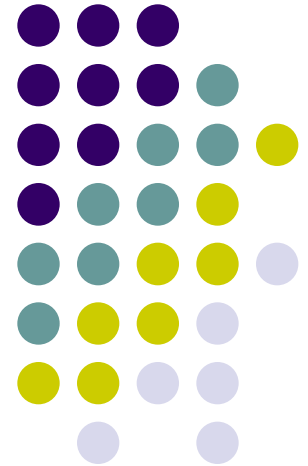


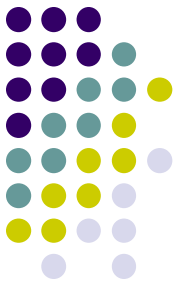


CT Inspection Protocol

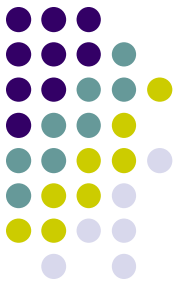
Presented by CRCPD
H-32, Committee on CT
May 2011



Goal



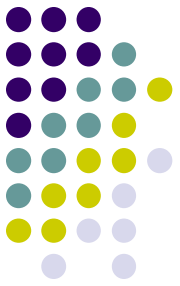
- Provide a means for the state inspector to collaborate with the CT Registrant in a meaningful way.
- Provide a resource for you to start inspecting CT units if your state does not already do so.



Goal

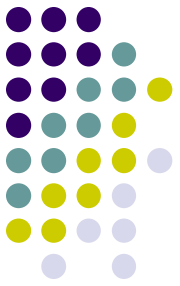
- The intent is to use this protocol to review the testing performed by the facility and their Qualified Medical Physicist (QMP).
- It is not the committee's intent for inspectors to start taking measurements on their own.

How to adopt the checklist



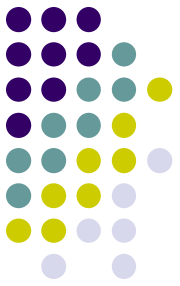
- **This is an example inspection checklist that has been developed based on generic criteria.**
- **It should be reviewed and evaluated against your specific state regulations and modified according before using.**

How to adopt ...



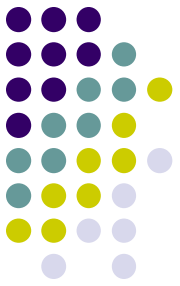
- **There are questions that are more demographic and some that are more enforcement in nature.**
- **This must be modified to meet your specific state regulations.**

Facility Items



A separate checklist is intended to be used for each unit.

- **Name of Facility/Registrant**
- **State ID number**
- **Date**



CT Unit Identification

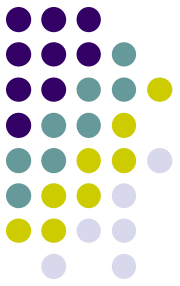
- Location (room number)
- Manufacturer
- Model and serial number
- Manufacturer date
- Maximum number of image per rotation capable on unit



Operators

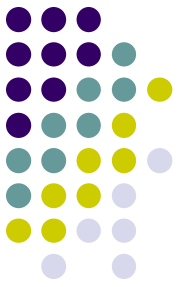
- CT Operator
- Number of CT Operators
- All CT Operators Credentialed
- Number of CT Operators with ARRT CT certification and currently registered

Accreditation



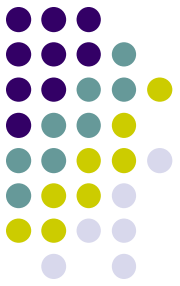
- Is your facility accredited?
- Which Accrediting Organization?
 - American College of Radiology
 - Intersocietal Accreditation Commission
 - The Joint Commission

Physicist



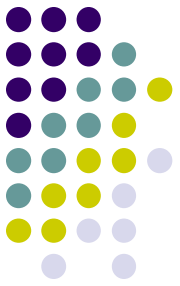
- List the Medical Physicist(s)
 - Qualified Medical Physicists (QMP)
 - Licensed Medical Physicist (LMP)
- If not, what are their qualifications?
- State registered or licensed?
- License or Registration #

Machine & Room Parameters



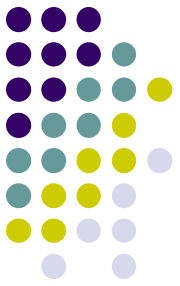
- Emergency stop button identified – (kill switch)
- Availability of means for X-ray Termination: (temporary stop)
- Ability to maintain constant audible & visual patient contact

Machine & Room Parameters...



- Control of all CT suite entrances (visual or auto locks)
- Control of all CT suite entrances (visual or auto locks)
- CT room appropriately labeled with Caution signage

Dose Management Program



- mA modulation capability available
- Dose Management Committee established
- Protocols established and available for review for each unit
- Protocols reviewed

Monthly _____, Quarterly _____, Annually _____
or Other Frequency _____

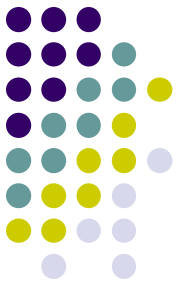
Dose

Management Program...



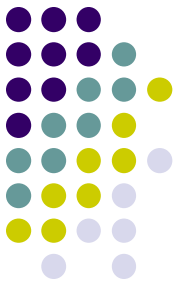
- Indication of CT dose ($CTDI_{vol}$ or DLP):
 - Is it indicated at operators console?
 - Is it provided to interpreting physicians on each study?
 - Is it included in the patient's permanent medical record?
 - Does the technologist monitor dose values for each patient study?
 - Does the site have established thresholds for dose evaluation?

Dose Management Program...



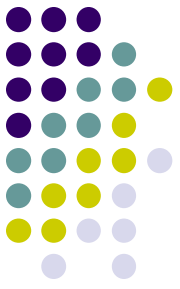
- Specific protocols for pediatrics
- Specific dose reduction strategies:
 - mA modulation
 - Iterative reconstruction technology

Dose Management Program...



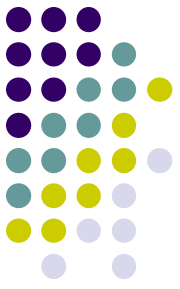
- If available, are protocols password protected?
- Are individuals identified who are allowed to modify protocols?
- Are modified protocols validated prior to clinical use?

Dose Management Program...

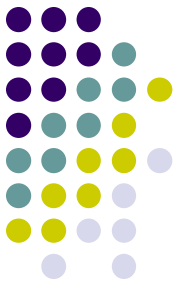


- Technologist's QC Checks:
 - Written policy including frequency of QC checks
 - Images stored for future review
 - Storage method used

Machine Calibration & Maintenance



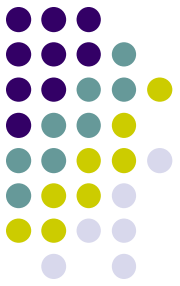
- Performance evaluation by QMP:
- Frequency:
Quarterly _____ Semi-annually _____ or Annually _____
- Dates of the two most recent tests
- Calibrated dosimetric equipment
(calibrated <2 yrs)



Machine Calibration & Maintenance...

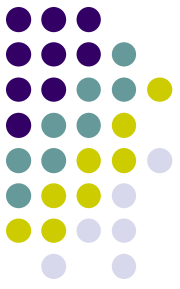
- Calibration or preventative maintenance by Service provider:
Frequency: Monthly ____, Quarterly____ or Annually ____
- Calibration report with numerical values
- Availability of Records

Qualified Medical Physicist Requirements/Reports



- Spot Check by QMP after major servicing (e.g., tube, detector or beam filters)
- Records available for review
- Is there a shielding review for current scanner?
- Are there scatter measurements for the current scanner?

Suggestions for the QMP or LMP Evaluation



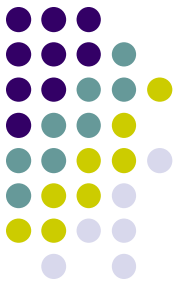
- CT conditions of operation
(image thickness, # of images per rotation, gantry angle, etc.) are indicated prior to the initiation of the scan
- Initiation of each scan or series is required by operator

Suggestions for the QMP or LMP Evaluation...



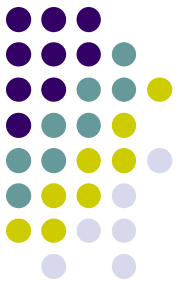
- A signal is visible to the operator indicating when X-ray exposure has been terminated
- Operator is able to terminate scans of greater than 0.5 seconds at any time
- Manual reset required after termination of 0.5 seconds or greater

Suggestions for the QMP or LMP Evaluation...



- Means provided for visible determination (light indicators) of the tomographic plane
- Visible indication of X-ray production at the gantry
- All emergency buttons and/or switches are clearly labeled
- QMP evaluation includes acceptable limits for QC checks performed

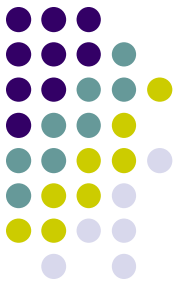
Suggested QC Checks



- **Mechanical Accuracy**

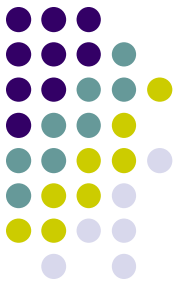
- Establish parameters based on manufactures recommendations and state regulations.
- Gantry angle
- CT laser alignment
- CT table index

Suggested QC Checks...



- **Image Quality Test**
 - CT number accuracy
 - Image noise
 - Image uniformity
 - Artifacts
 - Spatial resolution (image sharpness)
 - Low contrast performance
 - Image thickness

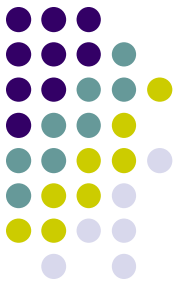
Suggested QC Checks...



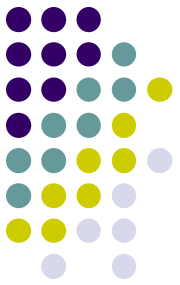
- **Dosimetry**

- Radiation beam width
- Adult head, adult body
- Pediatric head, if applicable
- Pediatric body, if applicable
- Accuracy of $CTDI_{vol}$

Suggested QC Checks...



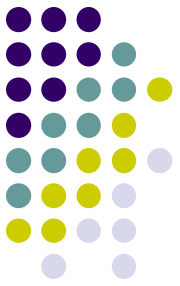
- **CT Acquisition Workstation Monitor QC**
 - Test pattern
 - Luminance testing



H-32 members

- Lisa Bruedigan (TX), Chair
- Candance Brown (MN)
- Asish Banerjee (NH)
- Roy Huhn (PA)

H-32 Resource Individuals



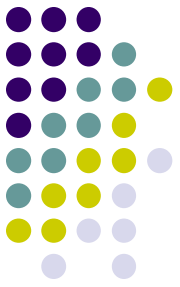
- **ACR** -Tom Payne
- **AAPM** –
 - Thomas Ruckdeschel
 - Doug Pfeiffer
 - Melissa Martin
- **ACCR** - Jan Martensen

H-32 Advisors

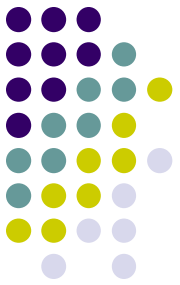


- James Lawson (ND)
- Glenn Sturchio (MN-Affil.)
- LaMonte Augustus (AL)
- James Campbell (TX-Affil.)
- Stephen Vastagh (VA-Affil.)
- Warren Freier (ND)
- Jeanne Broderick (MA)
- Bonnie Kanoy (NC)
- Ray Dielman (FL-Emeritus)
- Jabari Robinson (LA)
- Chuck Johnson (TN)
- John Ferris (MI)

Special thanks to AAPM



Melissa Martin, Doug Pfeiffer, Kyle Jones, Mike Tkacik, Tom Ruckdeschel and Tom Payne for providing assistance and expertise during the hands-on training and to Lynne Fairobent for coordinating the training and to AAPM for funding the training.



Questions?