New York State

The Guide for Radiation Safety/Quality Assurance Programs:
Primary Diagnostic Monitors

What is it?

The guide describes the criteria by which the NY State Department of Health will evaluate a Primary Diagnostic Monitor (PDM) as part of the Radiation Safety/Quality Assurance Program at a facility.
What is the purpose of the Radiation Safety/Quality Assurance Program?

This program was implemented to reduce radiation exposure, optimize diagnostic image quality and foster facility involvement in the responsibility for Quality Assurance (QA).
What kind of monitor is considered a PDM?

PDMs (Primary Diagnostic Monitors) are monitors used by practitioners to make primary diagnosis, for example:

- monitors that are used by practitioners to make primary diagnosis
- monitors that are used by teleradiology services for off hours interpretations and in home offices
- other monitors, such as "technologist's monitors" and monitors found in the ICU or OR ("clinical monitors")
What does compliance with the program mean for a hospital?

In order to comply with the program, the facilities using PDMs should keep a lot of recorded data which indicate that every monitor maintains the necessary image quality. Among these documents are the following:

- results of acceptance testing
- QC test results for the current year
- one set of QC test results from each intervening year to show changes over time etc.

In addition to this, each facility shall make or have made quality control tests to monitor equipment performance and maintain records of data collected.
What does compliance with the program mean for a hospital?

Responsible person:

a responsible person for the Quality assurance of the displays should be selected.

Manual:

The facility shall create a manual that describes the quality assurance procedure. The manual shall include:

- a list of tests to be performed and the frequency of performance;
- a list identifying which individual or group will be doing each test;
- a written description of the procedure that will be used for each test;
- a list of all the variables which comprise the operating conditions for each test procedure;
- the acceptability limits for each test;
- a list of the equipment to be used for testing; and
- sample records to be used for each test.

Records and reports:

for every test and task a report shall be generated and records shall be maintained and available for inspection. Records for each display shall include:

- Initial test results (acceptance testing and other documentation as appropriate);
- QC test results for the current year;
- One set of QC test results from each intervening year to show changes over time. Records of repairs and other pertinent data shall also be available.
The Tests

Display a SMPTE test pattern. Evaluate the SMPTE test pattern, an all-white image, an all-black image. If the PDM is capable of displaying color, an appropriate test pattern must be displayed and evaluated for color trueness.

GSDF verification should be performed at quarterly intervals, with full GSDF calibrations recommended annually. DICOM GSDF calibration verifications and calibrations will be made using a photometer (often called a "puck") and software resident on the workstation.

Among the tests to be performed are DICOM Grayscale Standard Display Function (GSDF) verification, the quantitative assessment of the luminance uniformity, of the luminance ratio, the assessment of the viewing conditions etc.
The Tests

Display a SMPTE test pattern
- Grayscale squares should be easily differentiated at each step, 0% through 100%.
- High and low contrast resolution patterns should be of high integrity in the center and all four corners.
- 95% - 100% and 0% - 5% patches should be easily visible.
- Grid lines should be straight with no distortion.

GSDF verifications and calibrations:

GSDF error should be less than 10% for primary and less than 20% for secondary displays

Max lum and ratio:
- For PDMs not used for mammography, the maximum luminance output of each PDM must be no less than 171 cd/m², with a luminance ratio no less than 170 (ref. AAPM Task Group 18 OR-03). A maximum luminance of at least 200 cd/m² and a luminance ratio of 250 or greater are recommended.
- For PDMs used for mammography, the maximum luminance output of each PDM must be no less than 250 cd/m², with a luminance ratio no less than 250. A maximum luminance of 450 cd/m² and a luminance ratio of 500 or greater are recommended.
Display needs to be evaluated following the schedule described below and whenever a major maintenance or a change in equipment occurs.

**Bi-Weekly (Routine)**

Evaluate the SMPTE test pattern, an all-white image, an all-black image. If the PDM is capable of displaying color, an appropriate test pattern must be displayed and evaluated for color trueness.

**Quarterly**

If the workstation and PDM has software allowing verification of DICOM calibration of the Grayscale Standard Display Function (GSDF) to be performed, GSDF verification should be performed at quarterly intervals, with full GSDF calibrations recommended annually. DICOM GSDF calibration verifications and calibrations will typically be made using the vendor-supplied photometer (often called a "puck" or inherent in the display device itself) and software resident on the workstation.

**Annually**

To verify the accuracy of the vendor-provided photometer and software, PDMs should be evaluated annually by a Licensed Medical Physicist. Among the tests to be performed are DICOM Grayscale Standard Display Function (GSDF) verification, quantitative assessment of the brightness (luminance) uniformity of each PDM, quantitative determination of the luminance ratio, quantitative assessment of the viewing conditions etc.
Is there any way to simplify this process for the person who is responsible for QA?

Yes - PerfectLum performs the NY quality assurance acceptance and conformance test by using a simple wizard-driven approach. The wizard guides you through all the steps of the regulation and automatically calculates if the thresholds were matched or not. At the end of every test a report is created and saved in the database. It can also be printed or exported as PDF.

PerfectLum not only verifies the display, but also calibrates it to DICOM GSDF part 14. Besides, PerfectLum automatically schedules all the tests to be performed in the future and reminds the user about them on the day the tests are due.
Is it possible to perform the tests listed in the guide using PerfectLum?

Yes - all the tests are performed by the software wizard automatically:

- DICOM Grayscale Standard Display Function (GSDF) verification;
- Quantitative assessment of the brightness (luminance) uniformity of each PDM;
- Quantitative determination of the luminance ratio;
- Quantitative assessment of the viewing conditions etc.
- Visual assessment of the Testpattern
In case of a large facility, should I schedule the QA tests manually on each PDM?

There is no need - with PerfectLum Remote Management, a system administrator can perform calibration, verification, and quality assurance tests for all displays in multiple hospitals and radiology practices from a single location.

The system administrator can schedule calibration and QA tasks for client machines, and a notifier on the client machine will remind the user to perform the task when it is due. An automatic alert system notifies the administrator via e-mail whenever a calibration or a QA test on one of the client machines has failed.
Yes - **PerfectLum** provides proof of maintenance for all your diagnostics displays.

PerfectLum saves all data of performed verifications or calibrations in a database. The user can at any time review any task and if required simply export the report as a pdf document, print it, and file. Automatic backup is performed for history database to ensure not a letter is lost.
What makes PerfectLum unique

The outstanding quality of PerfectLum and its features:

- NEMA DICOM calibration, CIE L* and Gamma calibration
- White level and black level calibration
- Uniformity correction
- Version 4 ICC profile generation
- Briggs, SMPTE, AAPM test patterns to visually check calibration results
- Calibration of up to 6 displays connected to a workstation
- Remote Management
- Task scheduler that reminds to perform tasks etc.
We are already trusted by many hospitals all over the world:

- PennMedicine the University of Pennsylvania Health System, USA
- UMM Universitätsklinik Mannheim Heidelberg, Germany,
- Hamad Medical Corporation, Qatar,
- Uppsala Hospital, Sweden,
- University of Wisconsin and many others.

**PerfectLum & Dell UltraSharp U3011:**

4MP 30” Medical Display with [FDA](#) and DICOM Compliance
PerfectLum is compatible with the latest versions of Windows and Macintosh OS, including:

- Macintosh OS X starting from 10.4;

Compliance with the New York State PDMs regulation step by step

1. Select the NY PDM regulation in PerfectLum preferences and enter the necessary data.

The thresholds and schedules are automatically calculated and programmed. For all performed tests PerfectLum creates a detailed report that is saved in a database and can be printed or exported to PDF at any moment, thus providing you with a full history of the quality assurance tasks performed on your displays.
Compliance with the New York State PDMs regulation step by step

2. Perform the Acceptance test for the selected display
Compliance with the New York State PDMs regulation step by step

3. Follow the test wizard
Compliance with the New York State PDMs regulation step by step

4. A report is built and saved in the history database. It is available on a regular basis, can be printed and exported to PDF. Schedules for the constancy tests are automatically programmed and a reminder will pop up when they are due.