

**Purpose:** Increasing interests in electronic portal imaging devices (EPIDs) for radiation dosimetry and other applications such as adaptive radiotherapy develop over the past decades, particularly with the recent technique advance in high-resolution amorphous-silicon EPID system. For a clinical quality assurance (QA) program, EPIDs may provide a useful QA tool with potential benefits of reduced cost and added convenience such as reduced setup time. This study is to explore the potential clinical application of EPID as a routine machine QA tool. **Materials and Methods:** An integrated EPID-based QA system was designed, which target to replace conventional machine QA methods. Recommendations by TG-40 and TG-45 reports were followed. EPID images were acquired using Varian aS1000 EPID system under integration acquisition mode (6 MV beam; 600 MU/min dose rate). Signal intensity of EPID images were calibrated to dose maps using a linear signal-dose relationship. Specific EPID-based QA procedures and image analysis algorithms were designed and developed for some basic QA tasks, such as beam flatness/symmetry test and Winston-Lutz isocenter test. **Results:** EPID-measured results were comparable to those measured monthly using films in our institute. For example, EPID-measured beam quality parameters were: flatness = 0.9-1.45%; symmetry = 0.48-1.31%; penumbra = 3.2-4 mm at SSD = 150 cm. Star-shot images were well reconstructed for isocenter check from EPID images acquired at different gantry or collimator angles. **Conclusion:** The results show that EPID may be properly used as a tool for clinical routine machine QA tasks. (Research sponsored by Oncology Data Systems, Inc, Oklahoma City, OK)