

AbstractID: 5175 Title: Quality control testing of diagnostic ultrasound systems: experience in testing 72 systems in 11 years

PURPOSE: The goal is to assess the necessity and relevance of QA/QC testing procedures for diagnostic ultrasound systems.

METHODS & MATERIALS: The ultrasound QA/QC program at our institute was reviewed in this paper. Over the past 11 years, 72 diagnostic ultrasound systems have been included in the QA/QC program. Acceptance tests were conducted in newly installed systems. In some situations, final payment was withheld to ensure the correction of the deficiencies revealed during the acceptance testing. Periodic QC reports were sent to the in-house engineer group and corrective actions were taken and documented. Our testing procedures included B-mode tests on distance accuracy, maximum depth of penetration, spatial resolution, contrast lesion detectability, image uniformity, dead zone, image display/soft copy fidelity and other physical and mechanical inspections. In addition, Doppler mode tests were performed on some units to measure the Doppler signal sensitivity, angle accuracy, gray-scale image congruency, range-gate accuracy and flow readout accuracy.

RESULTS: A total of 84 deficiencies were documented on those units older than 5 years (1.8 deficiencies/unit-year) and 183 deficiencies on the units with ages of 5 years or less (1.0 deficiencies/unit-year). These problems were classified in categories according to the QC tests and the percentage distribution of each category was calculated. While the overall image quality deterioration revealed through spatial resolution and contrast lesion detectability testing topped the deficiency category list for older units, a significant increase in transducer deficiencies was observed on newer modern state-of-art units. This observation was consistent with the increasing complexity in rapidly advancing transducer technology in recent years. QA/QC procedures appeared able to reveal problems at their early stage before these problems would severely interfere with clinical practices.

CONCLUSION: This experience of ultrasound QA/QC program at our institute confirms the necessity to have a comprehensive QA/QC program for diagnostic ultrasound systems.