

Purpose:

The objective of this study was to evaluate and identify the type of element failures found in ultrasound transducers used in our clinical practice.

Method and Materials:

Assessing transducer functional performance was accomplished using the Sonora FirstCall Test System, Sonora Medical Systems Inc. (Longmont, CO, USA). This system is an ultrasound transducer tester, which can test all essential transducer parameters according to FDA regulation 21CFR 820. The system was used to evaluate 199 transducers at 7 clinical sites from September 2007 to December 2008. All transducers were of the same manufacturer and may have been tested up to three times. The test system is connected to the transducer but not the ultrasound scanner. Each transducer element is tested and evaluated. The test is performed in water, where the elements are activated one by one using a metal target plate to reflect the ultrasound pulse emitted by each activated element. The returning pulse is analyzed by means of the peak-to-peak amplitude, center frequency, pulse width, bandwidth, and the pulse waveform. Additionally, the accumulated capacitance of every element is evaluated and element electrical integrity is tested identifying electrical failures.

Results:

This investigation found that 35 transducers (17.6%) failed our acceptance criteria. The 199 transducers evaluated during this study consisted of 5,168 total elements. An evaluation of the 35 transducers that failed our acceptance criteria resulted in a total of 291 elements that had one of the following defects: dead elements, lens delamination, wire cuts, capacitance short.

Conclusion:

Ultrasound Quality Assurance measurements using a commercial phantom are subjective and can require a considerable investment. Our survey indicates an urgent need for increased quantitative testing of the transducers in clinical departments, such testing should augment the current QA program to insure the highest quality performance of clinical ultrasound systems.