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Occupational radiation safety against X-ray exposure: sharing the 5-year experience of quality assurance program to lead apron integrity in Queen Mary Hospital

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Introduction

The occupational exposure received by hospital personnel working with X-ray radiation should be kept as low as reasonably achievable (ALARA). Lead aprons and thyroid shields are used for staff protective apparel against ionizing radiation. Intensive use of these accessories could lead to age-related or poor-handling defects resulting in multiple tears across the entire apron. These defects, often not visualized, will contribute to unnecessary radiation to personnel. Therefore, the locations and sizes of defects are important to evaluate whether a lead apron should be replaced or whether more frequent inspection will be required. Testing for imperfections of apron can be achieved by fluoroscopy. It has been our practice for departments in QMH to arrange their lead aprons to us for testing as an annual quality assurance (QA).

Objectives

We would like to share our experience in annual QA program to apron integrity by describing our (i) management system including measurement setup, (ii) regular training to staff to perform the QA; (iii) a tracking system for each apron; (iv) documentation to ensure traceability in case of public query, (v) recycling the usable portion as shielding blankets for nuclear medicine patients.

Methodology

We have performed QA to ~600 aprons in 2016 as an example. Aprons with defect $\geq 3 \text{ mm}^2$ or crack $\geq 2 \text{ cm}$ are regarded as failure and immediately removed from service. A label will be placed on each apron stating its pass/fail and date of measurement.

The failure rates in the past years have been ~5%. The number of new aprons, requesting our acceptance test, is about the same number of failure. Sufficient

number of aprons for personnel use has been maintained although defective aprons are removed from service from time to time.

Result

We wish to share our experience because there has been no incident of inappropriate exposure to staff because of defects in personnel protective apparel. Equally important, we perform acceptance test to new aprons to ensure sufficient lead thickness. As a result, all aprons in use in QMH are aligned with their radiation protection specifications and comply with the requirements of "Code of Practice on radiation safety of HA, 2011"™.