Audit on patient radiation dose in fluoroscopic-guided magnetic resonance shoulder arthrograms.
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Introduction
Direct magnetic resonance (MR) arthrogram is an imaging technique that involves intra-articular injection of dilute gadolinium contrast agent followed by MR study. Shoulder arthrogram is the most commonly performed arthrogram in Tuen Mun Hospital. The advantages of direct arthrogram include: consistent joint distension with contrast medium; markedly improved delineation of intra-articular structures and therefore improve detection of surgically correctable pathology; and more invasive and expensive procedures such as diagnostic arthroscopy maybe obviated. The most common method for direct administration of contrast into the glenohumeral joint is under fluoroscopic-guidance. It allows continual observation of the injection of contrast and provides accurate confirmation of intraarticular needle placement. However, along with injection of contrast during fluoroscopy screening, ionizing radiation is inevitably introduced to the patient simultaneously. Dose-area product is commonly used for estimating stochastic risk to patients by translation into an effective dose to organs. In order to minimize radiation risk for both the patients and operators, it is important to ensure the radiation doses are not only within international reference levels, but also to keep as low as reasonably achievable (ALARA).

Objectives
The aim of this audit is to review the patient radiation dose of fluoroscopic-guided shoulder arthrograms, and compared them with the international reference range.

Methodology
Patients with arthrogram performed were identified using New Territories West Cluster Radiology Information System (Cluster RIS) with the code “8429” (which represent “arthrogram”) in the field “Regional code”, “MRI” in the field “Modality” and “TMH” in
the field “Hospital”, during the period 01/01/2014 to 31/12/2014. The clinical data are obtained from electronic patient record (ePR). The demographics, regions of examination, indications, approach of fluoroscopic guidance, dose area product (DAP) and screening time are obtained. Taking into account of the various organ differential radiosensitivities, a tissue-weighted conversion factor is used to convert DAP to effective dose. As recommended by the National Council of Radiation Protection and Measurements, the conversion coefficient for arthrogram is 0.1mSvGycm-2. And we obtain the effective dose of arthrogram by multiplying the DAP with the conversion coefficient. According to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) 2008, which offers a large scale assessment of the magnitude of medical radiation exposure around the globe during the period 1997-2007, the average effective dose of arthrogram is 0.17mSv.

**Result**
A total of 23 shoulder arthrograms were performed in 22 patients, one patient had arthrogram performed in both shoulders. 5 patients were female and 17 patients were male. All used anterior approach for the injection of contrast. The age ranged from 19 to 71 year-old, with a mean 40.8 year-old (+/-15.5 year-old) and median 41 year-old. The mean effective dose was 0.065mSv. The radiation dose of fluoroscopic-guided MR shoulder arthograms is well comparable to the international standard.