Introduction
Plain abdominal radiographs are commonly requested in the emergency department (ED). They are often performed to investigate non-specific abdominal pain, vomiting or nausea. Studies dating back to the 1980s have revealed that a vast proportion of abdominal radiographs performed in the ED were either normal or showed unrelated positive findings (1).

The Royal College of Radiologists (RCR) iRefer guidelines stipulate appropriate indications for the completion of abdominal radiographs (2). The diagnostic yield of abdominal radiographs is higher when RCR guidelines are strictly followed (3). The iRefer guidelines state the following indications:
- Clinical suspicion of obstruction
- Acute exacerbation of inflammatory bowel disease
- Palpable mass (specific circumstances)
- Constipation (specific circumstances)
- Acute and chronic pancreatitis (specific circumstances)
- Sharp/ poisonous foreign body
- Smooth and small foreign body, e.g. coin, battery (specific circumstances)
- Blunt or stab abdominal injury (specific circumstances)

Each film is associated with a radiation dose of 0.5-0.7mSv, which is equivalent to 35 chest radiographs (4). The consequences of inappropriate requests include inefficient use of resources as well as unnecessary exposure to ionising radiation.

The aim of this audit was to reduce the number of inappropriate plain abdominal radiographs requested in the ED.

Methods
Retrospective analysis of plain abdominal radiographs performed in the ED in the month of January 2020 was undertaken. Patients under the age of 18 and follow-up images were not included in the audit.

Abdominal radiograph requests, in addition to the images and their reports were analysed for the following:
- The indication on the request form was compared to iRefer guidelines
- The number of images taken per study was noted
- The diagnostic yield of each radiograph was assessed

Following the first cycle of the audit, a teaching session focussing on the iRefer guidelines was delivered to ED clinicians. Furthermore, posters were disseminated within the ED and uploaded onto the shared drive.

Post-intervention data collection then followed over a one-month period, using the same exclusion criteria. Abdominal radiographs were analysed with regards to the same set of criteria as the first cycle.

Results

As demonstrated in figure 2, there was a 15% reduction in the number of plain abdominal radiograph requests post-intervention.

In both cycles, over half of the abdominal radiograph studies included more than 1 image. Figure 2 illustrates that following intervention there was a 4% increase in the proportion of abdominal radiographs consisting of 2 images.

In figure 3 illustrates an 8% increase in the proportion of plain abdominal radiograph requests that met RCR iRefer guidelines following intervention.

Conclusion
Following intervention, there was a decrease in the volume of abdominal radiograph requests. This was accompanied by an increase in the proportion of requests meeting iRefer guidance.

More than 1 image was required to gain a clinically adequate study in the majority of abdominal radiographs included in this audit. This has important implications with regards to the radiation exposure for patients.

There was an increase in the the proportion of abdominal radiographs aiding clinical management, as well an increase in the diagnostic yield of these films. This supports a higher diagnostic yield of abdominal radiographs when RCR guidelines are followed.

Our interventions helped facilitate the better use of this imaging modality within the ED through increasing awareness of guidelines and radiation exposure. As such, the aim of this audit was achieved. Routine education of the iRefer guidelines will help reduce inappropriate requests. This in turn will reduce unnecessary radiation exposure, whilst also reducing financial burden.

References