Background
NICE guidelines recommend three-view plain radiographs, of sufficient quality, are the initial investigation of choice to detect c-spine injuries (1,2). Good evidence suggests this imaging is effective (3,4,5,6) however it is often difficult to obtain adequate imaging of the c-spine in trauma patients. CT is recommended for only unconscious or high risk patients by the R.C.R and NICE (1,2). This audit was to assess whether the C-Spine trauma referral radiographs followed the standards set by the R.C.R.

Standard
Three-view trauma radiograph series should image the whole cervical spine. Where this is not possible further imaging should be performed or recommended.

Results of First Round
• Initially 37.5% (33) had adequate cervical spine images. A further 37 patients had further views/images or had recommendations in their reports.
• Total adequate reported cervical spine images meeting the standard 79.5% (70).
• Image quality: 60.2% (53) of the image series had an inadequate lateral view with jewellery artefact contributory; C1/2 was not properly seen in 2.3% (2); Peg view inadequate in 10.2% (9); CT scan done in 9 patients due to inadequate plain films.
• Only 1 patient demonstrated a fracture - a C2 fracture on CT scan following a suspicious X-ray.

First Round Action Plan
1. Training of radiographers on adequate C-spine imaging and recommended further views.
2. Patients should have their jewellery removed before immobilising for plain radiographs to be undertaken.
3. Staff reporting cervical spine image series should always report if images do not meet the criteria. Recommendations should then be made within the radiograph report.

Results of Second Round
• The re-audit 2 years later showed an improvement in the adequacy of trauma c-spine image series. Those image series meeting the standard set by the R.C.R. increased from 79.5% (70/88) to 89.4% (76/85) since previous recommendations were made and implemented.
• Re-audit showed a significantly increased utilisation of Swimmer’s view.
• There was a persisting problem of jewellery artefact.
• The true positive rate remained unchanged at 1% - a curiously similar case of C2 fracture following suspicious x-ray appearances in an elderly man following a fall from standing – Lessons to be learnt for a low threshold approach to direct CT scan!

Conclusion
1. This audit improved standard of service.
2. It provided staff with valuable feedback
3. In practice, the RCR standards for trauma c-spine x-rays are a tall order!
4. Optimum trauma c-spine x-rays depend on best inter-departmental practices (including removal of jewellery).
5. A case for a low threshold for 1st line CT scan even in some “low risk cases” and considering points 3. & 4.

References