

Abdominal X-ray use in Mater Dei hospital, Malta

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AIM

To examine a sample of patients who underwent Plain Abdominal X-Rays (AXR) in Mater Dei Hospital (MDH) Emergency Department, Malta and assess if indications for AXR requests met current Hospital Guidelines, relevance of findings in clinical management and if further imaging was required to confirm diagnosis.

METHOD

Retrospective review of 550 plain AXR taken between January 2016 till June 2016. The data collected from the MDH PACS System included patient age, gender, AXR indication and findings, follow-up CT abdomen. Guidelines from the Royal College of Radiology were used to confirm if an AXR was indicated or not. Data was then analysed using Microsoft Excel formulas.

RESULTS

Of 550 plain AXR reviewed, 62.6% were inappropriately requested with indications which did not meet the guidelines. Only 204 requests had a valid indication for plain abdominal x-ray as the initial modality of choice.

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INTRODUCTION

Multiple literature reviews on the use of abdominal x-rays (AXR) in emergency departments¹ and in the evaluation of acute abdominal pain² have concluded that AXR has a very limited role in the evaluation of patients with acute abdominal pain and exposes patients to significant amounts of radiation³.

No local guidance exists with regards to the use of AXR in the workup of emergency department patients. A local audit carried out in 2011 demonstrated that 137 AXR were carried out in the first week of January 2011, with 62% of these being not indicated according to Royal College of Radiology (UK) guidelines⁴.

CT imaging of the abdomen has been shown to have a much higher diagnostic yield in the workup of abdominal complaints, with higher sensitivity and specificity for pathology⁵, even in diagnosing intestinal obstruction⁶.

Anecdotal evidence seems to suggest that despite growing evidence of the futility of performing AXR and the increasing local availability of CT imaging, many patients are subjected to AXR as the initial imaging modality of choice for the abdomen. This risks exposing patients to unnecessary radiation and in the worst case scenario a missed diagnosis due to a normal AXR.

For this reason we have decided to examine a sample of patients who underwent AXR in Mater Dei Hospital emergency department and whether CT imaging was performed regardless of AXR result.

METHOD

A total of 550 plain abdominal x-rays taken at Mater Dei Hospital emergency department were collected using the PACS system. These

were taken between 1st January 2016 and 23rd January 2016 as well as 1st June 2016 and 26th June 2016. The data collected was patient age, gender, indication (via online request) for AXR, AXR report and whether they were admitted. Furthermore any patient who also had a CT Abdomen done within one week also had the result of the CT recorded. Data regarding patient admission to hospital was collected via iSoft. All data was collected retrospectively and to our knowledge none of the authors were directly involved in the management of these cases.

This data was recorded using Microsoft Excel. AXR were deemed to be indicated if the online request indicated any of the following:

- Suspected foreign body
- Suspected large or small bowel obstruction
- Acute exacerbation of colonic inflammatory bowel disease

As Mater Dei Hospital emergency department provides ready access to abdominal CT imaging, the following were not considered valid reasons for requesting AXR:

- Undifferentiated abdominal pain
- Acute abdominal pain with guarding
- Palpable mass
- Suspected perforation of hollow viscus
- Abdominal trauma
- Suspected renal colic
- Constipation

Guidelines from the UK Royal College of Radiology were used when deciding whether an AXR was indicated or not⁷. Negative AXRs were any reported as

either “NAD” or “faecal loading” only. Any other report was deemed positive. Data was then analysed using Microsoft Excel formulas.

RESULTS

Of 550 plain abdominal x-rays (AXR) taken, 258 (46.9%) were of female patients. 20 AXRs belonged to paediatric patients (under 16 years of age). The average age was 60.1, with ages ranging between 0 and 101 years. The median age was 65 (Figure 1).

From the total number of AXRs done, 134 (24.4%) were followed by a CT abdomen within 1 week. The distribution of these CTs is shown in figure 2.

With regards to validity, only 204 (37.1%) had a valid indication for plain abdominal x-ray as the initial modality of choice (Figure 3). It is worth noting that of these, 50 patients went on to have abdominal CT imaging nonetheless.

316 (57.5%) of patients who had AXR were admitted to hospital as inpatients. Of these, 203 had negative AXR findings and 118 went on to have CT imaging of the abdomen (Figure 2).

It is also worth noting that 73 patients had only “abdo pain” as the reason for request for AXR on iSoft.

The number of AXR done in the first two weeks of January and June in the emergency department was also recorded (Table 1).

Figure 1 Histogram of age

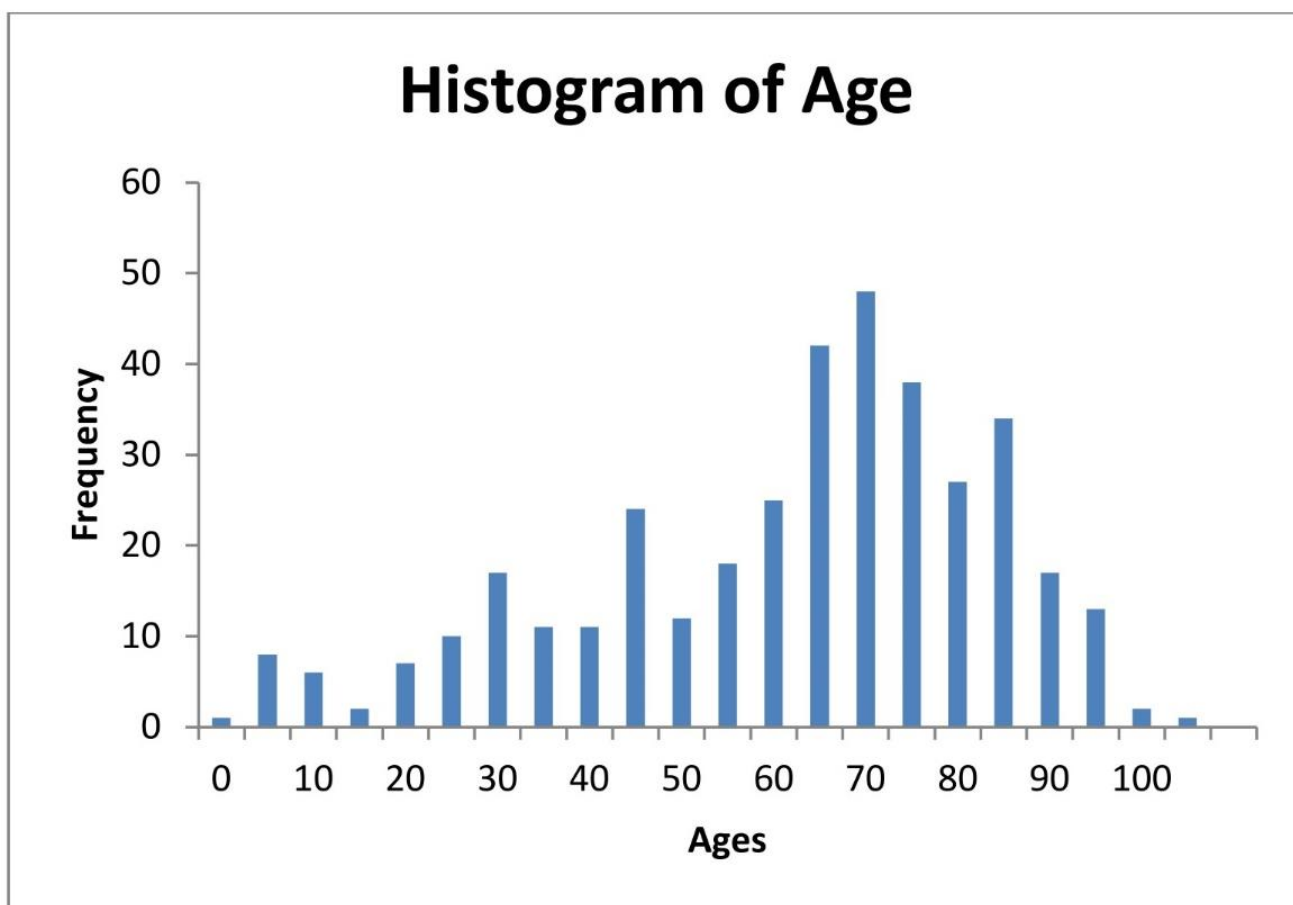


Figure 2 Distribution of CT imaging

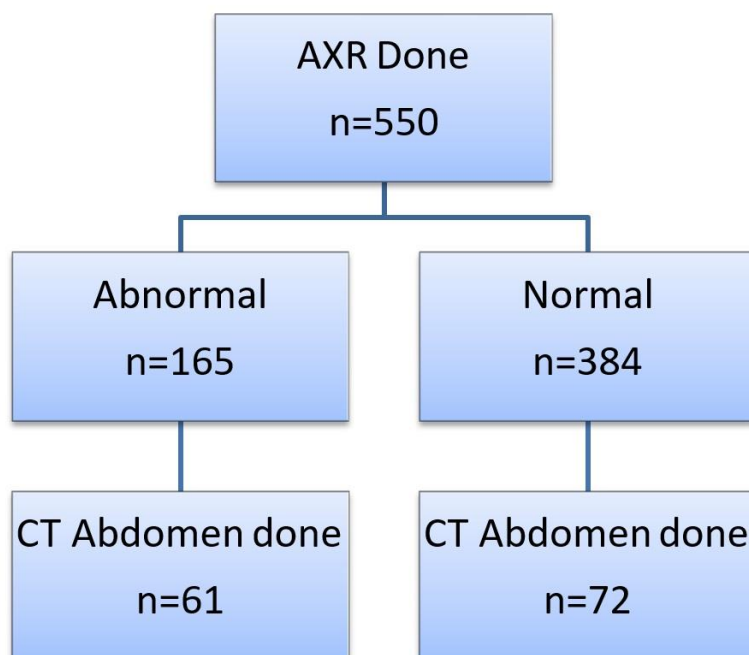


Figure 3 Validity of AXR request

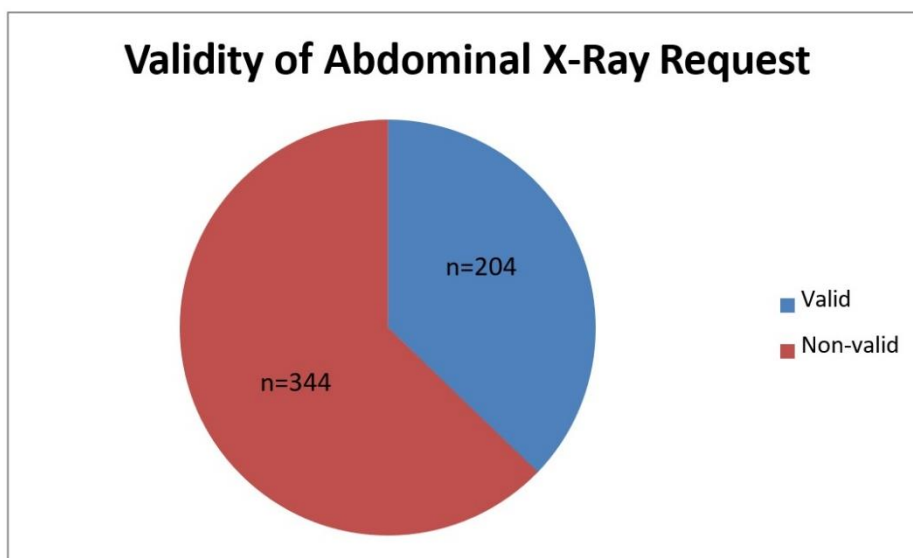


Table 1 Number of AXR by week

1 st week of January 2016	90
2 nd week of January 2016	86
1 st week of June 2016	93
2 nd week of June 2016	62

DISCUSSION

Compared to 2011, the number of AXR requested in the emergency department seems to have decreased slightly. However, the number of inappropriately requested AXR remains almost unchanged (62% in 2011 vs 62.6% in 2016).

It is worth noting that of those that had a valid indication for AXR, 50 went on to have a CT abdomen regardless of AXR result (figure 2). This further serves to highlight how limited the yield of AXR is especially with the availability of CT abdomen.

Some might feel justified in using AXR as a form of “screening” for bowel obstruction and then proceeding to CT to identify the level of obstruction. The problem with this logic is that if AXR is negative and a clinical suspicion of bowel obstruction remains, then the patient will likely need CT anyway. For this reason we propose that AXR only be used to identify bowel obstruction in patients who have a history of bowel obstruction with an identified cause on previous CT or surgery.

The fact that of the 316 patients requiring admission after AXR 64% had negative AXR findings seems to suggest that AXR has little to contribute with regards to disposition decisions. This also matches the 2011 findings.

The poor quality of information provided in online requests remains an issue (with 73 of 550 requests having only “abdo pain” as an indication) as has been reported in multiple local audits carried out in the past few years. Whilst it is understood that these orders are often submitted under time constraints, this information is the only information available to the interpreting radiologist and more effort needs to be put into these online requests. Realistically this online information is also the

only way to conduct audits and studies with large numbers of patients.

Although paediatric numbers were predictably small (only 20 patients were under 16), the number of valid indications was 12 (60%). This might indicate that more consideration is given before ordering AXR on paediatric patients. Further study with larger numbers is required before reaching any conclusions however.

The main limitation of this audit is that information was gathered only from online sources. No patient notes were reviewed. This might mean that patients with valid indications for AXR were underrepresented in view of poor quality of online request forms. However we feel this is limited as the 2011 audit, which whilst looking at a smaller number of patients reviewed patient notes, showed similar rates of valid vs invalid indications for AXR requests.

Potential exists for further study, for example incorporating the use of abdominal ultrasound in combination with pretest clinical scores to decide on which patients to send for CT abdomen.

CONCLUSION

The use of AXR remains disproportionately high, and a large number of AXRs are carried out unnecessarily. A large number of patients would benefit from the use of CT imaging of the abdomen as the first modality of choice, and this would actually decrease the overall amount of radiation that a patient receives by omitting the additional radiation of an AXR.

Our recommendation is that in the emergency department only the following patients have AXR:

- Patients with suspected foreign bodies in the abdomen

- Patients with suspected bowel obstruction who already have a history of bowel obstruction with a known aetiology
- Acute exacerbation of colonic inflammatory bowel disease
- Patients who for whatever reason cannot undergo CT imaging

We further recommend that foundation year doctors discuss with an emergency medicine trainee before requesting AXR. The findings were presented at the Emergency Department Teaching sessions and junior doctors updated on the shortfalls of indiscriminate AXR use.

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