The use of skull X-rays in head injury in the emergency department – a changing practice

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ABSTRACT

INTRODUCTION This is a consequential study of a previous audit, evaluating the role of skull X-rays in the emergency department in patients with head injuries, to see if the changes recommended, (implementation of The Royal College of Surgeons of England guidelines) have been adopted successfully and had the desired result.

PATIENTS & METHODS All patients who attended the accident and emergency department at the Royal Berkshire Hospital from 1–30 November 2003 with a diagnosis of head injury had their notes analysed for indications for skull X-ray, presence of fracture and outcome.

RESULTS 278 patients were identified as having a head injury and had notes available, 19% (54/278) of these patients had a skull X-ray, of whom 31% (17/54) had a clearly documented indication. This shows a marked improvement from the previous audit when 50% (193/385) had a skull X-ray with only 7% (14/193) having a clearly documented indication.

DISCUSSION Following the introduction of new guidelines, a clear improvement in the practice of evidence-based medicine has been achieved; however, there is still room for further improvement and on-going education of staff and auditing of performance will help to ensure this continues.

KEYWORDS

Head injury – Skull X-ray

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For more than two decades, the value of skull X-rays in patients with head injuries has been questioned. The Royal College of Surgeons of England (RCSE) produced modified guidelines (see Table 1) in 1999 for use in hospitals where there is 24-h access to CT scans. The NICE report of 2003 again questions the need to perform skull X-rays, especially in hospitals where CT scanning facilities are readily available; in fact, due to their limited sensitivity in identifying patients with an intracranial haemorrhage (38%), they do not identify any indications for their use in adult patients.^{1,2} An audit done in the Royal Berkshire Hospital in 1999 looking at this question suggested that, by adopting the RCSE guidelines, a great reduction could be made in the number of X-rays performed with no subsequent harm to the patient.³ Following the publication of this audit in March 2003, the emergency department adopted the guidelines. The Royal Berkshire Hospital provides a full 24-h service, which includes access to CT scanning. However, the NICE guidelines have not been fully adopted. Our current indications for obtaining a CT scan in adults and children are shown in Table 2.⁴ The department

Table 1 The Royal College of Surgeons of England indications for skull X-ray where CT is available 24 hours a day

Suspected non-accidental injury (in children)
Presence of boggy swelling particularly in the parieto-temporal region
Suspected penetrating trauma
Suspected compound fracture

has access to a neurosurgical unit at the Radcliffe Infirmary, Oxford and we are able to image link CT scans to the neurosurgical team for their advice.

This audit is a repeat of that done in September 1999,³ to see if the guidelines have been successfully adopted and if the number of X-rays being performed has indeed reduced whilst not compromising patient care.

Table 2 Indications for CT scan of patients after head injury at the Royal Berkshire Hospital

Emergency CT
GCS of 12 or less
Deteriorating level of consciousness
Focal neurological signs
Urgent CT
Radiological or clinical evidence of skull fracture
GCS 13–14 and not improving following 3–4 h of observation
Severe and persistent headache
Persistent nausea and vomiting
Irritability and abnormal behaviour
A seizure
Alcohol/drugs
Should never be assumed to be the cause of an altered GCS
Until proven otherwise, close observation is mandatory
If doubt remains about the cause of an altered GCS, a CT scan should be performed
Children (in addition to above indications)
Child < 18/12 who is shocked or has injuries due to NAI
Suspected penetrating injury to the head

Patients & Methods

All patients who attended the emergency department from 1–30 November 2003 and were computer coded as having a head injury were included. The accident and emergency notes were obtained and analysed for indications for skull X-ray, using the RCSE guidelines. The hospital radiology computer programme (PACS) was checked to see which patients had had a skull X-ray or CT scan and the radiologists report noted. We also documented the outcome of the initial consultation.

Results

In the month of November 2003, 307 patients with a head injury were seen in the department. Notes were available for analysis in 278 patients of whom 63% ($n = 175$) were male and accounted for 61% of the X-rays. Overall, 42% of patients ($n = 117$) were under 16 years of age, but only accounted for 13% of the X-rays; this is a similar proportion to the previous audit (see Table 3).

Table 3 Patient characteristics

	September 1999		November 2004	
	<i>n</i>	(%)	<i>n</i>	(%)
Male consultations	246	(64)	175	(63)
Children (< 16 years)	167	(44)	117	(42)
Male skull X-rays	120	(62)	33	(61)
Children skull X-rays	57	(29)	7	(13)

In this series, 19% of patients (54/278) had a skull X-ray. This compares with 50% of patients (193/385) who had a skull X-ray in September 1999 (Fig. 1).

Of the 54 patients in this series who had an X-ray, 31% (17 patients) were clinically indicated, [16 had boggy haematomas, and 1 had a suspected compound fracture] but in 69% ($n = 37$) there was no clear documented indication for performing a skull X-ray when applying the RCSE guidelines. This compares to 7% of patients (14/193) in the 1999 audit who had a documented indication for skull X-ray and 93% (179/193) who did not (Fig. 2).

Seven patients had a CT scan; 4 of these had a skull X-ray first, only one of which showed a probable fracture, not confirmed on CT. None of the X-rays demonstrated a definite fracture and 20 patients (7.2%) were admitted for neuro-observations.

Discussion

Since 2003, the RCSE guidelines have been adopted as departmental policy. It is apparent that there has been a reduction in the number of skull X-rays being taken, from 50% to 19%. However, of those having an X-ray, a large proportion are still not indicated (69% not indicated versus

Figure 1. Percentage of patients with head injuries who had a skull X-ray.

31% indicated) but this too has improved dramatically from 1999 (93% not indicated versus 7% indicated). It is clear that changing guidelines to adopt more evidence-based

practice is effective. However, it takes time for the new working practices to be uniformly adopted by clinicians. It is imperative that there is on-going education of all staff, new and old, if changes are to be implemented effectively, with regular audit of performance to ensure standards continue to improve.

References

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