

A review of the practice of requesting skull x-rays from the Emergency Department of St Luke's Hospital

Mary Rose Cassar, David Ellul, Tatyana Mintoff, Mark Camilleri

Abstract

Background: In the Emergency Department (ED) of St. Luke's Hospital (SLH), head injuries are a common presentation. Although there are various guidelines which recommend approaches to the management of head injuries, these are not followed locally and the authors feel that a significant number of unnecessary skull x-rays (SXR) are being ordered by doctors. In this review we wished to observe the current trends in head injury investigations at the SLH ED and compare these with the NICE head injury guidelines. We also wanted to determine the impact that the NICE guidelines would have on these trends if they were to be instituted.

Methods: The study is retrospective and observational. The demographics together with the rates of SXRs, CT scans and admissions were determined for patients presenting with head injury between the 1st of February and the 31st March 2006. The study also looked at the predicted rates had NICE guidelines been applied.

Results: 387 patients were studied in a 2 month period. Of this total, only 2 patients (0.5%) had indications for a SXR but 312 patients (80.6 %) had this investigation. Out of this total of SXRs only 6 had positive findings (1.9%) and these went on to have a CT brain. A total of 72 patients had a CT scan of the head and of these 10 (13.9%) had positive findings. According to NICE guidelines 70 patients had indications for a CT. One hundred and twenty one patients (31.3%) were admitted, 201 were discharged (51.9%) and 65 patients (16.8%) discharged themselves against medical advice.

Conclusion: The implementation of NICE guidelines would greatly reduce the rates of SXRs and hence reduce costs and radiation exposure. It also seems that the rates of CT scans will not change significantly.

Introduction

Head injuries are amongst the commonest type of trauma seen in the ED. In the UK they constitute 10-20 % of all ED cases or one million cases per annum. Although 74 % of these cases have a skull x-ray, only 2% will have a skull fracture. The majority of these cases are minor or mild (defined as persons presenting with Glasgow Coma Scale of 15/15) head injury.¹

Under current practice at the SLH ED most patients presenting with any form of head injury will have a skull x-ray. Statistics show that in such patients the risk for an intracranial haematoma is 1 in 6000 if there is no skull fracture and 1 in 30 if there is a skull fracture.² Furthermore the SXR is not indicative of intracranial lesions and therefore the CT scan will remain the conclusive study in excluding a serious head injury.

The National Institute for Health and Clinical Excellence (NICE) in the UK is an independent organization responsible for providing national guidance on promoting good health and preventing and treating ill health. It helps health professionals by providing guidelines in various clinical situations and these are based on audits and research within the UK NHS. They therefore suggest the most effective and cost efficient

Key words

Head injuries, imaging, guidelines

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Figure 1: Skull x-ray recommendations: NICE guidelines

- Suspicion of non-accidental injury in infant and young children
- Where CT scan resources are not available

investigations in particular medical conditions. In June 2003 NICE head injury guidelines were issued and these made recommendations for triage and early management.³ The major change in this document was that the head CT scan replaced the SXR and observation / admission as the first investigation. The recommendations and indications for SXR and CT scan according to these guidelines are summarized in Figures 1 and 2.

In SLH ED although no SXR recommendations are available, this type of x-ray is very popular amongst doctors in patients with any history of head injury. CT scans are at times ordered following criteria similar to the guidelines recommended by

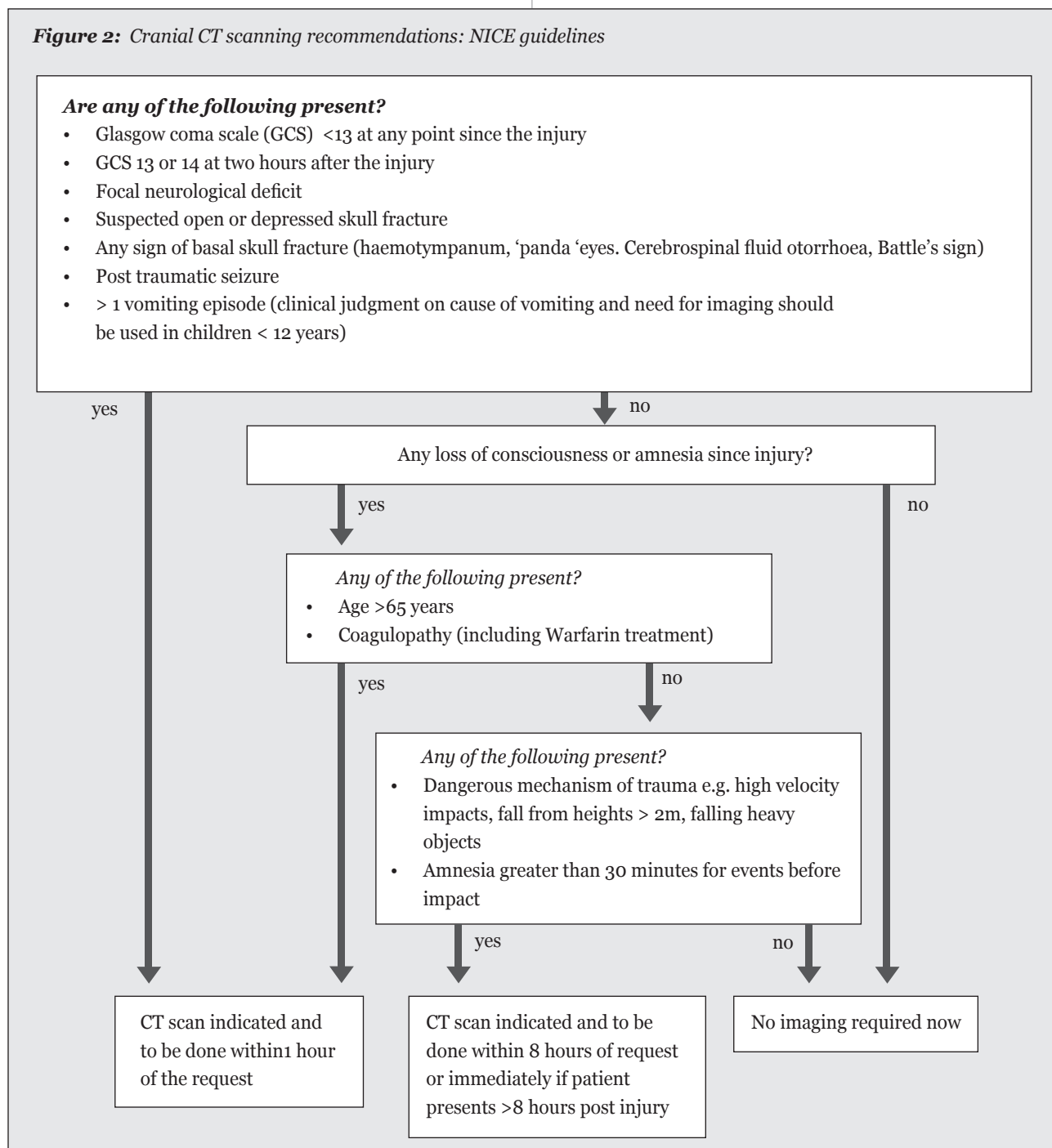
NICE. Furthermore since Maltese doctors in general follow medical management practice in the UK, we wished to determine the impact of instituting NICE head injury guidelines in our ED.

Method

The study is retrospective and observational and was carried out at the ED of SLH. This is the only ED on the island and had a turnover of 110,100 patients in 2006.⁴ It is therefore the main centre for referral of head injury patients especially if they are deemed to need investigations and/or observation.

The data was collected for patients attending the ED between

Figure 2: Cranial CT scanning recommendations: NICE guidelines



the 1st February and the 31st March 2006. The month of January was excluded since this marks the beginning of quarterly staff rotations and therefore a number of junior doctors would still be getting accustomed to the ED and might be extra cautious in investigating head injury cases. Information was retrieved from 3 sources:

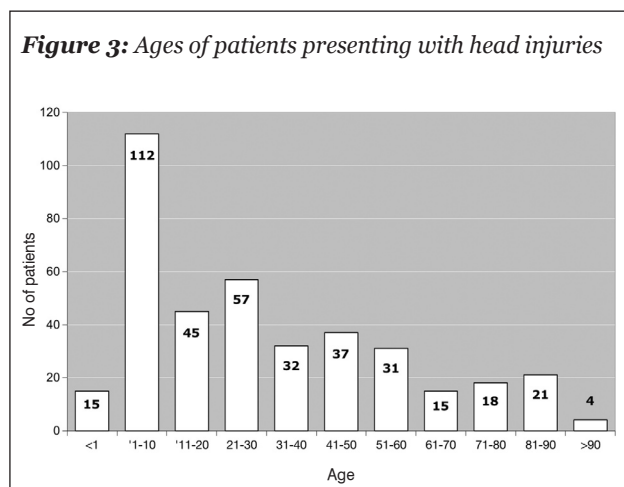
1. All records of patients kept in the ED within the time frame of the study .These were cases discharged from the ED on or against medical advice;
2. Hospital files of patients admitted to wards for 'head injury' or multiple trauma which may include head injury. This list was obtained from the SLH surgical admission book;
3. Hospital files of paediatric population admitted for non accidental injury (NAI). This list was obtained from the SLH paediatric admission book.

The patients' notes were studied by three doctors experienced in managing head injuries and only blunt head trauma was included. Other exclusion criteria included non trauma patients who had skull x-rays, isolated maxillo-facial or nasal trauma and patients with a head injury secondary to a more prominent pathology (e.g. collapse followed by a head injury). In SLH the latter cases do not usually have significant head injury and account for very few patients.

Data retrieved included demographic data, the mechanisms of injury, the number of SXR and CT scans taken, whether they were indicated according to NICE guidelines or not, the number of positive results and the admission rate.

Results

A total of 387 patients were seen at the ED with a head injury and their case histories were studied. These represented 2.2 % of all ED admissions. Of these 238 (62%) were males and 149 (38%) were females. The age distribution is depicted in Figure 3. Mechanisms of trauma included fall from heights under 2 meters (188 patients), fall from heights over 2 meters (29 patients),



road traffic accidents (59 patients), assault (43 patients), falling objects (12 patients) and other trauma (57 patients).

Skull x-rays were done on 312 patients (80.6%). Of all the x-rays done only 6 (1.9%) showed fractures and these patients went on to have CT scans. Only 2 patients would have qualified for a SXR according to the NICE guidelines and this was because of suspected paediatric non-accidental injuries. In these two patients, one case also qualified for a CT scan but the patient was discharged against medical advice and this test was therefore not done. In the second case a CT scan was not indicated and was not done and the patient was eventually discharged home. The 75 patients (19.4%) who did not get a SXR did not qualify for this investigation according to the NICE guidelines.

CT scans of the head were taken in 72 patients. Out of these 72 cases, only 47 were indicated and 25 were not indicated according to NICE guidelines. Review of the case histories also revealed that there were 23 patients who would have qualified for a CT scan according to these same guidelines but did not have this test.

There were 121 patients admitted, 201 patients discharged on medical advice and 65 patients discharged against medical advice. In February 2006 head injury admissions amounted for 8.8% of all surgical admissions whilst in March 2006 they amounted to 11.3 % of all surgical admissions.⁵

Discussion

It is immediately evident from the results of this study that:

- 1) Too many futile SXRs were performed. If NICE guidelines are followed only two patients would have qualified to have skull x-rays and this would have been as part of a work up in suspected paediatric non accidental injuries. However 312 out of 387 patients had SXRs and of these only 6 (1.9%) were positive for fractures. All these patients with positive SXRs went on to have a CT. This means that at least 306 patients had unnecessary radiation and there is no cost effectiveness of this investigation in head injuries.
- 2) There do not seem to be standard criteria for the request of CT scans by doctors. According to NICE guidelines 70 CT scans were indicated but 72 were performed. Analysis of the histories revealed that 25 CT scans were not indicated according to NICE guidelines but were requested. and there were 23 patients who would have qualified for a CT scan according to these same guidelines but did not have this test. These results are of concern and highlight the urgent need for the implementation of standard guidelines, like the NICE guidelines, for the request of CT scans in head injury patients. The almost equal figures of predicted and actual scans done may also mean that adhering to NICE guidelines will not increase the number of scans and therefore increase costs tremendously.

3) Although the practices for admission to hospital is beyond the scope of this study, one cannot fail to observe that although overall only 9 (2.3% of all head injuries) significant head injuries were diagnosed through CT scanning, 121 patients (31%) were admitted and 65 patients (16.8%) discharged against medical advice. Again there are cost implications in this observation and it may also mean that there should be clear admission/discharge guidelines in addition to investigation guidelines when managing head injury patients. CT scans are considered to lead to similar clinical outcomes compared with in-hospital observation in mild head injuries⁶ and more cost effective than admission.⁷ Of course one will have to adhere to clear guidelines to avoid unnecessary radiation exposure here.

The major weaknesses of this study are that it is retrospective, based on case history notes and it is non-random.

Conclusion

Implementing the NICE head injury guidelines in SLH ED will lead to significant reductions in SXR's since the only patients who will qualify for this test would only be children with suspected non accidental injury. No adult will qualify since CT scans are available in this hospital. This will therefore lead

to significant cuts in costs and unnecessary radiation exposure. Also following clear guidelines will lead to the better selection of patients and even reductions in the requests for CT scans. The information contained in this paper may be of some reassurance to the radiology department in that the number of requested CT scans will not change dramatically or may even decrease and they will lose the workload of reporting large numbers of SXR's which are of little diagnostic utility. Overall implementing guidelines for CT scans and admissions in head injury will mean better use of hospital beds and budget.

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