

ORIGINAL ARTICLE

An audit of clinical practice in the management of head injured patients following the introduction of the Scottish Intercollegiate Guidelines Network (SIGN) recommendations

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A prospective study was conducted by the Scottish Trauma Audit Group (STAG) in A&E of Edinburgh Royal Infirmary to examine clinical practices in the management of head injured patients pre- and post-inception of the SIGN guidelines published in August 2000.

1607 patients attended the department in two separate one month periods at equal intervals pre- and post-guidelines publication. The majority of patients with a SIGN indication for admission were admitted (93% pre- and 92% post-guidelines). For skull x ray (SXR) requests, in the pre-guidelines group, 92% of admitted patients with a SIGN indication for x ray had a SXR: this figure dropped to 79% post-guidelines. 36% of patients with a SIGN indication for CT actually had a scan pre-guidelines: this figure increased to 64% post-guidelines.

57% of patients pre-guidelines and 44% of patients post-guidelines were discharged from A&E in accordance with the SIGN recommendations. Of patients admitted for neurological observations, this increased from 50% pre- to 88% post-guidelines. Of patients who were discharged "inappropriately", only one re-presented and was subsequently admitted but required no neurosurgical intervention.

Despite publication of the SIGN guidelines and positive reinforcement in A&E and at ward level, practice has not changed significantly. Where our practice did not adhere to SIGN recommendations, there was no untoward sequelae. For published national guidelines to be effective, a formal audit structure with regular feedback is necessary to ensure a continued change in clinical practices.

Trauma is the leading cause of death under the age of 45 years and up to 50% of deaths are because of a head injury.¹ About 100 000 people attend hospital every year in Scotland with a head injury, and approximately 20% are admitted.^{2,3} Of the attendances, the majority (93%) are Glasgow Coma Score (GCS) 15 on presentation, whereas only 1% have a GCS of 8 or less.⁴ Nevertheless, head injuries account for a significant proportion of Accident and Emergency (A&E) workload, and are responsible for a high percentage of the cost of all admissions to hospital.⁵ Patients who sustain intracranial events as a consequence of head injury may suffer long term sequelae if definitive treatment is delayed. Additionally, although figures vary, up to half of all head injured adults may experience long term disability.^{6,7} It is therefore important that guidelines, based on peer review published evidence, are followed to achieve optimal care.

Guidelines for the management of this group of patients were first endorsed by the Department of Health in 1983⁸ and since then, with the increase in trauma services and availability of computed tomography (CT) scanning resources, further guidelines, which take these changes into account, have been produced. Initially, the Harrogate guidelines⁹ published in 1984 made suggestions on the early management of head injured patients; this was superseded in 1999 by the Galasko report from the Royal College of Surgeons.¹⁰ Since then, the Scottish Intercollegiate Guidelines Network (SIGN) published *Early Management of Patients with a Head Injury* in August 2000.⁴ Perhaps the most contentious aspect of management remains that of radiological assessment; in Scotland, skull radiography is still used as a screening tool, whereas Steill *et al*¹¹ emphasise the

early use of CT scanning. Similarly, the National Institute for Health and Clinical Excellence (NICE) guidelines,¹² published in 2003, emphasise the use of CT scanning as the primary method of imaging patients with head injury. Despite guidelines, the management of head injured patients in the A&E has been governed largely by local practice and availability of resources and is therefore inconsistent nationally and internationally.¹³

A clinical audit was conducted to see how our approach changed pre- and post-inception of the SIGN guidelines. This formed part of a national study to examine pre- and post-implementation clinical practices throughout Scotland.

PATIENTS AND METHODS

The study looked at patients attending the A&E department of the Royal Infirmary of Edinburgh (RIE) who presented with a head injury. All patients who had sustained blunt force trauma above the neck were included in the study. This included patients with facial injuries. The latter population were included because of the possibility of potential intracranial sequelae. Patients who had sustained a head injury as a result of collapse, and other "medical" conditions, were included, but their subsequent in-patient management was not audited. All other patients were followed to the point of discharge.

Abbreviations: A&E, Accident and Emergency; CT, computed tomography; GCS, Glasgow Coma Score; NICE, National Institute for Health and Clinical Excellence; RIE, Royal Infirmary of Edinburgh; SIGN, Scottish Intercollegiate Guidelines Network; STAG, Scottish Trauma Audit Group; SXR, skull x ray; WGH, Western General Hospital

The neurosurgical unit that serves Edinburgh and Lothian is based at the Western General Hospital (WGH), remote from the RIE. Patients who required neurosurgical intervention were followed up after transfer to the WGH until final discharge.

The study analysed two separate periods of admissions: 1–30 November 1999 (period 1) and 1–31 May 2001 (period 2). These periods were used for two reasons: first, each represented the fourth month in a standard six month junior doctor post (either February to July, or August to January) and would therefore represent a similar point in the experience level of the assessing doctors; second, each period was precisely nine months pre and nine months post the introduction of the August 2000 SIGN recommendations. As part of their induction programme, all senior house officers are given a one hour tutorial on the management of head injured patients. Since August 2000, this tutorial has been based on the SIGN guidelines; additionally, the guidelines were made available to nursing and medical staff working in the acute wards that have responsibility for the management of head injuries. This involved teaching sessions, posters, and action cards, which contained information on the radiological and discharge criteria for this group of patients. For each patient attending the A&E department with a head injury, a proforma was completed (see Appendix). Information was collected on the patient's age, sex, details of injury, and clinical presentation. During the attendance, information was also collected on their radiological assessment and its clinical indications. Details were recorded about admission or discharge, and whether this complied with SIGN recommendations, the clinical course during admission, and whether the criteria were fulfilled for safe discharge. For patients transferred to another hospital, data were collected on the indications for transfer, including GCS, CT scan results, and focal neurological signs.

RESULTS

Statistical analysis of the comparison of pre- and post-guidelines figures was performed using Fisher Exact Probability Tests (SPSS V11).

The number of head injured patients attending the department increased from 788 in November 1999 to 818 in May 2001 (table 1).

In November 1999, there were 575/718 (80%) discharges to home from A&E and 566/763 (74%) in May 2001. Table 2

Table 1 Patients discharged from the A&E department

	1999	2001	p Value
Number of attendances	788	819	
Male patients	575 (73%)	566 (68%)	0.04
No. of discharged patients	645 (82%)	622 (76%)	–
No. of discharges who had a documented pupil check	473 (82%)	458 (81%)	0.59
No. of discharges who had a documented CNS exam	464 (81%)	429 (76%)	0.052
No. of discharges who had a documented GCS	549 (95%)	555 (98%)	0.018
No. of discharges who had a SIGN indication for SXR	223 (40%)	171 (30%)	0.003
No. of discharges who had a SIGN indicated SXR	168/223 (75%)	123/171 (72%)	0.49
No. of discharges who had a SIGN indication for CT	11 (2%)	11 (2%)	1.00
No. of discharges who had a SIGN indicated CT	4/11 (36%)	7/11 (64%)	0.39
No. of discharges fulfilling SIGN 'safe discharge' criteria	329 (57%)	251 (44%)	<0.001

CNS, central nervous system; CT, computed tomography; GCS, Glasgow Coma Scale; SIGN, Scottish Intercollegiate Guidelines Network; SXR, skull x ray.

Table 2 Patients admitted to a ward from the A&E department

	1999	2001	p Value
No. of admitted patients	143	197	
No. of patients with a SIGN indication to admission	139/149 (93%)	191/208 (92%)	0.69
No. documented reason for admission	4/569 (1%)	6/555 (1%)	0.54
No. who had a documented pupil check in A&E	120 (84%)	179 (91%)	0.06
No. who had a documented CNS exam in A&E	125 (87%)	173 (88%)	1.00
No. who had a documented GCS in A&E	142 (99%)	194 (98%)	0.64
No. who had a SIGN indication for SXR	131 (92%)	168 (85%)	0.09
No. who had a SIGN indicated SXR	120/131 (92%)	133/168 (79%)	0.003
No. who had a SIGN indication for CT	23 (16%)	29 (15%)	0.76
No. who had a SIGN indicated CT	16/23 (70%)	23/29 (79%)	0.52
No. with a positive scan	10/19 (53%)	8/28 (29%)	0.13

CNS, central nervous system; CT, computed tomography; GCS, Glasgow Coma Scale; SIGN, Scottish Intercollegiate Guidelines Network; SXR, skull x ray.

shows that a significantly lower proportion of patients had documented SIGN reasons for admission in November 1999 compared with May 2001. Similarly, a higher number of patients were admitted in period 2. Of patients with SIGN listed reasons for admission, most were admitted in both periods.

Compared to pre-implementation practices, a significantly higher proportion of post-guideline patients were documented as GCS 15/15 on discharge or no longer having admission criteria. Neither the rates of documenting pupil checks nor central nervous system examination changed significantly, and fewer patients were noted as receiving head injury advice cards or being discharged to suitable supervision. This result led to a significant reduction in the overall proportion of fully SIGN compliant discharges post-guidelines.

Altogether, 70/788 (9%) patients who attended in period 1 took self discharge compared with 56/819 (7%) in period 2 (p = 0.14). These patients were not considered further. Of the remaining patients, excluding deaths in A&E, 143 of the 718 patients who attended in period 1 were admitted compared with 197 of the 763 patients in period 2 (table 2).

The rate of skull x ray (SXR) examination, when indicated, did not change significantly (tables 1 and 2). There was a significant post-implementation decrease in skull radiography in patients subsequently discharged, although the decrease amongst patients who had a SIGN listed reason for SXR was not significant. Of the 575 discharged patients in period 1, 223 (39%) had SIGN indications for a SXR: of these, 168 (75%) had SXR performed. CT scans on patients who were discharged from A&E were rare patients (12/1141 (1.1%)) and showed no significant change post-guidelines.

There was a significant post-implementation decrease in SXR amongst admitted patients, matched by a significant decrease in those who had a SIGN reason for SXR but who were not x rayed, and there was an insignificant difference between the two periods in the proportion of patients with skull fractures confirmed by SXR. All eleven patients who had a skull fracture identified on x ray subsequently underwent a CT scan.

There was no significant change in the overall proportion of admitted patients who had a CT scan (table 2). Altogether,

15–16% of admitted patients had SIGN reasons for a CT scan, and approximately three quarters of these were scanned. The proportion of negative scans increased from 47% to 71% ($p = 0.13$). The most frequently documented reasons for CT scanning were $GCS < 12$, or evidence of skull fracture from SXR or clinically. Of patients with a documented reason for CT scanning, those with a $GCS < 12$ were least likely to be scanned.

Table 3 shows the destinations of admitted patients. Ward management data were collected for patients who went to surgical, orthopaedic, short stay, or high dependency unit wards, intensive trauma unit, or theatre. Data were not collected for patients who went to medical wards (including maternity, geriatrics, plastics, ophthalmology, maxillo-facial surgery, ear, nose, and throat, psychiatry) or surgical intensive care unit. Patients transferred to the WGH Neurosurgical Unit are considered later. There was no significant difference in the proportion of patients who had a documented assessment on admission to the ward post-guidelines (table 4). There was a small post-guidelines drop in the percentage of patients who had complete reviews. Documented safe discharge compliance from the wards (table 5) increased from 38/76 (50%) patients pre-implementation to 99/112 (88%) patients post-implementation ($p < 0.001$; table 5). Altogether, 3/109 (3%) of admitted patients (excluding medical, and so forth) deteriorated in 1999 compared with 0/157 (0%) in 2001 ($p = 0.07$). None required neurosurgical intervention.

Altogether, 11/143 pre-implementation patients and 9/197 post-implementation patients were transferred to the WGH Neurosurgical Unit. There was no significant change in transfer rates, either directly from A&E or later. There were nine discharges home and two self discharges from A&E who had documented referral/transfer reasons (seven pre-implementation, four post-implementation). Most had base of skull fracture signs. Only two discharges were referred to neurosurgery before discharge.

DISCUSSION

This audit examines whether practice changed post SIGN guidelines inception in a busy A&E department. In terms of patient demographic and aetiology, our patient group matches other studies from Scotland and the UK,^{2, 3, 14} although assault as a mechanism of injury was slightly more common in our study group. This was also found by Strang *et al*¹⁵ and Swann *et al*¹⁶ who found proportionally more admissions in outlying hospitals related to road traffic accidents.

For admission criteria, the SIGN guidelines are followed and fewer patients without a SIGN indication for admission were admitted post-implementation. For admitted patients, a proforma exists for admission documentation; when used, documentation is accurate and comprehensive (GCS

Table 3 Post A&E destinations of admitted patients

	1999	2001
Number of patients	143	197
Ward: surgical, orthopaedic, short stay, or HDU	108 (76%)	155 (79%)
Ward: medical	24 (17%)	19 (10%)
Intensive trauma unit	2 (1%)	
Theatre	1 (1%)	
Other hospital*	12 (6%)	
Neurosurgery		
Direct transfer to Neuro	10 (7%)	9 (5%)
Late transfer to Neuro	1 (1%)	0 (0%)
Combined	11 (8%)	9 (5%)

*Mostly maxillo-facial surgery at St John's Hospital, Livingston.

Table 4 Ward management

	1999	2001	p Value
Number of patients admitted to RIE ward	109	157	
Assessed on admission	97 (89%)	133 (85%)	0.36
Self discharged within 24 hours	22 (20%)	18 (11%)	0.056
Documented review within 24 hours*	81 (93%)	120 (86%)	0.13
Complete review within 24 hours			
All admissions	6/87 (7%)	39/139 (28%)	<0.001
If any review undertaken	6/81 (7%)	39/120 (32%)	<0.001
No fulfilling "safe discharge" from ward†	38/76 (50%)	99/112 (88%)	<0.001

*Excludes patients who self discharged within 24 hours; †excludes self discharges, deaths, and transfers to other wards/hospitals and patients who remained in hospital for more than two days. RIE, Royal Infirmary of Edinburgh.

Table 5 Safe discharge from wards

	1999	2001	p Value
Number of patients	76	112	
Patient assessed	65 (86%)	102 (91%)	0.25
Eating and drinking	60 (79%)	103 (92%)	0.015
Neuro signs resolved	64 (84%)	100 (89%)	0.37
Mobile	66 (87%)	102 (91%)	0.47
Results reviewed	59 (78%)	102 (91%)	0.012
Head injury advice card	48 (63%)	99 (88%)	<0.001
Safe discharge (all of above)	38 (50%)	99 (88%)	<0.001

documentation: 95% in period 1 and 98% in period 2). Despite guidelines, patients were admitted who satisfied criteria for discharge home from A&E. In a previous audit, Brown *et al*² found that access to hospital beds is a major determinant of management in patients presenting with minor head injury, and may be more influential than clinical findings. For admitted patients, there was no significant change in the proportion of patients with documented pupil or CNS examinations in A&E, although there was an improvement in GCS documentation. Of the five patients who were not admitted despite a SIGN indication, one presented and was managed conservatively.

Although there are a number of published guidelines on the early management of the head injured patient, with a few exceptions there is a consensus on which individuals should attend and be admitted to hospital. However, imaging of the head injured patient remains a controversial issue. SXRs continue to be performed in patients without SIGN indications. This is related to the grade and clinical experience of the doctor requesting the investigation, but may also represent pressure from the patient to have the investigation performed. A previous study by McNally *et al*¹⁷ assessed patients' reactions to *not* having skull radiography performed, and demonstrated that, of 705 patients questioned, 51% said they expected a SXR to be performed, and of these 63% had left the department disappointed.

It appears that our use of CT scanning is largely SIGN compliant. The most likely indication for scanning is a $GCS < 12$; but it is this very group of patients who, in this audit, are least likely to have been scanned. Patients with $GCS < 12$ are not a homogenous group, having a wide spectrum of aetiologies; because of this, Teasdale and

Jennett suggest that the GCS score must be used in the clinical context of the patient.¹⁸ Furthermore the SIGN guidelines are not specific in some indications—for example, what exactly is “persistent vomiting”? A significant proportion of head injured patients have taken alcohol, which again makes interpretation of the GCS more difficult. Illicit drug use will also affect the GCS; clinically both alcohol and drugs must be taken into consideration in deciding the patient’s further investigations regardless of their GCS.

In terms of ward discharges, an interesting finding is the improvement in compliance from 50% to 88%. It is not known whether this has been led by surgeons, nurses, or A&E staff; however, most individuals are suitable for discharge by the nursing staff if they fulfil the SIGN criteria. Post-publication the guidelines were distributed on the wards and made available to all staff looking after head injured patients. This appears to be one area where specific instruction has resulted in an increase in compliance.

For patients transferred to the WGH Neurosurgery Unit, there has been little change in practice. Most patients with SIGN indications for transfer who were not transferred had signs of a skull base fracture. Mendelow *et al*⁵ concluded that the role of CT in detecting intracranial haematomas was well established, but it did not affect the dilemma of deciding which patients were admitted to a surgical ward or should be transferred to a neurosurgical unit. It is assumed that if more patients were promptly transferred to neurosurgical centres, there would be a reduction in mortality and morbidity from intracranial haematoma. In our study there is no evidence of undue delay leading to adverse outcome.¹⁹

One of the difficulties inherent in this kind of study relates to adequacy of documentation. In a busy A&E department, especially on weekend nights when a substantial proportion of our head injured patients attend, it is not always possible to make comprehensive documentation the main priority. From the point of view of safe discharge from A&E, it may be that “suitable supervision” is documented poorly in younger patients accompanied by a responsible individual. In the elderly, however, more consideration is required as to whether the patient lives alone or has family support. In terms of discharge advice, head injury advice cards may be issued by either an A&E doctor or nurse, and this is not always documented in the notes.

Another point of consideration is that the audit proforma notes the information recorded in the A&E document as recorded by the assessing doctor and does not refer to the nursing triage entry. In some instances, therefore, the doctor may not duplicate information already recorded in the nursing entry and this will have been overlooked in the proforma. Despite this, some parameters are recorded more consistently than others—the results show that the vast majority of patients have documentation of their GCS and any evidence of alcohol; however, our recording of any amnesia is poorer and inconsistent. This is presumably a reflection of the established importance of the GCS in determining the severity of the head injury as compared with the presence of amnesia, which correlates well with subsequent disability. The latter may therefore be considered to be of secondary importance in initial assessment. This study has shown that we should address this issue in the training of junior doctors who assess these patients.

CONCLUSIONS

Overall SIGN guidelines have not made a significant difference to the investigation and management of head injured patients in this large teaching hospital, except in the frequency of CT scanning and “safe” ward discharges. In the post-guidelines implementation phase, aspects of poor compliance relate principally to the documentation and provision of formal head injury advice and ensuring adequate supervision post discharge. From this viewpoint, systems are required that routinely monitor guideline implementation and compliance.

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APPENDIX 1

SCOTTISH TRAUMA AND CRITICAL CARE GROUP

SIGN Head Injury Guidelines

Name: _____
 A&E No. _____
 UNIT No. _____
 CONCEAL BEFORE POSTING

Hospital: Study No.:
 Age Sex: M F

Incident date: Incident time: : hrs
 Mechanism: Details: _____
 MVA: RTI-1, Assault-2, Fall-2m-3, Fall-2m-4, Other-5, Sport-6
 Re-presenting:

Arrival: Self-1, Ambulance-2, Air-3, Police-4 Other-5
 Transfer from:
 A&E date: A&E time: : Triage time: :
 Triage Area: Resus: Non-Resus: Triage Category:
 Re-triaged to Resus: Y N O Re-triage time: :
 Red-1, Orange-2, Yellow-3, Green-4, Blue-5

A&E Observations GCS: E <input type="checkbox"/> M <input type="checkbox"/> V <input type="checkbox"/> Time first recorded: <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/> Time seen by Dr: <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"><input type="checkbox"/> Pupils checked: Y <input type="checkbox"/> N <input type="checkbox"/> O <input type="checkbox"> CNS Exam done: Y <input type="checkbox"/> N <input type="checkbox"/> O <input type="checkbox"/> Neuro Obs Recorded: In first 2 hours: <input type="checkbox"/> times In next 4 hours: <input type="checkbox"/> times Alcohol: Y <input type="checkbox"/> N <input type="checkbox"/> O <input type="checkbox"/> Allomercer: <input type="checkbox"/> Minimum GCS: <input type="checkbox"/> Ward-1, ICU-2, Theatre-3, Mortuary-4, Other Hospital-5 Neuro-6, SW-7, Home-8, Self Discharge-9, CT-10 If Ward: <input type="checkbox"/> Medical-1, Surgical-2, Outpatient-3, Stroke-4, Other-5 If Other Hospital, where: <input type="checkbox"/> Safe discharge from A&E: (All 4 - Self Discharge) GCS 15 <input type="checkbox"/> Absence of admission criteria <input type="checkbox"/> Head Injury Advice Card <input type="checkbox"/> Suitable supervision <input type="checkbox"/> </input></input>	Indications for X-Ray Serious Mech. of Injury: <input type="checkbox"/> Loss of consciousness: <input type="checkbox"/> Amnesia: <input type="checkbox"/> Vomited: <input type="checkbox"/> Full-thickness lac.: <input type="checkbox"/> Buggy haematoma: <input type="checkbox"/> Inadequate history: <input type="checkbox"/> No SIGN indication: <input type="checkbox"/> X-Rays: Skull XRay: <input type="checkbox"/> Skull fracture: <input type="checkbox"/> C-spine XRay: <input type="checkbox"/> C-spine fracture: <input type="checkbox"/> Facial Views: <input type="checkbox"/> Facial fracture: <input type="checkbox"/> Indications for CT ↓ conscious level: <input type="checkbox"/> Persistent vomiting: <input type="checkbox"/> ↑ focal neurological signs: <input type="checkbox"/> GCS < 15 after 4 hours: <input type="checkbox"/> Evidence of skull #: <input type="checkbox"/> GCS15, no #, but clinical concern: <input type="checkbox"/> CT Scan CT Head <input type="checkbox"/> CT Spine <input type="checkbox"/> CT Date: <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/> CT Time: <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"><input type="checkbox"/> CT Results: Negative <input type="checkbox"/> Fracture <input type="checkbox"/> SDH <input type="checkbox"> EDH <input type="checkbox"/> Contusions <input type="checkbox"/> Other <input type="checkbox"/> If Other, details: _____ </input></input>
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Indications to Admit
 Persistent amnesia:
 Continuing nausea/vomiting:
 Severe headache:
 Seizure:
 Focal neuro signs:
 Irritable/abnormal behav.:
 Evidence of skull #:
 Abnormal CT:
 Signif. medical problems:
 Signif. social problems:
 No supervision:
 Other injuries:
 No SIGN indication:

Observations on Ward
 GCS recorded (or add later to Neuro obs = A&E):
 In first 2 hours: times
 In next 4 hours: times
 In next 6 hours: times
 In next 12 hours: times
 4 hourly until discharge:
Deterioration
 Did patient develop:
 Agitated/abnormal behaviour:
 ↓ conscious level:
 ↑ headache:
 Persistent vomiting:
 New or ↑ neuro signs:
If so, was this:
 Acted upon rapidly:
 Reported to medical staff:
 Dr re-assessed patient?:
 Appropriate action taken?:
 Transferred to neuro?:
 Transfer date: :

Management on Ward:
 Assessed on admission:
Reviewed within 24 hours:
 GCS:
 Neck movement:
 Limb power:
 Pupil reactions:
 Other cranial nerves:
 Check signs of BOS #:
Safe Discharge from Ward
 Patient assessed: Eating normally & not vomiting: Neuro signs resolved:
 Mobile: Results reviewed: Head Injury Advice card:

Depart Ward:
 Date: :
 Time: :
 Destination:
 1. Home
 2. SW/Discharge
 3. Other
 4. Self Discharge
 If other, details: _____

Indications to Refer / Transfer to Neuro:
 +ve CT Scan:
 Unable to scan*:
 Persistent GCS ≤ 8:
 Confusion > 4 hours:
 ↓ Consciousness:
 E ≤ 2, M ≤ 5, V ≤ 4:
 ↑ Focal neuro signs:
 Non-recovery seizure:
 Compound, depressed #:
 Penetrating injury:
 BOS # signs (eg CSF leak):
 *eg acetaminophen for nursing

Management on Ward:
 Assessed on admission:
Reviewed within 24 hours:
 GCS:
 Neck movement:
 Limb power:
 Pupil reactions:
 Other cranial nerves:
 Check signs of BOS #:
Safe Discharge from Ward
 Patient assessed: Eating normally & not vomiting: Neuro signs resolved:
 Mobile: Results reviewed: Head Injury Advice card:

Comments:
 Pupil Exam: Impossible or Refused:
 CNS Exam: Impossible or Refused:
 X-Ray Refused:
 CT Scan Refused:
 STAG No. (where appropriate): :

SCOTTISH TRAUMA AND CRITICAL CARE GROUP

Figure 1 For each patient attending the A&E department with a head injury, a proforma was completed

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