Care of Children and Young People Presenting to Hospital With a Decreased Conscious Level

Decreased Conscious Level (DeCon) Multi-site Audit 2010-2011 Report Executive Summary

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Explanatory notes

The symbol ⬇️ is used in this report to indicate the availability of additional online data found on the DeCon website www.rcpch.ac.uk/decon. This includes supplementary information in the form of more detailed tables and graphs in addition to the information contained in this report.

Throughout this document ‘child’ refers to infant, child or young person unless otherwise stated.

Some total percentages in this report may not sum to 100% due to rounding to 1 decimal place.

Acknowledgements

The DeCon Project Board would like to thank the following individuals and organizations for the contribution of their time, effort and support to the project during its duration:

- The National Reye’s Syndrome Foundation UK for funding this project;
- The clinical and non-clinical staff involved in data collection (Appendix A);
- The clinical staff involved in piloting of the audit tools and methodology;
- The stakeholders who provided their support to the project.

The Decreased Conscious Level Multi-site Audit Project Board comprises the following members:

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<th>Name</th>
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<tr>
<td>Dr Stephanie Smith</td>
<td>Consultant in Paediatric Emergency Medicine, Nottingham University Hospital</td>
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<td>Mr Gordon Denney</td>
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<td>Mr Jason Gray</td>
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<td>Consultant Paediatric Intensivist, Nottingham University Hospital</td>
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<td>Consultant in Paediatric Emergency Medicine, St. Mary’s Hospital, London</td>
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</table>
Stakeholder organisations

- Association of Paediatric Emergency Medicine
- British Association of General Paediatricians
- British Inherited Metabolic Disease Group
- British Paediatric Neurology Association
- Children Living with Inherited Metabolic Diseases
- National Reye's Syndrome Foundation UK
- Paediatric Intensive Care Society
- Royal College of Nursing
- Royal College of Radiologists
- The Encephalitis Society
- The Meningitis Trust
- The Society of British Neurological Surgeons
Foreword

Decreased conscious level is a presenting feature of many conditions which affect children attending hospital. The extent of the altered state of consciousness varies ranging from confusion and agitation to coma. These children may be at grave risk of severe morbidity or even death if not managed in a timely and appropriate fashion.

In 2004, Dr Richard Bowker in conjunction with the Paediatric Accident and Emergency Research Group based at Nottingham University Hospital with funding from the National Reye’s Syndrome Foundation embarked on an ambitious project to develop a guideline to breach the gaps in the care and management of children and young people presenting to hospital with a decreased conscious level. This guideline, *The Management of A Child with a Decreased Conscious Level* was subsequently endorsed by the Royal College of Paediatrics and Child Health in 2005 (Bowker RP, Stephenson T, Baumer JH. Evidenced-based guideline for the management of decreased conscious level. Archives of Disease in Childhood. Education and Practice Ed. 91, ep115 - ep122, 2006).

Six years on, this guideline is still as relevant now as it was then. It is with this in mind that the Decreased Conscious Level Multi-site audit project was commenced in 2010, again funded by the National Reye’s Syndrome Foundation. This report examines some of the key recommendations of the guideline and provides an insight into the current position of the management of these children in hospital settings across the UK pointing to areas of good practice but also deficiencies in care. This report’s findings have immeasurable importance for the enhancement of the quality of care these children receive from all health professionals when they first present to hospital.

Finally, I would like to pay tribute to the very hard work of Stephanie Smith and Carla Long in bringing this report to fruition.

Terence Stephenson
President, Royal College of Paediatrics and Child Health
Executive Summary

The epidemiology surrounding decreased conscious level in children and young people is unclear because there is a dearth of data on the numbers who present to hospital with this condition. Health Episodes Statistics data on head injury in children and young people less than 15 years of age in England in 2009-2010 suggests the prevalence of decreased conscious level due to traumatic causes could be in the region of at least 381 children per 100000 (Health Episode Statistics, 2010). A population study in the North of England reports an estimate of 30 children per 100000 for 0-16 year olds presenting to hospital with decreased consciousness with encephalitis and meningitis accounting for just over one third of these cases (Wong et al., 2001).

The Decreased Conscious Level in Children and Young People (DeCon) Multi-site Audit evaluated some of the recommendations in the guideline The Management of a Child with a Decreased Conscious Level (Paediatric Accident and Emergency Research Group 2005). This project comprised three components:

- A descriptive survey of the participating NHS trusts relating to their available facilities, resources and services;
- A clinical audit of specific recommended criteria and standards;
- A descriptive survey of clinicians examining the barriers and facilitators which impact on their use and compliance with the guideline’s recommendations.

The primary aims of the audit are:

- To assess whether children with a decreased conscious level are receiving appropriate care according to selected recommendations within the guideline; and
- To identify how the guideline is currently being implemented in different settings and determine any barriers to change.

Organisational features of the participating trusts

There were 54 National Health Service (NHS) trusts participating in the audit comprising 66 hospitals. 53 of the 54 (98.1%) trusts returned data for the Service Description Questionnaire.

41.5% (22/53) participating trusts reported that the guideline is not being used in their trusts, while a slightly higher number (31/53, 58.5%) reported using the guideline in some form either as a stand-alone guideline or incorporated within another guideline used in their trust.

Over half of the participating NHS trusts (30/53, 56.6%) reported that in a typical week, the most senior grade of paediatrician resident on-site all night at their trust is either a consultant or a doctor of ST4 to ST8 grade or equivalent.
81.1% (43/53) trusts have access to paediatric anaesthetic skills or expertise on-site in a typical week, although data was not collected on whether this expertise was at consultant level. The trusts were more likely to report having either a general anaesthetist with paediatric interests (40/53, 75.5%) or general anaesthetist (28/53, 52.8%) as compared to a paediatric anaesthetic specialist such as a paediatric anaesthetist (14/53, 26.4%) or a paediatric intensivist (9/53, 17.0%).

79.2% (42/53) trusts have a paediatric nurse with Advanced or European Paediatric Life Support or equivalent training present on shift in a typical week with 21/53 (39.6%) reporting this availability on a 24/7 (24 hours per day, 7 days per week) basis and 21/53 (39.6%) indicating availability but not on a 24/7 basis.

60.4% (32/53) trusts possess an on-site paediatric emergency department or an area in their emergency department solely dedicated to the care of paediatric patients.

11.8% (6/53) trusts possess a dedicated paediatric intensive care unit on-site, while a significant percentage reported having a short-stay or assessment unit solely dedicated to the care of paediatric patients (37/53, 69.8%).

**Clinical Audit Methodology**

Participating units were asked to prospectively identify any consecutive cases of children less than 18 years who presented to hospital with a decreased conscious level between the period 1 November 2010 to 30 September 2011 and enter their clinical details into an online questionnaire. Trusts reported difficulties in adhering to a strict prospective case identification methodology. All trusts involved in the audit employed either a wholly retrospective approach or a combined approach using both prospective and retrospective case identification.

There were several limitations of the audit which included:

- Under-estimation and poor data capture in some categories of children and young people such as neonates, those over 16 years old or those presenting with a decreased conscious level secondary to alcohol intoxication;

- Contamination of the methodology due to failure to adhere to a strict prospective approach;

- The risk that setting standards based on documentation overlooks care in cases where documentation is inadequate;

- Possible inconsistency in the trusts’ data capture due to the wide variation in case ascertainment among the trusts;

- Inadequate mechanisms for the detection of these patients in some trusts leading to small numbers of cases in comparison to other trusts with similar numbers of Accident and Emergency attendances;
Possible reduced generalizability and representativeness of the audit’s findings due to limited participation in Wales, Northern Ireland and Scotland.

The audit measured criteria within 8 main areas in the management and care of children and young people presenting to hospital with a decreased conscious level:

1. Features of the clinical history
2. Observations
3. Use of the physiological scoring systems: Glasgow Coma Scale and AVPU (alert, voice, pain and unresponsive) Scale
4. Recommended frequency of GCS measurements
5. Recommended core investigations and tests
6. Working diagnosis within 4 hours of presentation
7. Management plan within 4 hours of presentation
8. Parent or guardian involvement during initial resuscitation and management

There were exceptions to the standards and not every standard related to all children with a decreased conscious level; indeed some standards were only relevant to specific groups based on age and working diagnosis.

The DeCon Project Board set the thresholds for performance on the audit criteria focusing on the measurement of selected areas of basic care in the management of children with a decreased conscious level. A 90% performance target (optimal level) rather than a 100% target (ideal level) was set for the majority of audit standards, with a few exceptions such as the standards related to the recommended investigations for metabolic and infective cases, along with parental or guardian involvement.

A traffic light system consisting of green (90-100%), amber (75-89%) and red (<75%) is employed to illustrate visually how trusts in the audit performed for the specific standards.

**Audit sample**

For the data collection period 1 November 2010 to 30 September 2011 for the clinical audit questionnaire, there were 1135 cases submitted via the online tool. These data were submitted by 51 of the 54 (94.4%) participating trusts.

The audit sample comprised any child or young person less than 18 years, who presented to the participating trusts with a decreased conscious level. A decreased conscious level was defined as a Glasgow Coma Score (GCS) of 14 or less or an assessment of a response to voice, pain, or unresponsiveness on the AVPU scale.
If children and young people possessed any of the following features they were excluded from the audit: a previously diagnosed condition such as epilepsy or diabetes, a previously diagnosed metabolic condition, a ventriculo-peritoneal shunt, a GCS less than 15 on a day-to-day basis or a decreased conscious level from the moment of birth onwards.

1146 cases were submitted via the online tool, of which 1135 met the audit’s inclusion criteria. 11 cases were deemed ineligible for the following reasons:

- 1 case where the AVPU assessment was Alert and the GCS was 15;
- 5 cases where the AVPU assessments were Alert and there were no GCS scores; and
- 5 cases where the GCS scores were 15 and there were no AVPU assessments.

Of the 1135 cases, the total number of cases entered into the online data collection tool by the trusts ranged from 1 to 73, with a mean of 22 cases and a median of 15 cases. 7 trusts submitted less than 5 cases and 21 trusts more than 20 cases.

The majority of the audit sample presented to a mixed emergency department (701/1135, 61.8%). The remainder presented either to a paediatric emergency department (407/1135, 35.9%) or paediatric assessment unit (25/1135, 2.2%).

45.2% (513/1135) of the audit cases were female and 55.8% (622/1135) were male. A higher percentage of female children (170/513, 33.1%) presented with decreased conscious level secondary to alcohol intoxication as compared to male children (142/622, 22.8%), whereas a significantly higher proportion of male children (121/622, 19.5%) presented with a decreased conscious level secondary to traumatic causes as compared to female patients (56/513, 10.9%) (P <0.005).

The audit cases had a mean age of 8.3 years (standard deviation = 6.3 years) and a median age of 8 years. Children less than 5 years presenting to hospital with a decreased conscious level were more likely to present with febrile seizures (107/462, 23.2%) and infective causes (147/462, 31.8%), whereas children between 5 and 11 years were more likely to present with infective causes (44/169, 26.0%) and traumatic causes (47/169, 27.8%) and those 12 years and over, overwhelmingly with alcohol intoxication (309/504, 61.3%) and traumatic causes (75/504, 14.9%) (P <0.005).

On presentation to hospital, 94.9% (1077/1135) of the audit sample had a differential working diagnosis. The most common working diagnoses among the audit sample were alcohol intoxication (312/1077, 29.0%), infective causes (217/1077, 20.2%) and traumatic causes (177/1077, 16.4%).

62.1% (705/1135) of the children presenting to hospital with a decreased conscious level were either reviewed by a consultant or a ST4 to ST8 (Specialty trainee year 4 to 8) doctor in paediatrics or emergency medicine. Children under five years who presented to hospital with a decreased conscious level were more likely to be reviewed by a consultant (199/462, 43.1%) as compared with those children between 5 to 11 years (64/169, 37.9%) and those 12 years and over (98/504, 19.4%) (P <0.005).
There were 16 deaths (1.4%) among the audit sample. However, the majority of children were discharged from the emergency department or paediatric assessment unit (470/1135, 41.4%) or transferred for observation and treatment either to a general or specialist ward in the hospital (480/1135, 42.3%). 9.9% (112/1135) of the audit sample were transferred to paediatric intensive care units and 4.1% (46/1135) to other NHS hospitals. Data related to the outcome of the cases in this audit should be treated with caution because the number of deaths may be under-estimated since participating trusts were only required to indicate the child’s outcome in relation to the current episode of care.
Question 1: Features of the clinical history

In the majority of trusts, there was a failure to meet the performance targets for either all or some of the recommended clinical history features which should be elicited from children and young people who present to hospital with a decreased conscious level. Very few trusts met the performance targets for the documentation of the presence or absence of the following clinical history features: vomiting (4/51, 7.8%), fever (4/51, 7.8%), convulsions (4/51, 7.8%), alternating periods of consciousness (11/51, 21.6%), trauma (2/51, 3.9%), ingestion of medication or recreational drugs (2/51, 3.9%) and length of symptoms (23/51, 45.1%). However, many of the trusts meeting the performance targets for these standards had less than 5 cases.

There were three other features of this audit sample which form the basis of a good examination by any admitting doctor of a child and young person on presentation to hospital. These include checking for signs of shock, the presence or absence of a non-blanching rash, and the pupil size and response. These examinations were documented as being undertaken to the following extent in the audit cases for all trusts combined:

- Signs of shock = 51.7% (587/1135)
- Presence or absence of a non-blanching rash = 36.1% (410/1135)
- Pupil size and response = 73.2% (831/1135)

Question 2: Observations

Generally trusts performed well for the documentation of heart rate (50/51, 98.0%) and oxygen saturation (46/51, 90.2%), and to a lesser degree for respiratory rate (38/51, 74.5%). However, the documentation of blood pressure (11/51, 21.6%) and temperature (31/51, 60.8%) of the child or young person presenting to hospital with a decreased conscious level was of a poorer standard across the participating trusts.

Question 3: Physiological scoring system used

47/51 (92.2%) trusts met the performance target that at least 90% of children and young people presenting to hospital with a decreased conscious level should have either a GCS (adult or modified) or AVPU assessment performed and documented in their clinical record as a means of assessing the extent of their conscious level.

3.2% (36/1135) of the total audit sample did not have either GCS or AVPU used to assess their level of consciousness, although trusts still identified these cases as meeting the audit criteria based on their documented clinical history. Trusts reported qualitatively that some of the reasons for the lack of documentation were due to missing clinical records, missing observation charts and the quick recovery of patients after presentation which made these assessments unnecessary.
In children who had their GCS done, the severity of decreased conscious level was categorised as follows:

- **Severe**: GCS ≤ 8 = 22.5% (203/903)
- **Moderate**: GCS 9-12 = 24.5% (221/903)
- **Mild**: GCS 13-15 = 53.0% (479/903)

Children under five years (434/462, 93.9%) were less likely to have documentation of the use of either GCS or AVPU to assess their level of consciousness on presentation as compared with those five years and over (665/673, 98.8%) (P < 0.005).

**Question 4: Recommended frequency of GCS observations**

49 of the 51 trusts had eligible cases of children who had their GCS done on presentation, accounting for 903 cases. 1/49 (2.0%) met the standard that 90% of children and young people presenting to hospital with a decreased conscious level who had their GCS done should have the recommended frequency of GCS measurements performed and recorded in their clinical records.

The failure of the majority of trusts to achieve this standard may be due to a range of reasons such as:

- Misinterpretation of this question;
- The lack of sensitivity in this question to adequately detect this standard;
- A genuine failure of clinicians in the participating trusts to comply with this recommendation in the guideline; and
- The specificity of the recommendation which means that trusts which do not employ the guideline may show low compliance in this area.

**Question 5: Investigations and tests**

14/51 (27.5%) trusts participating in the audit met the standard that a child or young person presenting to hospital with a decreased conscious level should have their capillary blood glucose done within 15 minutes of presentation.

There were no performance targets set for the other recommended core investigations which relate specifically to metabolic or infective cases. Indeed, only 21/51 trusts possessed eligible metabolic cases with a total of 35 cases, and 46/51 trusts possessed eligible infective cases totalling 217 cases.
There were insufficient metabolic cases in this sample to provide useful interpretation of the data on whether these cases met the standards for the core investigations and tests recommended in the guideline on a trust by trust basis. However, even in this small group, children presenting to hospital with a decreased conscious level secondary to a metabolic cause fail to have adequate documentation that the recommended core investigations were taken. A similar picture was seen among the infective cases with low levels of documentation of dipstick urinalysis (64/217, 29.1%) and to a much lesser degree blood cultures (171/217, 78.8%).

**Question 6: Working diagnosis within 4 hours of presentation**

40/51 (78.4%) trusts met the standard that 90% of children and young people who present to hospital with a decreased conscious level should have their working diagnosis documented in their clinical record within 4 hours of presentation to hospital. Children under five years (428/462, 92.6%) were less likely to have documentation of the working diagnosis within 4 hours of presentation as compared with those 5 years and over (649/673, 96.4%) (P = 0.004).

**Question 7: Management plan within 4 hours of presentation**

All 51 trusts which provided clinical audit data met the standard that 90% of children and young people who present to hospital with a decreased conscious level should have a management plan documented in their clinical record within 4 hours of presentation to hospital.

**Question 8: Parental/Guardian involvement**

There were no performance targets set for the standards related to parental or guardian involvement and communication during the initial management and resuscitation of the child or young person presenting to hospital with a decreased conscious level comprising the following areas:

- Allowing the parent or guardian to stay with their child;
- Informing the parent or guardian of their child’s possible diagnosis and treatments; and
- Informing the parent or guardian of their child’s possible prognosis.

There were low levels of documentation of information-sharing and communication with parents’ or guardians with 46.9% (426/1135) being informed of their child’s diagnosis and 35.2% (426/1135) of their child’s possible prognosis.
Key Recommendations

For health professionals

1. All health professionals should take a comprehensive clinical history in children and young people presenting to hospital with a decreased conscious level irrespective of the differential diagnosis.

2. The clinical history documentation should include information on both the presence of a feature and its absence.

3. If health professionals are unable to obtain an adequate clinical history the reasons for this should be documented in the child’s clinical record.

4. On arrival to hospital, all children and young people with a decreased conscious level should receive measurement of the complete set of observations including heart rate, respiratory rate, oxygen saturation, blood pressure and temperature.

5. All health professionals caring for and reviewing these children and young people should be responsible for ensuring that the complete set of observations are performed.

6. On arrival to hospital, all children and young people with a decreased conscious level should have either an AVPU or GCS (adult or modified) undertaken and the measurement documented.

7. If a child’s decreased conscious level persists, this child should have their GCS measured and documented every 15 minutes if GCS ≤ 12 and every 60 minutes if GCS>12 in accordance with the guideline, until there is an improvement in condition.

8. If a child requires regular evaluation of their conscious level, GCS measurements should be commenced in addition to or instead of AVPU.

9. Capillary blood glucose should be undertaken in all children presenting to hospital with a decreased conscious level irrespective of the differential diagnosis.

10. All children presenting to hospital with decreased conscious level secondary to a metabolic, infective or unknown cause should receive appropriate and early investigation in accordance with the guideline.

11. All health professionals should document in the child’s clinical record not only the clinical care given but also any discussions undertaken with parents, as well as children and young people.

12. All health professionals should inform parents or guardians of their child’s possible diagnoses and prognosis and document this in the clinical record.
For trusts

13. Health professionals should receive regular training to reinforce good record keeping skills and this should be part of all trusts’ compulsory training programme.

14. Observations charts should be incorporated into the emergency department notes whether written or electronic to encourage staff to measure and document the observations of all paediatric patients presenting with an acute illness of which decreased conscious level may be a feature.

15. Trusts who participated in the audit who failed to meet a minimum target of 75% for the standards in at least one of the four key areas should consider repeating a limited audit in these areas, six months after the dissemination of the audit’s findings:

- Clinical history features of vomiting before or at presentation, fever before or at presentation, convulsions before or at presentation, alternating periods of consciousness and length of symptoms;
- Use of AVPU or GCS to assess the child’s conscious level;
- Observations of heart rate, respiratory rate, blood pressure and temperature on presentation to hospital;
- Capillary blood glucose taken within 15 minutes of presentation.

General

16. The guideline should be updated and following one year of the revised guideline being in place, management of the child with a decreased conscious level should be re-audited. The audit should include England, Wales, Northern Ireland and Scotland.

17. All health professionals managing the emergency presentation of children and young people should be made aware of the guideline’s existence and the audit’s findings by engaging with the College of Emergency Medicine, the Royal College of Nursing and other pertinent Royal Colleges.

18. All front-line staff both in paediatric departments but also in emergency departments should be made aware of the guideline and the audit’s findings by using a multi-faceted dissemination approach.
<table>
<thead>
<tr>
<th>Audit standards: Information documented</th>
<th>Cases meeting the standard</th>
<th>% Cases meeting the standard</th>
<th>Median percent (95% Confidence Interval)</th>
<th>Trusts meeting the 90 - 100% performance target level</th>
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<tbody>
<tr>
<td>vomiting before or at presentation</td>
<td>660</td>
<td>58.2%</td>
<td>57.6% (50.0%, 64.4%)</td>
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<td>fever before or at presentation</td>
<td>495</td>
<td>43.6%</td>
<td>45.9% (38.5%, 53.3%)</td>
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<td>convulsions before or at presentation</td>
<td>484</td>
<td>42.6%</td>
<td>44.7% (40.0%, 50.0%)</td>
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<tr>
<td>alternating periods of consciousness</td>
<td>644</td>
<td>56.7%</td>
<td>60.0% (50.0%, 73.3%)</td>
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<td>trauma</td>
<td>441</td>
<td>38.9%</td>
<td>30.8% (26.7%, 40.0%)</td>
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<td>ingestion of medication/recreational drugs</td>
<td>391</td>
<td>34.5%</td>
<td>28.6% (20.0%, 37.3%)</td>
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<tr>
<td>length of symptoms</td>
<td>895</td>
<td>78.9%</td>
<td>82.6% (79.4%, 93.1%)</td>
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<td>heart rate on presentation</td>
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<td>oxygen saturation on presentation</td>
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<td>95.2%</td>
<td>100.0% (95.9%, 100.0%)</td>
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<td>blood pressure on presentation</td>
<td>872</td>
<td>76.8%</td>
<td>77.0% (75.0%, 83.3%)</td>
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<td>temperature on presentation</td>
<td>1002</td>
<td>88.3%</td>
<td>92.3% (86.9%, 100.0%)</td>
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<td>GCS or AVPU used to assess conscious level</td>
<td>1099</td>
<td>96.8%</td>
<td>100.0% (100.0%, 100.0%)</td>
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<td>capillary blood glucose taken within 15 minutes of presentation</td>
<td>866</td>
<td>76.3%</td>
<td>83.3% (76.9%, 85.7%)</td>
<td>14</td>
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<tr>
<td>working diagnosis within 4 hours of presentation</td>
<td>1077</td>
<td>94.9%</td>
<td>98.3% (95.2%, 100.0%)</td>
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<td>management plan within 4 hours of presentation</td>
<td>1112</td>
<td>98.0%</td>
<td>100.0% (100.0%, 100.0%)</td>
<td>51</td>
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</table>
References


Paediatric Accident and Emergency Research Group (2005) The Management of a Child with a Decreased Conscious Level: an evidence-based guideline for health professionals based in the hospital setting; Nottingham, University of Nottingham.

Wong CP; Forsyth RJ; Kelly TP; Eyre JA (2001) Incidence, aetiology, and outcome of non-traumatic coma: a population based study; Archives of Diseases in Childhood; 84(3):193-199