Assessment of pain in children with brain injury: moving to best practice

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Abstract
Nurses are guided to use pain tools for assessing pain. Appropriate tools exist for all ages of children, as well as accounting for diverse communicative abilities and impairments such as brain injury. Use of pain tools, and good documentation of pain management, is part of providing best practice, high-quality care. Clinical audit, based on compliance with the Royal College of Nursing guideline for pain assessment, measured current and changing practice at a 70-bed national specialist centre for children with brain injury. Compliance was initially poor. Changes in practice were supported by evidence-based measures, including a written guideline, classroom teaching, visits to practice areas, sharing of audit results, reminders and a special interest group. Over 3 years, the audits showed an increase of child-specific pain tools available in children’s care files from 9% to 83%; assessment of pain using a pain tool, when indicated, increased from 0 to 30%. Documentation of interventions to relieve pain increased from 51% to 80% and reassessment of pain following an intervention increased from 15% to 63%. This article will resonate with any organisation trying to embed systematic pain assessment into routine practice.

Key words: Pain measurement ■ Brain injuries ■ Cognition difficulties ■ Child ■ Nursing audit

Pain is historically difficult to interpret without bias, and current best practice focuses on patient involvement and the use of pain tools to standardise pain assessment (Royal College of Nursing (RCN), 2009). Research into paediatric pain tools has been widely published over the last three decades (McGrath, 1987; McCaffery and Beebe, 1993; Tyler et al, 1993; Franck et al, 2000; Solodiuk and Curley, 2003; Ely et al, 2012), with indications that pain tools are a key element in effective pain management (Ellis et al, 2007). Nurses are guided to anticipate pain and use validated pain tools when pain is suspected (RCN, 2009).

For children with moderate to severe brain injury (congenital and acquired), anticipation of pain is paramount since they are at higher risk of experiencing pain owing to long-standing health conditions, potential investigative procedures and treatments (Breau et al, 2003; Solodiuk, 2013), accidental and non accidental injuries (Breau et al, 2003), and impaired expression of pain (Hunt et al, 2003; Chen-Lim et al, 2012). Managing pain effectively in this group of children is essential to prevent distress and enable them to participate in therapy, education, play and leisure activities; assessing pain is the first step. Self-reporting of pain is considered to be the gold standard but this presents challenges in some children with brain injury and particular attention is required when the ability to express pain is hampered by the impairment, cognition or the ability to communicate (Department of Health (DH), 2004; Ely et al, 2012).

Pain tools for children with moderate to severe brain injury are, moreover, observation based. Changes in body language and behaviour are the main cues to the presence of pain, discomfort or distress, but presentations of pain are unique to each child, with signs of pain for one being the same as signs of ‘no pain’ for another (Solodiuk, 2013). Good nursing assessment, therefore, is dependent on pain tools. As a result of the challenges in recognising pain, it is frequently inadequately treated (Hunt et al, 2003; Chen-Lim et al, 2012; Solodiuk, 2013) and severe health issues are at risk of going undetected (Solodiuk, 2013).

Given the wealth of literature and a profession-specific guideline for paediatric pain assessment, it could be assumed that systematic assessment of pain is part of contemporary nursing practice. In reality, nurses use pain tools inconsistently (Ellis et al, 2007), the guidance is implemented haphazardly, and pain continues to be poorly managed (Ellis et al, 2007; Franck and Bruce, 2009; Ely et al, 2012).

The need for organisation-wide systematic pain assessment, was identified as a priority at a 70-bed national specialist centre for children with brain injury, offering rehabilitation for acquired brain injury, transitional care for technology-dependent children, short breaks, continuing care, and residential and day education. Diagnoses include acquired brain injury—with causes including trauma, anoxia, tumour, and infections—or congenital brain injury, such as in cerebral palsy, often with accompanying comorbidities. The age range is 0 to 25 years, with a mean age of 13 years. Length of stay depends on the reason for admission: children accessing brain injury rehabilitation stay on average 154 days/5 months, while children and young adults accessing residential education may be permanently resident. Nurses and carers provide direct care, with significant input from the wider multidisciplinary team. Health professionals are warned to anticipate chronic headaches following brain injury (Blume et al, 2012), pains associated with severe impairments (such as musculoskeletal...
and gastrointestinal pains), as well as co- incidental pains such as toothache.

Regular audit of pain management is recommended (DH, 2004). Clinical audit looking at pain assessment was introduced at this centre in 2010, followed by the implementation of supportive measures to change practice. Additional audits considering other aspects of pain management, such as the prescribing of analgesia, are not discussed in this paper. This article discusses four consecutive audits and supportive measures taken for staff engagement, and shares progress made. The aim of the project was to measure pain assessment using clinical audit, with the end goal of evidencing a reduction in pain episodes and pain intensity.

Methodology
Clinical audit is commonly used in clinical governance for measuring a change in practice when efforts are necessary to support such a change (Jamtvedt et al, 2006). In 2010, the centre’s clinical governance group added pain management to the annual clinical audit programme, and agreed a goal of 90% compliance. Measuring current service provision through audit, does not require ethical approval, but given the vulnerabilities of this population, approval was sought and given by the centre’s research committee.

A clinical audit tool was developed by two registered nurses (with further qualifications in palliative care and pain management), based on the RCN (2009) guideline (Table 1).

Each audit was carried out by a minimum of two registered nurses over two days. Using the audit tool in 2010 (n = 23), 2011 (n = 31), 2012 (n = 53) and 2013 (n = 53) children’s care files were examined retrospectively for a period of seven days. The question regarding an appropriate validated tool being present in the child’s file was answered with a simple yes or no. This was checked against the communication section of the care plan, or checked with staff who had good knowledge of the child’s communicative abilities.

The remaining questions required the auditor to count the documented descriptors indicating pain or discomfort, or potentially painful procedures. For each episode the auditor then considered the remaining questions with a yes or no. For example, if three presentations of pain were documented, each episode was audited for an assigned pain score (evidence of pain tool being used), an intervention to relieve pain, and reassessment of pain following the intervention. As an example: ‘crying and grimacing/pain score 8’; re-positioned and paracetamol given, with good effect (or another pain score), would score ‘yes’ for all sections of the audit.

Supportive measures for changing practice
The first audit (2010) indicated that changes in practice were required. The key elements for making changes in practice are adapting knowledge to the local setting, identifying facilitators and barriers and developing an implementation strategy reflecting these (Canadian Institutes of Health Research, 2012).

Suggestions for supporting a change in practice specific to pain management include appointing a pain resource nurse and challenging the related attitudinal aspects of pain management (Ellis et al, 2007; Chen-Lim et al, 2012). Furthermore, generic evidence-based methods to support change in practice were sought and identified (Law et al, 2004; Grimshaw et al, 2004). Some studies favour specific supportive measures, others promote multifaceted measures, with two or more supportive measures combined, and clinicians are directed to consider benefits and costs when implementing guidance (Grimshaw et al, 2001; 2004).

Given a lack of clear direction, multifaceted supportive measures were implemented at this facility, chosen for their ease of delivery using minimal resources, and ability to engage staff. These measures were implemented intensely over the first 2 years and to a lesser degree over the remaining year.

Grimshaw et al (2001) reviewed the methods for supporting changes in practice. The most effective and applicable methods were implemented:

- Adapting existing guidelines to local context
- Classroom teaching
- Visits to the practice area
- Sharing of audit results
- Email reminders
- Formation of a special interest group.

Improved documentation of pain (with or without pain intensity scores) is often found following supportive measures for pain management (Ellis et al, 2007), but even with good effort and resources, support initiatives to change practice might only result in a mean improvement of 10% (Grimshaw et al, 2001; 2004).

Adapting existing guidelines to local context
A guideline was developed, informed by the RCN (2009) guideline and published literature, and made relevant to the local context. The guideline was disseminated in print form and made available to all staff. While printed material is acknowledged as inadequate as a standalone method for change (Grimshaw et al, 2001), the guideline also serves as a resource for staff, and a format for teaching sessions. Many guidelines are adopted ineffectually even with intensive dissemination (Waddell, 2001), achieving limited change in

Table 1. Translating the RCN guideline into a local audit tool

<table>
<thead>
<tr>
<th>RCN (2009) guideline</th>
<th>Local audit tool</th>
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<tbody>
<tr>
<td>Be vigilant for any indication of pain; pain should be anticipated in children at all times</td>
<td>Presentation of pain is documented when apparent</td>
</tr>
<tr>
<td></td>
<td>Documentation indicates pain has been considered when there is potential for it e.g. invasive procedures/presence of wound, fracture</td>
</tr>
<tr>
<td>Children’s self-report of their pain, where possible, is the preferred approach. For children who are unable to self-report, an appropriate behavioural or composite tool should be used</td>
<td>A validated pain tool appropriate to each child’s needs is identified and available in each child’s care file</td>
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<tr>
<td>If pain is suspected or anticipated, use a validated pain assessment tool; do not rely on isolated indicators to assess pain</td>
<td>When pain is suspected or anticipated the identified pain tool is used to obtain a score</td>
</tr>
<tr>
<td>Assess, record, and re-evaluate pain at regular intervals; the frequency of assessment should be determined according to the individual needs of the child and setting</td>
<td>An appropriate pain relieving intervention is documented</td>
</tr>
<tr>
<td>Reassessment of pain is documented</td>
<td>Interventions continue until child is comfortable/pain score 0</td>
</tr>
</tbody>
</table>
practice (Grimshaw et al, 2004). An organisational culture of learning and transformational leadership are noted as key elements in influencing guideline implementation, but even with these elements in place there remains variability in the execution of best practice guidelines (Marchionni and Ritchie, 2008).

The local guideline offers generic information about pain, specific to this group of children, suggests five pain tools and supports choice of appropriate tools using a decision tree. The pain tools were chosen for being validated tools, appropriate for the varying cognitive and communicative abilities of this group of children, for having similar maximum scores, and ease of use. The five pain tools suggested for use were the Numeric Rating Scale (McCaffery and Beebe, 1993), Wong Baker Faces (Wong and Baker, 1995), FLACC revised (Malviya et al, 2006), the Individualised Numeric Rating Scale (INRS) (Solodiuk et al, 2010) and the Nociception Coma Scale—Revised (Chatelle et al, 2012).

Common understanding of pain intensity scores facilitates improved pain management therefore most selected tools scored out of 10 (Ellis et al, 2007). Many children with complex health needs are often cared for by a range of health professionals as well as family members and pain tools need to be transferable, and easily understood, across a variety of settings and disciplines. Four of the chosen tools have a maximum score of 10, and one (Nociception Coma Scale—Revised) a maximum score of 9.

There are many other validated and useful tools not included in the guideline, primarily because of significantly varying maximum scores and complexity of use. The Non-Communicating Children’s Pain Checklist—revised (Breau, 2003) has a maximum score of 90 with some sections not relevant to all children, and the Paediatric Pain Profile (Hunt et al, 2004) has a maximum score of 60 for each different pain. While there is evidence to support the use of both tools in this group of children, a common scoring system is known to facilitate organisational adoption. Furthermore, nurses have shown a preference for simpler tools (Chen-Lim et al, 2012).

The INRS (Solodiuk et al, 2010) has been further developed locally to have a second parallel section suggesting child-specific, interventions, graded against pain severity. Local reliability of this tool has been found optimal when developed by three people who know the child well.

The Nociception Coma Scale—Revised (Chatelle et al, 2012) is used at this facility for children with disorders of consciousness (in minimally conscious/vegetative states), while as yet only validated for adults, and more complex to use than other tools, alternatives lack the sensitivity required.

The guidance suggests pain tools be used when pain is suspected or anticipated, or during an initial period of assessment. Recordings of ‘no pain’ are relevant where there is an identified source of pain, for example in the post-operative period.

The guideline also lists possible interventions (both pharmacological and non pharmacological) aimed at relieving pain, with pharmacological interventions based on the World Health Organization (WHO) two-step strategy (WHO, 2012), together with processes to follow in the event of pain not resolving promptly and suggestions for sharing the information with the multidisciplinary team to ensure a coordinated approach to pain management.

### Classroom teaching

Teaching sessions based on the local guideline were delivered to the multidisciplinary team. Classroom-based learning is recognised as inadequate as a standalone supportive measure for changing practice (Grimshaw et al, 2001), but for many at this centre, attending teaching sessions seemed to be preferable to reading the guideline, were often requested and well attended. The teaching sessions were accessed by approximately 200 (66%) of the multidisciplinary team, and evaluated well. However, dissemination back to team members was apparently poor.

### Visits to the practice area

Visits to discuss the use of pain tools and other issues relating to pain were available on request. Take up of the offered visits to departments was limited. However, a number of meetings were held with managers to discuss how to progress.

### Sharing of audit results

Audit and feedback can be supportive in changing practice, with best effects when adherence to recommended practice is poor, and when feedback is given intensely (Jamtvedt et al, 2006). Audit results were presented each year to the clinical governance group, and to heads of departments, for dissemination. The audit results also informed teaching sessions, and targeted interventions for specific departments. Guidance on reporting audit results was introduced to enhance the potential impact.

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**Figure 1. Audit results for use of pain tools, interventions and reassessment of pain, 2010-2013**

![Audit results graph](image-url)
Email reminders
Reminders have shown to be more effective than other supportive measures (Grimshaw et al, 2001), but might depend on access to email or printed forms. Reminders by email were used to a minimal extent, knowing that most clinical staff would not access these regularly. Within the emails, staff were briefly reminded to use a pain tool to obtain a score, document an intervention aimed at relieving pain, and to subsequently reassess pain.

Formation of a special interest group
A pain special interest group (PSIG) was formed, offering a chance for clinical staff to discuss issues related to implementing the guideline, but also to learn, share practice and discuss new literature. The PSIG facilitated improved understanding, and interest, with perhaps competition between departments being a factor in the audits; from these meetings staff were better placed to progress pain management within departments.

Findings
The results from each audit (2010, 2011, 2012, 2013) were entered into an Excel spreadsheet. All audits identified documented descriptors of pain/discomfort, suggesting episodes per child ranged from 0.8 to 2.4 per week.

The 2010 audit showed that 9% (n=2) of children had a pain tool identified in their care file, this increased to 55% in 2011, 66% in 2012 and 83% in 2013. All five pain tools were in place across site at the end of the audit period reflecting the diverse communicative abilities of the children.

When suspected pain was documented, the use of pain tools to score pain increased each year. Audit showed that use of pain tools began at zero in 2010; increasing to 9% in 2011; 12% in 2012, and to 30% in 2013, this increase is likely to be directly related to the number of pain tools in place, as well as supportive measures to increase their usage.

When suspected pain was documented, evidence of an intervention (either pharmacological or non-pharmacological, or a combination of both) aimed at relieving pain was documented 51% of the time in 2010, 75% of the time in 2011, 65% in 2012 and further increasing to 80% in 2013. Reassessment of pain following an intervention was documented 15% in 2010, 45% in 2011, 45% in 2012 and further increasing to 63% by 2013 (Figure 1).

Discussion
This audit suggests that pain is not an uncommon issue for children with brain injury. Evidently, children with brain injury are likely to have weekly pain or discomfort, and the number of suspected pain episodes are comparable with other studies in children with severe cognitive impairments (Breau et al, 2003).

The increasing presence of pain tools in the files suggests an increased awareness of the need to assess pain using objective measures, but the audit shows they were not used to measure every suspected episode of pain, making the severity and duration of pain episodes unclear. Initially, where suspected pain was documented, interventions aimed at relieving pain were documented half the time, and where interventions were documented, reassessment of pain rarely occurred.

The audit clearly identified a need for a change in pain assessment, yet the optimum methods for enabling such a change are unclear (Ellis et al, 2007). As such, a range of supportive measures was implemented, and compliance was seen to increase slowly over a few years.

While the audit results suggest nursing and care staff did not always use pain tools for assessing children’s pain, there was local confidence that practice was not truly reflected in the documentation. While this might be true, nurses in particular remain accountable for their actions, and documentation of assessments and care is part of the Nursing and Midwifery Council (2008) standard of conduct. Pain tools are particularly useful to show an ongoing objective measure of suspected pain, where changes in care staff, or a busy workload, might make a worsening health condition difficult to identify. Furthermore, good documentation of pain scores can inform appropriate prescribing. Documenting the pain intensity score, the intervention aimed at relieving pain, and the reassessment of pain, is a clear way of showing care is reflecting current best practice.

Inconsistent use of pain tools is not unusual (Chen-Lim et al, 2012), and despite employing multifaceted interventions over a 3-year period, progress was slower than hoped for. Factors influencing the use of pain tools include heavy workload and documentation overload (Ellis et al, 2007), both of which are arguably pertinent to most care centres.

The audits indicate the suggested benchmark of 10% improvement was exceeded, and thus that changes in practice were actually at a meaningful pace. With continuing effort, greater adherence to the local guideline, recently developed into policy, will undoubtedly lead to a more consistent approach to pain assessment for this group of children. Once systematic pain assessment is routine, the next step is to discern high pain intensities (Gordon et al, 2002), with the aim of ensuring a reduction of pain episodes and decrease of pain intensity.

Limitations
The audit may be limited by the incorrect interpretation of documentation assumed to indicate pain or discomfort, particularly in non-verbally communicating children, since presentations of pain are often unique to each child, and only

**KEY POINTS**

- Systematic pain assessment is not yet embedded in routine nursing practice
- Pain assessment for children with severe brain injury is hampered by communication, cognition and impairments
- Pain assessment requires appropriate pain tools, intervention(s) to relieve pain and reassessment of pain
- Methods to change practice include adapting guidelines to local context and providing written material, classroom teaching, reminders, sharing audit results and special interest groups
- Clinical audit effectively monitors progress
family members or carers know the child well enough to interpret correctly (Solodiuk, 2013). The majority of children were unknown to the auditors, and as such documentation assumed to suggest pain episodes may be over or under-estimated.

Conclusion
For children with brain injury, where pain is challenging to recognise, appropriate pain tools exist to meet individual needs but are not used consistently in practice. The literature and R CN guideline highlight the need to make pain assessment using pain tools part of routine nursing practice, but support is needed to embed systematic pain assessment in practice. The evidence base lacks clarity on how best to do this, particularly when resources are limited. This project has shown that multi-faceted supportive measures have some benefit, but that change takes years. Senior nurses and clinical educators need to implement long-term supportive measures to change practice, and clinical audit within a clinical governance framework, can be used to effectively monitor progress. Registered nurses have a responsibility to provide a high standard of care at all times, and are accountable for their actions and omissions (Nursing and Midwifery Council, 2008). Clearly, pain tools are an essential aspect of best practice, and high quality care, and not using them may be seen as an unjustifiable omission.

Conflict of interest: none

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Waddell C (2001) So much research evidence, so little dissemination and uptake: *Neurol Psychiatry* 7(3):295–9