TITLE: Deep Sedation and General Anaesthesia in Young Children: Safety and Guidelines

DATE: 4 June 2015

RESEARCH QUESTIONS

1. What is the clinical evidence regarding the safety of deep sedation or general anaesthesia in young children?

2. What are the evidence-based guidelines regarding the repeated use of deep sedation or general anaesthesia in young children?

KEY FINDINGS

Three systematic reviews and five non-randomized studies were identified regarding the safety of deep sedation or general anaesthesia in young children.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. To limit the number of retrieved publications, a focused search (with the main concepts appearing in title) was conducted. Methodological filters were applied to limit retrieval to non-randomized studies containing safety data for question 1 and to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials and guidelines for question 2. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and May 21, 2015.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.
SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

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<th>Table 1: Selection Criteria</th>
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<td><strong>Population</strong></td>
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| **Intervention**            | Q1: Deep sedation and general anaesthesia (any frequency)  
                                 Q2: Repeated deep sedation and general anaesthesia |
| **Comparator**              | Q1: No deep sedation;  
                                 Single event of deep sedation;  
                                 No comparator  
                                 Q2: No comparator |
| **Outcomes**                | Q1: Safety (harms during sedation, immediately after sedation, and long-term e.g., cognitive impairment, learning impairment, respiratory issues, substance abuse)  
                                 Q2: Evidence-based guidelines |
| **Study Designs**           | Q1: Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies (safety)  
                                 Q2: Evidence-based guidelines |

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

Three systematic reviews and five non-randomized studies were identified regarding the safety of deep sedation or general anaesthesia in young children. No relevant health technology assessments, randomized controlled trials, or evidence-based guidelines were identified.

Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

Two systematic reviews\(^1,2\) (SRs) examined the impact of general anaesthesia on neurodevelopment in children. The first SR reported that while the number of anaesthesia exposures before age four was a significant risk factor for neurodevelopmental impairment, the age at which exposure occurred was not.\(^3\) In addition, patients who had undergone anaesthesia before the age of four had a significantly greater chance of experiencing adverse behavioral or developmental outcomes than children who did not.\(^1\) The second SR concluded that early anaesthesia exposure resulted in moderately increased odds of behavioral or developmental issues.\(^2\) One SR\(^3\) examined anaesthesia-related pediatric mortality and found an anaesthesia-related mortality rate of less than one death per 10,000 anesthetics in Brazil and developed countries.

Five non-randomized studies\(^4-8\) were identified. One study\(^4\) examined the safety of deep sedation for pediatric patients with sickle cell disease and found there was no significant
difference in complication rates between these patients and patients without sickle cell disease. One study\(^5\) examined whether anaesthesia exposure as an infant impacted memory later in life. The authors concluded that children exposed to anaesthesia had significantly lower recollection scores, and impaired recollection of associative information when compared with controls.\(^5\) However, there was no difference in familiarity, IQ, or child behavior checklist scores between groups.\(^5\)

In children undergoing sedation for brain magnetic resonance imaging (MRI), there was no significant difference observed in overall sedative requirements, adverse events, or hypoxia between children with, or without, developmental disabilities.\(^6\) In children undergoing general anaesthesia for cardiac MRI, the majority of procedures in the study were performed without adverse events.\(^7\) Mild hypotension was the most frequently recorded minor adverse event.\(^7\)

One study examined the effect of deep sedation on children undergoing dental procedures (restoration with or without extraction).\(^8\) Agitation was recorded more frequently in the extraction group but this difference was only significantly different between groups at 15 minutes after sedation.\(^8\)
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified

Systematic Reviews and Meta-analyses

   PubMed: PM24465688

   PubMed: PM23076225

   PubMed: PM22522764

Randomized Controlled Trials
No literature identified

Non-Randomized Studies

   PubMed: PM25919732

   PubMed: PM24910347

   PubMed: PM23023474

   PubMed: PM22458837

**Guidelines and Recommendations**
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Randomized Controlled Trials - Not Limited to Age 12 Years and Under or Unclear Age


Non-Randomized Studies - Not Limited to Age 12 Years and Under or Unclear Age


Ongoing Clinical Studies


Consensus Statements and Practice Guidelines


Review Articles


Additional References