This is a repository copy of General anaesthesia under the age of 4 years has minimal impact on future academic performance.

White Rose Research Online URL for this paper:
http://eprints.whiterose.ac.uk/119594/

Version: Accepted Version

Article:

https://doi.org/10.1136/archdischild-2016-312518

© Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted. This is an author produced version of a paper published in Archives of Disease in Childhood: Education and Practice Edition. Uploaded in accordance with the publisher's self-archiving policy.

Reuse
Unless indicated otherwise, fulltext items are protected by copyright with all rights reserved. The copyright exception in section 29 of the Copyright, Designs and Patents Act 1988 allows the making of a single copy solely for the purpose of non-commercial research or private study within the limits of fair dealing. The publisher or other rights-holder may allow further reproduction and re-use of this version - refer to the White Rose Research Online record for this item. Where records identify the publisher as the copyright holder, users can verify any specific terms of use on the publisher’s website.

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.
Cohort Study PICKET

**Declarative Title:** General anaesthesia under the age of 4 years has minimal impact on future academic performance.

**STUDY DESIGN**

**Design:** Cohort study

**STUDY QUESTION**

**Patients:** All children born in Sweden between 1973 and 1993 who had a single anaesthetic exposure before age 4 years (33514 children).

**Comparison:** 159,619 matched children who had not been exposed to anaesthesia.

**Outcomes:** Average (mean) grades in school at age 16 years and IQ test scores at age 18 years obtained at the time of military conscription.

**MAIN RESULTS**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Mean (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean reduction in school grades at age 16 cf unexposed children</td>
<td>0.41% (0.7% to 0.12%)</td>
</tr>
<tr>
<td>Mean reduction in IQ scores at age 18 cf unexposed children</td>
<td>0.97% (0.15% to 1.78%)</td>
</tr>
<tr>
<td>Likelyhood of having grades below 10th percentile at age 16 cf unexposed children</td>
<td>1.02 (0.98 to 1.07)</td>
</tr>
<tr>
<td>Likelyhood of having no recorded school grades at age 16 cf unexposed children</td>
<td>1.29 (1.17 to 1.42)</td>
</tr>
</tbody>
</table>

**CONCLUSION**

Although general anaesthesia under the age of 4 was associated with a statistically significant reduction in school grades at age 16 and IQ scores at age 18, the actual differences were minimal (around 1% for IQ scores and 0.5% for school grades). This small risk to future academic performance must be balanced against risks and benefits of postponing surgery in young children.

**ABSTRACTED FROM**
As far as epidemiological studies of children undergoing anaesthesia go – this is probably as good as you can get them. This large-scale, nation-wide Swedish study addresses a fundamental question in paediatric anaesthesia: Is general anaesthesia harmful to the developing brain? Statistically seen possibly ‘yes’ but clearly other factors matter much more to the child. These factors include sex, age of string school and maternal background. The finer details of this complex interaction of surgery, co-morbidities, social background and perioperative care are more relevant to the individual. It appears that the conduct of anaesthesia rather than the drugs is responsible for neurocognitive impairment and is starting to receive the attention it deserves. (1) This study in conjunction with 2 recently published prospective clinical trials is likely to result in a decrease in pre-clinical anaesthesia research activity. (2,3) On the other hand, prospective quality improvement programmes will further improve the of safety perioperative care in children. Research funding should and will be redirected from finding the cure for a non-existing ‘disease of anaesthesia’ to cement the fundamental role of education, teaching and research in paediatric anaesthesia. Children deserve to be treated in a competent and child-friendly environment by knowledgeable and appropriately trained paediatric staff. They should not be pawns to serve individual or institutional ambitions. One additional notable result of this study is establishment of ‘academic performance’ (an apical outcome measure) as a valid and pragmatic outcome measure for epidemiological studies in children. This is what matters most to the parents and society. Such studies will enable the global comparison of ‘big data’ projects and measure the effects of intervention.


Englehardt, T., Hansen, T.G.