Paediatric Surgery across Sub-Saharan Africa: A Multi-Centre Prospective Cohort Study

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5 billion people
Lack access to surgical care
29% of the world's unmet need for surgery

50% of the population are children

Up to 1/3 of childhood deaths result from a surgical condition

Congenital anomalies are the 5th leading cause of death in <5-year olds
2015 – the year for global surgery

80% coverage of surgical care per country by 2030
Challenges of management and outcome of neonatal surgery in Africa: a systematic review

Sebastian O. Ekenze¹ · Obinna V. Ajuzieogu² · Benedict C. Nwomeh³

38 retrospective reviews
13 prospective
across 54 countries
in 20-years
Children’s surgery must be recognised in plans to scale up surgical care in SSA!
Aim:
To form a collaboration of surgeons and allied health professionals involved in children’s surgery across SSA to collectively undertake the largest prospective cohort study of paediatric surgery in this region of the world.
All collaborators as co-authors
Data Collection

On 5 conditions
Data Collection


Three collaborators per institution per month of data collection.

Using the online database:

REDCap
Research Electronic Data Capture
Data Collection

Primary outcome: in-hospital mortality.

Secondary outcomes: surgical site infection, wound dehiscence, need for re-intervention, condition specific complications.

Data was collected on: patient demographics, time to presentation, clinical status, peri-intervention care, intervention and outcome.

Hospital resources for neonatal & paediatric surgery.
Data Analysis

Chi-squared analysis & Fisher’s exact tests were used to compare outcomes in SSA with published benchmark data from high-income countries.

Multivariate logistic regression analysis was used to identify factors affecting outcome.

Data validated in 10% of centres.

Ethical approval from all centres.
Results
220 collaborators
76 hospitals
23 countries
Results

1407 cases:
- 111 gastroschisis
- 188 anorectal malformation
- 250 appendicitis
- 225 intussusception
- 633 inguinal hernia
All Conditions

Overall all-cause in-hospital mortality: 9.1%

30d mortality 10.0% compared to 0.7% in HICs p<0.0001

139 children died in this study: only 9 would die in HICs

Mortality was significantly associated with: Gastrochisis, higher ASA score, receiving a blood transfusion and anaesthetic nurse compared to doctor.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Mortality SSA</th>
<th>Mortality HIC</th>
<th>P value</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All conditions</td>
<td>10.02%</td>
<td>0.65%</td>
<td>&lt;0.0001</td>
<td>17.1 (8.7-33.6) P&lt;0.0001</td>
</tr>
<tr>
<td>Gastrochisis</td>
<td>75.5%</td>
<td>4.0%</td>
<td>&lt;0.0001</td>
<td>74.0 (35.9-152.5) P&lt;0.0001</td>
</tr>
<tr>
<td>Anorectal malformation</td>
<td>17.3%</td>
<td>2.9%</td>
<td>&lt;0.0001</td>
<td>6.9 (3.5-13.8) P&lt;0.0001</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>0.4%</td>
<td>0.004%</td>
<td>0.02</td>
<td>99.8 (6.2 – 1601) P=0.001</td>
</tr>
<tr>
<td>Intussusception</td>
<td>9.4%</td>
<td>0.2%</td>
<td>&lt;0.0001</td>
<td>52.7 (27.7-100.4) P&lt;0.0001</td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>0.3%</td>
<td>0%</td>
<td>0.003</td>
<td>82.0 (3.9-1709) P=0.0045</td>
</tr>
</tbody>
</table>
Gastroschisis

75.5% mortality compared to 4.0% in HICs p<0.0001

GA 37wks, weight 2.3kg
5% antenatal diagnosis
93% outborn

On arrival: 55% septic, 58% hypovolaemic, 76% hypothermic
Time to death: 4 days

Mortality associated with: ASA score & improvised silo use.
Hospital Resources & Facilities

0.5 paediatric surgeons/ 1 million population

<table>
<thead>
<tr>
<th>Resource</th>
<th>Percentage of collaborators with a reliable access to the resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU</td>
<td>23%</td>
</tr>
<tr>
<td>NICU</td>
<td>27%</td>
</tr>
<tr>
<td>Parenteral nutrition</td>
<td>18%</td>
</tr>
<tr>
<td>Central line for children/neonates</td>
<td>28% / 21%</td>
</tr>
<tr>
<td>Anaesthetic machine for children/ neonates</td>
<td>67% / 48%</td>
</tr>
<tr>
<td>Air enema/ hydro-enema reduction for intussusception</td>
<td>16% / 27%</td>
</tr>
</tbody>
</table>
Conclusion

1) Largest prospective cohort study of paediatric surgery in SSA to aid advocacy and policy planning.

2) All conditions had a significantly higher mortality in SSA than HICs.

3) Gastroschisis had the greatest disparity in outcome.

3) Formation of a research collaboration:
   - enhanced research capacity amongst collaborators
   - created a platform for ongoing research & interventional studies
Dissemination

• 30 international/ national/ regional presentations to date

• 10 further planned presentations
Future

Wellcome Trust Clinical PhD in Global Health

Clinical Interventional Study

7 hospitals:
Ghana, Zambia, Malawi, Tanzania

Aim:
Reduce mortality in neonates born with gastroschisis
Future

Global PaedSurg
Congenital Anomalies
Thank you to all collaborators who participated in the study
Steering Committee: Naomi Wright, Emmanuel Ameh, Niyi Ade-Ajayi, Kokila Lakhoo, Dan Poenaru, Andrew Leather


Thank you for listening

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