Approaching quality improvement at scale: a learning health system approach in Kenya

http://adc.bmj.com/content/archdischild/early/2018/03/07/archdischild-2017-314348.

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Paediatric Nephrologist & Public Health Specialist
On behalf of
Clinical Information Network (CIN)
The Journey .........Routine monitoring of QoC for seriously sick child

<table>
<thead>
<tr>
<th>Period</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Need assessment - quality of care in District hospitals</td>
</tr>
<tr>
<td>2005-2012</td>
<td>Developing, testing and implementing clinical practice guidelines and linked standardized record forms and a dissemination programme</td>
</tr>
<tr>
<td>2013 to date</td>
<td>Quality of care improvement project in 14 County Hospitals using audit feedbacks</td>
</tr>
<tr>
<td></td>
<td>• Challenges encountered</td>
</tr>
</tbody>
</table>

Focus Standard 1 and 2 QoC in health facilities
**Pneumonia**

for children aged 2-59 months without severe acute malnutrition

For HIV exposed/infected children see separate protocol

History of cough or difficulty breathing, age > 60 days

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### Intravenous/intramuscular antibiotic doses

(for age ≥ 7 days, neonatal doses: page 50)

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Penicillin* (50,000 iu/kg)</th>
<th>Ampicillin or Flucloxacillin (50mg/kg)</th>
<th>Gentamicin (7.5mg/kg)</th>
<th>Ceftriaxone IV/IM Max 50mg/kg 24hrly for neonates** Meningitis/ Very Severe Sepsis, 50mg/kg BD not to exceed 4 g/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>150,000</td>
<td>8 hrly 150</td>
<td>20</td>
<td>150</td>
</tr>
<tr>
<td>4.0</td>
<td>200,000</td>
<td>8 hrly 200</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>5.0</td>
<td>250,000</td>
<td>8 hrly 250</td>
<td>35</td>
<td>250</td>
</tr>
<tr>
<td>6.0</td>
<td>300,000</td>
<td>8 hrly 300</td>
<td>45</td>
<td>300</td>
</tr>
<tr>
<td>7.0</td>
<td>350,000</td>
<td>8 hrly 350</td>
<td>50</td>
<td>350</td>
</tr>
<tr>
<td>8.0</td>
<td>400,000</td>
<td>8 hrly 400</td>
<td>60</td>
<td>400</td>
</tr>
<tr>
<td>9.0</td>
<td>450,000</td>
<td>8 hrly 450</td>
<td>65</td>
<td>450</td>
</tr>
<tr>
<td>10.0</td>
<td>500,000</td>
<td>8 hrly 500</td>
<td>75</td>
<td>500</td>
</tr>
<tr>
<td>11.0</td>
<td>550,000</td>
<td>8 hrly 550</td>
<td>80</td>
<td>550</td>
</tr>
</tbody>
</table>
### Admission Diagnoses

- **Malaria**
  - [ ] Severe
  - [ ] Non-severe

- **Pneumonia**
  - [ ] Severe
  - [ ] Non-severe

- **Diarrhoea**
  - [ ] Non-bloody
  - [ ] Bloody (dysentery)

- **Dehydration**
  - [ ] Shock
  - [ ] Severe
  - [ ] Some

- **HIV**
  - [ ] Positive
  - [ ] Exposed / PMTCT +
  - [ ] Negative
  - [ ] Declined test

- **Malnutrition**
  - [ ] Kwash
  - [ ] Marasm
  - [ ] M. Kwash
  - [ ] Moderate
  - [ ] At risk/none

- **Anaemia**
  - [ ] Severe
  - [ ] Non-severe

- **Asthma**
  - [ ] Severe
  - [ ] Mild/moderate

- **Meningitis**

- **Rickets**

- **Neonatal sepsis**

- **Prematurity / LBW**

- **Suspected TB**

- **Sickle cell disease**

### Treatment Supportive care & Observations

- Keep warm
- IV / oral fluids plan
- Vitamin A
- Review status
  - [ ] Medical <6hrs
  - [ ] Priority Nursing Observations

### Treatment & Supportive care

- [ ] Oxygen
- [ ] Blood transfusion
- [ ] Nutrition / Feeds plan

### Observations

- [ ] Medical

### Clinician Name & Sign

Date... /....../...... Time ............

dd/mm/yyyy

am / pm
Pre-service training

Didactic sessions in lecture theater

Small groups for practicum
Disseminating the updates to the ETAT+ trainers

Instructors meetings

Last Instructors meeting during KPA conference in April 2016
Effects of the intervention on mortality in a tertiary hospital
Tracer disease (2005)-(2009)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>40/265 (15.1%)</td>
<td>19/293 (6.5%)</td>
<td>57%</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>53/297 (17.9%)</td>
<td>26/294 (8.8%)</td>
<td>50%</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>82/284 (29.9%)</td>
<td>44/197 (22.3%)</td>
<td>25%</td>
</tr>
</tbody>
</table>
ETAT+ and 13 years of getting evidence into practice

Rwanda, Uganda, Tanzania (Moshi, Ifakara), Somaliland, Malawi, Myanmar, Zimbabwe, Zambia, Sierra Leone,
<table>
<thead>
<tr>
<th>Input</th>
<th>processes</th>
<th>output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policies</td>
<td>Guidelines</td>
<td>Health system</td>
</tr>
<tr>
<td>Network</td>
<td>Funds</td>
<td>Quality health services and quality of care</td>
</tr>
</tbody>
</table>

Motivated, own, trust, Competent, quality data, interpret audit reports, leadership in complex of health systems and problem identification, complete audit cycles, Team work, data-driven actions, skills to mobilize and utilize resources.
Promoting Learning Health Systems – an approach for QI at scale

1. Create networks of engaged stakeholders that get involved in all aspects of the quality initiatives including its design, operation, and governance

2. Enable use of information derived from routine clinical data for local improvements

3. Promote more rapid adoption of evidence into routine clinical care

4. Enable researcher to conduct rapid and efficient health system research that supports strategic improvements in health (multicentre data base)
CIN Mission: “To generate hospital data we trust to inform our decisions, plans, monitor and evaluate our actions”

CIN Vision: To become leaders in the use of information to improve paediatric hospital care in Kenya and the region
Network meetings

Capacity building on leadership skills to:

- Introduce and sustain change in complex systems
- Interpret the audit reports, identify problems and solutions (PDSA cycle)
- Utilize hospital data
**Data Collection Tool**

*Paediatric Admission Record – Paediatric Ward*

**Linked to the Basic Paed Protocols & can be adapted, geared to improve data quality**

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### REDCap – Database design

<table>
<thead>
<tr>
<th>History</th>
<th>length of illness (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

- **Fever**
  - Yes
  - No
  - Not provided

- **Cough**
  - Yes
  - No
  - Not provided

- **Cough >3 weeks**
  - Yes
  - No
  - Not provided

- **Difficulty breathing**
  - Yes
  - No
  - Not provided

- **Diarrhoea**
  - Yes
  - No
  - Not provided

- **Diarrhoea > 14d**
  - Yes
  - No
  - Not provided

- **Diarrhoea bloody**
  - Yes
  - No
  - Not provided

- **Convulsions**
  - Yes
  - No
  - Not provided

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**Linked to the Basic Paed Protocols & can be adapted, geared to improve data quality**
Study procedures

Data collected using Standard operating procedures:

- Biomedical data
- Key history & examination
- Diagnosis
- Investigation
- Treatment
- Nursing care

>100,000 paediatric admissions

15 Quarterly Reports
3-monthly audit and feedback reports

<table>
<thead>
<tr>
<th>Colour Keys</th>
<th>Interpretation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent Performance</td>
<td>&gt;90%</td>
<td></td>
</tr>
<tr>
<td>Good Performance</td>
<td>80 - 90%</td>
<td></td>
</tr>
<tr>
<td>Some Performance</td>
<td>60 - 79%</td>
<td></td>
</tr>
<tr>
<td>Poor Performance</td>
<td>&lt;60%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>XXXDH (Feb '16 - Apr '16)</th>
<th>XXXDH (Nov '15 - Jan '16)</th>
<th>All other Hospitals (Feb '16 - Apr '16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin prescription</td>
<td>175/518 (33.78%)</td>
<td>159/315 (50.48%)</td>
<td>2611/4743 (55.05%)</td>
</tr>
<tr>
<td>Gentamicin prescription</td>
<td>120/518 (23.17%)</td>
<td>104/315 (33.02%)</td>
<td>1759/4743 (37.09%)</td>
</tr>
<tr>
<td>Fully documented prescription</td>
<td>170/175 (97.14%)</td>
<td>156/159 (98.11%)</td>
<td>2537/2611 (97.17%)</td>
</tr>
<tr>
<td>Correct dose</td>
<td>155/170 (91.18%)</td>
<td>142/156 (91.03%)</td>
<td>2163/2537 (85.26%)</td>
</tr>
<tr>
<td>Under dose</td>
<td>11/170 (6.47%)</td>
<td>11/156 (7.05%)</td>
<td>265/2537 (10.45%)</td>
</tr>
</tbody>
</table>
Scores of documentation of 25 items (Key biomedical, symptoms and signs)

- Each dot represents mean of all patient scores in each hospital
- The solid central trend line with black dots represents the median value of the 14 hospital-specific observations
- upper and lower grey trend lines represent the upper and lower IQRs, respectively.
Colored circular markers – proportion of documentation of oxygen saturation of all admissions aged 1 month to 12 years – each dot represent one of 14 CIN hospitals.

Solid central trend line with black dots - median value of the 14 hospital-specific observations with the upper and lower IQRs
Performance indicators (BPP-based audit criteria)

- Proportion of patients PAR is used
- Proportion of patients adequately assessed
- Proportion of patients correctly classified
- Proportion of patients prescribed correct treatment
- Proportion of patients who receive supportive care as per severity of the disease:
  - Oxygen for hypoxia
  - Feeds for those unable to feed
  - Dextrose for hypoglycaemia
- Proportion of patients given treatment as prescribed
- Proportion of patients with danger sign who have vital signs observed every 6 hrs
Correct diagnosis of severe acute malnutrition to correct prescription of F75

Correct diagnosis: 3242 / 4746, 68%

Prescription of F75: 2027 / 4746 = 43%

Adequate prescription: 1260 / 4746 = 27%

Correct prescription: 946 / 4746 = 20%
<table>
<thead>
<tr>
<th>Level</th>
<th>Examples of challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-service</td>
<td>• High impact interventions regarded as ‘too simple’ &amp; less priority</td>
</tr>
<tr>
<td></td>
<td>• Inadequate integration of primary, secondary and tertiary prevention</td>
</tr>
<tr>
<td>Hospital</td>
<td>• Very high turnover of the medical and clinical officer interns</td>
</tr>
<tr>
<td>context</td>
<td>• continued education meetings driven by agenda of pharmaceutical companies’</td>
</tr>
<tr>
<td></td>
<td>• Practical norms sometimes conflict with practices being promoted</td>
</tr>
<tr>
<td>National</td>
<td>• Weak systems for disseminating policies and monitoring their uptake</td>
</tr>
<tr>
<td></td>
<td>• Insufficient capacity for generating and using information as part of decision-making in resource allocation</td>
</tr>
<tr>
<td>Partners</td>
<td>• ‘quick technological fixes’</td>
</tr>
<tr>
<td></td>
<td>• Transforming health systems by ‘magic bullets’ - suboptimal performance often requires long-term institutional and individual behaviour change.</td>
</tr>
</tbody>
</table>
Summary - Quality of care for seriously sick child

- Requires quality data
- Correct problem identification that embrace complexity of health systems
- Completion of Plan-Do-Study-Act cycle
- Dedicated champions of change
- Building soft skill capacity of the champions of introducing and sustaining change
- Self-awareness and Learning from experience
Acknowledgement

• The participating hospitals and the CIN focal persons
• The CIN Collaborators
• All the patients and caregivers in the CIN hospitals

Clinical Information Network partners include: Vihiga County Hospital, Kakamega County Hospital, Mbagathi County Hospital, Mama Lucy Kibaki County Hospital, Machakos County Hospital, Nyeri County Hospital, Kisumu East County Hospital, Embu County Hospital, Karatina County Hospital, Kerugoya County Hospital, Kitale County Hospital, Busia County Hospital, Kiambu County Hospital, Mbale RHTC, Pumwani Maternity Hospital

[Logos of Republic of Kenya, Ministry of Health, KEMRI, Wellcome Trust, Kenya Paediatric Association]