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Foundation Trust, UK
27th Feb 2020

On behalf of: the wider NeoTree team

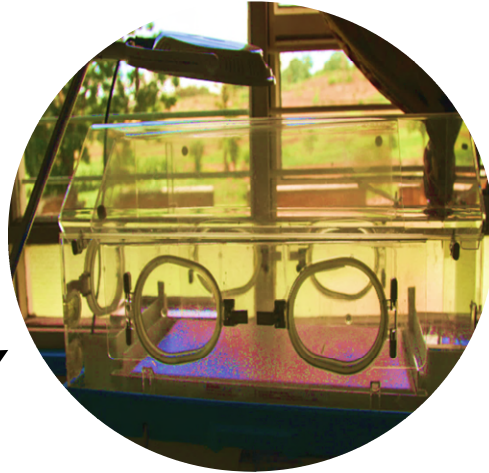


On behalf of: the NeoTree team

The Problem

2.9 million neonatal deaths globally

Poor quality neonatal care



Lack of hospital data systems



↓ 70%

through implementation of
existing evidence-based
guidelines

Our aims | NeoTree

Improve newborn care



Reduce newborn mortality



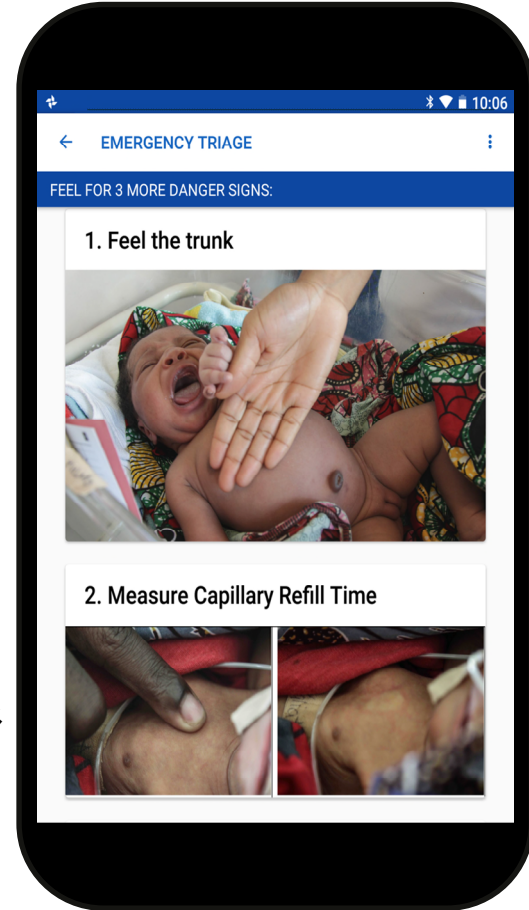
What is the NeoTree?

A digital Health system aiming to improve newborn survival in low resource hospitals

For newborn health care workers (HCWs) of all cadres

To admit & discharge newborns using digital forms on a tablet based application

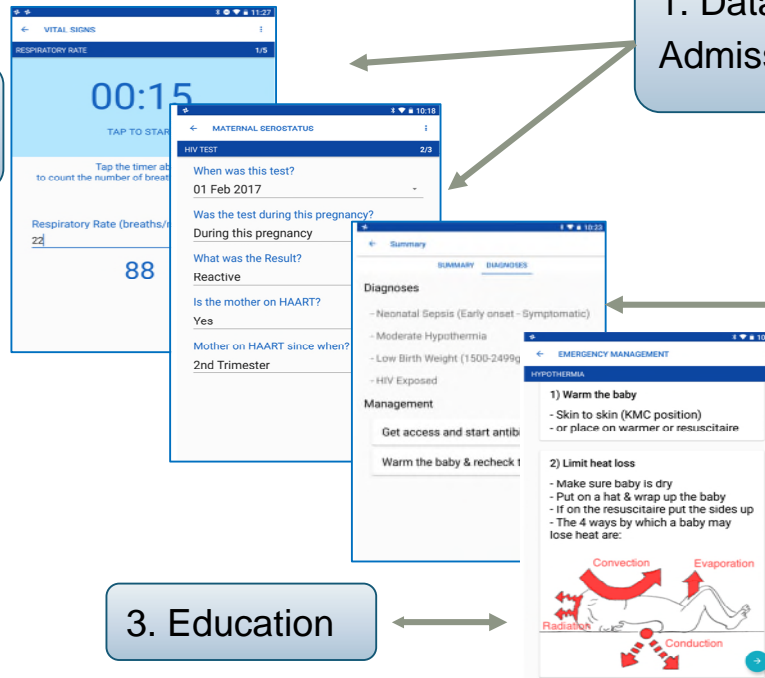
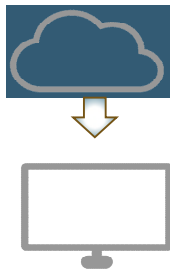
...the digital forms have inbuilt decision support & education according to evidence based guidelines (WHO, COIN etc.)



The NeoTree

1. Immediate data capture
2. Clinical decision support
3. Education
4. Data transfer – local and national
5. Data-driven quality improvement

4. Data transfer



1. Data capture
Admission/ discharge/ lab

2. Decision support
(emergency /diagnostic)

2. Decision support
(management summaries)

3. Education

Our Ethos

Open-source code

Country data ownership

High end software

Low cost hardware

**Co-production
(micro/ meso / macro)**

Participatory

Not for profit

Data driven quality improvement

Collaboration

**Responsive,
adaptable**

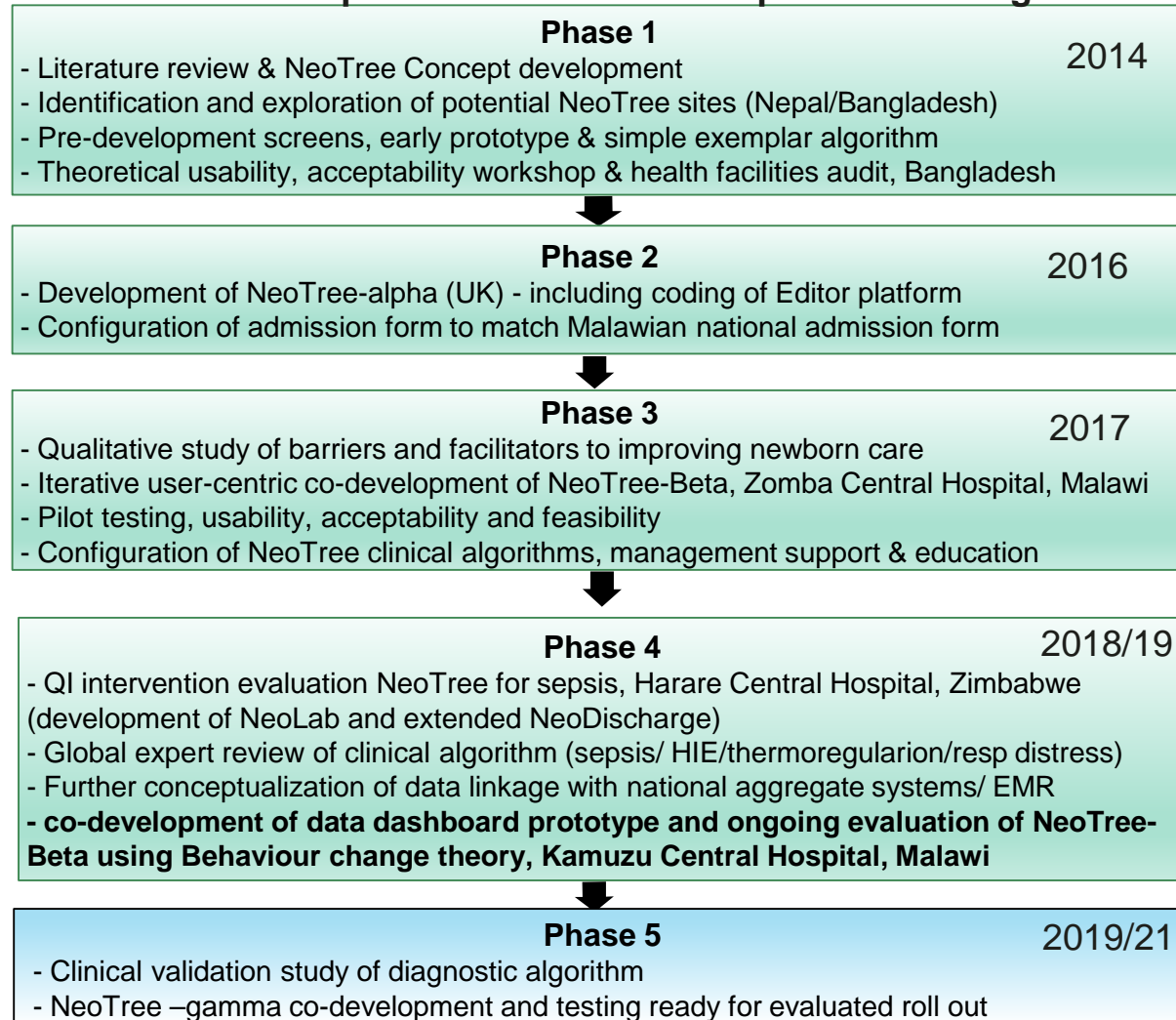
**Empowerment of
HCW**

Compatible

Innovation for immediate impact

Timeline

MRC complex intervention development & testing



UK & Bangladesh

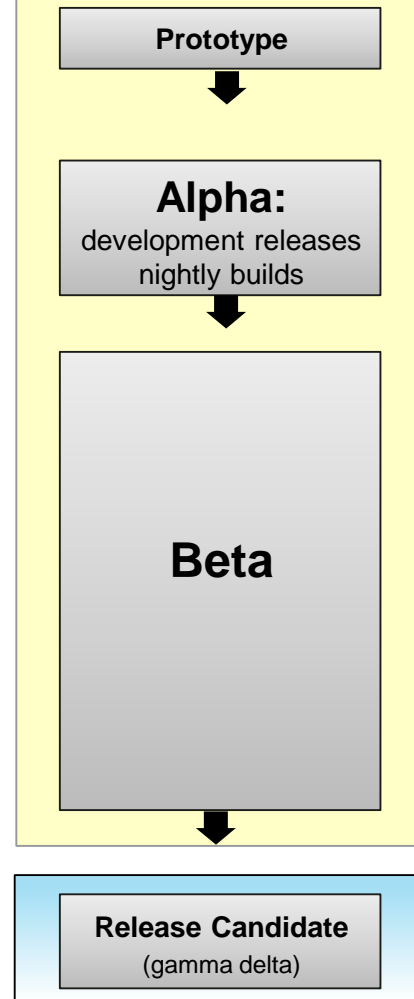
UK

UK
Malawi

Zimbabwe & Malawi

Zimbabwe & Malawi

Software development cycle



Phase 1 (2014-16)

- Literature review – barriers to reducing newborn mortality & potential solutions
- NeoTree Concept development
- Identification of potential NeoTree sites
- Baseline audit of health facilities Bangladesh
- Early pre-development screens

NeoTree-Prototype and concept refinement

Digital health could be part of the solution

Review of available literature

Potential causes for stagnation of NMR decline

Disparities in access to skilled attendance at birth and adequate postnatal newborn care

Shift to institutional deliveries

Quality of institutional care

Barriers to the scale-up of institutional neonatal care

Lack of specialized neonatal care training

Lack of communication and coordination between providers

Lack of evidenced-based interventions for providers to postnatal care for vulnerable newborns

Elements of the NCN

Newborn Health Education

mHealth "Neo-Tree" app

vNET

Arrows demonstrate the elements of the NCN addressing each identified barrier

SOLUTION?
Newborn care network

All words in deep red will be able to be clicked on and brought to their definition in the useful terms section



UID of baby

Date/Time of Birth

Birth Weight (kg)

Gestational Age (wks)

Admitted from

Place of birth

**I need help with neonatal resuscitation now.
Click the red button.**



Link to useful terms



Back to home screen



Information

Method of estimation drop-down

- 1) Fundal height
- 2) LMP
- 3) USS – date:
- 4) Ballard Score:

Link to Ballard /maturity score

Drop-down

- a) LW/PNW
- b) Theatre
- c) OPD
- d) Under 5
- e) Referred from outside:
 - Home (self referral)
 - Other HC/Hospital:

If BW < 2.5kg add **low birth weight** to problem list

If <37 wks add **risk of sepsis** to problem list

Drop-down

- a) Hospital
- b) Health centre
- c) Home
- d) Born Before arrival (in transit)

If born at home or BBA add **risk of sepsis** to problem list

Phase 2 (2016)

- Prototype adapted and developed using Ninjamock and data entry for admission form configured to match Malawian MoH form
- Coding of NeoTree-alpha (UK)
- Includes coding of Editor platform and android app
- Configuration of form with integrated clinical management
- Creation of new logo
- Created a website and introductory video

NeoTree-Alpha



EDITOR

Neo Tree - Content Manager









← Edit Script

Title
Neotree

Description
Alpha version

APPLY **UPDATE**

Screens +

Pos				Title	
1				Welcome to The NeoTree	 
2	NavW/NA		NeoNav1	NEW ASSESSMENT	 
3	1.0	NA	UID	NEW ASSESSMENT	 
4	1.2	ET1	Baby crying	EMERGENCY TRIAGE	 

Select screen type:

- Checklist
- Form
- Management
- Multiple choice list
- Simple list
- Single choice list
- Progress
- Timer
- Yes/No

CANCEL **CREATE**

Phase 3 (2016-17)

- Configuration of NeoTree-Beta clinical algorithm according to international and Malawian guidelines (COIN: Care of the Infant Newborn)
- Pilot testing & intervention co-development of NeoTree-Beta, Zomba Central, Malawi
- Qualitative study of barriers and facilitators to delivery of quality newborn care
- Iterative user-centric coproduction and app development
- Configuring of simple NeoTree-discharge forms
- Media footage, film, website

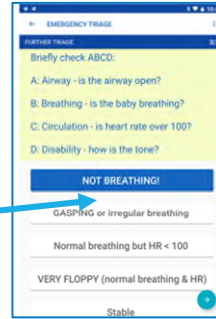
NeoTree-Beta

Highly usable acceptable and feasible tool

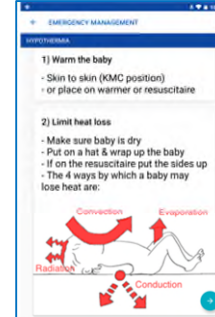
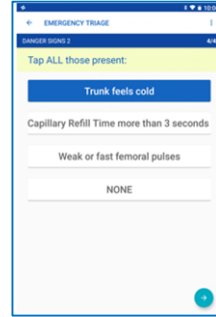
NeoTree App Interface (Front End)



Decision support
(2a Emergencies)

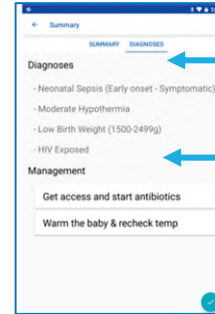
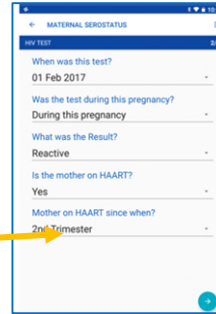
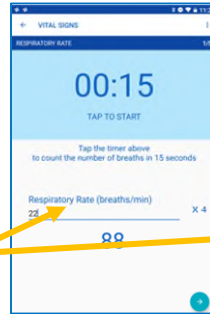


3. Data transfer



Decision support
(2b non-emergency /diagnostic)

1. Data collection



Decision support
(2c management summaries)

INTERVENTION DEVELOPMENT STUDY — ZOMBA CENTRAL HOSPITAL, MALAWI SOUTHERN REGION

Highly usable, feasible and
acceptable tool
Implementation
recommendations

The NeoTree application: developing an integrated mHealth solution to improve quality of newborn care and survival in a district hospital in Malawi

Caroline Crehan,¹ Erin Kesler,¹ Bejoy Nambiar,² Queen Dube,³ Norman Lufesi,^{4,5} Matteo Giaccone,⁶ Charles Normand,⁷ Kishwar Azad,^{8,9} Michelle Heys¹

To cite: Crehan C, Kesler E, Nambiar B, *et al*. The NeoTree application: developing an integrated mHealth solution to improve quality of newborn care and survival in a district hospital in Malawi. *BMJ Glob Health* 2019;4:e000860. doi:10.1136/bmjgh-2018-000860

Handling editor Soumitra Bhuyan

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bmjgh-2018-000860>).

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ABSTRACT

More than two-thirds of newborn lives could be saved worldwide if evidence-based interventions were successfully implemented. We developed the NeoTree application to improve quality of newborn care in resource-poor countries. The NeoTree is a fully integrated digital health intervention that combines immediate data capture, entered by healthcare workers (HCW) on admission, while simultaneously providing them with evidence-based clinical decision support and newborn care education. We conducted a mixed-methods intervention development study, codeveloping and testing the NeoTree prototype with HCWs in a district hospital in Malawi. Focus groups explored the acceptability and feasibility of digital health solutions before and after implementation of the NeoTree in the clinical setting. One-to-one theoretical usability workshops and a 1-month clinical usability study informed iterative changes, gathered process and clinical data, System Usability Scale (SUS) and perceived improvements in quality of care. HCWs perceived the NeoTree to be acceptable and feasible. Mean SUS before and after the clinical usability study were high at 80.4 and 86.1, respectively (above average is >68). HCWs reported high-

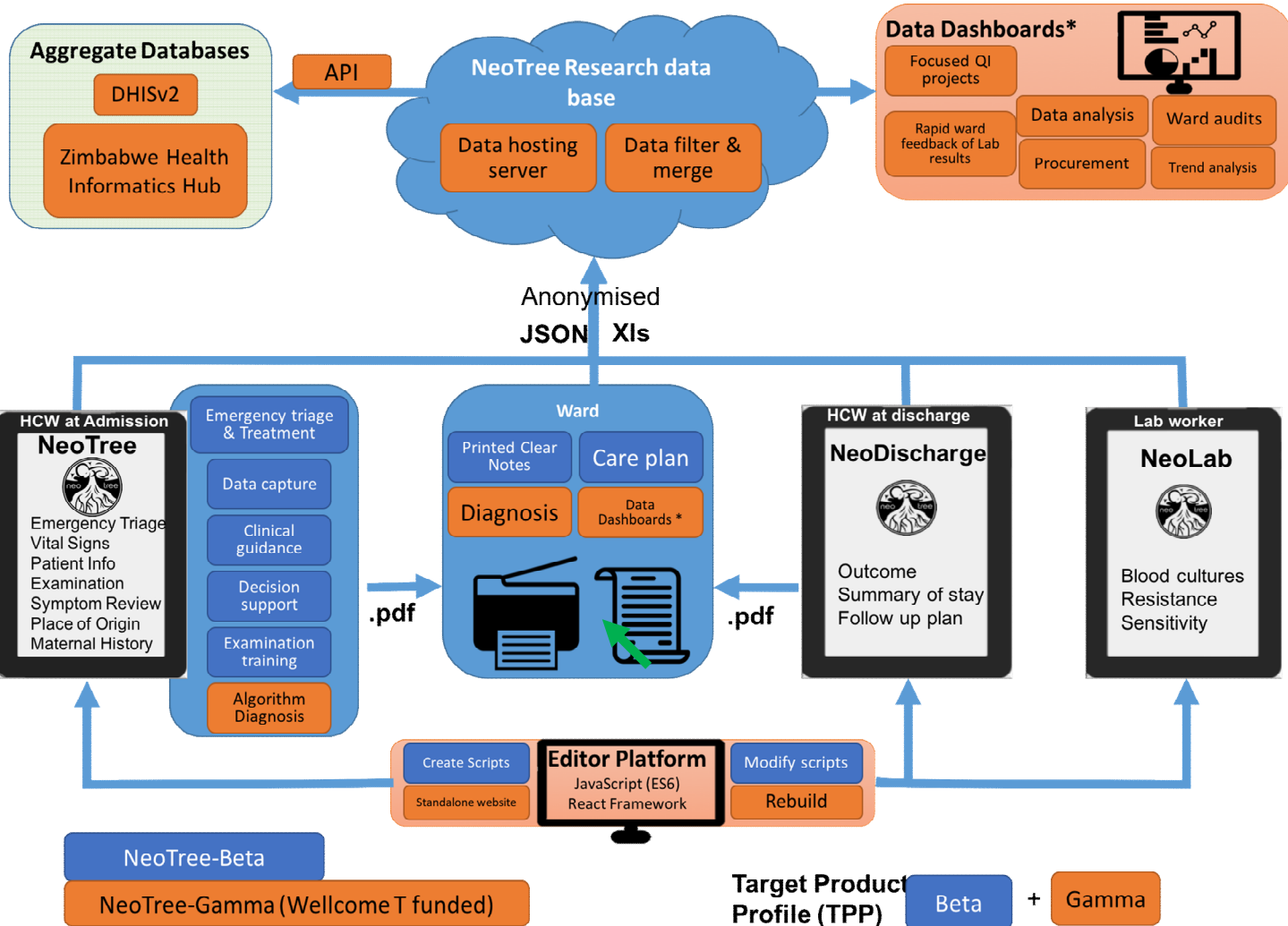
Summary box

- More than two-thirds of newborn lives could be saved worldwide if evidence-based interventions were successfully implemented.
- Reliable data sources and health information systems for counting births, stillbirths, neonatal deaths and delineating the causes of death are lacking.
- With the fast-moving digital revolution in low-income countries mobile health applications are being increasingly designed but these have not yet focused on facility-based newborn care.
- Here we present the NeoTree application, focusing on newborn care in low-income facilities, combining data collection by healthcare workers themselves, with interactive decision support and education for improving quality of care.
- We report iterative codevelopment with healthcare workers to create a highly usable interactive admission platform, which provides teaching and training, improving the perceived quality of care delivered by healthcare workers while admitting the baby.

Phase 4 (2018-19)

- International expert review of clinical algorithm (sepsis/ HIE/ thermoregulation/ respiratory distress)
- Quality improvement project: NeoTree to address sepsis management, Harare Central Hospital, Zimbabwe
- Configuration of NeoTree-Lab and extended NeoTree-discharge pages
- Development of data dashboard using Behaviour change theory and frameworks, Kamuzu Central Hospital, Malawi
- Development of monthly data dashboard using R code based, HCH, Zimbabwe
- Further conceptualization of data linkage with Zimbabwe aggregate data system working with Zimbabwean Ministry of Health

NeoTree-Beta



Key functions

1. **Data capture**
2. **Decision support**
3. **Education**
4. **Data linkage**

JSON: JavaScript **Object** Notation; minimal, readable format for data structure and transfer

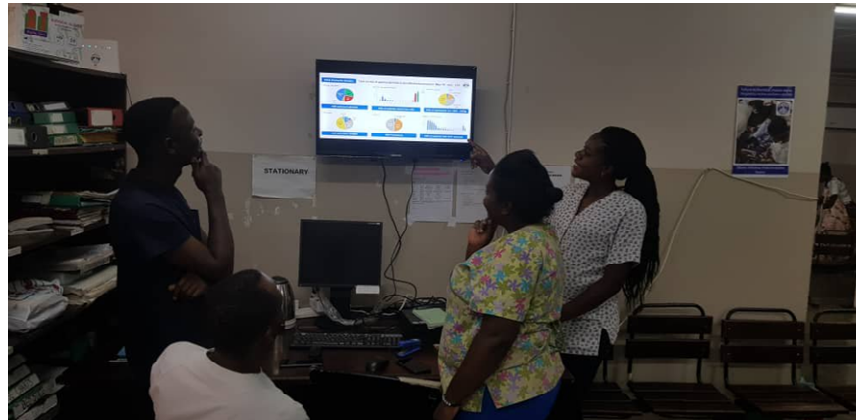
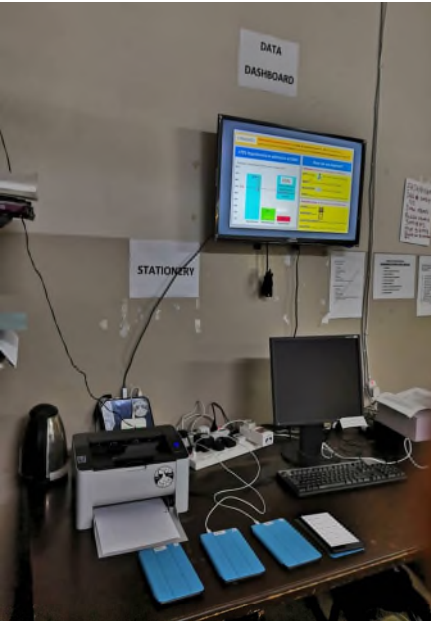
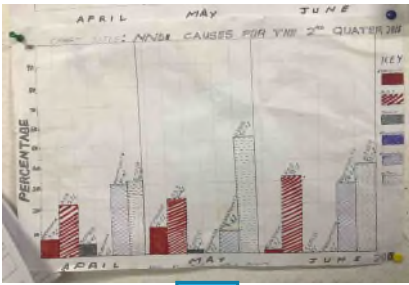
PRELIMINARY KEY MESSAGES FROM PHASE 4 IMPLEMENTATION

Harare Central Hospital, Zimbabwe:

1. Continuity of care despite doctors strikes – nurses now using the digital platform
2. Instant data capture and feedback for clinicians and management
3. Linkage with lab data
4. Improved antimicrobial stewardship on discharge

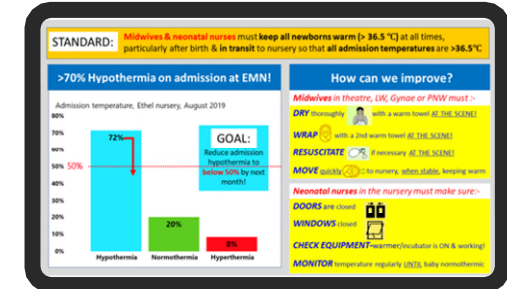
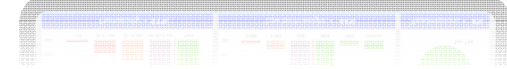
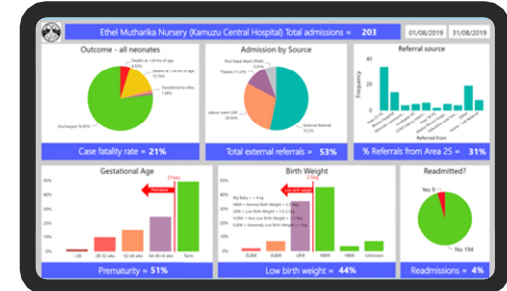
Kamuzu Central Hospital, Malawi:

1. Successful implementation and sustained use in a busy unit
2. Sustained high usability
3. Data driven change in quality of care – especially around thermoregulation of babies
4. Impact on mortality & morbidity meetings with obstetrics and gynaecology



Dashboard prototypes have been developed to give 3 outputs – these update in real time:

1. Mortality & Morbidity slide deck
2. Summary statistics dashboard
3. Behaviour change dashboard



Phase 5

(2019-21 – Wellcome trust funded)

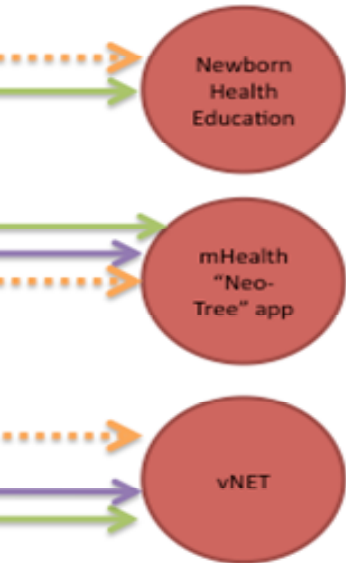
- Ongoing implementation in HCH and KCH
- Additional implementation in Chinhoye provincial hospital, Zimbabwe
- Revision of diagnostic algorithms according to expert review and modelling
- Clinical validation of key diagnostic algorithms (sepsis/ HIE/ resp distress)
- Staged implementation evaluation of full functionality of NeoTree-Gamma
- Protocol for robust evaluation at scale, including health economic analysis
- Development of data linkage to national data systems (DHIS-v2)

NeoTree-Gamma

Ready for large scale evaluated roll out

BACK TO THE START

Elements of the NCN



Some educational elements included in NeoTree Plan for augmented educational programme (subject to funding)

NeoTree Gamma by 2021

NeoCloud data linkage locally and nationally under development; other components conceptualised only

#MADEATUCL & PARLIAMMENTARY REVIEW

- Top 100 innovations across UCL



Our vision

NeoTree Neonatal international consortium

NeoTree should be at every newborns bedside

Counting every newborn

Caring for every newborn

ACKNOWLEDGEMENTS

PRINCIPAL INVESTIGATOR

- Dr Michelle Heys, Associate Professor Great Ormond Street Institute of Child Health (GOS-ICH), University College London (UCL), UK and Consultant Paediatrician, East London NHS Foundation Trust, UK

IN-COUNTRY PRINCIPAL INVESTIGATORS

- Dr Simbarashe Chimhuya, Paediatrician and clinical lead at Harare Central Hospital and lecturer at University of Zimbabwe.
 - Dr. Msandeni Chiume-Kayuni, head Paediatric Consultant at Kamuzu Central Hospital, Lilongwe, Malawi

CO-INVESTIGATORS

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- Dr Hassan Haghparast-Bidgoli, Institute for Global Health (IGH), UCL • Prof Monica Lakhanpaul, GOSH-ICH, UCL • Dr Fabiana Lorencatto, Centre for Behaviour Change, UCL • Dr Hannah Gannon • Prof Mario Cortina Borja, GOS-ICH, UCL • Dr Gwen Chimhini • Dr Emma Wilson, GOS-ICH, UCL, • Dr Liam Shaw, Modernising Medical Microbiology, University of Oxford.

SOFTWARE DEVELOPMENT TEAM

- Mr Yali Sassoon • Mr Charles Normand • Mr Louis du Toit

RESEARCH PARTNERS/ COLLABORATORS

- Dr Bejoy Nambiar, UNICEF, Malawi • Dr Norman Lufesi, Acute Respiratory Illness department, Ministry of Health (MoH), Malawi • Dr Queen Dube, Head Paediatric Consultant at Queen Elizabeth Central Hospital (QECH), Blantyre • Prof Valerie Robertson, University of Zimbabwe • Dr Shungu Munyati is Director-General of the Biomedical Research and Training Institute (BRTI), Zimbabwe • Dr Robert Gongora, Ministry of Health (MoH), Zimbabwe • Dr Gregory Valentine. Clinical Neonatal Fellow at Baylor Institute of Medicine and Texas Children's Hospital • Dr Pascal Lavoie. Neonatologist at British Columbia Women's Hospital and Associate Professor, University of British Columbia • Dr Simbini

CURRENT/ PREVIOUS RESEARCH STUDENTS

- Mr Sam Neal, UCL, • Dr Mari Evans (UCL, MSc 2019), • Miss Erin Kesler (UCL, MSc 2014)

TECHNICAL ADVISORY BOARD

- Dr Tim Colbourne, IGH, UCL • Dr Logan Manikam, GOS-ICH, UCL • Dr Ed Fottrell, IGH, UCL • Mr Marcus Wooton, Royal College of Paediatrics and Child Health (RCPCH), UK. • Dr Alex Stevenson, Neonatologist, Zimbabwe.

AND ALSO

- Prof Anthony Costello, UCL • Mr Matteo Giaccone (software development) • Dr Patty Costcova, UCL • Dr Rizine Mzikamanda, Malawi, • Miss Lauren Kesler, • Miss Brittany Abernathy

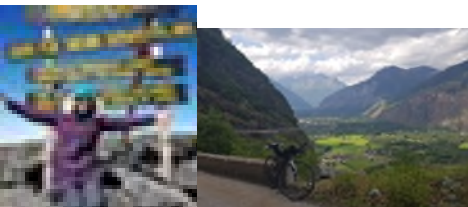
Acknowledgments

Thanks also to our funders to date - RCPCH, Naughton-Cliffe Mathews, UCL grand challenges & collaborator grant & Wellcome Trust Digital Innovation Award

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Slide acknowledgements: Caroline Crehan, Tim Hull-Bailey, Erin Kesler, Simba Chimhuya, Hannah Gannon

Special thanks to all the doctors, nurses, babies and families for their time, enthusiasm and participation in the NeoTree journey



|



SPARES


MANAGEMENT PAGES AT THE END OF ADMISSION



MANAGEMENT

JAUNDICE

1. Assess extent of jaundice

Start phototherapy	Areas where jaundice is visible
<p>If the jaundice is limited to area 1, then the serum bilirubin is likely in the range 150-200 mmol/L. Only start phototherapy if day 1</p>	
<p>Area 1+2 If the jaundice involves area 1+2 i.e. over the trunk, then the serum bilirubin is likely in the range 200-300 mmol/L. If preterm, low birth weight, or term but sick and there is jaundice over the trunk start phototherapy</p>	
<p>Area 1-5 i.e. involves palms and soles If the jaundice extends to include all areas (1-5) including the soles then the serum bilirubin is likely >340 mmol/L. Start phototherapy on all babies including healthy term babies if the jaundice extends to include the palms and soles.</p>	

2. Start phototherapy if necessary

- Protect the babies eyes with a mask
- Watch for dehydration
- Mothers can still breast feed

3. Further management:

Clinician to assess potential etiology:

- LBW
- Asphyxia
- Prematurity
- ABO incompatibility
- Birth trauma

→

DISCHARGE FORM — DATA COLLECTION

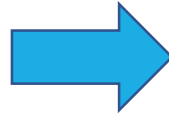
RESPIRATORY SUPPORT

RESPIRATORY SUPPORT

Any respiratory support given during admission?

More than one can be recorded, click all that apply

- NONE
- Intra-Nasal Oxygen
- Nasal Cannulae Oxygen
- CPAP
- Headbox Oxygen



DATE WEANED

DATE WEANED OFF RESPIRATORY SUPPORT

Please record date baby no longer required any respiratory support and was breathing spontaneously in air

Date weaned off resp support

Number of days of CPAP?

OVERVIEW OF ALGORITHM DEVELOPMENT

Year	NeoTree version	emergency diagnostic algorithms				management guidelines	non-emergency diagnostic algorithms				emergency management	clinical validity data
		conceptualised	Configured	activated	tested		conceptualised	Configured	activated	tested		
2013-2014	Concept	√	x	x	Bangladeshi HCW	√ (partially)	√	x	x	Bangladeshi HCW	concept only	x
<i>algorithms conceptualised and developed according to international guidelines and available evidence</i>												
2014-2015	Prototype	√	simple hypotheria	x	Bangladeshi HCW	√	√ (partially)	simple hypotheria	x	Bangladeshi HCW	concept only	x
<i>algorithms configured and refined according to international and national guidelines, available evidence and clinical judgement</i>												
2016	NeoTree alpha	√	√	√	Malawian HCW	√	√	√ (partial)	x	Malawian HCW	unlinked to diagnostic algorithm; HCW chosen	n~100
<i>lab data (blood cultures) linked to clinical data; discharge data augmented</i>												
2018-2019	NeoTree-Beta	√	√	√	Zimbabwean HCWs	√	√	√ (partial)	x	Zimbabwean HCWs	unlinked to diagnostic algorithm; HCW chosen	n~2000
2019	NeoTree-Beta	√	√	√	Malawian HCW	√	√	√ (partial)	x	Malawian HCW	unlinked to diagnostic algorithm; HCW chosen	n~1000
2018-2019		<i>International Delphi consensus study and review of diagnostic algorithms (sepsis/ HIE/ respiratory distress and hypothermia)</i>										
2019-2020		<i>literature review of HIC/LMIC sepsis algorithms and modelling of sepsis data</i>										
		<i>ethnographic study of adherence to emergency guidelines</i>										
2020	NeoTree-Beta clinical validity study	√	√	√	Malawian/ Zimbabwean HCW	√	√	√ (partial)	x	Malawian/ Zimbabwean HCW	linked to diagnostic algorithm	n>4000
<i>analysis of validity data and revision of algorithm</i>												
2020-2021	NeoTree-Gamma	√	√	√	Malawian/ Zimbabwean HCW	√	√	√	√	Malawian/ Zimbabwean HCW	linked to diagnostic algorithm	

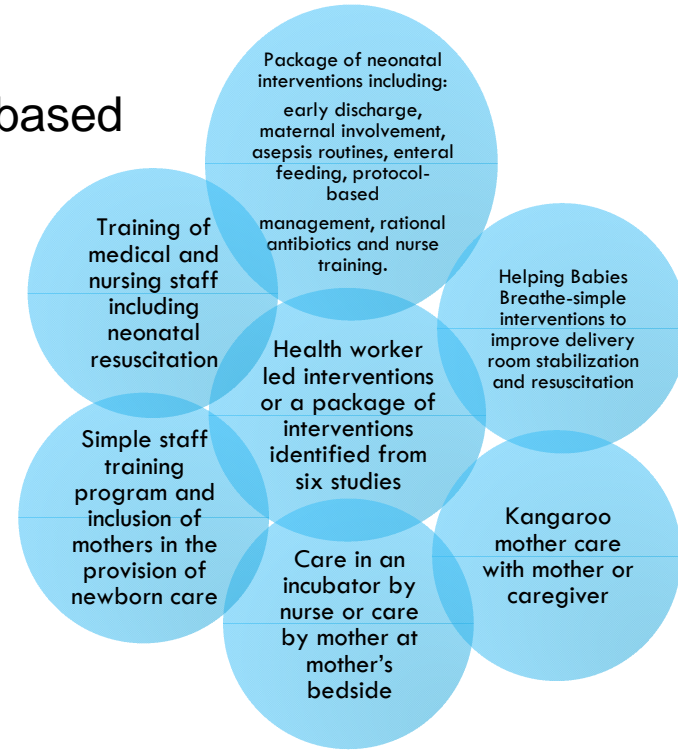
A systematic review of health worker led interventions to reduce mortality in low birth weight neonates in low and middle-income institutional settings

G259(P)

Kesler, Erin RN, BSN, MSc, Heys, Michelle Dr
Researcher UCL Institute for Global Health Tel: 07860 830 541



- limited evidence on HCW led facility-based postnatal interventions to decrease mortality in LBW infants.
- lack of consistent scale-up.
- Packages of care needed
- Implementation
- sustainability.

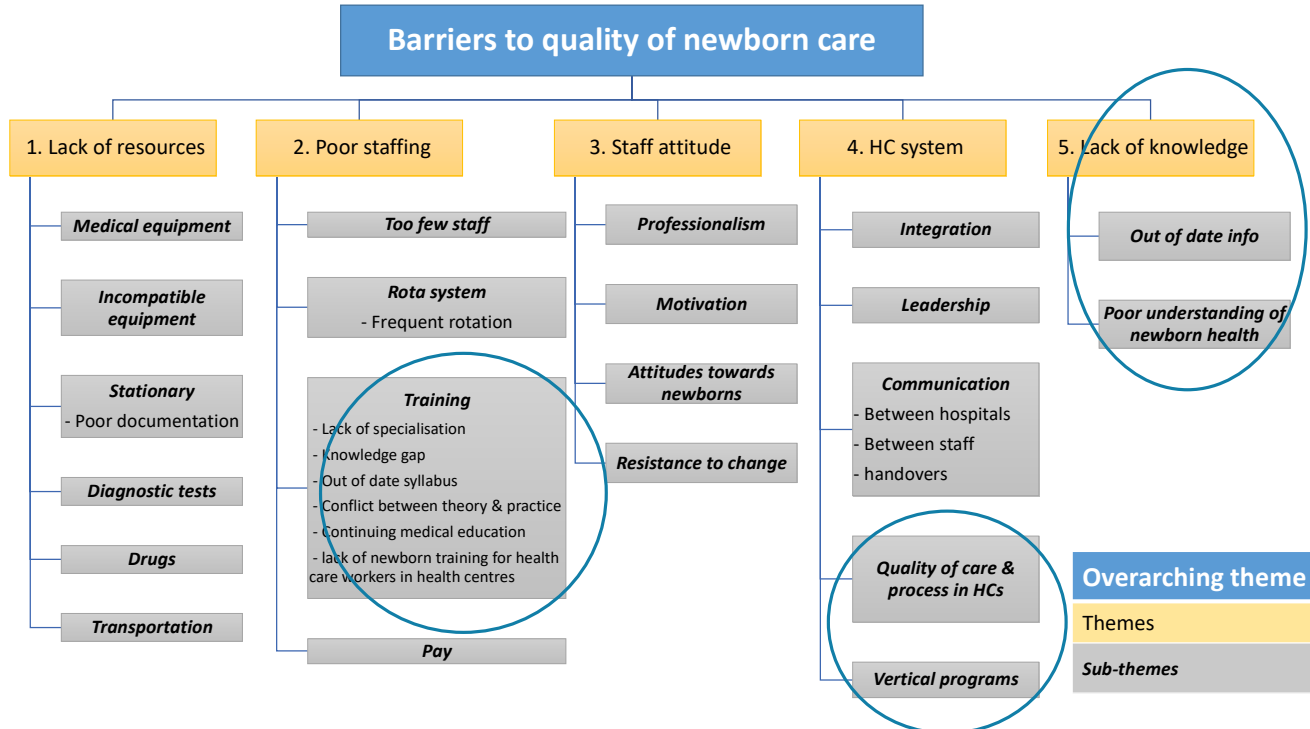


Diagnoses potentially generated by NeoTree algorithm

Categories / problems:	Symptoms / states:	Diagnoses:
1. LBW 2. VLBW 3. ELBW 4. Big Baby	16. Hypoglycaemia 17. Risk of Hypoglycaemia	26. Risk of Birth Asphyxia 27. Consider birth asphyxia 28. Birth asphyxia
5. Premature 6. Very premature 7. Extremely premature	18. Mild hypothermia 19. Moderate hypothermia 20. Severe hypothermia 21. Hypothermia	29. EONS asymptomatic 30. LONS asymptomatic 31. EONS symptomatic 32. LONS symptomatic
8. Difficulty feeding	22. Dehydration	33. Congenital abnormality
9. HIV exposed	23. Abdominal obstruction	34. Anaemia
10. Convulsions	24. Umbilical hernia	35. Jaundice
11. Consider NEC	24. Ambiguous genitalia	36. Pneumonia/bronchiolitis
12. Consider meningitis		37. ? Pnuemocystis Jerovechei Pneumonia
13. Consider tetanus		<u>Respiratory distress of the newborn:</u>
14. Untreated maternal syphilis		38. TTN: Transient Tachypnoea Newborn
15. Birth Trauma		39. RDS: Respiratory distress Newborn
		40. MA: Meconium Aspiration
		41. CPN: Congenital Pneumonia

QUALITATIVE STUDY: HCW PERCEIVED BARRIERS AND FACILITATORS TO DELIVERY OF QUALITY CARE (*MANUSCRIPT IN PREPARATION*)

Figure 1. Perceived Barriers to quality of newborn care – Themes from focus groups with facility Health Care Workers



QUALITATIVE STUDY: HCW PERCEIVED BARRIERS AND FACILITATORS TO DELIVERY OF QUALITY CARE (*MANUSCRIPT SUBMITTED*)

Figure 2: Perceived facilitators to quality of newborn care – Themes from focus groups with facility Health Care Workers



A DIGITAL PERINATAL OUTCOME AUDIT OF ADMISSIONS TO A DISTRICT HOSPITAL NEONATAL UNIT IN MALAWI USING THE NEOTREE APPLICATION (*MANUSCRIPT SUBMITTED*)

Figure 1. Temperature on admission (Degrees Celsius):

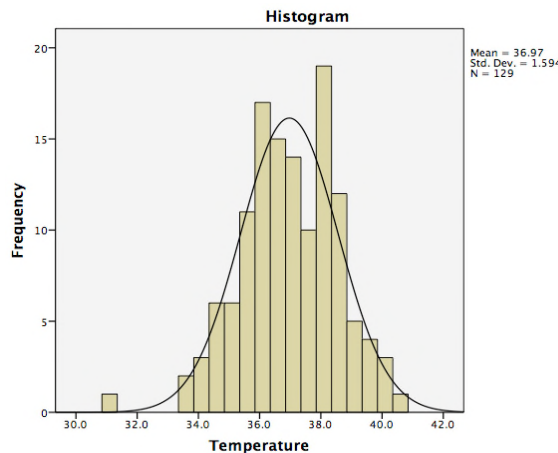


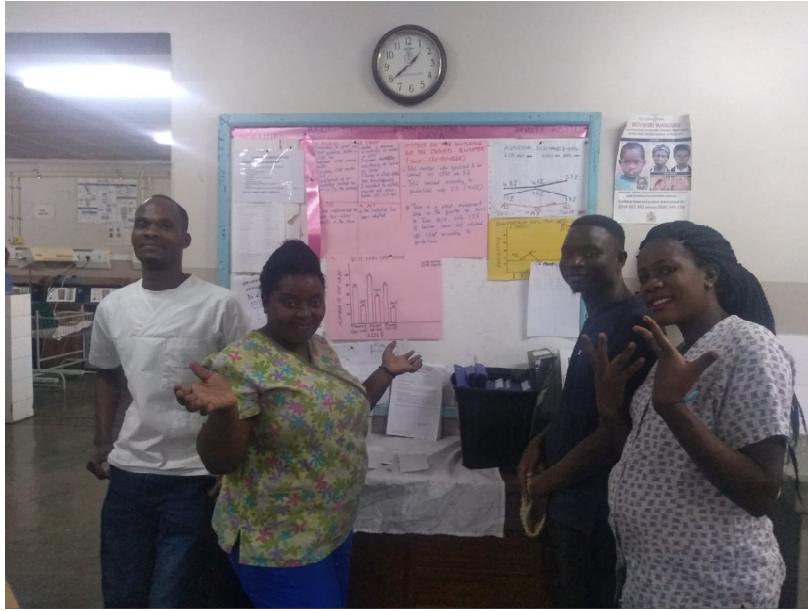
Table 2. Case fatality rate

Primary diagnosis*	Number of infants (n)	Number of deaths (n (%))	Case fatality rate
Prematurity with RDS	7	3 (42.8)	428/1000 cases
Birth Asphyxia	30	7 (23.3)	233/1000 cases
Neonatal sepsis	44	1 (2.3)	23/1000 cases
Congenital Anomaly	6	1 (16.7)	167/1000 cases
Other	42	0 (0.0)	0/1000 cases
Total admissions	129	12 (9.3)	93/1000 admissions

RDS = Respiratory Distress Syndrome. *Primary diagnosis was the most salient diagnosis (cause of death for neonatal deaths), decided by the researcher by reading the medical record and using clinical judgement as a neonatal registrar. These are mutually exclusive. Primary, secondary and tertiary diagnoses were recorded where necessary.

EXPERT REVIEW OF CLINICAL CONTENT AND VALIDATION OF CLINICAL ALGORITHM (MANUSCRIPT IN PREPARATION)

- Round 1: n=14 experts, n=9 (HIC); n=5 LIC
- Round 2: 10 experts
- Consensus reached on 52% of items
- Items must be consistent with local and WHO guidelines
- Example of key changes
 - HIE should use Thompson scoring system
 - Sepsis algorithm shouldn't use weighted system for diagnosis, but more evidence should be gathered (HCH, MRes study)
 - the revised respiratory algorithm, all neonates with respiratory distress will be given antibiotics



WHO HAS USED THE NEOTREE IN KCH ?

Who is using NeoTree?

- 90 different HCWs
- 5 different cadres (TBC)

How many times?

Permanent staff: Average 90 times (Range 23-195 times)

All users: Average 13 times (Range 1-195 times)

How long did it take?

7 mins - >1 hr (difficult to measure)

Median time taken Sep/Oct - 25 mins

Most people take < 20 mins

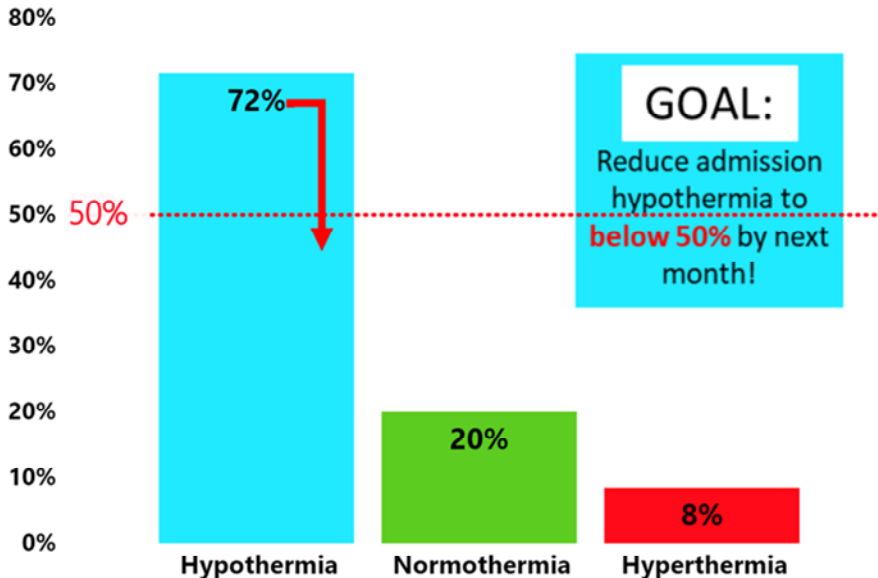
Discharge only takes 10 mins

BEHAVIOUR CHANGE COMPONENTS OF AUDIT AND FEEDBACK INCLUDED

STANDARD: **Midwives & neonatal nurses** must **keep all newborns warm** ($> 36.5\text{ }^{\circ}\text{C}$) at all times, particularly after birth & **in transit** to nursery so that **all admission temperatures** are $>36.5\text{ }^{\circ}\text{C}$

>70% Hypothermia on admission at EMN!


Admission temperature, Ethel nursery, August 2019



How can we improve?

Midwives in theatre, LW, Gynae or PNW must :-

DRY thoroughly  with a warm towel AT THE SCENE!

WRAP  with a 2nd warm towel AT THE SCENE!

RESUSCITATE  if necessary AT THE SCENE!

MOVE quickly  to nursery, when stable, keeping warm

Neonatal nurses in the nursery must make sure:-

DOORS are closed 

WINDOWS closed 

CHECK EQUIPMENT-warmer/incubator is ON & working!

MONITOR temperature regularly UNTIL baby normothermic

QI DATA PROJECTS (2019-2020)

Zimbabwe

- AN steroid exposure and neonatal outcome
- Outcome at discharge for babies with hypoxic ischaemic encephalopathy
- Outcome at discharge for babies with sepsis

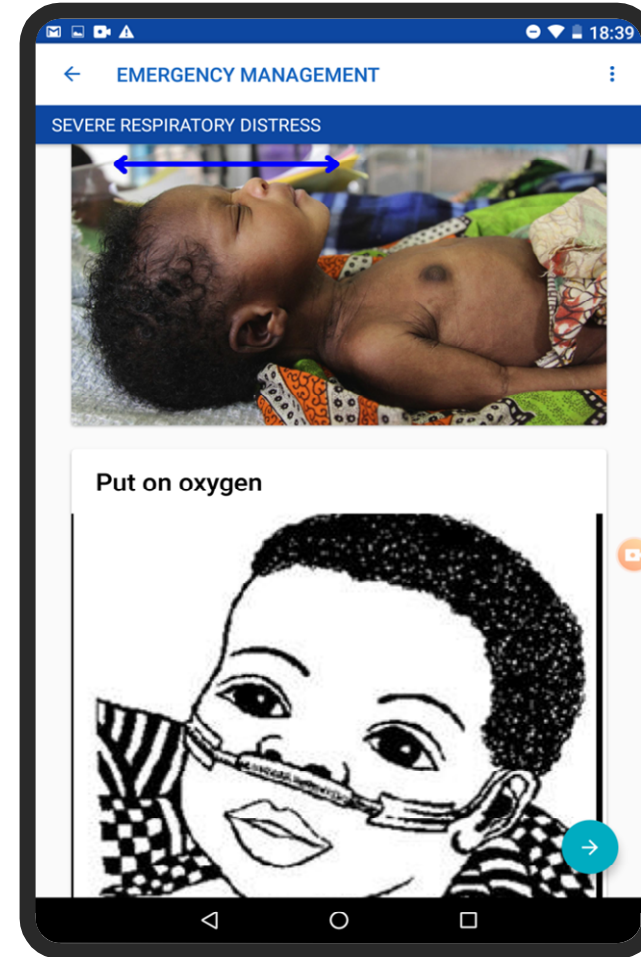
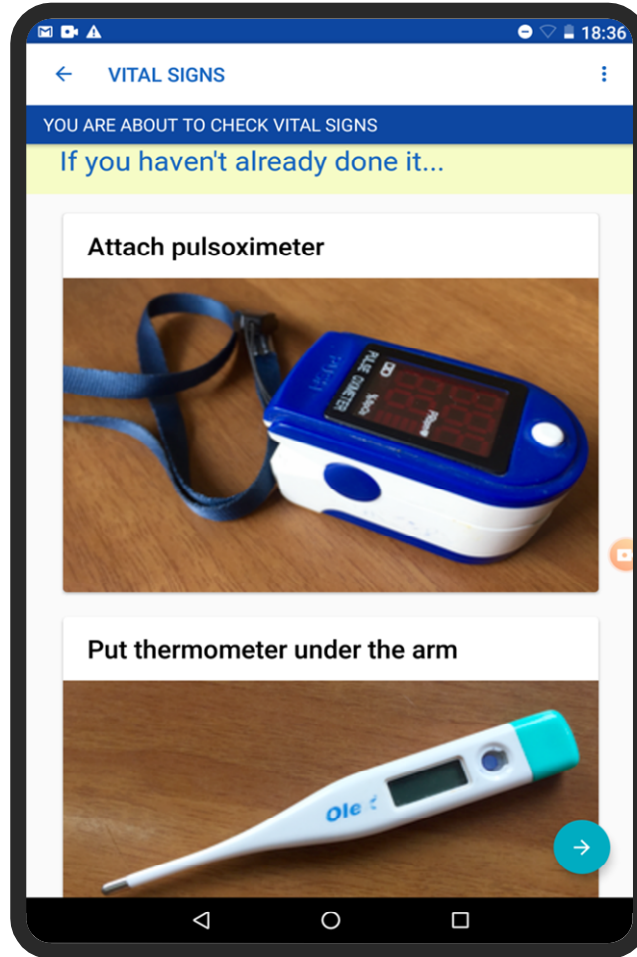
Malawi

- Outcome at discharge for babies with gastroschisis
- Monitoring of vital signs
- thermoregulation

ON ADMISSION

Quality improvement through educational / training pictures

In emergency management & triage



NEXT STEPS

- “Mummy Tree”
- Daily EMR
- NeoTree charity
- Link with community groups/ data
 - Especially for high risk newborns – eg post HIE
- Development of the app functionality for other groups eg AN maternal care and paediatric sepsis - QECH

Phase 5
(2019-21 subject to funding decision)

- Ethnographic evaluation of adherence to emergency diagnostic algorithm
- Development of educational arm
- Implementation in Queen Elizabeth Blantyre, Malawi

NeoTree-Gamma+

ZIMBABWE HARARE CENTRAL HOSPITAL

- 12,000 births per year,
- 4,800 admissions
- <4% blood test results returned in time to affect care of the newborn
- 97% babies discharged on oral antibiotics

Goals

1. To improve adherence to best practice guidelines for junior doctors and so improve care
2. To standardise and improve data collection for ease of audit and monitor unit activity
3. To reduce turn around time for blood culture results from median 6 days
4. **And so improve management of sepsis and infection control**

KAMUZU CENTRAL HOSPITAL OVERVIEW

MDRes study Dr Crehan

Implementation introduced over 4 week period

Data collection since 24th April:-

- 1436 admissions
- 1238 matched discharges/deaths
- (Outcome data available for 86%)
 - > 90 different HCWs & 5 different cadres have used the app

High usability (SUS score 88.3; core > 65 is considered above average)

Acceptability and feasibility according to behaviour change data awaiting analysis

- Rates of admission hypothermia are improving (down from 72% to 68%)

Co-development of data-dashboard prototype

Completeness of data 21%
better using an electronic point
of care app compared to paper
record