Optimizing neonatal care at the Saint Camille Hospital, Ouagadougou (HOSCO), Burkina Faso

The impact of the Neonatal Essential Survival Technology (NEST) continuous quality improvement (QI) program.

Merran Thomson
On behalf of the NEST Team
Disclosure statement

The Chiesi Foundation Onlus, a non-profit organization funded this project.

Employees of Chiesi Foundation Onlus were involved in the creation of the NEST program and its implementation at HOSCO.

The following authors have relevant conflicts to disclose:

• Merran Thomson undertakes paid consultancy work for Chiesi Farmaceutici S.p.A.
• Carmen Dell’Anna is an employee of Chiesi USA (an affiliate of Chiesi Farmaceutici S.p.A)
• Cecilia Plicco is an employee of the Chiesi Foundation Onlus and Chiesi Farmaceutici S.p.A
• Maria Paola Chiesi is a member of the Board of Directors and Coordinator of the Chiesi Foundation Onlus, and is a shareholder of Chiesi Farmaceutici S.p.A

The following authors have no relevant conflicts to disclose:

• Paul Ouedraogo
• Viviane Bissyande,
• Paolo Ernesto Villani
• Lucia Tubaldi
• Jenny Bua
• Fabio Uxa
Outline of this presentation

• Background
  • Neonatal mortality – a global health emergency
  • Bukina Faso
  • Saint Camille Hospital, Ouagadougou (HOSCO)
  • The Nest program

• Interventions
  • Theory of Change
  • QI methodology
  • “Action plan”

• Progress (results)
  • Improvements
  • Challenges
  • Mortality

• What we’ve learnt
• What’s next?
Neonatal mortality – “global health emergency”

• Sustainable Development Goals (SDG 3.2) - all countries should reduce neonatal mortality (NMR) to 12 deaths per 1000 livebirths or less by 2030
• Global NMR decreased by 51% from 36.6 in 1990 to 18.0 in 2017 (decreased from 5.0 million deaths per year to 2.5 million deaths per yr)
• West and Central Africa and South Asia - highest NMRs
• Between 2018 and 2030, it is project that 27.8 million neonates will die if the current rate of reduction in NMR is maintained
• More than 60 countries need to accelerate their progress to reach the neonatal mortality SDG target by 2030
• Accelerated improvements are most needed in sub-Saharan Africa and South Asia
Neonatal mortality – “global health emergency”

68% of newborn deaths can be prevented with simple fixes like:
- Skin-to-skin contact
- Exclusive breastfeeding
- Medicines

And access to clean, well-equipped health facilities, staffed by skilled health workers.

If governments invest just US$0.20 extra per capita in health, in low- and middle-income countries, we could prevent 2/3 of neonatal deaths by 2030.
Burkina Faso

- Landlocked country in West Africa (surrounded by six countries)
- 274,200 square kilometers
- Population - 19,751,651 (UN estimate 2018)
  - Rural - 70%
  - Population growth is high (3%)
  - 45% population <15yrs
- Recurring drought, food insecurity, limited natural resources = poor economic prospects for the majority
- Human Development Index rank 183 out of 188 countries (2014)
- Political and social unrest / violence including terrorist attacks in Ouagadougou (2014 onwards)
- Government introducing free healthcare in public hospitals for pregnant women and children <5 years
- Maternal mortality (2015) - 371 per 100,000 live births
  [Range of uncertainty 257 - 509 (UI 80%)]
- Lifetime risk of maternal death - 1 in 48 (cf 1 in 4900 developed regions)

UN Inter-agency Group for Child Mortality Estimation

Burkina Faso

<table>
<thead>
<tr>
<th>UN IGME estimate</th>
<th>Uncertainty Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.4</td>
<td>(17.8 - 35.3)</td>
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</table>

https://childmortality.org/data

NMR per 1000 live births (90% uncertainty intervals)

- 1990 - 45.9 (41.1, 51.1)
- 2000 - 41 (36.5, 46.0)
- 2017 - 25.4 (17.8, 35.3)

Lancet Glob Health 2019;7: e710–20

https://childmortality.org/data
Saint Camille Hospital, Ouagadougou (HOSCO)

• Founded in 1967 by the Order of St. Camillus (Camillian Fathers)
• Neonatal unit opened in 1974
• By 2004
  • ~ 5000 births per year
  • ~900 admission to NNU
  • NNU – 2 rooms equipped with 9 incubators (donated in early 1980s) and 50 cots
  • Mortality ~44%
Saint Camille Hospital, Ouagadougou (HOSCO)

- By 2010 – 1500 admissions (only NNU in BF)
  - 82% outborn
  - Oxygen, pulse oximeters, day-time lab and xray, phototherapy, weighing scales, breast pumps
  - Staff – 1 head nurse + 5 nurses and 16 nursing assistants (ancillaries)
  - No medical staff – day time cover if required from trainees on paediatric ward
  - Mortality - 39%
  - 12 “training missions” between 2005-2010 by Italian neonatologists and nurses

- By 2014 – 1900 admissions (880 VLBW)
  - 86% outborn
  - Staff – 2 senior paediatric trained nurses + 11 nurses and 26 nursing assistants (ancillaries)
  - 1 general physician – day time cover
  - Mortality 43% (VLBW mortality 67%)

BUT no additional space
**HOSCO and NEST partnership – 2014 onwards**

Need a more structured approach to improve neonatal outcomes

- Current model of basic neonatal care would not impact mortality given the increasing complexity of case mix
- Need to develop “semi-intensive care”
- Referral centre for the city
- Severe overcrowding – no space for babies, mothers, staff etc.
- HOSCO General Director – Italian trained paediatrician and neonatologist

- New building
- New approach to neonatal care

Formalise the partnership between HOSCO and CFO to implantation the NEST model of care
What is NEST? Neonatal Essential Survival Technology Project

Long term program (2014)

- Improve the quality of care for sick, unwell, preterm and low birth weight babies in low resource countries
- “Model for Neonatal Care Unit” in suitable facilities
- Effective, sustainable, replicable, adaptable, adequate to the local context
- Provide appropriate “technologies”
  - Suit local context
  - Comprehensive and tailored training programs – neonatal nurse
  - Empowerment of local staff
- Partnership with local health providers and governments
  - Collaboration
  - technical experts (e.g. neonatologist, nurses, engineers etc.)
  - non-profit organisation
  - private actors with relevant expertise

Analysis of the needs of the hospital in terms of neonatal care, in particular for unwell, sick and LBW babies

Ideal layout and organization of the NCU

Set of equipment
Basic equipment for neonatal care, adequate in terms of simplicity, adaptability, costs and maintenance

Selection and development of a set of reference guidelines and protocols for the NCUs

Data recording and monitoring system (statistics, medical records, etc.)

Recognition of the role of the neonatal nurse

Safe route from maternity to NCU
Adequate space
Dedicated + skilled health care providers
Family centered approach
Zero separation mothers + babies
Hygiene

MASTER program in neonatology addressed to nurses and/or doctors

Training on the job to improve the competencies of the NCU staff
Theory of change

• Used by government agencies, international NGOs, the UN, and many other major organizations to promote social change in high, mid and low income countries.

• Defines long-term goals and then maps backward to identify necessary preconditions (actions / interventions).

• Causal analysis based on available evidence helps explain how a given intervention(s) are expected to lead to a specific change.

https://www.theoryofchange.org
HOSCO – assessment of need 2014-15

- Buildings and facilities
- People – staff, mothers and families
- Equipment and drugs
- Networking and Collaboration
- Involvement of higher-level institutions within Burkina Faso
Explore and display the many factors contributing to neonatal mortality.
Action plan 2015

5 workstreams
interlinked

"Needs Assessment" would be repeated in January 2018 and then every 2 years

"template" continual review progress
What did we want to achieved?

**Needs**
- Babies: Warm, Pink, Safe
- Mothers and families: Kangaroo mother care, Parents information and empowerment, Family-centred care
- Staff, dedicated and responsible for the neonates: Tailored training programs, Empowerment and recognition of neonatal nurse, Hospital protocols, Teamwork and communication

**Facilities**
- Building: Unit dedicated to neonatal care, Water, energy and oxygen
- Layout and organisation of space
- Set of essential products: Drugs and consumables, Basic and advanced equipment

**Institutions**
- Official national guidelines and protocols for neonatal care
- Network and collaboration with other hospitals and birth centers
- Engagement and commitment of higher-level institutions

**DATA COLLECTION AND MONITORING**
Guarantee an essential level of quality newborn care, in particular for sick, premature and low birth weight neonates, at birth, in the neonatal care unit and during the follow up at home.
Progress (results) – the building

June 2015 – March 2017

- Intensive room (5 cots)
- Semi-intensive room (10 cots)
- Pre-discharge room (15 cots)
- KMC room (6 cots)
- Triage (4 cots)
- Breastfeeding room
- Milk Kitchen
- Area for the staff
- 2 bathrooms for mothers

Each cot

- Centrally generated oxygen, air and vacuum
- Minimum 4 electric sockets (8 in intensive room)
Progress – the building

NNU relocated for 20 months into one room in the paediatric ward
Difficult time – only space for 15 cots (pushed to 20)
Progress – the building

“Preparing to move in” – KMC chairs have arrived
Progress – the building April 2017
Progress - People

• Nurses
  • 2015 – one nurse per shift (shared with paediatrics) + 24 nursing aids
  • 2019 - phased increase – dedicated nurses, ↑2 per shift (14 total) + 24 nursing aids (3-4 per shift)
    • Average occupancy = 35 babies and 3 admissions per day
    • Time for training
    • Staff turn over – hard work leave for public hospital
  • Aim 4 dedicated nurses per shift (24 total) + 24 nursing aids

• Doctors
  • 2015 – 1 general practitioner weekday mornings only
  • 2018 – 1 general practitioner weekday mornings only
  • Struggling to increase to 2 general practitioner and 1 paediatric specialist
  • Reliant on HOSCO Director

• Mothers and Families
  ✓ KMC fully implemented
  ✓ 2019 – mothers 24/7 access to the NNU
  • Family centred care – a work in progress
Progress – KMC, mothers and families

2016 – KMC in corridor
Progress – KMC mothers and families 2017-2019

2017 - dedicated KMC room
2018 - dedicated staff
“Beds” – a working progress

2017 - NNU KMC chairs
2019 – mothers 24/7 access
Progress - Equipment

- Identified appropriate equipment
- Analysis of existing equipment and creation of partnership with manufacturing companies
- List of appropriate equipment
  - Proved efficacy
  - Low need for maintenance
  - User friendliness
  - Low cost
  - Adaptability to local conditions

Develop a training package to ensure safe use and maintenance for each device

Accountable nurse
### Progress – Equipment 2019

Analysis, selection and validation of appropriate equipment to local context

<table>
<thead>
<tr>
<th>Basic</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Thermal protection</td>
<td>• Respiratory support</td>
</tr>
<tr>
<td>✓ WATER HEATED MATTRESSES – KANMED</td>
<td>✓ OXYGEN ADMINISTRATION (blender, HUMIDIFIER, etc.)</td>
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<tr>
<td>✓ RADIANT WARMER MTTS</td>
<td>✓ CPAP – MTTS (2019)</td>
</tr>
<tr>
<td>• Hygiene</td>
<td>• Neonatal transport</td>
</tr>
<tr>
<td>✓ HAND SANITIZATION OPTIMA - MTTS</td>
<td>✓ TRANSPORT INCUBATOR</td>
</tr>
<tr>
<td>✓ REUSABLE NAPPIES– TOTSBOTS</td>
<td>✓ AMBULANCE</td>
</tr>
<tr>
<td>• Oxygen, measurement and respiratory support</td>
<td>• Other equipment</td>
</tr>
<tr>
<td>✓ PULSE OXIMETER–LIFEBOX</td>
<td>✓ INFUSION PUMPS</td>
</tr>
<tr>
<td>✓ LOW FLOW METER and NASAL PRONGS</td>
<td>✓ CARDIO–RESPIRATORY MONITORS</td>
</tr>
<tr>
<td>• Jaundice</td>
<td>✓ INCUBATORS</td>
</tr>
<tr>
<td>✓ JAUNDICE DIAGNOSTIC KIT</td>
<td>✓ ...</td>
</tr>
<tr>
<td>✓ PHOTOTHERAPY FIREFLY MTTS</td>
<td></td>
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<tr>
<td>✓ OVERHEAD PHOTOTHERAPY COLIBRI MTTS</td>
<td></td>
</tr>
<tr>
<td>• Resuscitation and stabilization at birth</td>
<td></td>
</tr>
<tr>
<td>✓ UP-RIGHT RESUSCITATOR and MASK, PENGUIN SUCTION DEVICE – LAERDAL</td>
<td></td>
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<tr>
<td>✓ NASOGASTRIC TUBES</td>
<td></td>
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<tr>
<td>• Neonatal transport</td>
<td></td>
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<tr>
<td>✓ EMBRACE WARMER</td>
<td></td>
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<tr>
<td>• Breastfeeding</td>
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<tr>
<td>✓ BREAST PUMPS, PLASTIC BAGS FOR STERILIZATION - MEDELA</td>
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Acquired equipment — effectiveness test completed

Equipment under evaluation

Research of partners/manufacturers
**Progress – Essential Drugs**

**Objective**
- To ensure availability of “appropriate and safe” essential drugs for neonatal care use
- To implement effective treatment protocols

**Activities**
1. Implementation of an appropriate supply chain for essential drugs, when not available
2. Development of the protocols for the correct use of essential drugs
   - Glucose/sucrose for pain
   - Caffeine for oral use
   - Paracetamol for pain control
   - Nystatin
   - Antibiotics
   - Vitamin K
3. Scientific validation of the protocols
4. Staff training

**Current status:**
- Verification of the presence of these drugs in Burkina Faso - complete
- Testing of the effectiveness of the protocols

**Parental costs:**
- Neonatal kit (~30 USD)
- Basic drugs
- N-g tubes, IV cannula
- Nappies
- Linen etc.

Plus “daily charge”
- 8.5USD every 5 days
Progress – Guidelines and Protocols

• No written guidelines
• In 2016 the HOSCO NNU doctor with the support and mentorship of the NEST training team developed a set of guidelines:
  - Resuscitation
  - Neonatal apnea
  - Use and dilution of antibiotics
  - Neonatal convulsions
  - Neonatal asphyxia
  - Nutrition volumes for small (< 1250g) and sick babies
  - Neonates with mothers with Hepatitis B
  - Hypocalcemia
  - Recognition and treatment of jaundice
  - Neonatal infection
  - Solutes and electrolytes
  - Oxygen therapy
  - Indication for discharge
  - Blood transfusion
Progress – Training

Develop + delivery of targeted program
Language - French (NEST multilingual)
Specific focus on the role of nurses
✓ Essential Care*: (Warm, sweet, pink and safe)
✓ Resuscitation (HBB)
✓ Immediate care after birth
✓ Thermal care*
✓ Kangaroo Mother Care
✓ Breast feeding*
✓ Family-centred care/developmental care*
✓ Hygiene in healthcare *
✓ Triage and admission in the neonatal care unit
✓ Basic respiratory support (SO2, pulse oximeter, use of oxygen, etc.)
✓ Neonatal transport and referral
✓ Procedures: IV cannulation, umbilical catheterization, etc.

External Training Visits
Targeted training and assessments covering clinical topics and equipment etc.

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
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<tbody>
<tr>
<td>2016</td>
<td>February</td>
<td>January</td>
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<td>2017</td>
<td>November</td>
<td>May</td>
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<td>2018</td>
<td>December</td>
<td>June</td>
<td>October</td>
</tr>
<tr>
<td>2019</td>
<td>January</td>
<td>November</td>
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“Training the trainer” model
Currently heightened level of security in BF has placed further visits on temporary hold

*developed in partnership with Birthlink
Progress – Training

Essential Care
An Overview of Fundamental principles of neonatal care
Warm, Sweet, Pink & Safe

Admission of baby
Small & preterm baby
Sick baby after delivery
Admission from home or health centre
They all need the same essential, basic care
Warm, Sweet, Pink & Safe

SETTLING the baby after care
• The best place to settle your baby is resting against your chest (kangaroo care).
• If you are settling your baby in the bed rest your hands gently on your baby’s head, shoulders or feet, keeping still until your baby is asleep.
• If your baby is awake after care and wants to be sociable this is a good time to talk softly and make eye contact.

Small group / large group
Formal / bedside

Referring hospitals and birth centres now sending staff for training
Progress – Training

Assess breathing – Look and listen

- Is there nasal flaring
- Is there chest recession
- Is breathing noisy – grunting
- Is baby pink, dusky or pale
- What is the breathing rate

Measure oxygen saturations

Positioning

- Tummy to mummy
- Hands off the breast
Progress – Training “Bite size”

• Training broken down into small sections
• Delivered in 10-15mins
• Packed in a “box”
• Instant education
  • Anywhere
  • Any time
Progress – Training

Current status: **ongoing**

Pre and post testing

Nurses - improve

Nursing Associates - less so
Networking and collaboration

- No collaboration with other departments and services
- No processes in place
- Suboptimal collection process
- Statistics not integrated into national database
- No referral process
Progress – Networking, Communication, Data

Records and Data analysis
- Case records – standardised and kept (some of the time)
- Nurses record observations
- Annual data report (basic)
  ✓ All babies birth and death certificates
  ✓ 2018 – hospital statistician appointed and contributing to national statistics

Internal communication and collaboration
- Improved with Labour Ward and Maternity
- Daily NNU meeting to plan workload etc.
- Handover

“External Perinatal Network” (>80% admissions outborn)
- Began to talk to local referral hospitals and birth centres in 2017 (initiated by HOSCO Director)
- Now – informal network established with a referral process, joint NEST training, data collection
  X No transport (private car / taxi) often brought by family
- Meeting planned this month to “formalise” and discuss priorities for joint working i.e. shared guidelines, teaching and staff training etc.
- Ministry of Health – may taken on Leadership and co-ordination

All interaction, initiated and lead by HOSCO Director with support of NEST if required
High neonatal mortality (0–28 days)
Progress – Higher level institutions

Professional bodies

✓ Société Burkinabe de Pediatriè (SOBUPED) – “endorsed HOSCO training, referral centre and network”
✓ Ministry of Health – engaged (but not finance)

Formal neonatal nurse qualification (attaché de santé)

• Recognition = salary
✓ Discussion with University started in 2017 (with President of SOBUPED)
• Agreement to establish “Masters in Perinatology” but no start date as need to better define the program and faculty

Ministry of Health

✓ Interactions with NEST and HOSCO began in 2017
✓ Support for HOSCO as “referral centre” within a city wide network
• No Money provided

All interaction, initiated and lead by HOSCO Director with support of NEST if required
Challenges – the view of the HOSCO team

• Keep the project going given the “instability” within BF
  - Contributes to nursing and medical shortages and many other functions of the neonatal service and wider hospital

• Establishing a functional Perinatal Network in Ouagadougou

• Continuing and expanding the training program at HOSCO and for the network

• How best to equip the NNU
Mortality

VLBW = 36%
ELBW = 9%
What has been achieved?

- **Needs**
  - Babies: Warm, Pink, Safe
  - Mothers and families: Kangaroo mother care, Parents information and empowerment, Family-centred care
  - Staff, dedicated and responsible for the neonates: Tailored training programs, Empowerment and recognition of neonatal nurse, Hospital protocols, Teamwork and communication

- **Facilities**
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**DATA COLLECTION AND MONITORING**

Guarantee an essential level of quality newborn care, in particular for sick, premature and low birth weight neonates, at birth, in the neonatal care unit and during the follow up at home.
What next?

- CPAP – complete training and roll out
- Better understand why babies die
  - Inborn
  - Data, Audit
  - Insufficient staff? Inexperienced staff
- Improve outcomes for outborn babies
  - Network
  - Training and support
  - Transportation
- Engage institutions (Ministry of Health, University)
- Focus on the neonatal nurse and the family
What next?

Survive and Thrive
Key findings document published in 2018

Awaiting publication full document

In development:
• Standards
• Clinical guidelines
• Outcome framework + matrix

✓ NEST program is well positioned for the future direction
Thank you

Staff at HOSCO
Father Paul Ouedraogo
Viviane Bissyande
Italian neonatal team
Paolo Ernesto Villani
Poliambulanza Foundation Hospital, Brescia,
Lucia Tubaldi
Hospital of Macerata, Macerata,
Jenny Bua
Institute for Maternal and Child Health, IRCCS ‘Burlo Garofolo’, Trieste, Italy
Fabio Uxa
WHO Collaborating Centre, Institute for Maternal and Child Health, IRCCS ‘Burlo Garofolo’, Trieste, Italy
IN development

• Management of jaundice
• Feeding of preterm newborns including intravenous fluids
• Treatment of infections, including management of fever and NEC
• Family centered care (as a further development of kangaroo mother care)
• Respiratory distress, Oxygen therapy, neonatal apnoea and use of pulse oximeters
• Advanced/non-invasive respiratory support and introduction to CPAP (Continuous Positive Airway Pressure)
• Management of neonatal complications such as convulsions, neonatal asphyxia, etc