What is the clinical problem?

- Background
What is the clinical problem?

11,000 babies born annually
2,000 admissions to MMH NCCU
240 babies born <1500g

What is the Evidence?

Early and aggressive enteral/parenteral nutrition is important to reduce nutritional deficits and has been demonstrated to improve short and long term outcomes:

- Reduced vulnerability to infection
- Reduced susceptibility to lung injury
- Reduced NEC
- Increased maturation of GIT and Growth

Short Term Outcomes

- Optimising brain development, intellectual attainment
- Improve cell growth in different body systems during critical periods including the cardiovascular system – reduce impact of adult chronic disease
What is the Evidence?

- # studies
- Level of Evidence
- Quality of Studies

Implementation Phase

- **PICO**
  - Population, Intervention, Comparator, Outcome
- **Thematic Analysis**
  - Line by Line Coding, Synthesising codes into Categories
- **TDF**
  - Theoretical Domains Framework
- **COM-B**
  - Capability, Opportunity and Motivation to affect behaviour change
- **BCW**
  - Behaviour Change Wheel
What is the Research Question?

**Population**
- In infants born <1500g

**Intervention**
- Will identifying and addressing the barriers to early nutrition,
- Compared to usual treatment

**Comparator**
- Result in implementation of new practices and improved nutrition outcomes

What was Implemented? Data Collection

**Literature Review**
- Infants born <1500g should receive 2g/kg/d protein and 40-50kcal/kg/d first 24 hours of life

**Resource Review**
- Orientation and education materials
- Policies, guidelines, other key documents
- PN Solution Composition - inadequate

**Survey and Audit Results**
- NAPSS: staff think neonates meet RNIs
- NENA (n191): neonates do not meet RNIs

**Observation**
- NCCU Process
- Service Mapping

**Interviews**
- Semi structured interviews with medical and nursing staff - theme saturation

What was Implemented? Interview Questions

- Tell me in your experience about the patient journey from birth?
- What are the treatment priorities in those first hours and day?
- What changes in the treatment priorities occur in the next few days?
- Tell me you thoughts about parenteral nutrition for preterm infants?
- What are your thoughts on establishing enteral nutrition for preterm infants?
- Research has shown the importance of establishing nutrition early, what do you see as some of the biggest challenges in achieving this in the NCCU environment?
Interview Analysis

- Interviews conducted, recorded, transcribed and analysed
- Read and highlighted key points (post it notes)
- Arranged post it into themes
- Identified emerging themes and sub themes
- Aligned themes into the TDF

Major Themes

- Decision Making
- Disconnect between Beliefs and Application of Evidence
- Monitoring and Awareness
- Roles and Responsibilities

Emerging Themes and Sub Themes

- Competing clinical priorities, Inconsistency, Ventilation and stabilisation, Size and gestation, Progressing feeds
  - “Airway, breathing and circulation is always going to win, next should be nutrition”
  - “A baby on a ventilator can start PN”
  - “Consultants aren’t singing from the same hymn book”

- Role delineation, Mater Culture, Prep for PN
  - “There is a big culture about waiting for WR before anyone makes a decision”
Emerging Themes and Sub Themes

- Clinical fears and complications, pros and cons, PN solution composition
  - "Benefits outweigh risks"
  - "More concentrated PN – better nutrition less fluid"
- Perceptions, Ordering PN, Awareness of PN content, Wasting resources, Infection and line management
  - "If it is busy in the unit... It takes longer to order PN."

Mapped using TDF

- 8 Theory Domains were identified (French 2012)
- Knowledge
  - Memory, Attention and Decision Processes
  - Skills
- Professional/Social Role and Identity
- Beliefs about Capabilities
- Beliefs about Consequences
- Environmental Context and resources
- Social Influences

Theoretical Framework to Identify Barriers and Enablers

- Theory domains aligned with sources of behaviour using COM-B system
- Mapped through Behaviour Change Wheel (Michie 2011)
Theoretical Framework to Identify Barriers and Enablers

Intervention Function + Delivery Mode

Regulation (Enablement)
- Consensus Agreement from Neonatal Staff Specialists
- All infants born under 1500g and <K32 will have UVC or PICC placed to deliver PN safely within 2 hours of birth
- Creation of Nutrition Bundle (critical time points/audit/feedback)

Guidelines (Training / Modelling / Restrictions)
- Nutrition Guideline for <1500g
- E-learning
- Orientation Package
- Medical and Nursing training programs
- Case studies
- Identify nutrition champions

Legislation (Environmental Restructuring)
- Empower all levels of medical and nursing staff to be confident with early nutrition decisions in line with consensus practice guidelines (increase target behaviour) 24/7
- Improve PN solutions to better meet RNIs with low fluid volumes

Service Provision (Education / Coercion)
- Engage stakeholders to define Nursing role at admission and in preparation for PN initiation
- Education around the value of change to current practice
### Intervention Function + Delivery Mode

<table>
<thead>
<tr>
<th>Environmental Social Planning (Restriction / Persuasion)</th>
<th>Communication (Persuasion / Incentivisation)</th>
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</thead>
<tbody>
<tr>
<td>• Admission processes that support and include nutrition early - Nutrition Bundle</td>
<td>• Use current communication channels and investigate novel modes to:</td>
</tr>
<tr>
<td>• Stickers, prompts</td>
<td>• Promote nutrition and updates to nutrition practice</td>
</tr>
<tr>
<td>• Streamlined PN Ordering</td>
<td>• Communicate audit feedback</td>
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</tbody>
</table>

### Outcomes

#### Implementation and Settling In Phase

<table>
<thead>
<tr>
<th>Audit of new practices</th>
<th>Process Outcomes</th>
<th>Clinical Outcomes</th>
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<tbody>
<tr>
<td>Line placement and timing</td>
<td>Initiating PN within 2hrs of birth &lt;1500g</td>
<td>Protein and energy intake within first 24hrs – Intake vs RNIs</td>
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<td></td>
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<td>Time to regain birth weight</td>
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<td>Weight/Centile at 36 weeks CGA</td>
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</tbody>
</table>

### Where to from Here?

- 2017 - Implement Consensus Guidelines
- 2017 - Implement New PN Solutions
- 2017 - Implement Nutrition Bundles
- 2018 - E-Learning, Orientation and Training Programs
The Light & The Dark

Light: What we learnt
- Research is timely
- The problem is not always obvious e.g. Infants receive nutrition based on the ventilatory support that they require - not by gestational age or weight.

Dark: What we would never do again
- Assume that we know the solution to the problem without clearly examining the issue first