



## GREENER FEEDING PRACTICES IN THE NEONATAL INTENSIVE CARE UNIT (NICU), NICU TEAM

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### TEAM MEMBERS:

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- on behalf of the Neonatal Team at Singleton Hospital



### Background:

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Family Integrated Care (FiCare) is a model of neonatal care which promotes a culture of partnership between families and staff. This enables parents to become confident, knowledgeable and independent primary caregivers.

FiCare is not a single entity or tangible, 'auditable' practice and there are many overlaps with the guiding principles of sustainable healthcare. FiCare aims to prevent mortality and morbidity associated with needing neonatal care through involving parents-as-partners in care ('self-care' on a family level), giving parents more responsibility for the management of their infants health and care. It has 'lean' and prudent principles at its core, as it aims to minimise unnecessary medical intervention such as blood tests, valuing normal parental care within the NICU setting. It promotes many low carbon practices i.e. parental presence in the unit, reducing travel between home and hospital, breastfeeding, skin-to-skin to encourage thermal care.

We aimed to integrate principles of FiCare into our sustainability project by focussing on feeding. Feeding forms a huge part of the family journey through the neonatal unit and is an opportunity for bonding between parents and their baby. Infants born premature and/or with health complications often experience difficulties feeding and take time to achieve full oral feeding (weaning off supports such as nasogastric tube feeds). While breastfeeding is promoted for all infants, many will also require bottle feeding. It is common practice to use single use teats and bottles for these feeds, despite infants and families needing to transition to reusable, commercially available bottles on discharge.

### Specific Aims:

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1. To support families to provide their own feeding equipment (bottles and teats) as early as possible to reduce single use equipment in our infant feeding processes, as well as encouraging optimal feeding practices for infants.
  2. To embed recycling and prudent waste management around feeding equipment into our two main clinical areas – NICU and special care
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## Methods:

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We disseminated a staff questionnaire (online) to establish baseline attitudes to the sustainability impact of infant feeding practices across the neonatal unit.

### **1. Parents using own bottles / increasing use of reusable bottles**

We developed and introduced parental written resources to the unit. We added to our pathways to inform parents about providing their own feeding equipment (bottles and teats). We emphasised patient benefits of this (detailed in results section). We provided written information to parents, 'rapid' staff education and embedded reminders in our daily safety huddles.

### **2. Recycling of feeding equipment**

Previously, all feeding bottles were disposed of in clinical waste. If rinsed, these can be recycled as per our health board waste pathway. We have been establishing infrastructure for recycling plastic waste associated with feeding on the unit and raised awareness of what can be recycled to all staff.

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## Measurement:

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Patient outcomes:

We will look at the number / percentage of infants who are receiving feeds via parent provided bottles / teats (as opposed to standard single use hospital issued feeding equipment). We completed an audit pre and post a 2 week intervention period. We have also reviewed literature on bottle feeding in premature infants to consider potential clinical benefits for infants.

Recycling of equipment will have no impact on patient care.

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Environmental sustainability:

We are currently in the process of calculating the carbon footprint of a disposable bottle vs two commonly used brands of reusable feeding bottles commercially available to parents. This involves collating information on the raw materials and weights of the products and packaging as well as on transport from manufacturer to supplier. We will apply carbon emission factors for materials and transport provided by UK Government GHG conversion factor report. We will apply carbon emissions for waste disposal based on emissions factors in Rizan et al 2021<sup>6</sup>. The carbon associated with sterilisation of reusable bottles will also be considered. A total carbon footprint for each product per use will then be created.

We will measure the number and weight of bottles recycled to calculate the difference in emissions from clinical waste disposal and recycling using emissions factors from Rizan et al 2021<sup>6</sup>.

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Financial Sustainability:

As a department we will save money through a reduction in single use bottles needed / ordered and in a reduction of waste volume. This can be measured via our procurement documentation.

We have calculated savings of redirecting waste from clinical waste stream to recycling based on costs provided by our waste team.

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Social sustainability:

Questionnaire examining staff knowledge and attitudes in regard to recycling and sustainability in the neonatal unit.

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## Results:

Patient outcomes:

The proportion of infants receiving oral feeds via a parent-provided bottle increased considerably, by 92% over a 2 week period.

Literature review of patient benefits:

Commercially available newborn teats are generally a slower flow rate than disposal teats. Slowing milk flow is a simple and effective intervention for promoting swallowing safety and oral feeding skill development for infants<sup>1</sup>. This is especially important for infants who commence oral feeding via bottle below the gestation age of 38 weeks, in which there is an increased risk and incidence of immature oral feeding skills and silent aspiration (foreign substance entering the lungs)<sup>2</sup>. Use of slow flow teats and parents own equipment aligns well with FiCare principles of parental involvement and in following a supportive infant led feeding approach, which can also improve long-term feeding outcomes and reduce follow up care for feeding related difficulties such as reflux/vomiting, transitioning to full oral feeding or feeding aversion<sup>3</sup>.

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Environmental sustainability:

### 1. Increasing use of reusable bottles

We are still in the process of identifying the carbon footprint of one disposable bottle versus a reusable bottle. We anticipate the CO<sub>2</sub>e of a reusable bottle to be significantly lower than a single use item, as the CO<sub>2</sub>e reduces per use. Based on an increase in parents bringing in their own bottles, we anticipate this project will lead to significant CO<sub>2</sub>e savings in the NICU.

### 2. Recycling of feeding equipment

There is a potentially recyclable weight of 0.054kg/plastic per feed (ring, large feeding bottle, and syringes). With an assumption of 12 feeds per day and 10 infants in special care baby unit (SCBU) we would redirect 6.48kg of waste per day to recycling.

With 100% cot occupancy this equates to 2,365.2kg of plastic waste per year.

- CO<sub>2</sub>e if placed into clinical waste: 2.33 tonnes x 1074 = 2,502.4 kgCO<sub>2</sub>e
- CO<sub>2</sub>e if placed into recycling: 2.33 tonnes x 21.23 = 49.46 kgCO<sub>2</sub>e
- Saving: **2,452.96 kgCO<sub>2</sub>e per year**. This is equivalent to 7,065 miles driven in an average car.

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Economic sustainability:

### 1. Increasing use of reusable bottles

Awaiting data. More time is required for our changes to be reflected in our procurement. We anticipate a financial saving as the purchasing of reusable bottles will be covered by parents. This is





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not an additional cost to families, as they would be required to purchase feeding equipment for home on discharge.

## 2. Recycling of feeding equipment

- Cost if waste placed into clinical waste: 2.33 tonnes x 504.04 = £1,174.4
- Cost if waste placed into recycling: 2.33 tonnes x 175 = £407.75
- Saving: **£766.65 per year**

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Social sustainability:

Staff:

55 members of staff took part in a survey. 85% of staff in the neonatal unit feel anxious about the environmental impact of neonatal care. 100% of staff would be willing to contribute to processes which mitigate the environmental impacts of providing neonatal care, even where these processes were more time consuming i.e. recycling sorting. These results demonstrate support for sustainable initiatives. We hope to decrease moral distress / burden for staff by them knowing the unit prioritises environmentally considerate practices.

Families:

Research on bottle feeding in NICU suggests that the top five concerns of parents in relation to feeding include how to regulate milk flow<sup>4</sup>. Parents express feelings of closeness and attachment to their infant when they have a role as a parent in making decisions about care, and when they provide for the infant (e.g. by holding and feeding them)<sup>5</sup>. Supporting parents to choose their own feeding equipment can support in addressing these concerns and encouraging parental autonomy and bonding. Linking bringing in their own feeding equipment with positive feeding outcome for their baby also support parental buy-in to the process of feeding.

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## Discussion:

Significant improvements in the number of infants feeding from parent-provided bottles were achieved through 2 interventions, namely – the provision of written information for parents and caregivers and ‘rapid’ staff education, embedded in the daily safety huddle – about the benefits of using parent-provided bottles from a patient, environmental, social and financial perspective.

There are potentially enormous environmental, financial and social benefits to the introduction of recycling in the NICU. This proof of concept work underplays the potential benefits as it only considered equipment associated with feeding in the special care area – the scope of plastic recycling is likely to be much greater than modelled here. Significant reductions in plastic waste result from the use of parent-provided bottles – reducing further the burden of single use plastic in our feeding pathways.

The consequences on staff morale were important – people felt good about the ability to support sustainability through the presence of recycling facilities on the ward. The staff survey has demonstrated how neonatal staff show concern for the environmental impacts of providing intensive care, and are keen to be involved in initiatives which have environmental, social and financial impacts – especially those which also improve patient care. Many expressed their dismay

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that recycling was not already embedded in our service as a standard of care. Parental perspectives on sustainable healthcare in the neonatal setting remain underexplored.

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### Conclusions:

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The principles underpinning Family Integrated Care and Sustainable Healthcare are highly aligned. The sustainable value of FiCare remains a ‘hidden benefit’ of a family integrated approach and is worthy of celebration and further research and characterisation as NHS Wales moves towards a Net Zero Ambition in 2030.

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### References

1. [Assessing the flow rate of different bottles and teats for neonates with feeding difficulties: An Australian context - ScienceDirect](#)
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  6. Rizan C, Bhutta M, Reed M, Lillywhite R. The carbon footprint of waste streams in a UK hospital. *Journal of Cleaner Production* 286 (2021) 125446. <https://www.sciencedirect.com/science/article/abs/pii/S0959652620354925>
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