

Christ Church Canterbury Educational Assessment Report – Da Nang Hospital for Women and Children NICU/HDU

Prepared for Newborns Vietnam

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INTRODUCTION

This report represents the findings of an educational assessment visit undertaken by Christ Church Canterbury University in March 2012, following a request to the Royal College of Nursing (RCN) by Newborns Vietnam (NBV) a charitable organisation working in partnership with the Da Nang Department of Health for assistance to advance neonatal care in central Vietnam. All parties recognised that nurses are critical to good neonatal care and assistance was sought to assess current skills, knowledge, working practices and to explore the potential to develop Vietnam's first neonatal nurse training curriculum. NBV's objective is to address the lack of a formal neonatal nurse training programme and through its fundraising activities provide sponsorship for additional nurses to improve the nurse baby ratio to facilitate the training and to provide the evidence base for advocacy for increased resources for neonatal care within Vietnam.

A formal letter of invitation was issued by the Da Nang Department of Health to Christ Church Canterbury University for experts from the University's Family, Health & Wellbeing department to visit the Da Nang Hospital for Women & Children to carry out a formal education assessment with a view to developing a long-term academic partnership. The invitation was endorsed and approved by the Da Nang People's Committee in a formal resolution passed to permit the assessment.

The Head of Family, Wellbeing & Health and a Senior Lecturer, Neonatal Care and Child Nursing carried out the assessment in March 2012 spending 6 days within the Neonatal Intensive Care Unit (NICU) and High Dependency Unit (HDU). Both assessors are also experienced neonatal nurses and have worked in 12 individual and different neonatal units in the UK and internationally, and have a combined work experience of 50 years in neonatal care.

In terms of making a difference to neonatal care in Viet Nam there are many lessons to be learnt from previous initiatives. Save the Children (2006) identify that when resources are scarce, targeted action in key areas within established healthcare setting are of great benefit. Funds should support and develop these in preference to supporting new initiatives. In Viet Nam there is recognition that preventing neonatal death is linked to the education and training which in turn assists the effective monitoring of pregnancy, childbirth and postnatal care¹ however, until now attention has been focused on the medical staff input. This review widens this focus by acknowledging the important role played by nurses within neonatal care.

The assessment visit timetable was organised flexibly to:

- Explore and establish an understanding of the current context and support for neonatal care
- Allow insight into the workforce and any planned workforce development,
- Establish if different staff groups held different views on the current nursing role and explore what different staff groups believed was required,
- Observe direct neonatal practice (mainly nursing with some medical observation),
- Correlate, where possible, nursing knowledge and experience against observed practice
- Review local Healthcare education regulations by direct contact with the Da Nang Department of Health and political support for any initiative.
- Review the local health care education to determine if collaboration between the UK and Vietnam higher education institutes would be possible in a sustainable way.

¹ Ministry of Health (2006) Vietnam Health report

The assessment aims was to:

- To understand the context of neonatal care in Da Nang
- To determine the composition of the future neonatal workforce
- To develop a proposal for a potential curriculum and delivery plan to increase the knowledge and skills of the neonatal nursing community in Da Nang,
- To consider how the project could move forward to access external funding
- To highlight external factors which need to be addressed for success.

The report has been compiled in good faith and has been subject to peer review by Newborns Vietnam and representatives of the Da Nang Hospital for Women & Children to ensure factual accuracy – however the judgements expressed within the report are those of the reviewers alone. It should be noted that these views are informed by comparison with UK standards and the, accepted evidence base within western society, which may be significantly different than standards within developing countries such as Viet Nam, however it was indicated that these standards were the aspiration for the future within Viet Nam.

Final

The context of Neonatal care in Vietnam

Viet Nam is a relatively young country, with a median population age of 28 years old. In the 1960's the high proportion of women within child-bearing age was managed centrally by a national '2 child only policy' for couples, which was relaxed in 2003. However, the subsequent baby boom has resulted in a reintroduction of this policy in 2008, to limit the total numbers of children. The current situation is such that the People's Committee National Assembly encourages only two children per family, with the ideal option being a girl, then boy. In theory therefore, the total numbers of infants being born across the country should be in decline, and thus the overall demand for neonatal care may reduce as a consequence. However, accurately determining how many neonates may require care is more problematic.

The outcomes of neonatal care are recorded in each country and provided to the World Health Organisation to allow country by country comparison, so the actual recording of births and death is of paramount importance for accurately predicting neonatal care demand. The number of 'neonatal deaths' (death in the first month of life) is the key indicator and is known as the Neonatal Mortality Rate (NMR). The NMR contributes to both the Infant mortality Rate (IMR- deaths in the first year of life) and the child mortality rate (0-five years of age). The World Health Organisation statistics for Viet Nam indicate that there has been a progressive decrease in the NMR (Table 1).

Table 1; Neonatal Mortality Figures for Viet Nam²

Year	1990	1995	2000	2005	2010
NMR	23	20	17	14	12

This has been matched by a progressive decrease in the IMR, from 37 per 1000 live births in 1990, to 19 per 1000 live births in 2010³. This decrease followed government intervention to meet the Millennium Development goals⁴. However, despite this decrease the 2010 figure equates to a total of 28,000 infants dying in their first year of life.

Table 2; Mortality statistics comparison; Viet Nam and UK

2010 WHO statistics	NMR – Deaths in first 28 days	IMR – Deaths in first year of life	CMR – Deaths in first 5 years
Viet Nam	12 deaths /1000 live births 18000 deaths	19 deaths / 1000 live births 28000 deaths	23 death /1000 live births 34000 deaths
United Kingdom	3 deaths / 1000 live births 2000 deaths	5 deaths / 1000 live births 4000 deaths	5 deaths /1000 live births 4000 deaths

Table 2 indicates that the proportion of neonatal deaths within the first year of life is similar to the United Kingdom (UK) levels as neonates contribute to 60% of the total IMR in both countries, however there is a continuation of deaths within childhood in Viet Nam not observed in the UK. This high proportion of neonatal deaths remains of concern within the UK and continues to drive the need for good quality neonatal care. In Viet Nam there is evidence that the actual need for neonatal

² WHO Statistics; Global Health Observatory Statistics available at; <http://apps.who.int/ghodata/?vid=21300&theme=country> Accessed 15.3.12

³ As 2

⁴ <http://www2.wpro.who.int/vietnam/mdg.htm>

care is likely to be under estimated. Data capture⁵ has been recognised as 'poor' with large regional variations and possibly up to 50% of infants dying in the first month being unreported⁶.

Improvement to reporting systems for births and neonatal deaths are required particularly in the countryside and remote areas⁷ since this under-reporting has significant consequences at local, national and international levels. At a local level, it results in a lack of awareness of the magnitude and differentials in NMR. At a national and international level the perceived low mortality rate is manifested in a lack of investment in neonatal care. It is recognised that poor reporting is not unique to Vietnam, it is an issue in many low and middle-income countries where needs for neonatal health reforms are greatest. This invisibility of neonatal deaths is a severe obstacle in the pursuit of improved neonatal survival since it precludes adequate planning and measures by local and global organisations. In the long term there is a need for improved health statistics and data reporting on child births and deaths in order to have a stronger basis for design and monitoring of interventions for improved neonatal survival.

Da Nang Hospital for Women & Children

The hospital was opened on 20th April 2011 and has a bed capacity of 600. The hospital looks after women and children's health for people from Da Nang and neighbour provinces in the central region of Vietnam. Da Nang is located in central Vietnam, borders Thua Thien-Hue Province in the north, Quang Nam Province in the south and the west, and the Eastern Sea in the east. Da Nang is at the end of the East-West Economic Corridor (EWEC), which stretches over Vietnam, Laos, Thailand and Myanmar. This location highlights Da Nang's role as a centre for socio-economics and culture in Central Vietnam. Da Nang has a surface area of 1.255,53 km² with a population of around one million with approximately 200,000 under 15 years of age.

The Department of Paediatrics has 8 units (Emergency, Neonatal ICU; Pediatric ICU; Gastrointestinal Unit; Cardio-Respiratory Unit; Neurology, Hematology & Nephrology Unit; Pediatric Tropical diseases unit and General Medicine Unit). The daily inpatient number is around 400-500. Every year there are approximately 20,000 pediatric admissions and more than 50,000 outpatient visits. The department has the following roles;

- Hospital for children from 0-15 years old in Da Nang city Referral hospital for other hospitals in Da Nang and Quang Quang Ngai, Thua Thien-Hue, and central highland provinces
- Clinical teaching centre for hospitals in Central Vietnam and two nursing schools and one medical school in Da Nang
- Planning child health strategies for Da Nang and other provinces in Central Vietnam
- Medical research centre in central Vietnam

Da Nang Neonatal Intensive Care Unit

The NICU of Da Nang Hospital was established in 1982 to manage medical and surgical newborns. Da Nang is designated as a neonatal training centre for the central region of Vietnam. The neonatal unit moved to the new Da Nang Hospital for Women & Children in April 2011.

There are around 10,000 deliveries a year in the maternity department and many are high risk and involve complications. If babies are very sick or premature they are cared for in the neonatal

⁵ Socialist Republic of Viet Nam (2011) Vietnam Population and Reproductive Health Strategy IN Viet Nam Social Economic Development Strategy. Socialist republic of Viet Nam

⁶ Målqvist M. Neonatal mortality: an invisible and marginalised trauma. *Global Health Action*. 2011;4:5724. doi: 10.3402/gha.v4i0.5724

⁷ Huy TQ, Long NH, Hoa DP, Byass P, Eriksson B: Validity and completeness of death reporting in a rural district of Vietnam. *Scand J Public Health* 2003, 62:12-18

intensive care unit (NICU) and later maybe looked after with their mother in the high dependency unit (HDU).

The NICU admits over 200 neonates per month from inborn patients, referrals from other hospitals and direct admissions from the community. It is estimated that 60% of the NICU admissions are from inborn patients. Criteria for the inborn babies admitted into the NICU are preterm infants under 2000 grams and sick newborns of any weight or gestation. All sick neonates (under 29 days) born in Da Nang are referred to the NICU as well as critically ill neonates from the surrounding provinces such as Quang Nam, Quang Ngai and Thua Thien Hue provinces, with a population of around four million people in the unit's catchment area.

Whilst some of the anomalies in data capture highlighted earlier may be due to births in outlying areas, hospital figures should provide more accurate data in terms of the actual need for neonatal care and neonatal death within this closed environment. The figures for admission to the neonatal unit and for hospital mortality figures are collated by the staff for the inpatient population. However, during discussions it was realised that caution is required when reviewing local hospital care neonatal mortality figures since the figures presented during this visit excluded infants who die at birth during obstetric care so are not comparable to UK hospital statistics.

The admission and mortality figures presented to the team, reflected neonatal care during the last 5 years both in the previous city centre general hospital and the new Da Nang Hospital for Women & Children. Contrary to a reduction in admissions, which may have been expected with population control measures in place, there has been a progressive small increase in admissions whilst at the previous facility, with a large increase in admissions following the move to the new facilities (Table 3).

In 2009, 1,911 neonates were admitted to the NICU. Whilst the greatest proportion of admission was described as 'jaundice' (431), this was followed by newborn infection (271), prematurity (232), sepsis (183) pneumonia (154), haemorrhage and hematoma (111), then RDS (~100) + additional causes. Whilst jaundice is clearly a significant element of care, there is a predominance of infection related admissions that are probably directly related to the neonatal mortality statistics. This is becomes more obvious in the gross statistics provided for all admissions (n = 9,771) where infection related admissions accounted for 38% of the total, Jaundice 20%, and Prematurity and complications 17%. Non-cardiac congenital anomalies accounted for 6% of admissions, as do Haemorrhagic problems, Intrapartum related events contribute to 4%, 3% were attributed to post-natal and IUGR admissions with the remaining percentage attributed to 'other'. In terms of data collection the nursing records of admissions recorded similar data to that commonly accepted in the UK, although this was in a more limited form and could benefit from extension to assist in future neonatal audits.

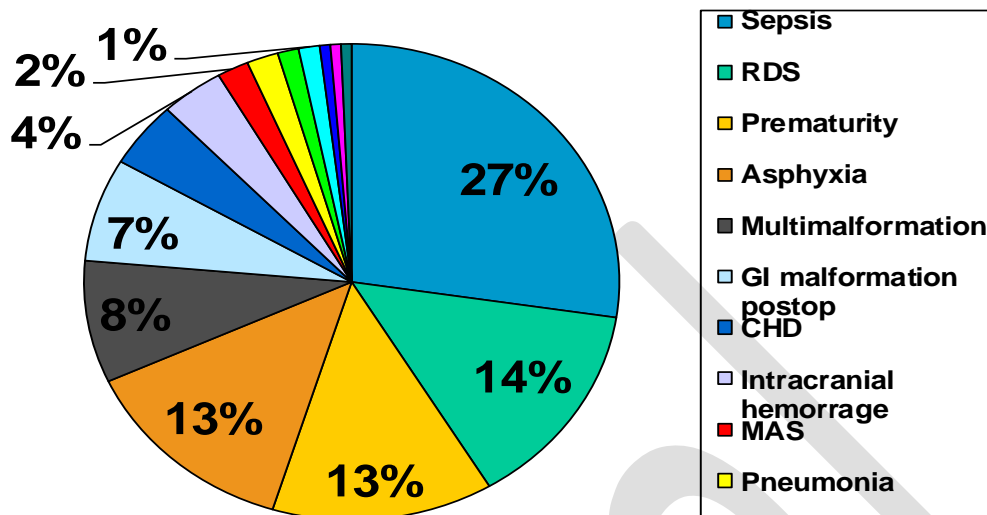
Table 3: Admissions to the Da Nang neonatal services⁸

	2004	2005	2006	2007	2008	2009	2010	2011
Total admissions	1576	1659	1615	1830	1791	1955	1700	2489
Total Deaths	225	240	218	219	170	157	NA	NA
% Deaths	14.3	14.5	13.5	12.0	9.5	8.0	6.7	8.8

⁸ As provided by Dr Hoang .

Across Viet Nam, the main causes of neonatal death are cited as Preterm, Low birth Weight, Asphyxia at birth, Pneumonia, Sepsis. Mortality data provided by the Da Nang team is seen in Figure 1;

Figure 1; Causes of death during neonatal care in 2009 in Da Nang.



This indicates similarities with national trends but with sepsis consistently being the lead cause of death. It is important to note that in Viet Nam, there is no post mortem pathology examination, so the statistics are generated by the medical staff alone and may also be subject to some minor inaccuracies. In neonatal care in Da Nang in 2008/2009, 90% of infants weighing less than 1.0Kg⁹ and 91% of infants less than 28 weeks gestation¹⁰ died. The staff indicated that clinical expertise has been developed in caring for infant from 27+ weeks gestation, infants > 800g, birth asphyxia, common neonatal problems (RDS, jaundice, sepsis,) infants who require surgical intervention, and ROP screening. But staff also stated that in light of the statistics, they prioritised care for infants > 1kg.

Table 3 demonstrates that in 2011, the NICU saw increased mortality following the move to the new facilities and increased admissions. Staff suggested the increase in the number of neonates admitted to the NICU contributed to the increased mortality. They suggested that many of these infants were sicker, putting additional pressure on already the already limited resources but no comparative data was available at the time of the report to confirm this. Experience would suggest that any increase is likely to be multi-factorial and require additional investigation that was beyond the scope of this review.

Whilst mortality is one indicator of neonatal outcome, morbidity is the second. The success of living with any long term disability depends in part on external factors embedded within society. The team were unable in the time allotted to review this in any great detail, however it became clear that poverty and education are also factors in survival and in a resource limited environment it is recognised that neonatal teams face difficult decisions. Many parents lack the ability and financial resources to care for neonates with long term morbidities.

⁹ 2008 figures

¹⁰ 2009 figures

Health Care in Viet Nam

The healthcare arrangements in Viet Nam are centralised into local facilities of varying sizes, depending on the location. The total population of Viet Nam in 2010 was in excess of 88,000,000¹¹, with a large proportion within the child bearing age group. In 2010, 28% of the population resided in urban areas, which represents an 8% increase over the last 20 years – however the majority of the population resides in rural areas, which includes the northern and central highlands, and delta regions. The dominant ethnic group is the Kihn, however the diverse spread of the population sustains a rich tapestry of ethnic minorities whose access to healthcare is often limited.

In rural areas facilities are located in communal health centres, which feed into small district hospitals. In provincial areas, there are larger facilities both publicly or privately funded. Da Nang, with a population of 906290, is an example of provincial provision with a public general hospital, several private hospitals and the newly established Hospital for Women & Children. In terms of neonatal care, the Hospital for Women & Children is the key provider of neonatal services for Da Nang City, the three of the surrounding provinces Quang Nam, Quang Ngai and Thua Thien Hue, and is the training centre for a further four provinces, Binh Dinh, Gia Lai, Dac Lac and Kontum

In reality hospital staff reported that women and children are admitted from 5 surrounding provinces. Table 4 demonstrates that neonatal admissions from the surrounding provinces are more likely to be associated with families experiencing increased levels of poverty, poorer incomes, and higher levels of infant mortality. This diversity of the population which any NICU serves is recognised as an influence on neonatal outcomes. Thus in poor communities and those with lower levels of maternal education the fetal and neonatal outcomes are negatively impacted. This occurs even in developed countries¹², but is compounded where access to services is inadequate.

Table 4; Local Provincial Populations Statistics 2010

Items	Unit	Đà Nẵng	Quảng Nam	Quảng Ngãi	Bình Định	Gia Lai	Đắc Lắc	Kontum
Population	Nghìn người	926.8	1427.1	1218.6	1492.0	1301.6	1754.4	442.1
Number of households	Hộ	232612	378488	324227	396716	302090	408511	104755
Average Income per person	Vietnamese Dong	1897.19	935.11	909.23	1149.58	1026.96	1067.70	947.23
Percentage of poor households	%	5.10	24.00	22.80	16.00	25.74	15.37	28.50
No' of poor households receiving free health care	%	9.01	20.06	15.49	8.91	34.67	12.17	14.86
No of poor households supported to buy health insurance	%	13.91	19.90	16.29	11.90	11.16	11.54	9.22
Type of health facilities (Số cơ sở y tế tuyến TP, quận/huyện, xã phường (BV, TTYY, TYT)	Cơ sở	69	276	0	184	252	207	0
- Bệnh viện tỉnh	Cơ sở	7	7		8	4	7	
- Bệnh viện huyện	Cơ sở	6	19		11	16	15	
- Trạm y tế xã, phường	Cơ sở	56	241		159	222	184	
- Phòng khám đa khoa khu vực	Cơ sở		9		6	10	1	
Mortality rate of children under 5 yrs.	‰	0.8	6.57	6.7	1.36	2.33	3.85	11.98
Mortality rate Children under 1 yr	‰	3.94	35.56	34.68	6.33	6.86	19.3	38.49
Distance from home to nearest facility	Km							

¹¹ As 2

¹² For example; Zhong Cheng Luo et al (2006) Effect of neighbourhood income and maternal education on birth outcomes: a population-based study Canadian Medical Association Journal 174 no. 10 doi: 10.1503/cmaj.051096

In 2007, the Ministry of Health in Viet Nam estimated that 86% of provincial and district health services had insufficient staff and equipment to manage obstetric conditions¹³. At local level this results in high levels of maternal morbidity (especially high in remote regions and ethnic minorities¹⁴) and on the initial care, management, and transfer of newborns to the provincial healthcare centres. In consequence such infants are likely to be in a poorer condition on arrival. In addition to poor levels of initial care, it was observed that neonatal transfer facilities were limited to the delivery of balloon oxygen via nasal prongs provided by a nurse within a car. The training received by nurses who engaged with this activity was not explored but was reported to be very limited. Two infants were transferred to the NICU during the team's period of observation but it was not possible to ascertain if the proportions of transfers 'in' had increased or if it was these 'transferred' infants that had been admitted with increased severity of disease or if this was more generalised.

However, the need for improved local healthcare at district level was reported to have a compounding effect within provincial delivery. When new facilities are opened to the public (such as the Da Nang Hospital for Women & Children) limited public confidence in the previously available services result in admissions above expectation. The Da Nang Hospital for Women & Children opened 11 months ago with 600 beds (300 women, 300 children) but the local and wider population have focused on the new facility. Staff reported that it was common for 2-3 women or children to share a bed. The NICU facility has 30 cot spaces, within 3 rooms. The HDU facility (located on the floor above) has 2 rooms with ~ 14 bed spaces in each. During our visit, the NICU cots had between 2-3 available spaces (dependant on admissions/deaths), and the HDU facilities had between 5-10 bed spaces free. However, whilst the stated cot/bed availability for NICU was 30, staff indicated that this was regularly exceeded with 45 patients requiring NICU care being commonplace. On the NICU/HDU such sharing does not occur but additional beds are provided within HDU mother-baby setting and all the available infant warmers are in use and there are insufficient warmers to meet the daily need. No additional staffing resource is present however, in extremis; the general nurse managers of the NICU and HDU reported that they undertook 'nursing duties' similar to many Clinical Managers within UK units.

Data in Table 3 demonstrates that on average neonatal care had 1,732 admissions over the past 7 years in the previous facilities. The increase in admissions to 2,489 represents a 44% increase in admissions (against this average) following the opening of the new facility. Whilst confidence may be a contributor and one that is sustained, the levels of admissions were reported to be influenced by cultural factors. Many individuals indicated that the 'year of the dragon', from Feb 2012 had been identified as a 'good' year for giving birth – so it is likely that many couples are planning to have infants during 2012 so the high numbers of births and associated admissions are likely to continue presently and future admissions are likely to fluctuate.

The throughput within the hospital was also observed to affect the neonatal care service provision. In Viet Nam, hospitals have the remit to provide first line medical advice (i.e; there is a Doctor led primary care service). This results in large 'attendance' numbers at the hospital requiring an initial review for 'minor' treatments and advice. Whilst this is an embedded approach to public health care, the availability of the service to operate efficiently is soon affected by any 'overwhelming event', which can quickly reach epidemic proportions. During our visit a hand, foot and mouth epidemic developed. It was reported to have resulted in 800 individuals attending the hospital on a single day that appeared to reduce the medical staff availability on the NICU to skeleton staff levels. Hence the external environment can impact significantly on neonatal care provision, leaving relatively junior medical staff unsupervised. In the UK, historically the medical staff presence has

¹³ Vietnamese Ministry of Health and UNICEF (2007) Review on the implementation of free healthcare services for children under 6 in public healthcare facilities with regard to child mortality and morbidity patterns and available treatment; Study Report

¹⁴ Ministry of Health and health Partnership Group (2008) Joint Annual Health Review 2007

progressively increased on neonatal units with the establishment of Neonatology as a specialist career. The previous lower medical staffing levels and occasional current lower staffing levels are 'risk managed' to a large degree by the established 'team approach' to care where the presence of experienced, articulate and knowledgeable nurses 'qualified in their speciality' have 'guided' junior medical staff towards the expected outcomes of care. In addition, should advice not be taken, the expectation has been for concerns to be quickly escalated up through the medical ladder. In Da Nang, there was little overt evidence of this occurring but this may have been due to language barriers and the stable conditions of the patients during our observations. The nurses are not regarded as having any specialist status, although clearly they have developed a repository of skills.

In terms of categorisation of care, there were 3 elements commonly referred to: critical - not likely to live, ITU – could survive with lots of support, and HDU – not requiring oxygen. However, the limited time available meant that this could not be explored in great detail. There was a sense however, that many of the infants categorised as ITU status would only warrant HDU status in the UK (i.e. stable on CPAP) or that those in HDU would commonly be categorised as 'Special Care' in the UK. This is not a judgement on the level of care provided simply an observation of how the level of ill health was categorised and translated.

Staff Perspectives and Practical Observations

The restricted time available during the visit and the adaption of the proposed timetable to clinical needs necessitated a pragmatic approach to gathering information to support the educational assessment. However, the facilitative skills employed created positive engagement from all staff groups in the NICU/HDU, and uniquely the team were able to seek the views of such groups independently. Initial brainstorming with the key officials in the hospital and NICU, and then further explored in discussion groups with individual staff groups and ultimately the main nursing group participated in a quiz to assist exploration of their underpinning knowledge base (Appendix 1). The multiple approach triangulated some information but also revealed unexpected perspectives. In addition to the discussions with staff groups (via an interpreter), two days were spent on the NICU/HDU observing the current roles of the nurses. The following narrative provides insight into this experience.

All the staff were very welcoming and helpful and clearly wanted the assessment visit to be successful. Appendix 2 provides insight into the observations made. Some of the key positives observed were:

- The locally made Bubble CPAP machine was used to good effect
- All babies we observed had 'boundaries' in place to aid security and comfort,
- In the absence of more sophisticated resources, premature infants and babies receiving phototherapy all wore hats with turned down brims to aid developmental care.
- Within the HDU area, all mothers (and some fathers) were present with their infant, many nursing the infants on their beds in preference to a cot.
- Kangaroo care was exceptionally well established and provided by mothers and fathers for prolonged periods.

Our initial observations identified a significant difference in care provision since the staffing ratio's (generally 1: 8 -10 in NICU compared to 1: 1-2 for UK) necessitated a task orientated approach to care delivery. Staff suggested this has been compounded by the move to the new hospital since the overall staffing resource was divided between the old and new facility. Research suggests that there is a direct link between staffing levels and outcomes in many setting in healthcare and this it highlights the complexity of the situation since education alone will not alter neonatal outcomes.

The task orientated approach allowed timely completion of essential activities. We observed co-ordination of practice i.e. drug administration co-ordinated with the same nurse obtaining arterial stab samples for blood sampling. However, there were unexpected discrepancies in the care provided for example: an Allens test was not performed to ensure collateral circulation was present prior to the arterial stab, the Arterial sample was taken after a period of initial disturbance so potentially reducing the reliability of the blood gas analysis. This suggested a lack of underpinning knowledge of anatomy and physiology associated with these tasks, which was confirmed within our 'quiz' later in the week.

In addition, the task approach had additional consequences – with nurses focusing on single activities often to the exclusion of any surrounding events. Examples of this observed were;

- Ignoring monitor alarms, or alarms simply continuing constantly as probes were not correctly secured.
- Limited or absent follow through of interventions; this included an absence of temperature monitoring following changes to the thermal environment, and an episode of profound tachycardia following changing of Dopamine infusions,
- No record of 'events' or ventilation observations/changes on the Daily Observation Sheet to assist the determination of deterioration or recognition of any improvements.

There appeared to be a general lack of understanding of the need to link any changes made by the team to the infants overall response in a formal way by record keeping – but this may have been accounted for within the vast quantities of evaluative text that was required for each patient, which was not kept at the bedside.

It became apparent within discussions that many practical aspects of nursing care which were of concern had evolved in direct response to low staffing levels but also a indicated lack of understanding of the underlying physiology. Nurses stated that;

- A lot of tape was required to secure probes, ngt/ogt or ETT as the nurse was not present all the time
- Ventilated infants were not moved from supine position as they feared that this would prompt extubation
- The arms of ventilated infants were restrained to prevent hands moving near the ETT and self extubation
- Nappies were changed every 4 hours

But there were additional consequences observed as a result of these. The rolls of tape used were not confined to one patient, so increased the risks for cross infection. The tape itself was the only type available, but left red angry marks when removed and almost certainly would contribute to increasing the risk of infection through the damaged skin surface. Ventilated infants benefit from changes in position as this assists expansion and alveolar recruitment so infants can recover quicker and in addition this prevents pooling of secretions in the mouth which was suggested as a reason for excess tape usage. Infants whose arms were restrained across the elbow joint had difficulty afterwards with limb development; we observed one baby who had been ventilated and was still unable to either raise his arms well or fold his elbows towards his mouth effectively. And finally, infants who had been agitated and unsettled but just gone into a deep sleep were woken to have a nappy change. Such a regimented approach that disturbs infants during sleep phases can prevent periods of prolonged rest vital for recovery and growth.

Whilst the nursing staff worked efficiently and accurately, it was noted that nursing staff rarely spoke to the infants, or demonstrated any empathy or developmentally supportive interactions when they were engaged in the associated tasks. Visiting was restricted in the NICU to 1 hr between 5pm and 6pm and this was not observed so no comment can be made about Family centred care or parent information giving in this stressful environment. However, parents asked a multitude of questions of us as visiting nurses within the HDU environment and we noted that talking to parents was not a high priority, but this may also reflect the status of nurse and the impact of the local culture where medical staff provided information when parents requested this.

The task orientation prompted by low staffing levels may be factors in this since research has indicated that such detachment has historically been present in staff groups, whose contact is very time limited by task orientation¹⁵. Vietnamese nurses undertook many medically based tasks and this was perceived to be normal but may impact on the time available for other nursing elements. Where nurses have greater time to interact with their assigned infants it is suggested that they develop individualised knowledge and are arguably better equipped both to support the infants in a manner that recognised them as individuals and advocate on their behalf as additional insight is gained.

15; OConnell R and Downe S (2009) A metasynthesis of midwives experience in hospital practice in publically funded settings. Health (London) November 2009 vol. 13 no. 6 589-609

The broad areas covered in Appendix 3 were discussed with the senior staff. Many of our suggestions were embraced by the team immediately including:

- The need for more consistent hand washing on entry and exit to the NICU,
- The need for soap within the toilet facilities,
- The need for an assigned roll of tape for each patient,
- The need for on-going updating of ambu-bag techniques (or introduction of Neo-puff)
- The need for a re-evaluation of NICU observation chart to better inform care.
- The need for nurses to be permitted to listen to heart and lung sounds with a stethoscope
- The need for effective temperature control

However, the discussion also revealed external influences on care provision. For instance neonatal care provision is 'determined' by the Ministry of Health. This national protocol sets the framework and most hospitals develop their own guidance based on US or Australian NICU guidelines. To date pain relief was not a requirement within the national protocol, although it was acknowledged that some hospitals were introducing pain relief but this was sporadic.

In addition a number of infants were receiving very low rate low pressure ventilation and in the UK would have been receiving Caffeine Citrate to aid extubation. Caffeine was supported by the current protocols, but was not being manufactured locally and was not on the current approved import list. We were told that Diaphyllin was being used but we cannot confirm this. It was noted that the incubators were not being used by nursing staff. Incubators are accepted in the UK as the best environment for controlling temperature of preterm infants and also contribute to effective infection control as they provide a barrier to immediate access to the infant. Accordingly the medical staff had highlighted this as problematic, however on exploration with the nurses it became apparent that there were several reasons why the 5 incubators were not used – firstly it was identified that the electric leads for the incubators were missing, secondly the cleaning of incubators was considered more time consuming and this was a problem with limited resources, and finally and potentially most importantly the incubators purchased were not adjustable in height so the Vietnamese nurse was disadvantaged when trying to provide nursing care and found efficient blood sampling or IV cannulation impossible. Whilst it would be wise to only purchase height adjustable equipment and in the interim a simple step could aid patient contact in this preferred environment, this highlighted how external factors influence care provision.

Since infection control was a key issue within neonatal care, the need for gloved hands when changing nappies was discussed. It became apparent that the lack of gloves was a problem, since although everyone was clear on their use, there was a current shortage which was beyond the units staffs control.

Finally there was much discussion surrounding the use of stethoscope by nurses. Many of the medical staff were initially very resistant to the idea of nurses using a stethoscope, believing that it was not taught as part of the nursing curriculum. However, nurses identified that they were taught to use the stethoscope in relation to ngt/ogt placement. Extending the use of the stethoscope to support effective determination of heart rate and the respiratory status was then considered as a possibility for the future. The use of the stethoscope within respiratory care allows the nurse to assess if the infant needs an invasive nursing intervention which is associated with increasing the infection risk - such as endotracheal suction. Such an assessment means that infants only receive this when required, not routinely.

The nursing workforce

As part of the assessment any potential plans for the current workforce were discussed. The nursing staff turnover within the NICU/HDU is small. Whilst the most experienced and senior nurses had 20 years experience, and were in the mid forty – fifty age range, many staff were in the mid 20-30 age range with 4- 6 years experience. Nearly all the nurses were qualified to 'Trung cap' status, having undertaken a 2 year diploma course (see later). The head nurse had undertaken additional study and was qualified to degree level. All Nurses and Doctors operate within a national rules set.

The career journey to NICU was generally assigned rather than chosen. Despite this all nurses appeared to be happy with their area of work. After qualification it is common for newly qualified staff to work within the hospital as volunteers until a job vacancy occurs. Nurses are then assigned to work in a specific area at the time of employment dependent on the demand – however, it was indicated that preferences, when expressed were considered.

In terms of roles dictated by qualifications, the following information was made available;

- a. Registered nurses (nurses with diploma/ degree) are able to perform basic procedures such as: creating patient care plan, giving medications according to the orders, implementing IV injections, changing dressing, place gastric tubes or urinary catheters, and some emergency procedures, maintaining medical equipment in the department as assigned.
- b. Bachelor of nurses, apart from performing the work as a registered nurse, perform complex procedures, participate in training, managing and using medical equipment available in the unit.

The development of nursing careers appeared very limited. New nurses were known as 'juniors'. More senior nurses guided them. The ward was managed by the Nurse Managers – one for NICU and one for HDU. There appeared to be very limited access to promotion within the current nursing staff since everyone was the 'same level' apart from the managers. As knowledge increases this may provide a platform to alter this in the future.

On arrival at the NICU, there was recognition of the novice status of the junior nurse and the need to extend their knowledge and understanding. Specialist knowledge acquisition has traditionally been by direct passage from one individual to another (i.e. senior to junior). It was reported that nurses were occasionally able to undertake training in specific areas at other hospitals or were released to attend study events bought to the hospital by outside organisations. Whilst these opportunities were clearly appreciated, it was suggested that this targeted approach was of limited success since there was little opportunity (or cultural willingness) to disseminating knowledge gained in a wider fashion. The nurses clearly all wanted the opportunity to individually engage with any development – to own their own development. When asked, the nurses could clearly illuminate the issues that they faced and identified some key factors that they felt would make a difference – these included requests for;

- More or replacement equipment (incubators, warmers, cold light, syringe pumps, SpO2 monitors, infusion pumps, personal care trolley, sterilising tanks, ventilators/ CPAP machines)
- Support workers to assist nurses,
- A dedicated EME Technician,
- An alteration from the current shift pattern (Day – Night – off, but this includes 24hr shifts at weekends)
- An increase in salary,
- More time to learn new knowledge about the care of the infants.

The nursing staff also identified themselves, the impact this would have on the neonates in their care, stating that they would have more 'time' to care.

The nursing management indicated that there was a desire to increase the overall staff numbers to support nurse; infant ratios to move from 1:8 in NICU to 1:3 and in HDU from 1:15 to 1:10 – both these remain lower than the UK standard. They suggested that the current nursing staff compliment would need to move to 52 i.e. an additional 27 staff) to allow this to occur. In terms of supporting any educational package, it would be essential to see some increase in staffing to allow any release of staff from normal duties to undertaken the education package. Any new staff would need to have reached a defined level of effectiveness also.

In addition they was also an expressed commitment to employ and develop 'support workers' to assist in establishing breast feeding for mothers in HDU, where there is a window of opportunity as both mother and baby is resident. It was suggested that the current staff ratios did not provide the time to undertake this activity. Breastfeeding was not frequently observed and large numbers of mothers were using formula milk during our visit, despite health promotion posters.

Ultimately the discussion also focused on the need to improve care in the outlying district hospitals and healthcare centres, with staff acting as Practice Educators. The aim would be to get mothers to hospitals earlier and provide any newborns that have additional needs at birth with appropriate support¹⁶. Research has identified that healthcare professionals at district levels have varying degrees of neonatal knowledge and skills and that this is an area where targeted intervention within a system could be of major benefit¹⁷. Early intervention has the potential to positively impact on the severity of illness and long term outcome of care when infants are transferred to Da Nang WCH.

¹⁶ Save the Children (2006) A Situational Analysis of Newborn Health and Interventions in Vietnam: Towards the Development of a Newborn Health Action Plan.

¹⁷ Eriksson L, Thu Nga N, Målqvist M, Persson L, Ewald U, and Wallin L. (2009) Evidence-based practice in neonatal health: knowledge among primary health care staff in northern Viet Nam. *Human Resources for Health* 2009, 7:36 doi:10.1186/1478-4491-7-36

Developing the curriculum

In terms of changes in working practices to be promoted within any educational package, the medical officials very strongly identified that they wanted to support the raising of the professional status of the nurse within the NICU environment so that nurses became more self directed, and able to act in a more authoritative and autonomous manner within the health care team.

In addition to any educational package, there was an expressed desire by the medical team to have support to develop the Da Nang neonatal care guide lines and accompanying nurse guidelines and protocols to support and guide the nurses in the future. It was felt that nurses would have more clarity as to the extent of their role and responsibilities and duty of care. Whilst guidelines have been used in Viet Nam previously in other areas of neonatal care, there is evidence that success has been limited as 'guidelines had not been embedded into local practice at the beginning, rather they were imposed nationally'¹⁸. A localised approach has the advantage of being 'owned' by the nursing staff, being contextually relevant so should promote change in a positive way. The National Pediatric Hospital in Hanoi and Children's Hospital Number 1 in Ho Chi Minh City have already established useful guidance based on published US and Australian guidance, the Children's Hospital No 1's guidance was briefly reviewed and it is thought that these could be adapted to suit the Da Nang context however, this is likely to be more successful if the local nurses owned this process rather than this be imposed by an external party.

The need for the curriculum to address the local care needs of the Da Nang neonatal population were identified specifically in the following initial areas; Care of the ventilated infant, Care of UAC/UVC/Long Lines/Infusions, Post operative care (Principles of post operative care, specifics on coil PDA closures, stents, TGA, ASD, Diaphragmatic Hernia repairs), Developmental care and Physiotherapy. However the review of infant admissions and subsequent discussions extended this to an extensive and comprehensive list not dissimilar to the content within a UK course (see Appendix 3).

The challenges to the actual delivery of such an extensive curriculum were identified as;

- Who should attend and how should this be organised for maximum impact.
- Release for the nurses to undertake the education
- The tension between the current 'rote' culture of learning and the request to promote 'free thinkers'
- What were the prior educational experience of nurses and how this could be developed in line with their qualifications and the needs of local educational providers
- Sustaining the impact within the practice area over a prolonged period of time.
- Cultural norms which need attending too
- How this could be provided in a sustainable way which allowed engagement with established Vietnamese providers
- How could this be funded?

The method of delivery should help students to develop wider skills in developing a rationale for their nursing care practice. It should also assist in embedding the knowledge with developing skills and changing practice. The suggestion was that the programme should be delivered in discrete study blocks of 2 weeks, ~ every 2 months with both theory and practice elements. The initial teaching would be supported by a competency booklet to complete during the phase between teaching events so keeping the new knowledge at the forefront of everyday practice and accounting for express concerns over the eventual time span.

¹⁸ As 13

The length of any programme of study and the related change processes that will occur require support to prevent the process faltering. It was proposed that each delivery event should result in the appointment of a 'champion' for an area /subject, who would take responsibility for supporting the changes required for the duration of the course and feedback directly to staff. However, managers identified that this would be problematic. In general it is not culturally acceptable for colleagues to remind one another, so this could disrupt the normal organisation of care as team leaders might come into conflict with the champions. In addition being awarded 'champion' status for attaining the highest marks does not necessarily translate into 'being the best in practice'. Whilst the senior nurses accepted that the 'champion' would be good for morale, there was agreement that any practice change should be monitored by audit of practice against agreed standards which was less confrontational, and could be advertised to all staff. Such an audit could be the remit of the champion. However whilst this highlighted how positive action could be taken to support the change process, there was no discussion about the consequences of a nurse failing to meet the required academic standards of any educational package. This should be clarified so students are clear on the expectations and any implications for future employment.

This subsequently supported discussion as to which nurses should attend the course, if there should be a series of courses (i.e. one cohort delivered over one year, followed by another cohort delivered in the second year) or a single course over a longer period. However the thorny issue of releasing the entire nursing staff from their normal duties to undertake a course of education over such a time period was recognised as problematic. Whilst an on-line course was an option, it was felt that within Vietnamese culture the importance of personal contact with an external tutor would be a positive force and assist in influencing and sustaining the change process. The lead nurses identified that ideally everyone would need access to the new knowledge at the same time to support the change process – but that this would be problematic with current staffing levels. The delivery of a single course over a longer period of time was the preferred option, with all nurses attending the course, but with content delivery repeated on different days of the week to allow access.

It was recognised, that whatever was determined, additional staff would be required to allow release of the nursing staff. These additional staff will require the normal 'on the job' training so they are able to function within the workforce effectively so others can be released. This will need to be complete prior to the new educational package being commenced otherwise neonatal outcomes maybe further compromised. This increase in resources has financial implications, and although funds may be available via charitable support, the long term costs need to be part of the overall workforce plan.

The Da Nang Department of Health

The impetus for an internationally led neonatal nurse training programme has been driven by the Da Nang Department of Health.

The current Director, Dr Chien, re-stated his support for the Department's partnership with Newborns Vietnam (NBV) and his willingness to support a 'project' initiative designed to support the development of neonatal nursing at the new hospital. Such a project would be breaking new ground, within a very different health care system. There was recognition that success could be affected by both the cultural norms and that the influence of the Department in wider matters would be instrumental in the overall success of the project. Not least, there was an acknowledgment that success would require the effective and reliable release of staff to attend the educational events over a period of time and that this was only possible with an increase in resources. CCCU and NBV believe that the training initiative should be championed and led by the Department of Health and this is central to a successful outcome.

The Department is committed to working with NBV to advocate and develop a case based on positive outcomes (reduced mortality & morbidities) for a higher nurse baby ratio for neonatal care. In the longer term, after the project has been successfully completed, the Director indicated that he would consider how to support any future potential development in the overall education for nurses at pre-qualification and after employment. Key indicators of success were not discussed and would need to be determined prior to the project commencing.

Designing in line with the current nursing education system

When designing any curriculum, the content and standard of prior education need to be considered. In addition, although this is an initial project there is also a need to consider the long-term sustainability of neonatal nursing, as although staff turnover is low, the knowledge base needs to be developed.

To support this, the team reviewed the current Vietnamese nurse educational system. Within healthcare education in Viet Nam, there are 3 options for nurses.

- The 2 year 'trung dip' course (no stated HE equivalent in UK)
- The 3 year 'Cao-dang' course (equivalent to a Certificate in HE in UK qualifications)
- The four year Bachelors Degree Course (equivalent to an ordinary degree in UK qualification)

The majority of nurses working in the NICU/HDU environment had completed a 2 year 'trung cap' course. The courses are provided locally by the National Technical College for Medicine (No 2), located in Da Nang city (which has recently been promoted to a University).

The curriculum was translated and demonstrated that 2 year Diploma nurses undertake 60hr of theory (30 in year 1 and 2) and 90 hours of practice (year 2) relating to sick children. The underpinning anatomy and physiology appears to be limited to 45 hours in total, although this may also be scattered across other elements of the programme.

The majority of the learning in the Vietnamese system is learning by rote, with a heavy reliance on memorisation. The observations of actions and feedback in the NICU based discussions and quiz supported our instinct that there was little emphasis placed on underpinning anatomy and physiology and how this could rationalise actions in daily nursing care. There was further evidence of this within comments made during the discussion around delivery since there was concern expressed with regard to the length of time someone would need to 'remember something' rather than learn and adapt the knowledge. This suggests an assessment strategy with a focus on 'right and wrong' and an absence of developing individuals' ability to think rationally to justify decision making as expected within the UK.

Reflecting on this supported the proposal for delivery of any educational package in 'chunks' of manageable content. These chunks could also support an incremental formative and summative assessment strategy design – although this would have to meet the local and UK university criteria. This could be supported by either a single appointment across the time required, which potentially could be compressed – or intermittent external contributions across the time span. In either approach, if Christ Church Canterbury University (CCCU) was to be involved in the partnership, effective quality control measures would need to be agreed.

There are additional challenges to this, since although a number of the younger nurses spoke some English, the delivery of the curriculum content and any assessment would need to be translated into Vietnamese and vice versa. The use of translators will need to be factored into costing for both delivery and assessment. If the educational package is developed as a UK/ Vietnamese University Collaboration/Dept of Health, there will need to be an agreed method to support the reliability of translation for the quality processes required in the UK for example: Video or tape recording of assessment with random translation sampling to ensure that any answers given by the nurse under examination were being correctly translated.

The local university; The Da Nang National Technical College of Medicine No 2

A meeting with the Dean of the College –Associate Professor Chuong, and the Head of Nursing - Dr Luc, indicated a willingness to work with a UK university to enhance the skills of the current neonatal nurses at the Da Nang Hospital for Women & Children. There was some initial discussion about how this additional education could be harnessed to allow the award of the 3 year diploma to the nurses who successfully completed the course, so it was recognised within the Vietnamese education system.

In light of the equivalence in qualifications, any education package which seeks to improve neonatal knowledge would need to be delivered initially at UK Level 4, since the Trung Dip is considered a transitional qualification between secondary and higher education in the UK. Level 4 equates to attainment expected within the first year of a degree programme within England. UK courses are delivered at Level 5 – 7 depending on agreement between the local Neonatal providers and their University. The lower level of attainment required in Viet Nam has advantages, as it can be more practically focused in line with the local need with less emphasis on academic writing. The total hours of study determine the UK module equivalence, which is likely to be 40 - 60 credits (or 2-3 x 20 credit modules) at Level 4.

In terms of sustainable delivery, it was proposed that the theoretical element of the initial 'project course' could be delivered within the college, initially by approved UK external lecturers who would be accompanied by a Da Nang college tutor who would 'learn on the job' and progressively take more responsibility for delivery during any repeat courses. The learning will be facilitated by a medically qualified translation support team from the hospital. The aim would also be for the tutor to challenge and support practice in light of the new knowledge during clinical visits. The need for linking theory to practice contexts, and the development of more 'rationale based thinking' would be undertaken within practical sessions at the NICU itself. Ultimately, the additional knowledge and skills need to be sustained within the current workforce, any future new recruits and to outlying areas and district hospitals. The future will require these 'Neonatal Nurses' to develop skills in 'practice education' so they can effectively share their knowledge with others promoting higher quality neonatal care. So although the initial project is specific to current staff on the neonatal unit, there are longer term implications – potentially in the pre-registration course and any 'teacher training'. The National Technical College of Medicine No 2 was awarded university status by the Viet Nam Government on March 5th 2012 and has established research and exchange partnerships with the Jonkoping University, Sweden; University of Siena, Italy; and University of Wake Forest, USA. They are currently working with the University of East London in the area of Bio-medical science. As yet there are no collaborative partnerships with a UK university in programme delivery, but this is established with Jonkoping, where the School of Health Science certify the certificates of the graduates of the institution.

In light of their prior experience with Jonkoping, College staff suggested that any education package would benefit from joint 'badging' with a UK university, bringing kudos to the students and the newly appointed university. It was recognised that there would be additional benefits of partnering with a UK university – since this would provide access to 'bid' monies, available to UK institutions which could support the project costs in such a resource challenged country. However, the completion for external funding is fierce and the arrangements for such collaboration can be complex. Potentially, the aim would be to minimise costs particularly if bids were unsuccessful and charitable sources are to be used to fund course delivery in the main.

Delivery of the educational package with a Vietnamese partner would need to be subject to further negotiations. There would need to be an assurance / agreement from NBV that funding sources were secure prior to any collaboration being able to commence. There would be an agreement between all parties, the Department of Health as the lead partner (in Viet Nam), UK University,

Medical Training College No 2 & NBV surrounding the overall attributing of costs, and the use of external experts teaching on the programme. The UK University would then agree a fee per student to support all the necessary quality controls in line with the UK quality assurance – which would include translation costs where required. The Department of Health would facilitate any further local permissions to meet any Da Nang city local requirements.

Whilst the national arrangements for the delivery of Higher Education programmes within Viet Nam in the organisations premises are clear, there is no current guidance on the delivery of a collaborative programme – or a Vietnamese programme receiving approval from a UK university. The Dean of Medical Training College No 2 College stated that they had the appropriate permission from the Vietnamese Ministry of Health to work directly with overseas partners, and were only required to report such partnerships following a formal Memorandum of Understanding between the relevant parties. A copy of the permissions and the university status document would be required –and appropriate ‘Due Diligence’ procedures would need to be undertaken to allow any partnership to develop. An initial review of the facilities available within the college indicated that it would broadly meet the UK venue check criteria which would be applied in order to progress any partnership application with Christ Church Canterbury University. The Department of Health would lead the initiative (in Viet Nam) and facilitate any further local permissions and monitoring to meet any Da Nang City requirements.

If a partnership between the universities was not possible, in light of the local university interest, the proposed delivery approach and curriculum has the potential to proceed as planned, with the National Technical Medical College (No 2) and the Department of Health supporting either intermittent visits from UK educationalists or an appointment of a Neonatal Lecturer post for the period required. The involvement of the local university would allow recognition of the increased knowledge and the potential for this to be recognised by an additional award. It would also keep neonatal nursing high on the local agenda for any future course development.

Conclusion and Recommendations

In many respects neonatal care in Viet Nam is similar to that across the world – it is evolving as resources and technology allow. There is evidence that Vietnam has made good progress in reducing child mortality and there is a national imperative to further reduce neonatal mortality. However, accurate comparisons of the effectiveness of neonatal care are difficult since the statistical reports contain significant inaccuracies and the actual numbers of infants who require care are likely to be underestimated. Whatever the stated size of the problem – it is likely to be greater than recorded and demand for care may increase if early interventions are established effectively within rural locations in the long term.

In many ways Viet Nam is typical of a country at a difficult crossroads, as it makes the transition from simply providing the most basic interventions to introducing more advanced neonatal care. However such aspirations need to be supported by appropriate resources, both in terms of equipment and personal staff development. Whilst the environment of care has improved, and basic equipment is available in a limited form, the knowledge and skills required by personnel to operate in this evolving specialist environment also need attention. Without such development, nursing care and neonatal outcomes will not improve.

Vietnamese nurses receive a broad initial nursing education that supports their employment in the general healthcare setting on qualification. On employment in NICU's these nurses are novices – similar to those in the UK. Currently individuals develop specialist-nursing knowledge by sharing their experience and understanding. Whilst this passage of knowledge from senior to junior staff has assisted, the information available to the nurses is limited and not open to challenge to support care development, change or improvement in outcomes.

This review has allowed an exploration of the current activity on the NICU, and insight into the gaps in knowledge used to support current care, and as a result a contemporary curriculum has been developed to support the advancement of neonatal care locally with the introduction of a formal neonatal nurse education programme. Such an initiative has the potential to impact also at regional level in areas of greatest poverty and infant mortality. The geographical population covered by the hospital is extensive and includes rural populations with minimal healthcare facilities – so infants requiring transfer travel considerable distances, via car, with nasal cannula oxygen only and are already compromised on arrival. Investing in and formalising neonatal intensive care nurse education will create a skilled pool of nurses who have the potential to further develop as potential Practice Educators. These educators can then train and support front line staff at commune health centres and improve newborn care in the poorest areas of the central region.

Whilst the initial proposal is supported by direct discussions with the Director of the Department of Health for Da Nang City, it is clear that each potential partner has a role to play in the success of any change. Whilst the environment of care locally has improved, the NICU has experienced a 44 % increase in admissions during the last 12 months. This is against a backdrop of reduction in staffing and nurse:baby staffing ratio's of 1:8-10 in the NICU, (against a UK norm of 1: 1-2 for ITU). Whilst it is important to note that the criteria used to define the infants status differ from the UK criteria (some stable infants would have been categorised HDU and most of the HDU infants in Da Nang would have been categorised as Special Care) local action is required to improve staffing ratio's to allow a consistent level of care delivery.

The key cause of admission was stated as infection – and this was the main stated cause of death. However jaundice and prematurity also feature highly in admission statistics and it is known that poor temperature management is a key contributor to poor outcomes in neonatal care in general. Staff stated they prioritised care for infants > 1kg in light of current outcomes, but clearly any improvement in outcome is also dependent on equipment availability and usability. Some

equipment is left unused, and it is recommended that prior to any further equipment being purchased, unit staff should evaluate the benefits and usability prior to acceptance, so ensuring equipment is locally fit for purpose.

Locally the NICU team clearly recognised that preventing neonatal death is linked to education and that this educational approach needs to be extended to the nursing workforce. The future workforce intentions at the Da Nang Women and Children's Hospital were clear.

- Support workers are to be introduced into the HDU area specifically to enhance breastfeeding.
- All currently employed qualified nurses will be required to undertake the educational package when it is delivered.
- Practice Educators will be established in the future to work in partnership with district hospitals and local commune healthcare centres to raise neonatal care expectations in the poorest areas.

However, the release of nurses to undertake the educational package from their normal duties can only occur with the introduction of additional staff, with initial training prior to any educational package being delivered. Ultimately, the education of any future recruits to the neonatal workforce will need to be addressed. This will require further negotiation with the Director of the Department of Health and clear guidance from the department on what indicators of success are to be used in their evaluation of this initial project.

The broad indicative curriculum content developed reflects the local context and desire to alter the culture of the neonatal nursing workforce (Appendix 3). Whilst many of the areas to be covered are common in UK courses, some have not been included e.g. Family Centred Care, NAS. The curriculum may need further adaption and development in light of the experience of delivery, however the content of the curriculum reflects the need for the nurses to develop greater levels of underpinning knowledge, which is currently limited, so they are able to rationalise their actions and will recognise how to organise care differently to enhance neonatal outcomes. However, to allow this new knowledge and skills to be embedded into practice, nurses will also require additional time to 'care'.

It is recommended that this is approached simultaneously, and that following any increase in nursing staff, that the management approach to care should transfer from task orientation to an individualised care approach. This requires staffing levels to be improved prior to any educational package being delivered. The NICU and HDU managers will need to determine the best approach to the transition, which will take time and perseverance to establish and maintain. There also needs to be clarity about the implications for any member of staff undertaking the educational package who might fail to meet the standards required.

The curriculum content should be delivered to achieve UK Level 4 learning outcomes, in line with development against the current standards of education of the nurses in Viet Nam. If the UK university is involved then delivery should be organised into discrete chunks, with teaching occurring over a two week period every ~2 months, with formative and summative assessment embedded at regular intervals. Delivery should ideally occur at the local university, with practical follow-up on the NICU. The total staff complement will undertake the educational package, so a dual delivery system will be required to allow release of 50% during week one, and the alternate 50% during week 2. To ensure long term sustainability, the local university should assign a local lecturer to shadow the initial external lecturer (s) and the Department of Health should assign a doctor so as to develop knowledge and skills for future delivery. The dates should be set in advance to prevent any clashes with holiday entitlement. The organisation of delivery is open to negotiation depending on costing – since although external lecturers planned visits may generate initial interest, a full time employee may prove of greater benefit and assist in promoting the required change.

Competency Booklets will also be used between delivery episodes to keep individuals focused on the requirements. In addition, defined topic areas will have 'champions' appointed, who will audit the progress of care against expectations. These expectations will be defined in nursing guidelines, adapted from other guidelines already available. It is recommended that these guidelines are adapted by the nursing staff themselves so that they 'own' the standards expected.

All educational packages have an associated cost. If the initial project was developed as a collaboration between the Department of Health, the local university and a UK university, there is the possibility of bidding for external funding to support the development and delivery costs. The UK risk management requirements and the associated costs for quality controlling the course delivery by the Vietnamese partner may present a significant challenge to this approach particularly as this would be new territory for both. However, should a partnership not be possible, or if bids for funding are not successful, then the project could be revised and still continue using the same delivery pattern and content, but as a Vietnamese led initiative, with experts invited to deliver the same, providing all local rules are complied with.

During the review, the team had the privilege of observing how care was effectively adapted in many situations within a resource poor environment. However whilst some care adaptations were positive, others were problematic. It became apparent that the NICU team were powerless to resolve some issues, which need external action. Education alone will not increase the staffing numbers to allow care to alter, or inappropriately purchased equipment to be used correctly. Education alone will not force manufacture, or purchase of medications and equipment to support the delivery of care. Education alone, will not sustain staffing levels or changes in the way in which care is managed, this needs to be led locally. So in conclusion, it is important to note that the success of this project lies not simply within the purchasers or providers of any educational package, but it is also reliant on action within the Department of Health to promote changes to working practices, which can be supported by providing additional nurses. In addition the Department of Health needs to advocate for the production of medications and appropriate resources to support improvements in the quality of care.

Appendix 1: Nurses' Quiz

The nurses were given a quiz in order to identify their knowledge base and their ability to link theory and practice. In order to make it non-threatening, they were divided into 2 groups and allowed to confer. An element of team competition was added to increase the informality of the exercise. There were some easier questions added, for which an assumption was made that they would know the answer. Again this was to reduce any threatening element to the exercise if they had difficulty with the more searching questions

Below are the questions that they were asked, along with the expected answer and a summary of what they said. In order to tease more information from them, supplementary questions were put to the group offering the answer to gauge the extent of their knowledge.

1. Give 3 signs of respiratory distress in a baby

Expected answer: any 3 of the following; Tachypnoea, nasal flaring, sub-costal and inter-costal recession, apnoea, dusky/cyanosis

They were quickly able to give nasal flaring, recession and 'blue'.

2. A baby of 30 weeks gestation is on a ventilator for respiratory distress syndrome. He needs 30% oxygen. His saturation monitor has been reading 95%, but then falls to read 50%. Give 3 actions that you would take

Expected answer: Check the probe on the baby, turn up FiO₂, assess chest for movement and air entry checking for equal air entry, and for secretions. Also check that the tube has not become dislodged. Suction if necessary based on the chest auscultation, and check the ventilator tubing for disconnection and ventilator for mal-function or alteration of settings. This would also include the measurements such as tidal volumes. If no response, or there is suspicion that the ETT has become dislodged, summon medical help for further assessment.

The answers given were partially correct in that they said to suction the ETT, though no mention was made of assessing the air entry prior to and after suction.

They also mentioned that they would check the ETT visually using the measurements on the tube and whether the measurement at the lips was correct.

They also answered that they would check that the ventilator tubing had not become disconnected.

The lack of auscultation corresponded with the observed practice, and the checking only of the tubing of the ventilator also corresponded to the reported practice that the ventilator settings and adjustments were the domain of the medical staff only, hence the lack of understanding of this by the nurses.

3. This baby needs the endotracheal tube to be suctioned. How far down would you pass the suction catheter? The answer that was looked for here was some indication of 'tip-to-tip' suctioning, measuring the tube length and not passing the catheter beyond this in order to prevent further trauma to the trachea.

The answer they gave indicated the concept of tip-to-tip suctioning, and they demonstrated knowledge of the ETTs in use and their overall length. This corresponded to the observation that the ET tubes were not shortened following intubation, which would remove the necessity to measure tubes individually for their length.

4. How can you tell that a baby needs their endotracheal tube suctioning

The expected answer with this question was that on auscultation, secretions could be heard in the lung fields either uni or bilaterally. Other expected responses included increasing O₂ requirements, or CO₂ levels on blood gas, visible secretions, decreasing tidal volumes, decreased chest-wall movement.

Their answer included decreased chest-wall movement, visible secretions in the tube (the ETT used are clear). The final part of the answer was concerning the ventilator coming apart and then the settings on the ventilator. On further questioning, they were unable to clarify which settings on the ventilator they would notice changes in and there was no mention of changes in oxygen levels or requirements.

A further question was put in here to try and gain more information from the nurses, and they were asked how frequently they would suction the ETT. Their answer reflected their task oriented approach in that it would be 2 hourly, but the frequency increased if there were more secretions but there was no indication of the assessment of the infant.

5. What is the substance found in the lung that stops the lung from collapsing down

This they answered correctly as surfactant

6. Which cells in the blood carry oxygen

They were able to identify that this was the red blood cell, or haemoglobin

7. In a baby that is not having milk by breast or bottle, how do you keep their mouths clean

With this question, it would be expected that the infants' mouths would be cleaned with sterile water, using either cotton wool, gauze or something similar.

There were differences of opinion with this between the nurses. Some of the nurses claimed that they were using saline, and others that they were using bottled water. Cotton buds and cotton wool were the methods used to clean the insides of the mouth.

8. A baby of 37 weeks gestation is admitted, but he is very small for his gestational age. What 3 observations do you need to take when he is admitted? The weight was clarified for the nurses as 1.5kg.

The answers that would be expected would demonstrate that they were aware that this baby was IUGR and would be at risk of hypothermia and hypoglycaemia. General observations would also be expected such as respiratory status, colour, and general condition.

The answers that the nurses gave were that they would probably assess breathing, assess colour and the infant's reactions and movement. There was no appreciation of the necessity to take a blood sugar level or check the temperature.

9. How soon do these need to be taken?

The answer that they gave for this was that these observations needed to be taken immediately, though on the admissions observed in practice, this did not seem to happen.

10. His blood glucose is 2.1mmol and the plan is to give him small milk feeds every hour. What is the best way of giving him these feeds

The answer looked for here was that the infant would have a naso-gastric tube passed and the infant fed via this to allow the baby to rest.

The first group to answer this question mentioned that they would use a small spoon or syringe the milk into the baby's mouth into the side of the cheek. This was passed to the other group, who correctly said that they would pass a naso-gastric tube and feed via that.

11. How do you test that the nasogastric tube is in the stomach before the feed that is 4 hours after the tube was first inserted

The expected answer for this would include the aspiration of gastric contents, the testing of the pH, observation of the length of the tube at the nostril, auscultation of the stomach while injecting a small amount of air, then aspirating it back again.

The answers that were given indicated that there were no pH stripes available and on further questioning, it became clear that they had never heard of testing the pH of gastric aspirate. However, the answers given indicated reliable ways of testing NG tubes. These included pushing a small amount of air into the stomach whilst listening with a stethoscope, holding the end of the NGT in water and observing for bubbles, aspirating the NGT and observing the nature of the aspirate, looking for partially digested milk and noting the measurement at the nares.

When questioned about their use of the stethoscope, as this was contrary to what we had been told, they said that this was the practice taught in the School of Nursing.

12. Where is the best place to take the blood glucose from to make sure that the milk feed is bringing the blood glucose up to normal limit

This question was answered perfectly, with one of the nurses drawing a diagram on the white board.

13. How often do you need to check the nasogastric tubes position

Again, this was answered correctly with the nurses saying before each feed

14. Give 2 signs that a baby is not tolerating the milk in the stomach

The answers looked for in this question included large NG aspirates, vomiting, and abdominal distension.

They were able to identify these, giving a value of 20% of the milk feed remaining in the stomach.

15. Which is best for baby – breast or bottle milk

This was correct in that they said breast milk was better for a baby than bottle

16. A baby born at 28 weeks gestation is on the ventilator and the doctor has put in an umbilical arterial catheter. What are 2 things that you need to observe about this catheter

The answers that would be expected with this question are divided into 2 significant parts. Firstly, the catheter itself should be observed for slipping either into or out of the umbilicus, oozing blood or fluid from the umbilical stump and the connections on the infusion and transducer are connected correctly and are secure. The area around the umbilicus should also be observed for signs of infection and inflammation such as redness

The second area of observation concerns the circulation to the distal limbs, including buttocks and feet/toes, and the nature of the transduced wave. Abdominal distension, blood in the stools and urine should also be areas of nursing observation.

The answers that were given included; observing for fluid from the umbilicus, redness of the area surrounding the umbilicus, abdominal distension. They were also aware of observing for slippage of the catheter, both in and out. Circulatory observations for the distal circulation needed prompting in order to achieve the answer of blue feet.

There was awareness at the beginning of the week that UAC's were not commonly used within the NICU and the equipment to transducer the line may not have been available, though this was not established.

17. You are taking blood from a baby who is on CPAP. How would you stop it hurting too much and stop him crying whilst you take the blood, without using drugs

The expected answers for this question would have included the use of Sucrose solution prior to the procedure, non-nutritive sucking, containment holding, allowing the infant to self comfort by sucking fists etc.

The answers given indicated that the nurses had little teaching on non-pharmacological pain management techniques. They said that they could give a 'teat' to the infant or put ice on the area prior to the procedure in order to numb the area.

Following this question, the nurses indicated that they would like to have more on this based on the questions that they were asking, and asking for more information about how we might use strategies to reduce the impact of the pain of the procedure on the infant.

18. A baby is under phototherapy for jaundice. How much of the baby needs to be uncovered

The answer that was looked for here was that as much of the baby as possible should be exposed.

The answer they gave indicated that there was an understanding of this, as they indicated that the eyes and reproductive tracts should be the only areas covered.

19. Where in the body does bilirubin originate from

They answered this question correctly, stating that bilirubin originated from haemoglobin

20. He develops a skin rash whilst under the lights. What would you apply to this rash

The answers that were looked for here included the identification of the rash and the elimination of sepsis as a cause, and nothing should be applied to the skin whilst under phototherapy to reduce reactions from the phototherapy and burning of the skin.

The first part of the question they gave was to exclude sepsis as a cause for the rash. They would then apply Methylene blue to the skin. This was the local policy for the hospital, which highlighted the lack of questioning of the guidelines and protocols set out and their willingness to comply with policy.

21. How are you going to tell that the baby no longer needs phototherapy

The answers for this question would include laboratory measurement of the bilirubin levels, and the correct plotting of the level on the appropriate chart.

The nurses highlighted the need for observation of the infant's colour and the measuring of the levels within the blood. With some prompting, and further questioning, they were able to indicate that this level would need to be plotted on the phototherapy chart.

22. Which part of the body is noticed to be jaundiced first and which is last to become jaundiced

They were able to correctly identify the cephalo-caudal progression of jaundice with palms of the hands and soles of the feet being the areas affected only with high levels of bilirubin.

23. The baby under phototherapy has his temperature taken and it is 36°C. Is this normal?

Correctly identified as abnormal. With further questioning, they could give the infant temperature range as 36.5 – 37.5°C.

24. You notice that the towel he is lying on is very wet. How might this be adding to the problem that he is cold

The knowledge that was being looked for with this question was concerning the methods of heat loss. In particular, this infant would be losing heat via evaporation, though other elements such as convection, radiation and conduction might also be playing a part.

Correctly, they identified that the towel was wet and the water being lost from the skin would be taking heat with it. Some other nurses were able to identify that the air movement in the room might also have a part to play.

25. Name 3 things that help a team work together

These questions were included to identify elements of team-working, leadership and the fact that members of teams have different strengths and weaknesses. A common goal would also be a factor to include here

The answers given may have been influenced by their teaching at school and the general political make-up of the country. However, they were able to include aspects such as equality within the team, strong operation and a high level of responsibility for the whole team. Other areas that came out in further discussion of this included listening and discussing, solidarity and a team leader.

26. Name 1 thing that stops a team working together well

The areas that were being looked for in this answer included lack of communication and different agendas within the team itself.

Further work was done with the group of nurses to try and reduce the amount of tape used on the babies to fix ETT, NGT/OGT and cannulas. They were quick to understand the rationale behind what we were saying to them and there was a level of agreement within the nurses that the damage to the infants' skin would increase the risk of infection. When a reduced tape method of fixing an ETT was demonstrated to them, they said that this was how they had been taught to fix the tubes, but they were finding that the saliva and moisture from the babies' mouths was reducing the effectiveness of the tape in securing the tubes. It was suggested that oral suctioning would reduce the amount of secretions, but they highlighted that there were not enough nurses to do this more regularly than they were already doing. Turning the infant was suggested, which would allow secretions to drain from the infants' mouths, but they were reluctant to do this for fear of accidentally extubating the infant whilst turning the baby as the ventilator tubing was heavy.

Overall, the nurses had a basic level of knowledge but from the observations and the answers to the quiz questions, it would appear that they learned mainly by rote and so were unable to rationalise and adapt techniques to different situations. This was a conclusion drawn from the observation of nursing practice on the unit and confirmed in the answers given by the nurses during the quiz. The questions based on the scenario of the admission of the IUGR infant demonstrates this well, and the suggestion that can be drawn from this is that the underlying knowledge of anatomy and physiology need improving if the levels of nursing led care are to increase.

Appendix 2; Observations of Practice

Observations of Practice

Positives	Areas for development
<p>Taking of observations;</p> <p>Current staffing promotes task focused approach to care; (Nurses perform duties en mass, every baby nappy change, baby drug rounds, blood letting rounds).</p> <p>Babies receiving ventilation appeared reasonably settled without pain relief / sedation</p> <p>Routine suction performed 2-4 hourly to clear secretions</p> <p>All babies have blood glucose 8am morning and every 3 hrs after if required.</p> <p>Blood gases transported in very handy container to lab, lab results returned quickly to promote efficient ventilation management.</p>	<p>Care should ideally be more responsive to babies individual needs – more human. If interventions/observations organised and clustered this allows long levels of undisturbed rest to promote growth.</p> <p>Some of these babies would probably be capable of extubation into incubator oxygen, reducing risk of infection from invasive technology. Need caffeine citrate to support this</p> <p>ET Suction is invasive and increases risk of infection so should only be performed when indicated. Since indications require auscultation of chest it is essential that nurses should develop skills with stethoscope to hear if required and also assess if successful.</p> <p>Greater understanding of infants nutritional needs should reduce un-necessary tests and have potential to redirect precious resources to those in greater need.</p> <p>A clear communication strategy is required to ensure timely result review and action planning.</p>
<p>Drug administration</p> <p>Drugs and infusions prepared in room by 2 nurses; good aseptic techniques and safe production as removed from external environment and interruptions.</p> <p>Infusion fluids changed all at similar times so fluids are can be adjusted appropriately.</p> <p>Main fluids provided via secure long line.</p> <p>Long T connectors used on the long line – allow good access.</p> <p>Long line management - good clean or aseptic technique used.</p>	<p>To achieve level of safe drug administration practice some adaptations would be required – no apparent checking of drugs by nurse administering– she focused on task.</p> <p>Need to understand drugs and side effects to ensure that no harm comes to baby by technique employed.(Line 'broken' to change dopamine, and HR > 215bpm for 20mins...)</p> <p>Use of luerlock bungs or octopus would reduce infection risk as no slide on long line, connection being made from adult IV sets to neonatal sets.</p> <p>Excess length of line means excessive flushes used which promotes excess positive fluid balance – options include three way tap nearer to infant, infuse reduced volume of flush, use shorter and possibly cheaper lines. This may take additional time but the complications of saline overload or infusion overdose could be life threatening.</p> <p>Ideally LL should not be 'broken' to administer drugs – could use 3 way tap if only access.</p>
<p>Skin care</p>	

<p>Very secure IV cannula's - sterile elastoplasts at cannula level, then 3 pieces of tape, one over one around back to forward then 3rd piece around entire hand.</p> <p>Routine nappy changes 4-6 hrly to assist skin integrity. Nappys used were weighed for fluid balance assessment</p> <p>Nurses competent at taking routine bloods (using radial artery stabs).</p> <p>Application of phototherapy effective</p>	<p>Major issue with tape being used...only one roll per room, very sticky, amount used indiscriminate. All surfaces very sticky. Major dermal abrasions likely as a result.</p> <p>Nappy wipes used - unlikely to be pH neutral for preterm skin.</p> <p>No Allens test performed to ensure collateral blood flow at arterial puncture.</p> <p>NICE guidelines in UK state no difference in exposure when using white sheet, but might protect other infants?</p> <p>No evidence of mouth care for babies on CPAP/ eye care for babies under phototherapy.</p>
<p>Thermoregulation</p> <p>Warmers in use and incubators available</p> <p>Skin probes can allow constant skin monitoring when observation performed every 2 hrs.</p> <p>Routine check with thermometer validates this</p> <p>Generally coped well with unexpected events eg;</p> <p>Infant 1 admitted from emergency suite – no warning, straight onto 'warmer' with radiant heater</p> <p>Infant 2 admitted from ...delivery suite – no warning, placed onto warmer</p> <p>Positive pressure flow conditioners provide 29 degree stable working environment</p>	<p>General use of warmers problematic since warmth not accessible by baby if covered with towel, but required because the fans and air con are used in preference to the positive pressure or possibly in addition to. Whilst broad principles are evident application suggests general understanding needs development.</p> <p>Skin probes not attached so constant alarming as background noise...</p> <p>The only time a temperature was taken was when I asked for one...</p> <p>Baby ? cold so radiant heater placed at the babies side – no obvious on-going monitoring...</p> <p>Travelled from Mountain 100k, with nasal cannula and balloon oxygen. Warmer needs to be ready and warm</p> <p>At least one incubator needs to be ready - only 1 electric lead available for 4 incubators.</p> <p>Dr stated nurses like warmers more than incubators since easier to get to babies and perform procedures...</p> <p>PP needs to be turned on...air conditioning turned onto hot on some occasions creating drafts which cool babies underneath.</p>
<p>Positioning / Developmental Care</p> <p>Many babies with respiratory problems nursed slightly elevated and with NGT in place on free drainage (both aid breathing.)</p> <p>Tubing also well supported to prevent dragging.</p> <p>Arms restrained to prevent self extubation (no sedation or pain relief available)</p>	<p>Changing the babies position aids drainage in lungs. NGT can be closed to prevent access of organisms but decompress and aspirate hourly if not on free drainage</p> <p>Restraining of either upper or lower arm will allow some movement and prevent confined full extension at all times. Gentle flexion exercises would assist this – but take time....</p>

<p>General good use of boundaries to enhance infants security</p> <p>Overall positioning techniques basis present, - hips slightly elevated, with use of boundaries and movement of lower limbs (lifting of buttocks) at nappy change time</p> <p>Clever use of local hats to protect infants eyes from bright lights.</p>	<p>(At least one baby on the way to recovery was unable to raise his arms effectively?related to this practice).</p> <p>This can be sustained during position changes and enhanced during blood letting by introducing containment holding to provide comfort for the infant. Use of the midline also needs to be encouraged to allow infant to self comfort. These interventions take time which is lacking currently.</p> <p>Changing the position of the baby prevents excess pressure and promote normal joint development, also can aid food absorption, fluid retention, oedema, drainage in lungs when consolidated. Promotes recovery but requires greater physical presence of the nurse and more time to interact with infant.</p> <p>Eye care should be standard to allow eyes to open without any unpleasant sensation</p>
<p>Infection Control</p> <p>Sinks and drying cloths available on entrance.</p> <p>Spaces around the baby are uncluttered and easy to keep clean.</p> <p>Individual alcohol wash available at each cotside which was used regularly between infants. Gloves used for taking bloods, sterile gloves for ET suction.</p> <p>Top to toe approach to personal hygiene of babies.</p> <p>Infants in open warmers are immediately available in the event of emergency and procedures are performed more comfortably.</p> <p>Good safe aseptic ET suctioning by using 2 nurses.</p>	<p>Both improved compliance with washing hands on entry and exit, and improved access to soap, water and adequate drainage in the staff toilets, will reduce infection transmission routes to the infants on NICU and beyond.</p> <p>Damp dusting from upper shelves to base of warmer, changing water/ cloths between cot areas would enhance current practice and prevent spore development.</p> <p>Whilst this is used liberally there was no appreciation of actions required in addition to this eg; if no gloves worn for changing nappy, alcohol applied but this does not destroy c.diff.</p> <p>This will prevent opportunistic infection spread – unclear if sterile water used for preterm babies, no infant received eye, nose, mouth or ear care, despite suction, phototherapy and intubation..</p> <p>Infants in open warmers are immediately available to any airborne organism and the infant and it immediate surrounding are readily accessible and constantly touched.</p> <p>Infants in incubators are protected from excess noise, fluctuations in heat, and not available to immediate air borne infection. Dexterity can be initially compromised but developed. Babies and their surrounding are not being constantly disturbed – lessens infection risk and also promotes more settled infant, with deep sleep established for longer periods to promote growth.</p> <p>Infants born outside the hospital environment are not isolated, so increase the infection risk. Care in an incubator offers additional protection for the greater majority.</p> <p>The suction occurs without assessment, so stable baby can become unstable easily as a result. If inadequately performed lungs become consolidated and respiratory function is reduced, so increasing the severity of the condition and causing deterioration. Nurse needs to use stethoscope.</p>

Use of monitoring to support understanding of infection development.

All monitor outputs require validation. A weak thread heart of 160 bpm is not accurately felt by pulsation. Apex is only reliable method to allow complete thorough nursing assessment of the chest.

Final

Appendix 3 – Draft Curriculum

1. Fetal development

- Broad overview of all systems
- Fetal circulation

2. High risk Pregnancy

- Normal broad anatomy and physiology
- Altered A+P and subsequent events

Acute haemorrhagic episodes
Maternal metabolic illness
Pre-eclampsia / hypertension
Multiple pregnancy
Placental insufficiency

3. Neonatal Thermoregulation

- Normal Anatomy and Physiology for fetus and healthy infant
- Altered Anatomy and physiology and consequences

Sick term
Preterm
IUGR

4. Promoting team working

5. Nutrition

- Normal anatomy and physiology to support nutrition needs in fetus and newborn

Glucose metabolism
Nutritional requirements

- Altered states of metabolism

Sick Term
Preterm
IUGR
IDDM

(to include feeding techniques, breast feeding, speech and language issues) NB No Litmus paper available

6. Renal

Normal anatomy and physiology of fetus and newborn

Normal fluid shifts at birth
Maintenance electrolyte balance
Maintenance of BP

Altered anatomy and physiology

Excess ADH release
Electrolyte imbalance
Abnormal BP response

(urine testing, input/output, CRT, BP monitoring – invasive / non invasive, infusion management, and IV LL, UAC/UVC site management) NB IV vitamins and TPN not available

7. Neonatal immunology and infection control principles

Normal anatomy and physiology to support passive and active fetal/healthy newborn immune

Response

- Non-Specific defence mechanisms
- Specific defence mechanisms

Altered anatomy and physiology

- Sick term
- Preterm
- IUGR

Local specific infection concerns

- Acinobacter
- Pseudomonas
- HIV

(skin and mucosa care, local immunisations schedules)

8. Respiratory

Normal anatomy and physiology of the fetus and newborn

- Lung development
- Surfactant and its role
- Onset of first breathes, Adaptation and Transition
- Breathing regulation and acid base maintenance

Altered anatomy of the fetus and newborn

- Respiratory distress
- Transient Tachypnoea of newborn
- Pneumonia
- Air leaks
- Meconium aspiration
- PPHN
- Chronic lung disease
- Hypoplastic lung / Congenital Diaphragmatic hernia
- Resuscitation at birth and beyond

(Use of stethoscope, administration of surfactant, management of airway, suction, oxygen by cannula, NCPAP, ventilation, chest drains, understanding blood gases, equipment set up and training) NB No Caffeine available currently, 4 different types of ventilator used

9. Haematology

Normal anatomy and physiology of the fetus and newborn

Erythropoiesis
Coagulation
Physiological jaundice

Altered Anatomy and physiology

- Anaemia of prematurity
- Coagulation defects (Haem disease → DIC)
- Pathological jaundice

(Use of phototherapy, transfusion effects, exchange transfusion)

10. Ethical practice

Ethical principals
Breaking bad news
Palliative and terminal care

(NB; Promoting wellbeing and health within a society where poor parents may abandon infants with significant disease/ongoing disability)

11. Cardiac

Normal development in fetus and newborn

Overview development in fetus and newborn

- PDA
- ASD
- VSD
- TGA
- Pulmonary stenosis (stents)
- CDH

(NB: Only cardiac catheter techniques available and conservative management)

12. Gastro intestinal

Normal development of the GI Tract

Altered development of the GI Tract

- NEC
- TOF
- Reflux
- Small bowel atresia
- Volvulus/ intersuseption, malrotation
- Hirschsprungs
- Meconium plug / cystice fibrosis
- Imperforate anus

(NB: surgical principles, c/o stoma, wound care, post op feeding)

13. Neurology and development

Normal development of the brain and sensory development

Brain
Reflexes
Sight,
Smell

Altered development / damage to the brain and senses

HIE
IVH
Hydrocephalus
(?menigioceles)
Seizures
Meningitis
ROP screening

Stress and Pain management (non-pharmacological)

Developmental care/ physiotherapy, massage and posture

The aim wherever possible would be for a guideline on nursing care and management to be generated alongside the teaching to support delivery change;

Teaching sessions could be subdivided into a standard format to ensure elements related to admission, ongoing care, infection control, related pharmacology, discharge elements (where this is relevant) were accounted for.

A competency set would need to be developed to support this to ensure that everyone reached the same standard of practical skill and understanding.

Final