Bundle of Care for Prevention of Infection in the NICU

Guideline Responsibilities and Authorisation

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Guideline Review History

Version	Updated by	Date Updated	Summary of Changes
01	Arun Nair		First version

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Bundle of Care for Prevention of Infection in the NICU

1 Overview

1.1 Purpose

To prevent late onset sepsis in the NICU and outline initial management.

1.2 Scope

Te Whatu Ora Waikato staff working in Newborn Intensive Care Unit (NICU).

1.3 Patient / client group

Babies and infants in NICU.

1.4 Background

An infection happens when pathogens enter the body, multiply, and trigger a response in the body. The body's immune system activates in reaction to an illness by releasing chemicals that are normally used to combat the illness into the bloodstream. When the body's immune reaction to these substances is out of balance, it can cause alterations that can harm various organ systems, resulting in sepsis. Sepsis is a severe reaction of the body to an infection and possibly a life-threatening condition.

Neonatal sepsis contributes substantially to neonatal morbidity and mortality, and is an ongoing major concern in the NICU. According to the onset of age, neonatal sepsis is divided into early-onset sepsis (EOS) and late-onset sepsis (LOS). This bundle deals with the Late Onset Sepsis (LOS) that is associated with the postnatal nosocomial or community environment in the unit.

Due to LOS-associated high risk of mortality and long term neurodevelopmental sequelae, it is important that measures are put in place for prevention. The following bundle of care is an evidence based set of documents to achieve this in the NICU

1.5 Definitions and acronyms

CNS	Clinical Nurse Specialist
CVAD	Central venous access device
EOS	Early onset sepsis, ≤ 48hours after birth
IPC	Infection Prevention and Control
LOS	Late onset sepsis, >48 hours after birth
NNP	Neonatal Nurse Practitioner
RMO	Registrar
SMO	Senior medical Officer

2 Clinical management

2.1 Competency required

- NNP, CNS, RMOs and SMOs
- Registered Nurses and Enrolled Nurses who have completed NICU Level 2 orientation and generic medicines management certification. Registered Nurses using CVAD and arterial lines must have completed orientation and CVAD training and achieved NCV/NAC certification. Enrolled Nurse who has completed Level 2 orientation and is under the direction and delegation of a registered nurse

2.2 Components of the bundle

2.2.1 Early Recognition of Sepsis

For Early recognition of sepsis refer to Sepsis management and Antibiotic use in the NICU guideline (1659)

2.2.2 Environmental Factors

1. Hand Hygiene

This is the single most important intervention in interrupting the transmission of microorganisms and thus preventing neonatal sepsis. Bacterial counts on hands of health care workers range from 3.9×10^4 to 4.6×10^6 colony forming units/cm^2, and may include pathogens such as *Staphylococcus aureus, Klebsiella pneumoniae, Enterobacter, Acinetobacter* and *Candida spp, MRSA and S. marcescens*.

A *Serratia marcescens* outbreak was identified in the Newborn intensive care unit at Waikato Hospital in June 2021. *Serratia marcescens* is a rare, but important, pathogen in hospital-acquired infections and can be transmitted through direct contact by hand of hospital staff or contaminated surfaces.

Refer to Lippincott Procedure: Surgical hand scrub, neonatal

2. Cleaning of equipment and environment

For ultrasound machines, follow the IPC developed cleaning guideline attached to the side of the machine

Mobile phones and other paraphernalia used by medical, paramedical staff and parents and visitors should be cleaning with 70% Isopropyl Alcohol wipes before entering the NICU and handling of patients and fomites.

Lanyards must not be used within the NICU.

Coats/jackets must be removed and sleeves should be rolled up above the elbow prior to entering the nurseries.

Remove all hand jewelleries (plain wedding bands can be worn) .

Crowding is a specific risk for spread of nosocomial infection, the number of staff should be kept to the essential minimum at all times during ward rounds and procedures in the unit.

3. Specific control measures for infection outbreaks in the NICU

Refer to:-Infection Prevention and Control policy (6307) & Lippincott Procedures: Infection Control Outbreak Investigation and Management

NICU Visiting policy as per current recommendations circulated to parents/caregivers.

2.2.3 Skin Care

Skin and mucosa form the first line of defence from infection. In preterm babies the skin and mucosal barrier is not as competent as in term babies. The smaller the baby, greater the risk. Monitor for skin and mucosal integrity (e.g. CPAP/Cannula related injury to the nostrils) and attend to any breakdowns, promptly.

Glamorgan scale – Neonatal/ Paediatric Pressure Risk Assessment tool, Form A7167HWF, (Appendix A)

2.2.4 Nutritional Factors

Human Breast milk plays an essential role in building resistance to infection but not all babies would be able to get their own mother's breast milk, hence effort should be made to at least procure donor milk. In the absence of the same, it is important to make sure every care is taken to prevent infection through formula that the baby receives.

Refer to:-

- Use of Donor Breastmilk in the Neonatal Intensive Care Unit (NICU) procedure (5926)
- Enteral Feeding Standardisation in Newborn Intensive Care Unit (NICU) protocol (6172)
- Oral Immune Therapy in the Newborn Intensive Care Unit (NICU) procedure (6169)
- Artificial Milk Formula Feeding for Infants policy (1901)

2.2.5 Probiotics

In babies born at term by vaginal delivery, the gut is colonized with probiotic bacteria from the mother such as *Lactobacilli* and *Bifidobacteria* which are crucial to the development of the intestinal mucosal immune system. Preterm neonates have abnormal intestinal colonization, often with pathogenic bacteria and have low numbers of probiotic bacteria.

Refer to Probiotic (Infloran) for neonates 2931

2.2.6 CVAD/UAC/UVC/PA/PIV management:

All venous access devices provide stable intravenous access to sick or low birth weight infants, who need long term intravenous nutrition or medications. Umbilical arterial catheters are used for blood sampling and continuous blood pressure monitoring. These lines are ubiquitous, and usually essential in the NICU, but they increase the risk of sepsis by breaching the protective skin barrier and the materials used tend to have the propensity to form biofilms of micro-organisms. Remove them as soon as these are no

longer required. Consider removal of CVAD when the enteral feed volume reaches 120ml/kg/day.

Refer to:-

- Central Venous Access Device (CVAD) insertion, management and maintenance in the NICU guideline (2654)
- Peripheral Arterial Access in the Neonate protocol (5494)
- Arterial Line Catheterisation in Newborn Intensive Care Unit (NICU) procedure (1637)
- Arterial Line – Sampling, Nursing Management and Removal in NICU procedure (1638)
- Umbilical Artery and Vein Catheterisation in the Neonate guideline (6294)

2.2.7 Ventilator Associated Pneumonia (VAP)

It is well known that endotracheal intubation leads to impairment of mucociliary clearance and the potential for colonization of the endotracheal tube and trachea, from both endogenous and exogenous sources, which may then descend further and result in infection. Endogenous sources of colonization include oropharyngeal secretions, and aspiration of stomach contents. Exogenous sources include transmission of infection from health care workers' hands, contamination of suction apparatus, airway circuits, and humidifiers.

Interventions with potential benefit in neonates are:

Minimising the days of invasive ventilation, hand hygiene, wearing sterile gloves when handling secretions if no in-line suction available, prevention of unplanned extubation & reintubation episodes, no routine changing of ventilator circuits (change only if contaminated or malfunctioning or as per manufacturer's recommendations), in-line suctioning, oral care with colostrum and frequent removal of condensate from the ventilator circuit. Care of Ventilated Infant procedure (0432)

2.2.8 Parental Education /Caregiver Education

Refer to:

- Pamphlet - Infection Control Information for parents and visitors
- Poster in Parent Lounge and NICU Entrance about prevention of infection.
- Handwashing Video on TV in the parent / coffee room

2.2.9 Staff Education

All health care staff dealing with babies need to keep themselves updated and familiarised with the DHB and NICU procedure and guidelines and meticulously follow the infection prevention guidelines listed under this bundle. All new staff should be oriented to the policies and guidelines grouped under this bundle and cite certification/recertification as appropriate before commencing work in the unit.

All visiting specialists should be made aware of the existence of this Bundle and that they are expected to follow the rules of good practice outlined here.

2.2.10 Environmental cleaning

Strict adherence to the recommendations of the Infection Prevention Te Whatu Ora Waikato incident review committee following the Outbreak of *Serratia marcescens* in NICU.

Sodium Hypochlorite (diluted Hyposal) 1:100 ml ratio, is a broad-spectrum antimicrobial agent recommended for effective disinfection of hospital-acquired viruses, bacteria, fungi, and mycobacterium including MRSA and Serratia Marcescens. All hard surfaces and the general environment in NICU should be cleaned and disinfected using diluted hyposal.

For all other equipment that diluted hyposal is not advisable to be used, 70% Isopropyl Alcohol wipes must be utilised.

Additionally, hydrogen peroxide vapour (BioQuell) decontamination of all the nurseries is being facilitated 6 monthly to further prevent the spread of infection such as *S. marcescens.*

Refer to IPC developed guide/poster for more information regarding cleaning and disinfecting NICU environment.

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- Ying Dong, Christian P Speer. Late-onset neonatal sepsis: recent developments. Arch Dis Child Fetal Neonatal Ed 2015;100:F257–F263

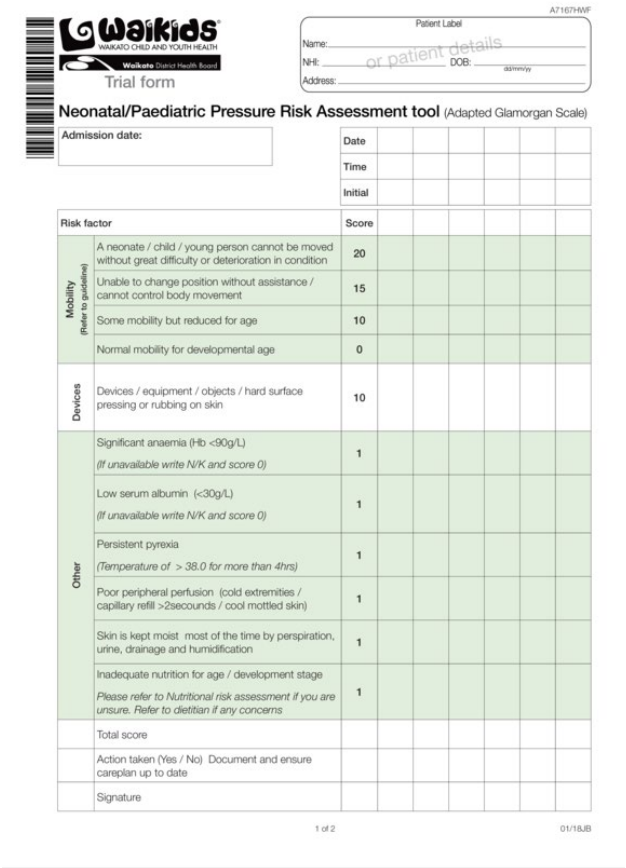
- Infection Prevention Waikato DHB incident review :Incident Investigation Report into the Outbreak of *Serratia marcescens* in NICU. 23rd Jun 2021

3 Associated Te Whatu Ora Waikato Documents

- Antibiotic Usage in Newborn Unit guideline (1659)
- Artificial Milk Formula Feeding for Infants policy (1901)
- Cleaning and Disinfection of the Exterior of the Electric Breast Pump in NICU procedure (4943)
- Enteral Feeding Standardisation in Newborn Intensive Care Unit (NICU) protocol (6172)
- Expressing Breastmilk in the Newborn Intensive Care Unit (NICU) guideline (6088)
- Feeding Equipment in the Newborn Intensive Care Unit (NICU) procedure (2894)
- Labelling, handling, storage, transport and administration of human milk in NICU procedure (2771)
- Oral Immune Therapy in the Newborn Intensive Care Unit (NICU) procedure (6169)
- Use of Donor Breastmilk in the Neonatal Intensive Care Unit (NICU) procedure (5926)
- Cleaning and Decontamination of the Fisher and Paykel Airvo Humidifiers protocol (6035)
- Lippincott: Cleaning Clinical Environment
- Lippincott: Cleaning and Disinfection of Fisher and Paykel Humidifier with Heating Wire
- Lippincott: Cleaning of Equipment used in Breastfeeding and Infant
- Lippincott: Equipment cleaning and disinfection – neonatal

Appendix A – Neonatal/Paediatric Pressure Risk Assessment Tool

(order through Atlas)



A7167HWF

Waikids
WAIKATO CHILD AND YOUTH HEALTH
Waikato District Health Board
Trial form

Patient Label
Name:
NHI: or patient details DOB: dd/mm/yy
Address:

Neonatal/Paediatric Pressure Risk Assessment tool (Adapted Glamorgan Scale)

Admission date:

	Date							
	Time							
	Initial							
Risk factor		**Score**						
Mobility (Refer to guideline)	A neonate / child / young person cannot be moved without great difficulty or deterioration in condition	20						
	Unable to change position without assistance / cannot control body movement	15						
	Some mobility but reduced for age	10						
	Normal mobility for developmental age	0						
Devices	Devices / equipment / objects / hard surface pressing or rubbing on skin	10						
Other	Significant anaemia (Hb <90g/L) *(If unavailable write N/K and score 0)*	1						
	Low serum albumin (<30g/L) *(If unavailable write N/K and score 0)*	1						
	Persistent pyrexia *(Temperature of > 38.0 for more than 4hrs)*	1						
	Poor peripheral perfusion (cold extremities / capillary refill >2secounds / cool mottled skin)	1						
	Skin is kept moist most of the time by perspiration, urine, drainage and humidification	1						
	Inadequate nutrition for age / development stage *Please refer to Nutritional risk assessment if you are unsure. Refer to dietitian if any concerns*	1						
	Total score							
	Action taken (Yes / No) Document and ensure careplan up to date							
	Signature							

1 of 2 01/18JB

Patient Label
Name:
NHI: or patient details DOB: dd/mm/yy
Address:

Packages of care

Risk score	Category	Package
0	**Not at risk**	• Glamorgan assessment should be completed within 8 hours of admission and every time condition changes. • No action needed at present • Reassess if condition changes
10+	**At risk**	• Glamorgan assessment should be completed within 8 hours of admission • Daily skin check and document • Encourage mobilisation / Regular change of position 4 - 6hrly • Maintain adequate hydration, nutrition and oxygenation • Keep skin clean and dry • Use a standard hospital mattress. • Reposition equipment/devices every 2 - 4hrs • Observe IV Lines hourly for skin integrity, perfusion and placement
20+	**High risk**	• Glamorgan assessment should be completed within 8 hours of admission, • **Twice daily** skin check and document (Neonate 4 - 6hrly) • Mobilise/ change of position 2 - 3hrly • Reposition equipment/devices every 2hours • Observe IV Lines hourly for skin integrity, perfusion and placement • Ensure adequate pain relief given to promote movement • Maintain adequate hydration, nutrition and oxygenation • Keep skin clean and dry • Educate parents/caregivers on PI prevention • Have a discussion if an air mattress is needed for this patient, otherwise use a standard hospital mattress
30+	**Very high risk**	• Glamorgan assessment should be completed within 8 hours of admission • **Inspect** skin hourly and document • Protect heel and bony prominences • Mobilise / change of position 2 -3hrly • Reposition equipment/devices every 2hours • Observe IV lines hourly for skin integrity, perfusion and placement • Ensure adequate pain relief given to promote movement • Maintain adequate hydration, nutrition and oxygenation, maintain a food and fluid chart • Keep skin clean and dry • Educate parents/caregivers on PI prevention • Document any existing or new pressure injuries • Be aware the decreased sensory /sensation perception increases PI risk • Use appropriate pressure relieving devices such as gel mattress, air mattress

Name	Designation	Initial	Signature