Neonatal Nursing Transport Standards for Low Resource Settings Council of International Neonatal Nurses, Inc. (COINN)

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"Every newborn counts, everywhere"
A health systems approach with robust interfacility newborn transfer processes is integral to attaining the Sustainable Development goal of decreasing newborn mortality in all countries to <12 per 1000 live births. With the Every Newborn Action Plan target for 80% of districts to have a least one Level 2 unit to care for the small and sick newborn, it is critical to invest in timely interfacility transport as a vital component within the health system to facilitate transfer between all three levels of newborn care.

However, interfacility transfer requires personnel with specific skills and training to care for the small and sick newborn and their families during the initial stabilization, the care within the often-challenging confines of the transport environment and the safe handover process at the receiving hospital. Teamwork and communication are key, as well as having detailed guidance, procedures, and policies to enable the provision of safe quality care.

This first COINN transport guideline is our initial step in providing evidenced based standards to improve the care of the small and sick newborn during the transport process.

Professor Karen Walker PhD MN BAppSC RGN RSCN
President, Council of International Neonatal Nurses, Inc. (COINN)

FOREWORD

"The Hospital Between Hospitals"

Interfacility transfer of infants requiring additional medical/nursing resources is a necessary component of a health system intending to deliver lifesaving and life-preserving care to newer members of our communities.

This document is intended to assist with developing and maintaining safe and productive interfacility transport of young infants when such transfer is indicated.

Issues of organization, bedside skills, quality, and communication are focused on. The role of the nurse transport personnel member is central, but physicians, respiratory therapists, and administrators are also necessary. The authors hope this document will evolve and further the purpose of safe infant transport by inviting suggestions to be made through the sponsoring organization.

William Keenan, MD
Professor Emeritus, Saint Louis University
President, International Pediatric Association (IPA) Foundation

EXECUTIVE SUMMARY

INTRODUCTION

These standards and guideline are intended to support the development, function, and quality improvement required for a neonatal transport service in a low-resource setting. It provides guidance on the organization, management, specific challenges, and clinical skills required to provide high-quality care. Emphasis is on the importance of having adequate skilled neonatal transport personnel that support represent all community Maternal Newborn Child Health (MNCH) providers that are devoted to quality performance.

Regionalization

The model of perinatal regionalization is recommended to ensure that all newborns are cared for in a facility that can address each newborn's healthcare need to achieve optimal health outcome (AAP Section Transport Medicine, 2018). Ensuring that a quality referral system for small and sick newborns is implemented is an essential component of regionalized care and has been endorsed by the World Health Organization (WHO) (WHO, 2020a).

WHO (2020a) recommend the following:

- Referrals should be seamless, coordinated, and timely.
- Information between facilities is relevant and appropriate, and the referring healthcare personnel receive feedback that will benefit the newborn's care and transport in the future.
- Every facility that cares for small and sick newborns functions within the designated standard of care and is part of an integrated newborn network with a transparent, concise referral system that is established by the local or the regional health care network or authority.
- Coordinating referral centers provide clinical management, support, protocols, and guidelines.
- Every small and sick newborn will be provided with a safe, efficient transfer to and from the referral hospital by qualified personnel who can manage required devices such as intravenous lines and continuous positive airway pressure (CPAP) as well as required medications,
- Whenever possible, every small and sick newborn is transferred in the kangaroo mother care (KMC) position with the mother or other family member.

Leadership

Staff who are responsible for supervising the personnel are necessary to ensure that the neonatal transport personnel best function of neonatal transport personnel. Such leadership staff usually consist of one senior medical and one senior nursing individual (advanced practice if available) who are experienced neonatal care providers with management expertise and in-depth knowledge of newborn issues. (AAP Section Transport Medicine, 2018) They are generally responsible for hiring, staffing, timely personnel responses, personnel composition, protocols, quality reviews and improvement processes, performance reviews of personnel members, educational updates, regional communication, and budgeting (AAP Section Transport Medicine, 2018).

Transport Standards

Standard 1

All transports of a small and sick newborn should be conducted by a minimum of two healthcare workers, with additional supportive personnel, who have the expertise and skills required and clearly defined scopes of practice.

Standard 2

Patient care management is prioritized to include actual and anticipated problems of small and sick newborns in the transport environment.

Standard 3

Evidenced-based protocols guide the provision of family-centered care practices integrated throughout all aspects of the transport process.

Standard 4

Processes are in situ throughout the interfacility transfer to ensure optimal communication and continuity of care between transport personnel, referral and receiving facilities, and families.

Standard 5

Processes and procedures are in place to ensure safe return transports to referring hospitals.

Standard 1

All transports of a small and sick newborn should be conducted by a minimum of two healthcare workers, with additional supportive personnel, (in addition to the personnel serving as drivers, riders, or pilots), who have the expertise and skills required and clearly defined scopes of practice. This defined scope of practice should reflect their care level. The health care workers responsible for the small and sick newborn should possess the combined expertise to effectively assess actual and predict potential problems, prioritize the care plans, provide immediate and ongoing care interventions, and evaluate any given interventions during the inter-or intrahospital transport.

A. Transport personnel: Two qualified health care workers are the minimum standard to safely transport a small and sick newborn. Exceptional circumstances may occur where there is only one qualified person available to transport the newborn and the transport cannot be delayed. Multiple combinations of transport personnel may be used and should be determined based on local transport guidelines if available (Karlsen, Trautman, Price-Douglas & Smith, 2011). See Appendix 1 for Team Composition.
    1. Community Health Nurse (trained in neonatal transport care).
    2. Community Health Worker (trained in neonatal transport care).
    3. Registered neonatal nurse.
    4. Neonatal Nurse Practitioner or Neonatal Advanced Practice Nurse.
    5. Neonatal staff (minimum of 1 year experience and trained in neonatal transport care.
    6. Pediatric resident.
    7. Registered Midwife.
    8. Registered Respiratory Therapist (trained in neonatal transport care) as part of a multi-person team but cannot serve as the team leader.

B. Consideration for determining the team makeup is dependent on the following:
    1. Country, hospital standards, and scope of practice.
    2. Complexity of the patient.
    3. Level of available expertise and varied job responsibilities of the transport personnel.
    4. Legal scope of practice of the team members.
    5. Anticipated degree of stability of the patient during transport.
    6. Degree of supervision required by and available to the transport personnel.

7. Distance and time it will take to transport the newborn.

C. Each transport has a team leader who will oversee the transport. The role should be based on:
    1. Licensure and credentials linked to neonatal care.
    2. Demonstrated clinical experience with small and sick newborn.
    3. Education specific to neonatal care during transport.

D. Responsibilities and skills of the whole team include but are not limited to:
    1. Interaction with the admitting staff to provide a comprehensive history and communicate the present condition.
    2. Patient physical assessment
    3. Advanced skills, as determined by the team leader, including umbilical line placement, peripheral intravenous placement, endotracheal tube placement, needle aspiration, and chest tube placement.
    4. Skill in interpreting diagnostic data such as x-ray results and laboratory tests.
    5. Obtaining parental consent for transfer and treatment during the transport.
    6. Collaborate with the receiving Medical Control Personnel (MCP) on a transport plan of care and coordinate the care during the entire transport process.

E. Medical Control Personnel (MCP) at the receiving hospital:
    a. Individual responsible for receiving the call from the referring hospital.
    b. Should be neonatal-trained medical personnel (neonatologist, pediatrician) or advanced practice neonatal nurses skilled in coordinating transport care for small and sick newborns.
    c. After discussion with the nursing staff, the MCP will determine if the newborn can be admitted to their unit or must be referred to another hospital.
    d. Responsible for the care of the newborn from the time the patient is accepted, until the newborn is admitted to their neonatal unit or referred to another hospital.
        i. On admission to the accepting hospital the local neonatal staff will assume care responsibilities and supervise the care using continuous quality improvement (CQI) strategies.
    e. Review policies, procedures, guidelines, training, and ensure continued education of transport personnel.

F. Non-neonatal transport personnel assist the team leader with the small and sick newborn care. These individuals may include respiratory therapists, critical care nurses, paramedics, emergency medical technicians (EMTs), community nurses, or community health workers. If they are expected to provide care for the neonatal patient during transport, they must be provided with orientation based on predetermined criteria.

G. Predetermined criteria for transport of the small and sick newborn include:
    a. Orientation to the neonatal unit for at least 4 to 6 months. (COINN, 2023)
    b. Documentation of annual continued neonatal nursing competencies.

H. All transport personnel should have an objective competency evaluation before starting in the transport role.

I. All transport personnel should have an annual review of continued competencies via simulation, skills lab demonstrations, and knowledge testing of expected transport procedures, role requirement, schedules, and calls. This should include:
    a. Articulation clearly of role requirements.
    b. Demonstrating skill and competencies related to transport equipment usage.
    c. Knowledge and skills required to care for the small and sick newborn, including respiratory modes of support, peripheral and central venous access skills, diagnostic tests and interpretation and procedural skills.
    d. Annual re-certification in neonatal resuscitation.
    e. Presentation annually of a minimum of one neonatal case study at the transport meeting.
    f. Participation in a minimum of one medical transport record review and annual presentation.
    g. Obtain a pass rate (set at 70%) on exams related to:
        i. Maternal factors, physiology and pharmacology factors related to neonatal conditions.
        ii. Neonatal anatomy, pathophysiology and common neonatal conditions and management.
        iii. Pharmacology test which includes standard drug calculations, knowledge of the Neonatal Pain, Agitation and Sedation Scale (NPASS) (Hummell, Puchalski, Creech, & Weiss, 2004), non-pharmacological and pharmacological management of pain.

h. Evidence in a log of at least 3 successful intubations annually.

i. Provide proven competencies of an annual minimum of:

a. 10 peripheral intravenous placements (PIV)

b. 5 venipunctures for lab specimen collection.

J. Documentation of the evaluation process and ongoing competencies must be maintained by the unit administration.

K. Regularly scheduled transport personnel meetings in-person or via internet video must be held to review continuing quality education findings, discuss problems and new policies, and ensure competencies are current.

Standard 2

Patient care management is prioritized to include actual and anticipated problems of small and sick newborns in the transport environment.

A. Process of *initiating* transport.
    1. Conduct a health assessment to gather baseline data before transport, keeping priorities and risk assessment in mind, and communicate findings to the receiving MCP.
    2. The doctor and/or Advanced Practice Nurse (APN)/Nurse at the referring center requests neonatal transport with the family's consent.
    3. The accepting MCP at the receiving hospital will serve as the MCP in the consultative/advisory role for the transport personnel while enroute and in the referring institution.
    4. MCPs supervise and direct the quality of care during the transport.

B. The receiving MCP will receive a systematic history provided by the transport personnel to share with the receiving staff that includes:
    1. Maternal history: age, race, ethnicity, and any language barriers; maternal conditions, illnesses, and diseases.
    2. Gravida, parity including premature births, stillbirths, perinatal losses, previous neonatal unit experiences, and living children.
    3. Blood type and maternal serology results.
    4. Maternal medication intake (including traditional medication, over the counter, and prescribed), smoking, drinking, and any substance abuse or misuse.
    5. Significant family history and social history.
    6. Exposure to infectious diseases.
    7. Obstetric trauma.
    8. Assessment for domestic violence.

C. Transport personnel and staff must ensure all documents are up to date and copied for the transfer.

D. The newborn must have two identification tags on two separate limbs before beginning the transfer.

E. Based on the history and examination, the transport personnel will develop a clinical problem list and begin treating problems based on the hierarchy of needs.

1. Airway/breathing should be assessed first, and any issues addressed before moving to any other system. Attend the airway emergently. Do not wait to call the receiving MCP.
2. Breathing: consider the need for respiratory support including oxygen.
3. Circulation: assess for shock. Check capillary refill and attend if prolonged ≥3 before moving to another system.
4. Obtain laboratory tests to assess for hypoglycemia, blood gases, and electrolytes are possible and indicated by the newborn's age.
5. Ensure all lines, tubes, and catheters are patent and securely placed with documentation of the placement.
6. Consider potential care and problems which may be encountered and ensure all equipment, drugs, and fluids are readily available.
7. Communicate with the receiving MCP to discuss required tests and results required prior to transport.
8. Communicate with the MCP before leaving the hospital on the transport.
9. Discuss interventions and plans with the family before leaving.
10. Ensure that the family is ready to leave with the transport personnel.
11. Ensure all paperwork is signed and completed before leaving the hospital or health care facility.

F. Intra-transport process.
1. A small and sick newborn is transported on a cardiopulmonary monitor and/or pulse oximeter.
2. IV fluids are infused continuously at a prescribed rate or given per the recommended process and rate.
3. Resuscitation bag and bulb suction are available, and all resuscitation medications are easily accessible.
4. Temperature control is provided, preferably using KMC or using a transport incubator with a chemical mobile mattress.

G. Systematic evaluation and continuous reassessment during transport
1. The small and sick newborn's status is monitored continuously and documented at a maximum of every 30 minutes. This includes temperature, heart rate

respiratory rate, capillary refill time, and oxygen saturation if there is a saturation monitor available.

2. Any adverse change in the patient's status receives an immediate response, with interventions and responses documented. A thorough handover report is provided at the receiving hospital.

H. Family involvement during the transport process.

1. Informed consent is critical as parents are the ultimate decision-makers.
2. Different modes of transport are offered (if available) and the pros and cons of each transport method are given.
3. The possibility of adverse outcomes and death during transport is discussed.
4. Document that the family was given time and privacy to make decisions.
5. If at all possible, a family member travels with their baby, however if not possible they must be kept informed during the transport.
6. Support systems should be offered as needed, such as social work, a chaplain, clergy, additional family members or friends, and palliative care personnel.

I. Imminent death in transport.

1. Communication with the family is paramount.
2. The transport personnel, the receiving MCP, and the referring hospital must communicate with the family.
3. If the family is in the transport vehicle, the lead transport personnel communicate with the family and the receiving MCP.
4. If there is a death in transit the laws and discussions between the family and the receiving doctor/APN determine the body's transport.
5. Bereavement protocols are implemented.
6. Post-transport debriefing is essential for all medical personnel involved.

Standard 3

Evidenced-based protocols guide the provision of family-centered care practices integrated throughout all aspects of the transport process.

A. The Family unit is maintained as much as possible.
    1. Transport of both the mother and newborn is prioritized when feasible.
    2. Accommodation will be provided for designated family members if the mother cannot travel with the newborn.

B. Admitting hospitals implement hospital policies that reflect a sustained commitment to reducing the family's anxiety.
    1. If neither parent is traveling with the newborn, inform the family where the small and sick newborn will be transferred.
    2. Obtain transport permission from the family, and if they are sending a family member, receive permission from the parents and family member.
    3. A map and directions to the receiving hospital are given.
    4. Phone contact of the receiving unit is given to the receiving hospital.
    5. Sleeping arrangements at the receiving hospital are made for the family.
    6. All visiting policies are shared with the family.
    7. Family members are allowed to be present throughout the transport stabilization process at referral and admitting hospitals.
    8. Transport personnel allow time for the family to ask questions and to verbalize fears.
    9. Upon arrival at the receiving hospital, transport personnel will call both the family (unless accompanying) and the referring hospital.

C. Transport personnel develop appropriate policies to provide information to the family with language limitations.
    1. "Qualified" medical interpreters are available to speak with the family. Qualified implies that the interpreter is proficient in the language and in medical and ethical terminology.
    2. Minors should only be used as interpreters if there is an emergency and no other option.
    3. Careful consideration is needed if a family member or friend is used to interpret medical care.

Standard 4

Processes are in situ throughout the interfacility transfer to ensure optimal communication and continuity of care between transport personnel, referral and receiving facilities, and families.

A. Appropriate medical communication is initiated and maintained throughout the neonatal transport process to ensure continuity of care.
B. A direct and reliable communication network exists between the referring, transporting, and receiving hospitals.
C. Health Care Workers in District Hospitals or Clinics
    1. Have staff knowledgeable about how to organize and facilitate a transport.
    2. Should have knowledge of how to gain access to available resources.
    3. Have the ability to copy material and neonatal charts, x-rays, and other pertinent data.
    4. Staff should have the ability to communicate with the family via phones or other devices/services to notify them of the need for transport and obtain or assist in obtaining consent for transport, as well as any procedures or treatments needed for stabilization, and communication.
D. Clear process for obtaining consultation 24 hours/day with the contact number and names accessible.
E. The receiving hospital has contingency plans for transferring referrals to another facility if beds are unavailable.
F. All transport communication between the MCP referral hospital, transport personnel, and the receiving hospital is documented and ongoing.
    1. Each transport program has a dedicated transport communication system.
    2. MCP and transport communication is immediate.
    3. Transport is initiated after bed availability is confirmed.
    4. The referral hospital has received communication via the MCP.
    5. Coordinating of the transport center is made.
    6. Communication between MCP and the transport personnel is always available.
    7. Before leaving the referral hospital, communication occurs between the transport personnel and the receiving nursing staff.
    8. Tracking of the transport vehicle during the transport if available.

9. All communication is audio-recorded (if available) with the ability to play back incoming and outgoing telephone and radio transmissions. All text messages are saved.

G. Backup emergency power for communications and equipment is available.

H. Cellular phones are specific to transport personnel. Personnel cellular phones should only be used as back up in the transport process.

I. Documentation includes: the time the call was received, the name and phone number of the referral doctor and unit, the time the team departed, the time the team arrived, and the name of every person on the team.

J. Ongoing communication between the referral and receiving hospitals.
    1. Keep the family updated regarding the newborn's condition.
    2. Receiving doctor updates the referral doctor.
    3. Consider weekly updates for the referral hospital while the newborn is admitted.
    4. Update referring personnel when the newborn is discharged or dies.

Standard 5

Processes and procedures are in place to ensure safe return transports to referring hospitals.

A. Return transport should be considered when the small and sick newborn's condition has improved, and the level of care can be provided at the referring hospital. Clear communication pathways between receiving and referring hospitals, district or health centers are required.
    1. Indications for return transport include:
        a. Family request.
        b. Need for bed space at the higher level of care or receiving hospital.
        c. Closer proximity of the small and sick newborn to the family residence.
B. Requirement for return transport.
    1. Informed consent obtained from the family before initiating the return transport process.
    2. All aspects of original transport guidelines for the receiving hospital apply to return transports.
    3. Families are offered the opportunity of a return transport, as outlined by the policies and guidelines of individual hospitals and transport personnel.
C. Informed consent includes:
    1. Advantages and disadvantages of the return transport.
    2. Risks inherent to transport and expected care during the return transport.
    3. Anticipated date, time, and mode of transport.
    4. Policies regarding accompaniment of the family during return transport.
    5. Name of the hospital where the small and sick newborn in transferred.
    6. The receiving unit for the return transport and the unit's phone number.
    7. The name of the receiving doctor.
    8. The name of the accepting nurse at the receiving hospital.
    9. The receiving unit's policies regarding visiting hours and telephone calls.
D. If there is stored breastmilk, arrangements are made for safe transport of the stored breastmilk to the receiving hospital.
E. Continuous Quality Improvement (CQI) is integral to the return transport process.

Appendices

Appendix 1: Neonatal Transport Form

Appendix 2: Doctor Transport Order Form

Appendix 3: Composition of Transport Personnel

Appendix 4: Continuous Quality Improvement (CQI) and Case Reviews

Appendix 5: Safety

Appendix 6: Medicolegal Issues and Regulations

Appendix 7: Disaster Preparedness/Planning

Appendix 8: Extended Sick Newborn Score

Appendix 9: Sarnat & Thompson Score

Appendix 10: Neonatal Infant Pain Score (NIPS)

Appendix 1: Neonatal Transport Form

Neonatal Transport Form			
Receiving Hospital	Referring Hospital	Date/Time	Transport Personnel
Transport Time Log Transfer Call Received _____	Time Transfer Call made:_____ Call to Ambulance: _____ Call to Other Mode of transport: _____ Time left for receiving hospital: _____	Stabilization Time: Arrival ambulance: Departure: Time newborn left the hospital: _____ Time arrived at the receiving hospital: _____	Community Worker: _____ Nurse: _____ Doctor/Physician: _____ Respiratory Therapist: _____ Mother: _____ Father: _____ Other: _____
Maternal History and Birth Details	Prenatal Labs	Medication during pregnancy/labor & delivery	Current Pregnancy
Maternal Age: _____ G___P____A____L____ DOB: _____ Sex: M _____F_____ Gestational Age_____ Birthweight: _____ Current weight: _____ Apgar's: 1: ____, 5: ____, 10:____, 15: _____	Blood Type & Rh _____ Rubella Imm__Non __ Unk ____ RPR Reac__ Non: ___Unk ____ Hep B Pos___ Neg___ Unk____ HIV Pos ____ Neg___ Unk____ GC Pos ____ Neg ____Unk____ Other: _____ Other: _____	Vitamin __ Iron___ Folic acid (date started) _____ Antimalarials (date started) _____ Other_____ Cigarettes ____ Alcohol _____ Other: _____ General Anesthesia: _____ Spinal ____, Epidural ____ Mag. Sulfate _____ Steroids: _____ Antibiotics: _____ Other: _____	No problem___ Rh incomp ____ Premature labor___ PROM time/date___ Oligo____ Poly____ Previa____ Abruption_____ Pre-eclampsia_____ Eclampsia_____ Diabetes: A B. C D Asthma ___ Other_____

ROM/Intrapartum Infection	Type of Delivery	Resuscitation	Psychosocial
Date: _____ Time: _____ Spontaneous ____ Artificial____ Clear _____ Meconium _____ Maternal fever: _____ Other: _____	Vaginal ____ Vertex ___ Breech____ Vacuum ____ Forceps___ C-section_____ Elective _____ Emergency _____	Suction: Bulb ____ Catheter___ ETT____ O2 and percentage _____ Ventilation _____ (how long) Endotracheal Tube (ETT): _____ Chest Compressions (how long) _____ Volume expander: _____ Epinephrine: _____ Other: _____	Language barrier _____ Adoption _____ Abandoned _____ Religion: _____ Support person: _____ Other: _____
Follow-Up Doctor/Physician	Phone number:	OB Doctor/Physician	Phone Number:
Referral Doctor/Physician	Phone number:		
Assessment			
<u>Respiratory</u> Normal Effort _____ Stridor _____ Nasal Flaring _____ Retraction: mild ___, moderate ___, severe ____ Grunting _____ Other _____ <u>Breath Sounds</u> Right. Left _____ Clear. _____	<u>Neuro</u> Activity: Sleepy ____; Lethargic _____; Active _____; Crying _____; Sedated _____ Fontanel Bulging _____; Soft _____; Flat _____; Firm _____; Sunken _____ Motor Strength Right upper/left upper: _____/_____ Right lower/ left lower: _____/_____ Tone	<u>Cardiovascular</u> Skin Color Pink _____; Pale _____; Mottled _____; Cyanotic _____; Acrocyanosis _____; Jaundiced _____; Plethoric _____ Pulses Brachial R____ L_____ Femoral R ____ L _____ Capillary Refill <3 seconds _____ >3 seconds _____ Murmur _____	<u>Gastrointestinal</u> Abdomen Flat ____; Distended _____; Scaphoid _____; Soft _____; Rigid _____; Tense _____; Discolored _____ Bowel Sounds Present _____ Absent _____ NG/OG NG/Size _____ OG/Size _____ GU Patent Anus _____ Voided _____

_____. Fine Crackles _____ _____. Coarse Crackles _____ _____. Wheeze. _____ _____ Diminished. _____ Endotracheal Tube Size _____ Secured at _____ Position on X-ray _____	Hypotonic _____ Hypertonic _____ Unresponsive _____ Jittery _____		Other _____
<u>Integumentary</u> Skin Condition Dry _____; Meconium Staining _____; Peeling _____; Gelatinous _____ Temp Central Peripheral Warm. _____. _____ Cool. _____. _____ Hot. _____. _____ Marks/Bruises Location _____ _____ _____			

Patient Monitoring and Interventions Consent obtained _____ Mother present on transport____ Father present on transport ____ Pulse oximeter applied _____ Patient Secured _____												
Vital Signs	Time				Time				Time			
Heart Rate												
Respiration												
Temperature (axilla)												
Oxygen Saturation												
Capillary refill (CR)												
CR treatment												
Glucose												
Glucose Treatment												
NIPS Score												
Thompson Score												
Extended Sick Newborn Score												
Feeds												
IV Fluids												
Time												
Site												
Fluids												
Ml/hr												

Name of Medication	Dose	Route	Time		
Drug					
Procedures	Time	Site		Outcome	
Venipuncture				Successful	Unsuccessful
OG/NG					
PIV:					
Umbilical Venous Catheter					
Respiratory Intervention	Time Applied			Changes in Transport	
Nasal Cannula - Flow and % O2					
CPAP - %O2 and cm of CPAP					
Ventilator - %O2, rate, PIP, PEEP, IT					
Thermoregulation Interventions	Time	Time		Time	Time
Skin to Skin - mother					
Skin to Skin - other					
Chemical Mattress Temperature					

Resuscitation in Route		
	O2 increase	Pre-resuscitation narration:
	Drugs	
	Resuscitation Bag	Post resuscitation narration:
	Compression	
	Glucose	

Seizures				
Time				
Body part involved				
Duration				
Intervention				

Appendix 2: Doctor Transport Order Form

Doctor Transport Order Form	
Date/ Time	Transport Orders
	Weight _____ Transport via: Helicopter ____ Other _____ To _____NICU to Dr. _____ Reason for Transport/Diagnosis: _____ Vital signs every _____ minutes with continuous pulse oximetry O2 Therapy O2 via Nasal Cannula at _____L/minute Birth weight less than 1500 grams keep oxygen saturation 88-93% NCPAP _____L/min O2 _____cm CPAP Titrate oxygen to maintain saturation of _____% IV Fluids and Infusions Fluid _____ Drug _____ Dose _____ Rate _____ PIV __ UVC __ Fluid _____ Drug _____ Dose _____ Rate _____ PIV __ UVC __ Fluid _____ Drug _____ Dose _____ Rate _____ PIV __ UVC __ Fluid _____ Drug _____ Dose _____ Rate _____ PIV __ UVC __ Fluid _____ Drug _____ Dose _____ Rate _____ PIV __ UVC __ NPO during Transport _____ Medication Drug _____ Dose _____ Route_____at _____ Drug _____ Dose _____ Route_____at _____ Drug _____ Dose _____ Route_____at _____ Drug _____ Dose _____ Route_____at _____ Drug _____ Dose _____ Route_____at _____

Appendix 3: Composition of Transport Personnel

Personnel Composition	Number of Personnel
RN/Community Health Nurse	
Community Health Nurse/Community Health Worker	
Register Nurse (RN)/ Respiratory Therapist (RT)	
RN-RT-Neonatal Nurse Specialist (NNS)	
NNS-RT-Doctor	
RN-RN	
NNS-RT	
RN-Neonatologist	
RN-RN-RT	
RN-RT-Emergency Medical Technician (EMT) (Basic or Intermediate)	
RN-NNP	
RN-RT-Paramedic	
RN-Paramedic	
RN-Neonatal Fellow	

Appendix 4: Continuous Quality Improvement (CQI) and Case Reviews

Continuous quality monitoring (CQI) and case reviews systematically evaluate the transport process for effectiveness. Every individual involved in the transport process ought be engaged in CQI.

1. Case reviews include learning the analysis of processes and problems associated with transport. Regular scheduled CQI meetings should be held. All CQI activities and results are documented and communicated to all the transport personnel, hospital administration, and referring and receiving Anydoctors.
2. Problem-solving as a team should happen when an issue is discovered. Any problems identified are recorded and reviewed to ensure improvement or resolution. All the CQI policy and procedure modules should be available to all transport personnel and reviewed every two years. Existing patient care guidelines and protocols are reviewed regularly.
3. A systematic quality improvement process is essential. Part of the process should include determining who is accountable for maintaining the CQI, scope of practice for all personnel, assessment of the care, developed indicators related to operations and adverse medical events using evidence-based or research-based practice, and a process of reporting, problem-solving, resolution, and communication about the CQI process.

Suggested indicators for CQI projects:

1. Organization of transport personnel.
    a. Education of personnel.
    b. Review of clinical competence.
    c. Transport personnel composition and staffing patterns.
    d. Available equipment, proper function, and maintenance.
    e. Vehicle availability, proper function, and maintenance.
    f. Transport service policies and procedures.
    g. Consumer access.
2. Assessment of the process and the steps involved in providing service.
    a. Procedure for dispatching transport vehicles and personnel.
    b. The flow of communication from initial referral call to patient follow-up after transfer.
    c. Safety measures for transport personnel, the patient, and others contacted during transport.

d. Transfer of patient from referring hospital to transport to receiving hospital.
e. Transfer of patient care from referring hospital staff to receiving hospital staff.
f. Completeness and accuracy of patient assessment by transport staff and documentation of the evaluations.
g. The thoroughness of the care documentation provided.

3. Regular assessment of outcomes and the ability of the service to provide the desired result.
    a. Timely response to call for transport.
    b. Rate of morbidity and mortality.
    c. Frequency of unsuccessful procedures.
    d. Satisfaction of referral staff, receiving staff, and parents.
    e. Stability of the small and sick newborn during the transport.
    f. Frequency of staff injuries occurring during transport.
    g. Impact of failed equipment or vehicles during transport.
    h. Appropriateness of care during transport.
    i. Appropriate use of resources.

Appendix 5: Safety

All transport personnel provide a safe environment for themselves and the small and sick newborn.

1. The small and sick newborn is always secured to prevent injury during unexpected acceleration or deceleration.
2. The small and sick newborn is secured to allow visibility for the transport personnel.
3. All equipment (including the transport incubator) is appropriately secured in ground vehicles.
4. The patient environment is adequately lit.
5. Operation procedures and equipment manuals are available to ensure the safe and correct operation of equipment.
6. All transport personnel are familiar with the vehicle's safety features and equipment.
7. Written policies that address the use of lights and sirens are in place, which indicate they should only be used in life-threatening emergencies.

Equipment and vehicles are kept operational through regularly scheduled inspection and maintenance programs.

1. Hospital biomedical engineering departments ensure equipment reliability and safe operation.
2. All maintenance and safety checks are recorded and available for review.
3. Ground ambulances or cars are maintained by a reliable contractor or vendor who adheres to an established maintenance program to ensure safe operation.
4. Ground transport is provided in an approved ambulance or car licensed by the government.
5. A written policy to address alternative vehicles when primary or dedicated cars are scheduled for preventive maintenance or repair is in place.

The personnel members, hospitals, vendors, and private companies understand that the transport environment requires physical capabilities beyond those expected of personnel in a more static environment.

1. Transport personnel of the small and sick newborns are not assigned a patient load when in the role of transport nurses.
2. Extended shifts that require transport personnel to work ≥14-hour shifts are discouraged.
3. The transport personnel are guaranteed a minimum of 10 hours of uninterrupted rest between shifts.
4. Policies and procedures related to accident preparedness and reporting are in place.
5. Transport personnel provide current contact information available for next of kin.
6. In inclement weather, the need for transport does not outweigh safety considerations for the transport personnel and small and sick newborns. A written plan must be in place for providing medical consultation when transport is not possible because of inclement weather.
7. Inservice education on safety is regularly offered at defined intervals (minimum annually). Transport personnel are trained to safely load and unload vehicles ensuring safe work practices.

Appendix 6: Medicolegal Issues and Regulations

All participants in the transport process must comply with medicolegal mandates. The employer and employing institution authorize the existence of the transport personnel and provide the legal framework to delineate each personnel member's scope of practice. The receiving hospital ensures all the transport personnel have the appropriate and current licensure, training, and expertise to perform their tasks. The hospital has a copy of the patient care guidelines and standing orders available for review. All verbal communication with the personnel is documented as part of the medical record. If the patient is not transferred the written communication is kept in a transport call file.

The receiving hospital head nurse ensures each personnel member functions within the scope of practice, confirms that signed informed consent forms are obtained prior to initiating any procedure or transporting the small and sick newborn, and maintains all documentation throughout the transport process.

Appendix 7: Disaster Preparedness/Planning

A written plan is in place that is easily identified, readily available, and understood by all program personnel and includes information in the following areas.

a. Criteria determining that the neonatal unit is to be evacuated.
    a. Loss of power.
    b. Street flooding or structural damage impending access to a faculty.
    c. Structural and nonstructural damage impeding access to the facility.
    d. Fire.
b. List of personnel to notify in order of priority of impending evacuation.
    a. Hospital executive
    b. Doctors.
    c. Any advanced practice nurses.
    d. Registered nurses; neonatal transport nurses.
    e. Paramedics.
    f. EMTs.
    g. Respiratory care technicians.
    h. Any other available staff

The communication system includes but is not limited to a central command center that coordinates all the transport systems.

1. Equipment needed for evacuation.
    a. Self-inflating resuscitation bags.
    b. Stretchers.
    c. Evacuation aprons if available.
    d. Flashlights or alternative light sources.
    e. Batteries.
    f. Isolettes or mobile incubators.
    g. IV pumps.
    h. Monitors.
    i. Oxygen tanks.
    j. Air tanks.
    k. Ventilators

l. CPAP.
m. IV fluids.
n. Resuscitation drugs.
o. Antibiotics
p. Narcotics.
q. IV catheters, extension tubing, and flushing set.
r. Arm boards, occlusive dressing.
s. Tape.
t. Food-grade plastic bags, clear food-grade plastic wrap, and blankets.
u. Antiseptic cleansers.
v. Disposable gloves and sterile gloves.
w. Portable suction devices.

2. Methods to assist in patient identification and tracking.
    a. Color-coded bands.
    b. Written or computerized patient tracking record.
    c. Documentation on transport.
    d. Paper charts.
3. Parent education, consent, and ongoing contract during an emergency.
    a. Information explaining the institution's transport plan in emergencies is available.
    b. Advanced permission to transport patients in the event of a disaster.
    c. Procedure on how they are to contact the institution.
4. Evaluation of the effectiveness of the transport personnel drills.
    a. Annual planned drill for emergency evacuation
    b. Reflection and discussion on the positives and negatives during the drill.
    c. Adjustment of plans during emergencies based on the drills.
5. Incident command policies.
    a. Determine in advance who is in charge.
    b. Determine triage and patient flow.
    c. Determine who oversees what area.
    d. Decide how to handle security issues and communication.
    e. Design a hospital emergency operation.

Appendix 8: Extended Sick Newborn Score

Parameter	Score 0	Score 1	Score 2
Respiratory effort, breaths/min	Apnea	Rate >60+ Retraction	Rate 40-60
Heart rate, bpm	Bradycardia or asystole	>160	100-160
Mean blood pressure	$<5^{th}$ %	5^{th}-10^{th} %	$>50^{th}$ %
Axillary temperature Celsius	<36	36-36.5	36.5-37.5
Capillary filing times, seconds	>5	3-5	<3
Random blood sugar, mg/dl and mcg/dL	<45 or <810	45-60 or 810 – 1080	>1080
SpO2 % in room air	<86	85 to 92	>92
Moro reflex	Absent	Depressed or exaggerated	Corresponding to gestational age
Modified Downes score (respiratory rate, retraction, grunt, cyanosis, and air entry score carrying 0, 1, or 2 points with minimum score 0 to maximum score 10)	6	2-6	0-2

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Appendix 9: Sarnat & Thompson Score (Sarnat & Sarnat, 1976) (Thompson, 1997)

Sign	0	1	2	3
Tone	Normal	Hyper	Hypo	Flaccid
Level of Consciousness	Normal	Staring	Lethargic	Comatose
Fits or Seizures	None	<3/day	3 or more/day	
Posture	Normal	Fisting	Strong distal flexion	Decerebrate
Moro	Normal	Partial	Absent	
Grasp	Normal	Poor	Absent	
Suck	Normal	Poor	Absent +/-bites	
Respiration	Normal	Hyper	Apnea	IBBV
Fontanelle	Normal	Full	Tense	

Grade I: Mild encephalopathy. The LOC-infant is hyper-alert, irritable, and over-sensitive to stimulation. The tone is normal/hypertonic. Tendon reflexes are increased. Complex reflexes, such as sympathetic over-stimulation, tachycardia, dilated pupils, and jitteriness, are normal. There have been no seizures. The Thompson score is 1-10 and standard on Day 7.

Grade 2: Moderate encephalopathy. LOC—lethargic. Tone-truncal hypotonia, proximal weakness. Tendon reflexes—increased. Complex reflexes weak. Parasympathetic overstimulation—low resting heart rate, small pupils, and copious secretions. 70% will have frequent seizures. Thompson score: 11-14. Prognosis is 80% normal. Consider body cooling within 6 hours if Thompson scores>7 before 6 hours.

Grade 3: Severe encephalopathy. LOC – stuporous/coma. Tone – flaccid. Tendon reflexes – depressed/absent. Complex reflexes – absent. Drooling of saliva due to poor swallowing and gagging. Frequent seizures. Thompson score: 15-22, remains abnormal on Day 7: prognosis 50% death and 50% significant sequelae.

Adapted with permission from: KwaZulu-Natal (KZN)Health (2023). Thompson Score for Hypoxic Ischemic Encephalopathy (HIE). Retrieved from: https://www.kznhealth.gov.za/newborns/records/HIE%20score%20sheet.pdf

Appendix 10: Neonatal Infant Pain Score (NIPS) (Lawrence, Alcock, McGrath, Kay, MacMurray, & Dulberg, 1993)

Assessment	Score
Facial Expression	
0 – Relaxed (restful face, neutral position)	
1 – Grimace (Tight facial muscles: furrowed brow, chin or jay, negative facial expression noted around the nose, mouth, and brow	
Cry	
0 – Not crying and/or quiet	
1 – Whimper (mild moaning and/or intermittent do not confuse with grunting)	
2 – Crying (loud scream; rising, shrill, continuous. **NOTE:** if intubated see evidence of crying in the face and mouth)	
Breathing	
0 – Relaxes (normal pattern for the newborn)	
1 – Change in breathing (begins to in draw, irregular, fast breathing; gagging, or breath holding)	
Arms	
0 – Relaxes/restrained (no muscle rigidity; occasional random movement of arms dependent on gestational age)	
1 – Flexed/Extended (Tense, straight legs; rigid and/or rapid extension, flexion)	
Legs	
0 – Relaxes/Restrained (No muscle rigidity; occasional random leg movement	
1 – Flexed/Extended (Tense, straight legs; rigid and/or a rapid extension, flexion)	
State of Arousal	`
0 – Sleeping/Awake (Quiet, peaceful sleeping or alert random leg movement	
1 – Fussy (Alert, restless and thrashing)	

A score > 3 indicates pain.

Treatment

Mild: 0-3 – initiate Nonpharmacologic treatment (swaddle, sucking, skin to skin). Pharmacologic: Paracetamol.

Moderate: 4-6 – Nonpharmacologic (swaddle, skin-to-skin, sucking). Pharmacologic possible opioid bolus.

Severe: 7-10 – Pharmacologic opioid bolus or infusion coupled with non-pharmacologic. Severe pain requires both treatments.

*Any treatment initiated for pain requires reassessment and documentation 30-60 minutes after treatment.

Adapted from WHO Guideline on Neonatal Pain Assessment and Management (2020b).

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