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Assessment of Physiological Stability and its' Effects on Neonatal Morbidity and Mortality for Newborns Transferred by Ambulances to the Neonatal Intensive Care Unit at Caritas Baby Hospital in Bethlehem

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Thesis Approval

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Declaration

I certify that this thesis titled “Assessment of Physiological Stability and its’ effects on Neonatal Morbidity and Mortality for Newborns Transferred by Ambulances to the Neonatal Intensive Care Unit at Caritas Baby Hospital in Bethlehem”, for a degree of master is my own research, in addition, I understand the nature of plagiarism and am aware of the University's policy on this.

The content within this thesis represents my own effort, except for sections where sources are explicitly acknowledged. This work has not been presented for any other academic award or credential by any individual.

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Date: 29/10 /2024

Dedication

This research is dedicated to my family, whose unwavering patience and support have been my constant sources of strength, to my husband Firas, and our children Issa, Hanin and Hadeel for their endless love and encouragement. I dedicate this work to my parents, the pillars of strength and support with unwavering belief in me and to my family-in-law, for their kindness and support throughout this journey.

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Abstract

Background: In the west Bank, limited specialized neonatal transport services result in infants being transported in inadequately equipped ambulances without medical expertise. This increases neonatal mortality and morbidity risk due to delayed access to proper medical care. Understanding these risks is crucial for developing interventions to enhance neonatal transport and care in resource-limited and hard-to-reach areas.

Objectives: The study aims to assess the physiological stability and its effect on neonatal mortality and morbidity for newborns transported by ambulances to the neonatal intensive care unit at Caritas Baby Hospital, using the TRIPS score, ABGs, and Blood sugar.

The TRIPS score tool was used to comprehensively to assess vital signs, response to stimuli, and respiratory function of transferred neonates. The research seeks to understand the issues concerning ambulance preparedness and the safety of neonates during transport.

Methodology: This retrospective cohort study analyzed data from medical records in a health information system (HIS) for newborns admitted to the neonatal intensive care unit at Caritas Baby Hospital (CBH) for the year 2021. The study focused on infants aged 0-28 days transported by ambulances. Descriptive variables such as age, sex, gestational age and weight, and physiological measurements were examined, the Transport Risk Index of Physiological Stability Score (TRIPS) assessed parameters including temperature, respiratory work, systolic blood pressure, and stimuli response, in addition to blood sugar readings and ABGs results on admission. A purposive convenience sample of 96 records was selected based on their relevance to study objects.

Results: Significant correlations were found between TRIPS score and gestational age, weight, and ABGs findings. Higher TRIPS scores were linked to greater physiological instability, temperature, and respiratory work varied significantly with gestational age, and males exhibited higher respiratory work.

Conclusions: Higher TRIPS scores were associated with greater physiological instability, highlighting the urgent need for improving ambulance preparedness and neonatal transport. Addressing these challenges is crucial for improving neonatal care in areas with limited specialized transport services.

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List of Abbreviations

ABGs	Arterial Blood Gases
ACCEPT	Assessment. Control, Communication .Evaluation, Preparation And Transportation.
CBH	Caritas Baby Hospital
GAT	Grounded Ambulance Transport
HIS	Hospital Information System
IVH	Intraventricular Hemorrhage
MINT	Modified Infant and Neonatal Transport
NICU	Neonatal Intensive Care Unit
NB	Newborn Babies
RWAT	Rotary Wing Air Transport
SBP	Systolic Blood Pressure
TRIPS	Transport Risk Index of Physiologic Stability
VLBW	Very Low Birth Weight Infants
WB	West Bank
WB	World Health Organization

Chapter One

1. Introduction

This chapter will present the study background, research questions, study, problem statement, significance of the study, objectives of the study, and research hypothesis.

1.1Research Overview (Background)

The transference of premature and high-risk newborn babies often presents the largest medical challenges to the medical team. Those challenges are concerns regarding the environmental stressors involved during transference (Shipp, 2023).From here, we can recognize that it is the foremost significant and essential issue to study.

High-risk newborns are defined as a group of newborns who are very likely to experience a severe acute illness or another negative consequence such as prematurity, low birth weight, respiratory distress, or blood disorders (Narayanan et al., 2023).

Sundrani et al. (2019) reported that when high-risk newborns are transferred, their mortality rates will increase considerably from nosocomial infections, intra-ventricular hemorrhage, and severe respiratory distress syndrome. The prognosis for high-risk newborns depends on how well the transport system functions because these newborns are frequently in critical condition where, if they do not receive the proper care, it may lead to neonatal death.

The neonatal morbidity rate is the number of medical conditions in the first 28 days of life per 1000 live births (Rana & Karumanchi, 2017). In contrast, the neonatal mortality rate is the number of deaths during the first 28 completed days of life per 1000 live births in

a given year or other period of life. In Palestine, the neonatal mortality rate in 2022 was 12.3 deaths per 1,000 live births (Infant Mortality Rate in Palestine 2022, 2024) Neonatal mortality resulting from transferring the newborn in grounded ambulances is not known nor studied at the Palestinian level. At the same time, there are no significant studies or numbers about the percentage of mortality rate referred to ambulance transversal.

The term newborn infant or neonate describes a child who is under 28 days old (Newborn Health, 2018). According to the World Health Organization (WHO, 2023), preterm birth is any birth that occurs before the 37 completed weeks of gestation or fewer than 259 days since the first day of the woman's last menstrual period. WHO further described prematurity as split into 3 types consistent with the gestational age:

- Extremely preterm (<28 weeks).
- Very preterm (28–<32 weeks).
- Moderate or late preterm (32–<37.6) completed weeks of gestation.

Neonatal transport describes the process of transferring a newborn in unstable circumstances to another appropriate medical facility for ongoing observation, care, and treatment (Alraimi & Alqahtani, 2019). This mode of transportation serves as a lifeline, connecting the places of childbirth with specialized neonatal care centers, thereby ensuring that infants receive critical medical attention during their crucial initial moments of life. It is worth emphasizing that safe neonatal transportation not only represents an integral component of healthcare logistics but also translates to saving precious lives.

Physiological stability refers to the dynamic state of living organism where key physiological parameters are maintained within normal range, despite factors that could

potentially disrupt this balance (Lebel et al., 2014).In neonate, physiological stability means maintaining the specific parameters within the normal range, such as maintaining a heart rate between 120-160 beats per minute, respiratory rate of 30-60 breaths per minute, oxygen saturation level above 90% without supplemental oxygen and between 90-95% with supplemental oxygen. And an axillary body temperature of 36.6-37.1C (Blomqvist et al., 2020).

Caritas Baby Hospital (CBH) was founded in 1953. It is the only children's hospital in the West Bank, which provides social and medical assistance to all children in need up to 18 years old. CBH also treats the most basic pediatric, neonatal, and congenital illnesses.

In the Neonatal Intensive Care Unit (NICU) in CBH, most cases are referred to because of prematurity, sepsis, respiratory distress, and neonatal jaundice where all of these cases require intensive care and close observation (Caritas Baby Hospital, n.d.)

According to this study investigator and based on her observation and experiences in CBH-NICU, the newly transferred babies by ambulances from different places (Governmental and non-governmental hospitals) have mostly arrived with hypothermia, hypoglycemia, cyanosis, and distress and very few numbers arrived with the hospital dead.

These ambulances were described as inadequately prepared and unsafe, thus exposing the referred neonate to further serious complications as mentioned above. Therefore, given the circumstances regarding neonates' transference and the lack of local studies on this issue, the investigator sought to study this phenomenon that was not studied before in Palestine. Thus, the study aims to assess the physiological stability and its effect

on neonatal morbidity and mortality risk for newborns transferred by ambulances to the neonatal intensive care unit at Caritas Baby Hospital.

1.2Problem Statement

The transfer of newborn babies (NB) can be challenging for healthcare teams. Studies have shown that newborns at risk and transfer for advanced medical care are at greater risk during their first days of life. They face risks, such as intraventricular hemorrhage (IVH) and hypothermia, which significantly increase their risk of mortality (Morris et al., 2020)(Piccolo et al., 2022)

Even though there are defined policies and guidelines for transfers outlined in official neonatal guidelines and the national neonatal protocol mandated by the Palestinian Ministry of Health (2019), challenges persist in ensuring the safe transport of neonates, especially when transferring critically ill children from one NICU to another. Thetransfer process emphasizes the importance of a safe environment, trained transportation teams, and adherence to the ACCEPT model, which encompasses steps such as assessment, control, communication, urgency evaluation, preparation, and secure transportation. This model is crucial in minimalizing risks like intraventricular hemorrhage (IVH) and hypothermia and demands strict implementation to reduce mortality risks effectively. “Guidelines for the Safe Transport of Clinically Ill Children 2013" by the World Health Organization (WHO) provides comprehensive instruction on these practices, highlighting the importance of close monitoring, seamless communication between centers, and emergency preparedness during transfers (WHO,2013).furthermore, the consistent use of a formally approved checklist, aligned with national protocols, guidelines, and policies, is essential for maintaining the

safety and well-being of the neonates transported. Additionally, a formally approved checklist, aligned with the national neonatal protocols, guidelines, and policies, will be included in the appendix, which should be consistently used when transferring neonates between hospitals.

Therefore, assessing the Physiological Stability and their Impact on Neonatal Morbidity and Mortality for Newborns transferred by ambulances is a necessity to recommend for health providers to understand the condition of these transferred babies

Furthermore, there is a lack of data regarding the total number or estimated count of neonatal transfers to Neonatal Intensive Care Units (NICUs) through ambulance services. This lack of data emphasizes the need for an in-depth examination of the neonatal transfer process to improve the quality of care and outcomes for illnesses for these neonates.

CBH protocol for all transferred NBs admissions requires screening for all vital signs (Temp, BP, HR, and RR), blood sugar, and cardiac screening (pre-post ductal saturation, and four limbs BP). Apply an IV access followed by a whole blood test as requested by the doctor. This information is registered on the ICU flow chart and HIS (computerized health information system).

A qualified ambulance means an ambulance well prepared for transferring sick NBs as many studies on neonatal transporting policies and protocols recommended (National Neonatal Protocol, 2019; Neonatal Guidelines, 2019; Bellini et al., 2019). Transferring ambulances should have the essential supplies, equipment, and medications, such as a transporting incubator with high specifications and a power-controlled mechanism, reachable, along with clear and readable instructions for use; it should also be able to warm

up quickly and securely in motion, and the baby should easily be visualized. Moreover, the baby should be reachable from a minimum of two incubators. Respiratory support devices and mechanical Ventilators should be lightweight, sturdy, and easy to operate. Cardiac Monitor devices with Multifunctional monitors, cardiac rhythm and oxygen saturation monitoring should be present with invasive and noninvasive blood pressure monitoring. Alongside the mentioned essentials above, there should also be a Parenteral infusion material, which must be charged and easy to work with, a phototherapy device and a transport bag (Basic material and medicines could also be used during transferring (Narli et al., 2019).

Based on a rapid appraisal assessment confirming this research problem, conducted over six months, from January 1 to the end of June 2022, data revealed that out of the total 47 neonates admitted to CBH/NICU by ground ambulance during this period; approximately 38 cases arrived with hypothermia (80%), 25 cases with hypoglycemia (53%) and 18 babies were without IV access (38%). All of them were on pulse oximeter, but there were 5 cases in which the machine was applied but turned off. These readings affect the NB duration of stay in the hospitals and the mortality and morbidity rate. Therefore, this proposed retrospective study will focus on the physiological stability and the risk of morbidity and mortality index for transferring NBs by grounded ambulances by looking backward at data collected from previous babies admitted to NICU-CBH for 2021

During the researcher's experience in NICU/CBH, systematic observations were made concerning the number of babies who arrived with hypothermia. Furthermore, documentation indicates that some neonates were transported without a portable ventilator,

relying instead on bag-mask ventilation, and others exhibited signs of cyanosis even though they were receiving oxygen via nasal cannula. Many studies and protocols advocate for fundamental and essential standards and criteria for well-equipped grounded ambulances, which are critical in saving lives. However, when neonates are observed arriving in unstable conditions, such as hypothermia and respiratory distress, it becomes evident that these ambulances may not meet the required qualifications for providing the necessary level of care.

All of these essential materials and medications in transferring ambulances have a direct effect on the arrival status of the NBs, and a lack of them could cause hypothermia, hypoxia, respiratory distress, and the tendency of intra-ventricular hemorrhage occurrence, as well as, an increase in mortality and morbidity rate.

1.3 Significant of the Study

The primary goal of this research is to assess the physiological stability and its impact on neonatal morbidity and mortality in newborns transported by ambulances to the NICU at CBH

In the absence of similar studies in Palestine concerning this topic, this research relies on accurate statistics available for neonates directly transported to Caritas Baby Hospital's Neonatal Intensive Care Unit (NICU). However, there is a noticeable lack of data regarding neonates transferred by ambulance to other neonatal hospitals in the region. The researcher contacted other NICUs in the West Bank to see if they had any records of ambulance transports, but the responses confirmed the data gap, which means no precise

data. As of 2016, the total neonatal admission load in the West Bank (WB) was reported as 7,880 cases (Massad et al., 2020).

1.4 Research Goal and Objectives

The primary goal of this research is to assess the physiological stability for NBs transferred by ambulances and their impact on neonatal morbidity and mortality within the neonatal intensive care unit at Caritas Baby Hospital in Bethlehem. To achieve this goal, the following measurable objectives are set;

1. To assess the physiological stability of neonates upon arrival by grounded ambulance to NICU at CBH using the TRIPS score, ABGs, and Blood Sugar Levels.
2. To correlate the TRIPS score, ABGs, and Blood Sugar Levels with neonatal physiological stability considering gestational age, birth weight, and gender factors
3. To provide recommendations for improving neonatal transport practices to enhance physiological stability and reduce the morbidity and mortality risk.

1.5 Research Questions:

1. What is the level of physiological stability using the TRIPS score measures for neonates upon arrival by ambulance to the NICU at CBH?
2. What are the levels of ABGs and blood sugar for neonates upon arrival by ambulance to NICU at CBH?
3. Are TRIPS scores affected by gestational age, birth weight, and gender factors?

1.6 Research Hypotheses

HO1: There is a significant difference at a level of ≤0.05in physiological stability based on TRIPS scores and related to neonatal gestational age, weight and gender upon arrival by ambulance to NICU

HO2: There is a significant difference at a level of ≤0.05 in physiological stability based on ABGs and blood sugar levels related to neonatal gestational age, weight and gender upon arrival by ambulance to NICU

HO3: There is a significant difference at a level of ≤0.05 in physiological stability based on TRIPS scores and ABGs and blood sugar levels

1.7 Study Variables

Independent Variables

Physiological stability (TRIPS Score): Components of Temperature, systolic blood pressure, respiratory status, and response to stimuli

Gestational age, Weight, Gender, ABGs finding, and Blood sugar levels.

Dependent Variables

Mortality and morbidity risk.

Physiological instability based on TRIPS tool score.

Conceptual and Operational Definitions:

Independent Variables

1. Physiological stability (TRIPS) score

Conceptual definition: the state, of a newborns vital sign as measured by a standardized score that includes various physiological parameters.

Operational definition: measured using the TRIPS score, which evaluates the newborn's temperature, systolic blood pressure, respiratory status, and response to stimuli upon arrival at NICU.

2. Temperature:

Conceptual definition: the body temperature of a newborn.

Operational definition: recorded in degrees Celsius using a thermometer upon arrival at NICU.

3. Systolic blood pressure:

Conceptual definition: the pressure exerted by the blood against the walls of the arteries during a contraction of the heart.

Operational definition: measured in mmHg using neonatal blood pressure monitoring upon arrival at NICU.

4. Respiratory status:

Conceptual definition: the condition of a newborn's breathing and oxygenation.

Operational definition: assessed by respiratory rate and oxygen saturation and ventilation method upon arrival at NICU.

5. Response to stimuli

Conceptual definition: the newborn's reflexive and l reactions to external stimuli

Operational definitions: assessed through the newborn's response upon arrival, categorized as follows:

- None: no response to stimuli.
- Seizure: observable convulsion or abnormal motor activity.
- Muscle relaxant: significant minimal response to stimuli.
- Lethargic response: minimal response to stimuli, reduced movement, and weak crying.
- No cry: absence of crying, suggesting severe distress, or poor neurological status.
- Withdraws vigorously, Cries: indicating a good reflexive response.

6. Gestational age:

Conceptual definition: the period time from conception to birth.

Operational definition: calculated in weeks and days based on maternal medical record

7. Weight:

Conceptual definition: the body mass of newborns

Operational definition: measured in grams using a digital scale upon arrival to NICU.

8. Gender:

Conceptual definition: the biological sex of newborns.

Operational definition: recorded male or female based on the physical examination and the medical records.

9. ABGs (Arterial Blood Gases) Finding

Conceptual definition: the level of oxygen, carbon dioxide, and blood PH in the arterial blood, indicating respiratory function and metabolic status.

Operational definition: measured using an arterial blood gas analyzer upon arrival at the NICU.

10. Blood Sugar Levels

Conceptual definition: the concentration of glucose in the newborn's blood.

Operational definition: measured in mg\dl using a glucometer upon arrival at the NICU.

Dependent Variables

1. Mortality and Morbidity Risk

Conceptual definition: the likelihood of death or the presence of disease and health complications in newborns.

Operational definition:

Mortality is the recorded the number of deaths within the first 28 days of life upon arrival to NICU.

Morbidity: documentation as the presence of conditions such as respiratory distress, sepsis hypothermia hypoglycemia, and low systolic blood pressure.

2. Physiological instability based on TRIPS tool score

Conceptual definition: the degree of deviation from normal physiological parameters in newborns, indicating instability.

Operational definition: assessed using the TRIPS score where a higher score indicates greater physiological instability. The score is calculated based on temperature, systolic blood pressure, respiratory status, and response to stimuli, categorized into low (0-6) moderate (7-5), and high (more than 16).

Chapter Two
Literature Review

2.1 Introduction

In neonatal care, the safe and efficient transportation of newborn infants to specialized medical facilities is crucial in determining their overall health outcomes. The process of neonatal transportation carries significant implications, as it can impact the well-being of these fragile babies and influence their future quality of life.

This literature review aims to explore the consequences associated with neonatal transportation, shedding light on the challenges and risks neonates face during this journey, in addition to the TRIPS score tool. Furthermore, it will delve into the universal standards and guidelines established to ensure these neonatal patients' highest care and safety throughout transportation. To ensure a comprehensive examination of contemporary practice and developments, this review systematically searches. Literature published over the past decade focusing on studies, reviews, and guidelines from key databases such as Medscape, Google Scholar, and Cinahl).

2.2 Previous Studies

Neonatal physiological stability changes associated with transportation:

Abnormal vital signs were frequently observed during neonatal transport, such as Heart Rate and Systolic Blood Pressure, with more common with Temp and Oxygen saturation (Greene et al., 2022). Pai et al. (2019) conclude that high-risk neonates are more at risk for instability during transport. Neonatal transport services are essential for providing high-quality care. Improving the outcomes relies on ensuring physiological stability and training

in patient assessment (Neonatal Transport in Developing Country Settings: A Systematic Review, 2011). Multiple studies have confirmed the occurrence of deaths and illnesses following the transfer of newborns between hospitals (Marlow et al., 2014).Early infant death, respiratory distress, and perinatal asphyxia, along with kangaroo mother care, are an important public health problem, and gestational age is independent (Girma et al., 2023).Hypothermia is a significant risk experienced by newborns during neonatal transport, with prolonged exposure increasing morbidity and mortality rates (Bellini, 2021). Hypothermia in very low birth weight infants (VLBW) is associated with increased intra-ventricular hemorrhage (IVH) and mortality (Miller et al., 2011).

Universal Standard of Neonatal Transporting Process

Transport of critically ill infants requires understanding other localof situations, providing appropriate caregiver training, developing referral systems, and ensuring coordination between caregivers, hospital staff, and transport teams (Ashokcoomar & Bhagwan, 2022).There is no evidence that neonatal transport by staff with prior work experience improves infant outcomes. Instead, it appears beneficial for employees to use certain leadership styles, regardless of their background (Fenton & Leslie, 2009).By strengthening educational programs and involving NICU staff in the birth process, outcomes for high-risk infants can be improved, and safety can be ensured (Xu et al., 2019). Unique features and great heterogeneity characterize the critical care transport environment. It is important to understand these characteristics and heterogeneity (Noje et al., 2019). The limited utility of road transport, particularly ambulances, and the weight of the transported neonates significantly contribute to the risk of neonatal mortality (Narang et al., 2013). Adequate

training and valuable transport interventions can significantly improve infant outcomes, reducing mortality rates and enhancing the efficiency of inter-hospital transport.

Consequences Related to Neonatal Transport

Transportation is a poor environment and with many hazards, such as vibration, poor lighting, noise, and temperature differences, may expose the patients and health team to physiological changes and further discomfort (Noje et al., 2019). Transferring sick infants is critical for survival, but current systems are inadequate and require improved staffing, monitoring, and safety measures (Richard Okonkwo et al., 2020). Neonatal transport plays a crucial role in preventing neuro-developmental impairment in neonates (Gupta et al., 2019). Specialized teams provide intensive care during high-risk transfers, ensuring the infant's clinical condition is stabilized. However, transport introduces hazards like noise, vibration, acceleration, and temperature fluctuations. To improve neuro-developmental outcomes, integrating intensive care neuromonitoring tools into the transport milieu is essential (Gupta et al., 2019).The vibrations, noise, and accelerations associated with transportation raise the risk of serious brain damage when transferring sick preterm newborns between hospitals (Partridge et al., 2021). Very premature newborns born in a non-hospital facility and transferred within 48 hours have worse outcomes than those born in a tertiary care facility (Helenius et al., 2019). It was determined that high birth weight and long carrying times were the main causes of infant deaths in newborn children. These findings suggest that some aspects of transportation, such as ambulance use and access to appropriate medical personnel, may not be sufficient to ensure children's survival (Narang et al., 2013). The choice of mattresses during the transportation of sick infants can

considerably affect their exposure to vibrations, and this exposure tends to increase when the vehicle speed exceeds 60 km/h (Blaxter et al., 2017). Sound and whole-body vibration levels during neonatal transport surpass adult recommendations, and sound appears to be more distressing to the infant than vibrations (Karlsson et al., 2011). Hypothermia occurs in babies whose body temperature is too low according to World Health Organization standards. Preterm infants who undergo transport within the first 72 hours of life are at a higher risk of developing serious intraventricular hemorrhage (Shipley et al., 2019). Inter-hospital transfer of VLBW infants is linked to an increase in the occurrence and severity of IVH (Shipley et al., 2019).

Transport Risk Index of Physiologic Stability Score (TRIPS) Tool

The TRIPS score, an important tool for evaluating neonatal transport care, was validated in 2001. This was confirmed by the results of a study in which the TRIPS score was carefully developed and extensively tested in a group of neonatal patients. The findings not only confirmed the reliability of the TRIPS score but also emphasized its importance in neonatal care. The score's ability to predict outcomes, particularly in the critical context of neonatal transport, provides valuable information that continues to inform neonatal care today (Lee et al., 2001). TRIPS are a valuable tool for predicting critical neonatal transport outcomes in tertiary care centers (Kulkarni et al., 2019). TRIPS are a standardized tool for evaluating the severity of neonate illnesses at admission and up to 24 hours post-injury (Lee et al., 2012). TRIPS, a neonatal mortality predictor emphasizes enhancing newborn physiological stability before, during, and after transfer to reduce mortality rates (Luna-Hernández, 2015). The TRIPS score, a crucial indicator of neonatal mortality, has been

proven to significantly predict outcomes, emphasizing the need for effective strategies to mitigate this risk (Shah et al., 2020).

A comparison study comparing various neonatal transport scoring methods for their capacity to foretell mortality risk in full-term out-born children showed that the TRIPS and MINT scores performed better than competing transport scoring systems, such as the NICS and TREMS scores. This study adds to the evidence that suggests TRIPS and MINT scores may be more helpful in predicting mortality in full-term out-born neonates receiving NICU care within the first week of transfer (Qu et al., 2022). According to the findings of an association study between the Transport Risk Index of Physiologic Stability in Extremely Premature Babies and Mortality or Neuro-developmental Impairment at 18 to 24 Months, the TRIPS score at the time of NICU admission can be used as an additional, objective tool for counseling the parents of extremely premature infants soon after their admission to the NICU (Grass et al., 2020). This tool was used as a reference/theoretical framework for this study to answer the research questions and meet the study objectives. According to Luna-Hernández et al. (2015), a score of 16 is used to predict neonatal mortality. In comparison, Shah et al. (2020) indicated that a score of 18.5 was highly sensitive and specific for predicting neonatal mortality during the first week of admission.

2.3 Summary:

Neonatal transportation is critical for neonates' health outcomes, especially those who require specialized care. Studies have identified considerable dangers during transport, including physiological instability, and hypothermia, particularly for very low birth weight (VLBW) newborns. Trained personnel, proper supplies, and protocol adherence are all

required for effective transportation. The TRIPS score is a validated tool for evaluating newborns' physiological stability during transport, predicting outcomes, and guiding interventions that reduce mortality risk. Despite the crucial need for specialist newborn transport services in Palestine, there is a huge research gap in terms of the region's particular geographical and political constraints. Current research emphasizes the importance of physiological stability and tools such as the TRIPS score in predicting neonatal outcomes during transportation; however, there is insufficient information on how long distances between cities, frequent and unpredictable checkpoints, and poor road conditions affect neonatal transport outcomes in Palestine. Extended travel times enhance physiological instability, resulting in higher morbidity and mortality risk, while frequent checkpoints disrupt continuous medical care, generating major delays. Poor road conditions enhance vibration and instability, which can lead to hypothermia and respiratory distress. As well as intraventricular hemorrhage risk, additionally, there is a lack of research on ambulance preparedness in terms of equipment and team training, and the effectiveness of current transport protocols under these specific conditions is not well established. Addressing these gaps is critical for creating specific interventions to improve the safety and effectiveness of neonatal transport, thus lowering newborn morbidity and mortality risk in Palestine. Comprehensive research into these unique problems, enhanced ambulance preparedness, and tailored transport protocols are crucial to attaining these objectives.

Chapter Three

Research Methodology

This chapter summarizes the research approach used in the study information design, explains how the sample was chosen and who it represents, and explores how the data was collected and analyzed.

3.1 Research Design

A retrospective cohort study design was used for this study. This data is registered for each admission and saved into a computerized system (health information system HIS). The study covered all newborn babies arrived to NICU in CBH for 12 months, from the first of Jan. to the end of Dec. 2021.

A retrospective cohort study is an observational research technique that focuses on people who have experienced the same disease or particular risk factors in common. This type of study analyzes health outcomes across a certain period to make links and assess the risk of a particular outcome associated with a particular exposure (George, 2023).

The study examined descriptive variables based on CBH statistical records, which included; age, sex, gestational age, weight, time of contact, physiological measurements, ABGs result, and blood sugar.

The Transport Risk Index of Physiological Stability Tool (TRIPS) variables were used. This tool contains four measurable scores including; temperature, respiratory work, systolic blood pressure, and response to stimuli, which were conducted immediately after the arrival of the NB and within 30 minutes after.

3.2 Study Setting

The computerized records of newborns for the year 2021 at CBH were purposefully and conveniently accessed for this study.

3.3 Study Population

The sample size was all newborns aged 0-28 days (the estimated sample size was 96 NB patients) transferred to the NICU at Caritas Baby Hospital by grounded ambulance in 2021based on hospital records and data for that year.

3.4 Inclusion & Exclusion Criteria

3.4.1 Inclusion Criteria

All neonates aged 0-28 days were transferred from another health facility by grounded ambulances for the year 2021.

3.4.2 Exclusion Criteria

All neonates admitted to the NICU were not transferred by ambulance (from the outpatient clinic or the CBH ward).

All neonates admitted to the NICU with certain disorders such as; congenital hypertonia, metabolic acidosis, heart diseases, etc…

3.5 Study Period

The study was conducted in 2023 after obtaining the requested approvals following adherence to the proposed sample size and sampling techniques from Caritas Baby Hospital in 2021.

3.6 Sample and Sampling

3.6.1 Sample

The study sample consisted of 96 records for newborn infants admitted in 2021, all aged between 0 and 28 days, who were transferred by ambulance to the Neonatal Intensive Care Unit (NICU) during the specified study period.

3.6.2 Sampling Method

A convenient sampling method was used in this study whichis a form of non-probability sampling approach where data sources, including the initial nurse's notes, will be obtained retrospectively from computerized records for transferred NBs for the year 2021. The convenient sample is a non-probability sampling method; the selection of convenient participants depends on the researcher interest and the participant's willingness to engage in the study (Nikolopoulou, 2023).

Purposive sampling is intentionally selecting participants based on their characteristics, knowledge, experiences, or other criteria. Convenience sampling involves recruiting individuals primarily because they are available, willing, or easy to access or contact practically (https://www.ncsc.org › community-engagement › toolk).

The data collection involved using recorded health information system data complemented by the initial assessment, which provides a comprehensive description of the neonatal condition upon arrival.

This sample size and criteria was selected based on the research objectives, available resources, and the need for a manageable sample that provides meaningful

insights into the impact of ambulance transfers on newborn infants within the specified age range.

3.7 Study Tool

The Transport Risk Index of Physiologic Stability (TRIPS), as shown in figure (1), is utilized to achieve the goals and objectives of this study. Kulkarni et al. (2019) described the tool to be a practical and empirically weighted system designed to assess neonatal transport outcomes based on physiological parameters, it includes four components: temperature, blood pressure, respiratory status, and response to stimuli (Kulkarni et al., 2019).The TRIPS score is determined using a defined checklist. Healthcare providers systematically record these physiological indicators.

This tool stems from a thorough evaluation of specific physiological parameters, which encompass the infant's temperature, categorized into three levels (0, 8, and 14), blood pressure, with corresponding values of (0, 16, and 26), respiratory status, assigned scores of (0. 5, and 14) and their responsiveness to stimuli, featuring values of (0, 6, and 17). It is important to highlight that the highest cumulative point total among these parameters signifies the utmost risk for mortality (Luna-Hernández et al., 2015).

Undoubtedly, the significance of the highest point total is pivotal in assessing the risk for mortality. For instance, fluctuations in body temperature, particularly among prematurely born infants, can lead to life-threatening complications. Similarly, any disturbances in blood pressure can result in inadequate blood circulation to vital organs, substantially elevating the mortality risk. Impaired respiratory status is especially precarious, particularly for neonates affected by conditions like respiratory distress

syndrome. Finally, the infant's response to noxious stimuli serves as a pivotal marker of their neurological function and overall health, with any deficits indicating the presence of severe issues that necessitate immediate intervention. In essence, TRIPS stands as a valuable instrument, equipping healthcare providers with the means to make well-timed and informed decisions during neonatal transport, with direct implications for the welfare and survival of these fragile infants (Kulkarni et al., 2019).

Furthermore, to ensure a comprehensive evaluation of the transported newborns and enhance the precision of risk assessment, two critical clinical measurements were incorporated to further understand the neonatal well-being upon arrival to NICU: first blood sugar reading and first blood gases. These two essential parameters provided valuable insights into metabolic and respiratory status and further strengthening of the neonatal assessment. By integrating the TRIPS score with these 2 key clinical measurements, the study aimed to provide a thorough evaluation of the clinical signs and risks associated with newborn transportation, contributing to the improvement of safety and care protocols for this vulnerable patient population

TRIPS Variable	TRIPS Score Points
Temperature (°C)	
<36.1 or >37.6	8
36.1–36.5 or 37.2–37.6	1
36.6–37.1	0
Respiratory status	
Severe (apnea, gasping, intubated)	14
Moderate (respiratory rate >60/min and/or pulse oximetry <85)	5
None (respiratory rate <60/min and pulse oximetry >85)	0
Systolic blood pressure	
<20	26
20–40	16
>40	0
Response to noxious stimuli	
None, seizure, muscle relaxant	17
Lethargic response, no cry	6
Withdraws vigorously, cries	0

Figure (1): The Transport Risk Index of Physiologic Stability (TRIPS)

(Dağsuyu et al., 2016)

Validity and Reliability of the Tool

Validity of the tool

The TRIPS score is a valid predictor of early neonatal mortality, with a component correlating with early neonatal death. Therefore, enhancing the physiological stability of newborns before, during, and after transfer is crucial to reducing neonatal mortality (Lee et al., 2012) (Shah, M, & S, 2020).

Reliability of the Study Tool

The reliability of the study tool, the Transport Risk Index of Physiologic Stability (TRIPS), was crucial for consistent and accurate assessment of neonatal well-being during inter-facility transport. The TRIPS score demonstrated strong reliability and was widely accepted in neonatal healthcare.

The Cronbach–alpha value of 0.77 has been reported for TRIPS tool, indicating good internal consistency and reliability (Forero, 2023; Statology, 2021).This strong reliability measure enhance the credibility of the TRIPS score as an efficient tool for neonatal risk assessment

Furthermore, the comprehensive nature of the TRIPS score, which evaluates specific physiological indicators such astemperature, bloodpressure, respiratory status, and responsiveness to stimuli, contributes to its reliability. By encompassing multiple facets of neonatal physiology, the TRIPS score provides a holistic assessment that enhances its reliability in identifying infants at heightened risk during transport.

Incorporating the TRIPS score into the study methodology ensures that assessment of neonatal well-being is grounded in a validated and reliable tool, thereby bolstering the credibility and rigor of the research findings. Additionally, the integration of critical clinical measurements such as initial blood sugar readings and blood gases further strengthens the reliability of the risk assessment, offering a comprehensive evaluation of neonatal health status upon arrival at the Neonatal Intensive Care Unit (NICU).

3.8 Data Collection

Data collection of pertinent information regarding transporting newborn infants to the Neonatal Intensive Care Unit (NICU) at Caritas Children's Hospital. The collection process adhered to established protocols and procedures to ensure the accuracy, reliability, and integrity of the data obtained.

The primary data sources for this study included recorded health information system (HIS) data. These sources provided comprehensive documentation of neonatal conditions upon arrival at the NICU. They are essential for conducting a thorough analysis of the impact of ambulance transfers on newborn health outcomes.

Utilizing a retrospective cohort study design, data was collected for all newborn infants admitted to the NICU at Caritas Children's Hospital over a 12-months period, specifically from January to December 2021. The study population consisted of newborns aged 0 to 28 days who were transferred to the NICU by ground ambulance during the specified study period.

A convenient sampling method was employed to select data sources retrospectively from computerized records. This approach allowed for the intentional selection of participants based on predefined criteria, ensuring that the sample is representative of newborns transported to the NICU by ambulance in 2021.

Inclusion criteria for data collection had encompassed essential clinical metrics such as physiological measurements, initial blood sugar readings, and blood gas measurements. These criteria are critical for assessing neonatal well-being and evaluating the impact of ambulance transfers on health outcomes.

Data collection was conducted in compliance with ethical standards and regulatory requirements, with strict adherence to patient confidentiality and privacy protocols. Researchers involved in data collection received appropriate training and supervision to maintain consistency and accuracy throughout the process.

Overall, the data collection phase of this study involved a comprehensive and systematic approach to gather information essential for evaluating the consequences of transferring newborn babies in grounded ambulances on neonatal mortality and morbidity within the NICU at Caritas Children's Hospital.

3.9 Data Entry and Analysis

Upon collection, the gathered data was meticulously entered into secure spreadsheet software. Once the data entry phase was completed, quality checks were conducted to identify any discrepancies, outliers, or missing values. Data cleaning techniques were employed to rectify errors and enhance the integrity of the dataset, thereby preparing if for analysis

The analysis of collected data was guided by the research questions and objectives outlined in the study. Descriptive statistics, such as means, standard deviations, frequencies, and percentages was utilized to summarize the characteristics of the study population and key variables of interest.

Inferential statistical techniques, including correlation analysis and regression modeling, were employed to explore relationships between variables and assess the impact of ambulance equipment levels on neonatal outcomes. The Statistical Package for Social

Science (SPSS version 23) was utilized to conduct the analysis, ensuring robustness and efficiency in data processing.

The findings of the data analysis were interpreted in the context of existing literature and theoretical frameworks, providing insights into the consequences of transferring newborn babies in grounded ambulances on neonatal mortality and morbidity within the NICU at Caritas Children's Hospital. The implications of the findings for clinical practice, policy development, and future research will be discussed comprehensively.

Overall, this study's data entry and analysis phase has been adhered to rigorous standards and methodologies to derive valid and reliable conclusions that contributed to the advancement of knowledge in neonatal healthcare and transportation.

3.10 Ethical Consideration

Ethical considerations are paramount in conducting research involving human participants, ensuring that the rights, safety, and well-being of individuals are protected throughout the study process (Arifin, 2018). This study adhered to ethical principles and guidelines established by relevant regulatory bodies and institutional review boards to safeguard the dignity and rights of participants. The AAUP Institutional Review Board (IRB) Approval was obtained for commencing the study. Ethical approval was obtained from the CBH research committee to access the HIS to collect the Neonatal data for the year 2021.

Chapter Four

Results

4.1Introduction

This chapter presents the results obtained from the analysis of data collected in the study "The Consequences of Transferring Newborn Babies in Grounded Ambulances and Their Impact on Neonatal Mortality and Morbidity". The numerical results will be presented in graphs and tables alongside narratives that explain these results.

4.2 Analysis of Demographic Characteristics

The initial tables provide a breakdown of the study population's key demographic and clinical characteristics, focusing on blood sugar results.

Table 1: Study Population's Key Demographic and Clinical Characteristics

Category	Subcategory	Frequency	Percent
Gender	male	60	62
	female	36	37.5
Weight	1500 and less	18	18.8
	1501-2200	33	34.4
	More than 2200	45	46.9
Gestational age	Extremely preterm(28 wks and less)	6	6.3
	Very preterm (29-32 wks)	18	18.8
	Late premature (32.1-37.6	43	44.8
	Term=38 wks. and more	29	30.2

Gender Distribution

The neonate's gender distribution (table 1) shows a higher proportion of males (62.5%) compared to females (37.5%), enabling gender-based comparisons in subsequent analyses.

NBs Weight

Most newborns (46.9%) weighed more than 2200 grams, followed by 34.4% weighed 1501 to 2200 grams and 18.8% weighed 1500 grams or less. Understanding weight distribution is crucial for assessing neonatal health status and potential risk factors.

Gestational Age (GA)

The gestational age distribution reveals that the most significant proportion of newborns (44.8%) was "Late Premature", followed by (30.2%) was “Full Term", (18.8%), "Very Premature" and "Extremely Preterm" (6.3%). Gestational age is a critical determinant of neonatal health outcomes and will be further explored in subsequent analyses.

NB Diagnoses and Arterial Blood Gases (ABGs) findings

Regarding ABGs findings, the majority of newborns (34.9%) had combined respiratory alkalosis and metabolic acidosis, followed by metabolic alkalosis (23.3%), respiratory acidosis (22.1%), and normal ABGs findings were only (12.8%). Understanding the distribution of diagnoses provides insights into the prevalence of specific health conditions among transferred neonates that could be related to the inefficient use of oxygen supply which has been reported in previous studies on the conditions of the transferring ambulances.

Table 2: Frequency Table for ABGs Findings Distribution

		Frequency	Percent
Valid	Respiratory acidosis	19	19.8
	Metabolic acidosis	20	20.8
	Respiratory alkalosis	4	4.2
	Normal	11	11.5
	Combined (Respiratory Alkalosis +Metabolic acidosis)	30	31.3
	Combined (Respiratory acidosis+ Metabolic alkalosis)	2	2.1
	Total	86	89.6
Missing	System	10	10.4
Total		96	100.0

Blood Sugar Levels

Analysis of blood sugar levels (table 3), indicated that 64.6% of newborns had normal blood sugar levels, while 26.0% exhibited hyperglycemia and 9.4% experienced hypoglycemia. These findings indicated blood sugar abnormalities among one-third of transferred neonates providing a valuable insight into the clinical characteristics of the study population, and laying the foundation for further exploration of the relationship between ambulance transport and neonatal health outcomes

Table 3: Frequency Table for Blood Sugar Levels

		Frequency	Percent
Valid	Normal	62	64.6
	Hypoglycemia	9	9.4
	Hyperglycemia	25	26.0
	Total	96	100.0

4.3 Analysis of TRIPS Score Results

The TRIPS (the physiological conditions of newborns upon arrival at the NICU) scores provide valuable insights into the physiological stability of newborns during transport to the Neonatal Intensive Care Unit (NICU). Table (4) reflects the breakdown and interpretation of the TRIPS score results for all neonates under study categorizing them into low, moderate, and high score levels. It is essential to understand the classification of the TRIPS score which categorizes the risk levels as follows: Low Risk: (0-6), Moderate Risk: (7-15), and High Risk: (16 points and above), which is used to predict neonatal mortality. This rigorous analysis aims to construct a comprehensive assessment of the infant's condition during transport.

Table 4: Frequency Table for TRIPS Score Results

Category	Frequency	Percent
Low (0-6)	43	44.8%
Moderate(7-15)	29	30.2%
High≥16	24	25%
Total	96	100.0%

Distribution of TRIPS Scores: The table displays a varied distribution of TRIPS scores among the study population, ranging from zero to 48. This wide range reflects the diverse physiological conditions of newborns upon arrival at the NICU.A significant number of newborns, 43 out of 96 (44.8%), had a low TRIPS score (0-6), indicating no or low risk for physiological instability and a relatively stable condition during transport.in contrast, 29 out of 96 (30.2%) had moderate TRIPS scores (7-15), suggesting a heightened risk level requiring careful monitoring and prompt medical intervention. Notably, 24 out of 96 (25%) had a high TRIPS score (more than 16), indicating serious physiological instability,

necessitating immediate intervention and specialized care upon NICU arrival. Clinically, TRIPS scores are a valuable tool for health care providers to identify neonates at increased risk of adverse outcome during transport.

Overall, the analysis of TRIPS score results provided valuable insights into the physiological status of newborns during transport to the NICU, informing clinical practice and enhancing the quality of neonatal care.

4.4 Analysis of TRIPS Score by Gestational Age (GA) Results

The cross-tabulation of TRIPS score by gestational age (GA) provides insights into the association between physiological stability during neonatal transport and gestational age categories as indicated in Table (5):

Table 5: TRIPS Score by Gestational Age Results

			GA Code				Total	χ^2	p-value
			Extremely preterm (28 and less)	Very premature = 29 - 32	Late Premature = 32.1 - 37.6	Term = 38 and more			
TRIPS Score	0.00	Count	0	2	4	5	11	71.962	0.028
		% of Total	0.0%	2.1%	4.2%	5.2%	11.5%		
	1.00	Count	0	2	3	2	7		
		% of Total	0.0%	2.1%	3.1%	2.1%	7.3%		
	5.00	Count	0	3	6	10	19		
		% of Total	0.0%	3.1%	6.3%	10.4%	19.8%		
	6.00	Count	1	1	2	2	6		
		% of Total	1.0%	1.0%	2.1%	2.1%	6.3%		
	7.00	Count	0	0	1	2	3		
		% of Total	0.0%	0.0%	1.0%	2.1%	3.1%		
	8.00	Count	0	0	1	1	2		

		% of Total	0.0%	0.0%	1.0%	1.0%	2.1%		
	11.00	Count	0	0	12	2	14		
		% of Total	0.0%	0.0%	12.5%	2.1%	14.6%		
	12.00	Count	0	1	6	2	9		
		% of Total	0.0%	1.0%	6.3%	2.1%	9.4%		
	13.00	Count	0	0	1	0	1		
		% of Total	0.0%	0.0%	1.0%	0.0%	1.0%		
	19.00	Count	1	1	1	1	4		
		% of Total	1.0%	1.0%	1.0%	1.0%	4.2%		
	21.00	Count	1	0	0	0	1		
		% of Total	1.0%	0.0%	0.0%	0.0%	1.0%		
	22.00	Count	0	0	1	0	1		
		% of Total	0.0%	0.0%	1.0%	0.0%	1.0%		
	23.00	Count	0	0	1	0	1		
		% of Total	0.0%	0.0%	1.0%	0.0%	1.0%		
	28.00	Count	0	0	1	0	1		
		% of Total	0.0%	0.0%	1.0%	0.0%	1.0%		
	31.00	Count	1	3	1	1	6		
		% of Total	1.0%	3.1%	1.0%	1.0%	6.3%		
	32.00	Count	2	2	2	1	7		
		% of Total	2.1%	2.1%	2.1%	1.0%	7.3%		
	39.00	Count	0	2	0	0	2		
		% of Total	0.0%	2.1%	0.0%	0.0%	2.1%		
	48.00	Count	0	1	0	0	1		
		% of Total	0.0%	1.0%	0.0%	0.0%	1.0%		
Total		Count	6	18	43	29	96		
		% of Total	6.3%	18.8%	44.8%	30.2%	100.0%		

Distribution of TRIPS Scores across Gestational Age Categories:

The analysis of TRIPS scores by GA categories underscores the importance of considering GA when assessing physiological stability during neonatal transport. For extremely preterm neonates (28 weeks and less) only 1 out of 6 had a low score, while 5 of 6 (5.2%) had higher TRIPPS scores reflecting severe instability and the need for intensive care. Very premature infants (29-32 wks.) showed mixed stability with out of 18 (8.3%) having low scores, 1(1%) having a moderate score and 9 (9.4 newborns in this category had a low TRIPS score, indicating significant risk for physiological instability during transport. Late premature infants (32.1-37.6 weeks) demonstrated an increased prevalence of low (15.6%) and high (21.9%) scores, highlighting ongoing risk and term infants more than 38 weeks. Had the highest proportion of low scores (19.8%), reflecting better stability, but also notable instances of moderate (11.5%) scores requiring attention. The Chi-Square test indicates a statistically significant association between TRIPS scores and gestational age (p-value=0.028), suggesting gestational age influences physiological stability during transport. Understanding this association informs clinical decision-making and optimizes care protocols for newborns across different GA categories.

4.5 Analysis of TRIPS Score by Weight Recode Results

Cross-tabulating TRIPS score by weight recode provides insights into the association between physiological stability during neonatal transport and newborns' weight categories.

Table 6: TRIPS Score by Weight Recode Results

			Weight Recode			Total	χ^2	p-value
			1500 and less	1501 - 2200	more than 2200		53.388	0.018
TRIPS Score	0.00	Count	0	4	7	11		
		% of Total	0.0%	4.2%	7.3%	11.5%		
	1.00	Count	2	1	4	7		
		% of Total	2.1%	1.0%	4.2%	7.3%		
	5.00	Count	0	8	11	19		
		% of Total	0.0%	8.3%	11.5%	19.8%		
	6.00	Count	1	2	3	6		
		% of Total	1.0%	2.1%	3.1%	6.3%		
	7.00	Count	0	0	3	3		
		% of Total	0.0%	0.0%	3.1%	3.1%		
	8.00	Count	0	1	1	2		
		% of Total	0.0%	1.0%	1.0%	2.1%		
	11.00	Count	1	7	6	14		
		% of Total	1.0%	7.3%	6.3%	14.6%		
	12.00	Count	1	2	6	9		
		% of Total	1.0%	2.1%	6.3%	9.4%		
	13.00	Count	0	1	0	1		
		% of Total	0.0%	1.0%	0.0%	1.0%		
	19.00	Count	1	2	1	4		
		% of Total	1.0%	2.1%	1.0%	4.2%		
	21.00	Count	1	0	0	1		
		% of Total	1.0%	0.0%	0.0%	1.0%		
	22.00	Count	0	1	0	1		
		% of Total	0.0%	1.0%	0.0%	1.0%		
	23.00	Count	1	0	0	1		
		% of Total	1.0%	0.0%	0.0%	1.0%		

	28.00	Count	0	1	0	1		
		% of Total	0.0%	1.0%	0.0%	1.0%		
	31.00	Count	4	1	1	6		
		% of Total	4.2%	1.0%	1.0%	6.3%		
	32.00	Count	4	1	2	7		
		% of Total	4.2%	1.0%	2.1%	7.3%		
	39.00	Count	1	1	0	2		
		% of Total	1.0%	1.0%	0.0%	2.1%		
	48.00	Count	1	0	0	1		
		% of Total	1.0%	0.0%	0.0%	1.0%		
Total		**Count**	**18**	**33**	**45**	**96**		
		% of Total	**18.8%**	**34.4%**	**46.9%**	**100.0%**		

Distribution of TRIPS Scores across Weight Categories:

The distribution of TRIPS scores across weight categories highlights the impact of weight on physiological stability during neonatal transport. Among newborns **weighing 1500 grams or less**, no newborns had low TRIPS scores (0-6), indicating a higher risk for physiological instability. In contrast, 6 out of 18 (6.3%) in this category had moderate TRIPS scores (7-15), suggesting a heightened risk level requiring careful monitoring and prompt medical intervention, while 12 out of 18 (12.5%) had high TRIPS scores (≥16), indicating serious physiological instability. For newborns weighing **1501-2200 grams**, 5 out of 33 (5.2%) had low TRIPS scores,10 out of 33 (10.4%) had moderate scores, and 18 out of 33(18,8%) had high scores. among newborns weighing **more than 2200 grams**, 9 out of 45 (9.4%) had low TRIPS scores,16 out of 45 (16.7%) had moderate scores, and 20

out of 45 (20.8%) had higher scores highlighting ongoing risks of instability even higher weight categories

Significance: The Chi-Square tests reveal a statistically significant association between TRIPS score and weight recode categories ($p = 0.018$). This finding suggests that newborns' weight may influence physiological stability during neonatal transport, with different weight categories exhibiting varying distributions of TRIPS scores.

Interpretation: The association between TRIPS score and weight categories underscores the importance of considering newborns' weight when assessing physiological stability during neonatal transport. Low birth weight newborns may have different transport-related challenges compared to those with higher birth weights, necessitating tailored care protocols and interventions.

The prevalence of moderate to high TRIPS scores across different weight categories highlights the variability in physiological stability among newborns during transport. Healthcare providers should consider these differences when planning and executing neonatal transport procedures to optimize outcomes and minimize risks.

Overall, the analysis of TRIPS scores by weight recode provides valuable insights into the relationship between newborns' weight and physiological stability during neonatal transport, informing clinical practice and enhancing the quality of neonatal care protocols.

4.6 Analysis of TRIPS Score by Gender Results

The cross-tabulation of TRIPS score by gender provides insights into potential differences in physiological stability during neonatal transport between male and female newborns.

Table 7: TRIPS Score by Gender Results

			Gender		Total	χ^2	p-value
			Male	Female		16.128[a]	0.515
TRIPS Score	0.00	Count	9	2	11		
		% of Total	9.4%	2.1%	11.5%		
	1.00	Count	5	2	7		
		% of Total	5.2%	2.1%	7.3%		
	5.00	Count	12	7	19		
		% of Total	12.5%	7.3%	19.8%		
	6.00	Count	4	2	6		
		% of Total	4.2%	2.1%	6.3%		
	7.00	Count	2	1	3		
		% of Total	2.1%	1.0%	3.1%		
	8.00	Count	0	2	2		
		% of Total	0.0%	2.1%	2.1%		
	11.00	Count	9	5	14		
		% of Total	9.4%	5.2%	14.6%		
	12.00	Count	4	5	9		
		% of Total	4.2%	5.2%	9.4%		
	13.00	Count	1	0	1		
		% of Total	1.0%	0.0%	1.0%		
	19.00	Count	1	3	4		
		% of Total	1.0%	3.1%	4.2%		
	21.00	Count	1	0	1		
		% of Total	1.0%	0.0%	1.0%		
	22.00	Count	0	1	1		
		% of Total	0.0%	1.0%	1.0%		
	23.00	Count	0	1	1		
		% of Total	0.0%	1.0%	1.0%		
	28.00	Count	1	0	1		
		% of Total	1.0%	0.0%	1.0%		
	31.00	Count	5	1	6		
		% of Total	5.2%	1.0%	6.3%		
	32.00	Count	4	3	7		
		% of Total	4.2%	3.1%	7.3%		
	39.00	Count	1	1	2		

		% of Total	1.0%	1.0%	2.1%		
	48.00	Count	1	0	1		
		% of Total	1.0%	0.0%	1.0%		
Total		Count	60	36	96		
		% of Total	62.5%	37.5%	100.0%		

Distribution of TRIPS Scores across Gender:

Male Newborns: Among male newborns, TRIPS scores were distributed across various levels, with the highest frequency observed at 5.00 (12.5%) and 11.00 (9.4%). This group exhibited a diverse distribution of TRIPS scores, indicating variability in physiological stability during transport.

Female Newborns: Similarly, female newborns also displayed a varied distribution of TRIPS scores, with the highest frequency observed at 5.00 (7.3%) and 11.00 (5.2%). Like male newborns, female newborns showed variability in physiological stability during transport.

Significance: The Chi-Square tests indicate that there is no statistically significant association between TRIPS score and gender ($p = 0.515$). This suggests that gender may not be a significant factor influencing physiological stability during neonatal transport, at least within the scope of this study.

Interpretation: The distribution of TRIPS scores among male and female newborns suggests that both genders may experience similar levels of physiological stability during transport to the Neonatal Intensive Care Unit (NICU).

The lack of a significant association between TRIPS score and gender indicates that other factors, such as gestational age, weight, and underlying medical conditions, may have a greater influence on physiological stability during neonatal transport.

Healthcare providers should consider a comprehensive approach to assessing and managing physiological stability during neonatal transport.

4.7 Analysis of arterial blood gases (ABGs) findings by Gestational Age Results

Cross-tabulation for ABGs findings by gestational age (GA) provides insights into the distribution of different diagnoses among newborns across various gestational age categories.

Table 8: ABGs findings by Gestational Age Results

			GA Code				Total		
			Extremely preterm (28 and less)	Very Premature= 29 – 32	Late Premature = 32.1 - 37.6	Term = 38 and more		χ^2	p-value
ABGs findings	Respiratoryacidosis	Count	0	4	7	8	19	12.587	0.634
		% of Total	0.0%	4.7%	8.1%	9.3%	22.1%		
	Metabolic	Count	3	4	10	3	20		
		% of Total	3.5%	4.7%	11.6%	3.5%	23.3%		
	Respiratory Alkalosis	Count	0	2	2	0	4		
		% of Total	0.0%	2.3%	2.3%	0.0%	4.7%		
	Normal	Count	0	2	6	3	11		
		% of Total	0.0%	2.3%	7.0%	3.5%	12.8%		
	Combined (Respiratory alkalosis Metabolic acidosis)	Count	3	5	11	11	30		
		% of Total	3.5%	5.8%	12.8%	12.8%	34.9%		

	Combined (Respiratory Acidosis/Metabolic Alkalosis)	Count	0	0	1	1	2		
		% of Total	0.0%	0.0%	1.2%	1.2%	2.3%		
Total		Count	6	17	37	26	86		
		% of Total	7.0%	19.8%	43.0%	30.2%	100.0%		

Distribution of ABGs findings Across Gestational Age Categories:

Extremely Preterm (28 and Less): Among newborns classified as extremely preterm, the most common diagnoses were metabolic acidosis (4.7%) and combined respiratory alkalosis/metabolic acidosis (3.5%). This group had a relatively lower frequency of diagnoses compared to other gestational age categories, possibly due to their extreme prematurity and associated medical complexities.

Very Premature (29 - 32 weeks): Newborns in the very premature category exhibited a diverse distribution of diagnoses, with metabolic acidosis (4.7%) and combined respiratory alkalosis/metabolic acidosis (5.8%) being the most prevalent. This group had a higher frequency of diagnoses compared to extremely preterm newborns.

Late Premature (32.1 - 37.6 weeks): The late premature category had the highest frequency of diagnoses, with metabolic acidosis (11.6%) and combined respiratory alkalosis/metabolic acidosis (12.8%) being the most common. This group exhibited a higher prevalence of diagnoses compared to other gestational age categories.

Term (38 and more): among the term newborns; metabolic acidosis (3.5%) and combined respiratory alkalosis/metabolic acidosis (12.8%) were the predominant diagnoses. While

the frequency of diagnoses was lower compared to the late premature category, term newborns still exhibited a notable prevalence of medical conditions.

Significance: The Chi-Square tests revealed that there is no statistically significant association between ABGs findings and gestational age categories ($p = 0.634$). This suggests that the distribution of diagnoses does not significantly vary across different gestational age groups within the scope of this study.

Interpretation: The distribution of diagnoses across gestational age categories highlights the complexity of medical conditions among newborns, irrespective of their gestational age at birth. While certain diagnoses may be more prevalent in specific gestational age groups, there is no significant association between ABGs findings and gestational age categories, as indicated by the non-significant Chi-Square test results.

Healthcare providers should consider a comprehensive approach to ABGs findings and managing medical conditions in newborns, taking into account factors beyond gestational age alone, such as clinical presentation, laboratory findings, and response to treatment.

In summary, while there may be differences in the distribution of ABGS findings across gestational age categories, gestational age itself does not appear to be a significant factor influencing the prevalence of specific medical conditions among newborns, as evidenced by the non-significant Chi-Square test results.

4.8 Analysis of ABG Findings by Birth Weight Results

The cross-tabulation of ABGs findings by birth weight provides insights into the distribution of different diagnoses among newborns across various birth weight categories.

Table 9: ABGs findings by Birth Weight Results

			Weight Recode			Total		
			1500 and less	1501 - 2200	more than 2200		χ^2	p-value
ABGs findings Coding	Respiratory acidosis	Count	0	7	12	19	22.869	0.011
		% of Total	0.0%	8.1%	14.0%	22.1%		
	Metabolic acidosis	Count	7	7	6	20		
		% of Total	8.1%	8.1%	7.0%	23.3%		
	Respiratory Alkalosis	Count	2	2	0	4		
		% of Total	2.3%	2.3%	0.0%	4.7%		
	Normal	Count	0	7	4	11		
		% of Total	0.0%	8.1%	4.7%	12.8%		
	Combined (Respiratory alkalosis +Metabolic Acidosis)	Count	9	6	15	30		
		% of Total	10.5%	7.0%	17.4%	34.9%		
	Combined (Respiratory acidosis + Metabolic alkalosis)	Count	0	0	2	2		
		% of Total	0.0%	0.0%	2.3%	2.3%		
Total		Count	18	29	39	86		
		% of Total	20.9%	33.7%	45.3%	100.0%		

Distribution of ABGs findings Across Birth Weight Categories:

- **1500 and Less Grams:** Among newborns with a birth weight of 1500 grams or less, metabolic acidosis (8.1%) and combined respiratory alkalosis/metabolic acidosis (10.5%) were the most prevalent diagnoses. This group had a relatively higher frequency of related medical conditions compared to other birth weight categories, possibly due to the medical complexities associated with low birth weight.

- **1501 - 2200 Grams:** Newborns in the 1501 - 2200 grams birth weight category exhibited a diverse distribution of diagnoses, with combined respiratory alkalosis/metabolic acidosis (7.0%) and metabolic acidosis (8.1%) being the most common. This group had a moderate frequency of medical conditions related to ABGs findings across various conditions.
- **More Than 2200 Grams:** The birth weight category of more than 2200 grams had the highest frequency of diagnoses, with combined respiratory alkalosis/metabolic acidosis (17.4%) and metabolic acidosis (7.0%) being the predominant diagnoses. This group exhibited a higher prevalence of medical conditions related to ABGs findings compared to other birth weight categories.

Significance: The Chi-Square tests reveal that there is a statistically significant association between ABGs findings and birth weight categories ($p = 0.011$). This suggests that the distribution of diagnoses significantly varies across different birth weight groups within the scope of this study.

Interpretation: The distribution of diagnoses across birth weight categories highlights the impact of birth weight on the prevalence of specific medical conditions among newborns. Newborns with lower birth weights, such as those in the 1500 grams or less category, tend to have a higher frequency of diagnoses, reflecting the increased medical complexity associated with low birth weight. The significant association between ABGs findings and birth weight categories underscores the importance of considering birth weight as a factor in diagnosing and managing medical conditions in newborns.

In summary, birth weight appears to be a significant factor influencing the distribution of diagnoses among newborns, as evidenced by the statistically significant association revealed by the Chi-Square tests. Healthcare providers should take into account both birth weight and specific medical conditions when assessing and managing the health of newborns.

4.9 Analysis of TRIPS Score by ABGs Findings Results

The cross-tabulation of TRIPS scores by ABGs findings provides insights into the distribution of TRIPS scores across different ABGs findings categories.

Table 10: TRIPS Score by ABGs Findings Results

			ABGs findings						**Total**		
			Respiratory acidosis	**Metabolic acidosis**	**Respiratory Alkalosis**	**Normal**	**Combined (Respiratory alkalosis +Metabolic acidosis)**	**Combined (Respiratory acidosis + Metabolic Alkalosis)**		**χ^2**	**p-value**
TRIPS Score	0.00	Count	1	1	0	0	8	0	10	61.334[a]	0.940
		% of Total	1.2%	1.2%	0.0%	0.0%	9.3%	0.0%	11.6%		
	1.00	Count	2	1	0	1	2	0	6		
		% of Total	2.3%	1.2%	0.0%	1.2%	2.3%	0.0%	7.0%		
	5.00	Count	2	2	0	4	5	1	14		
		% of Total	2.3%	2.3%	0.0%	4.7%	5.8%	1.2%	16.3%		
	6.00	Count	1	3	1	1	0	0	6		
		% of Total	1.2%	3.5%	1.2%	1.2%	0.0%	0.0%	7.0%		
	7.00	Count	2	1	0	0	0	0	3		
		% of Total	2.3%	1.2%	0.0%	0.0%	0.0%	0.0%	3.5%		
	8.00	Count	0	0	0	1	1	0	2		
		% of Total	0.0%	0.0%	0.0%	1.2%	1.2%	0.0%	2.3%		
	11.00	Count	3	2	1	2	3	1	12		
		% of Total	3.5%	2.3%	1.2%	2.3%	3.5%	1.2%	14.0%		

	12.00	Count	3	2	0	1	3	0	9		
		% of Total	3.5%	2.3%	0.0%	1.2%	3.5%	0.0%	10.5%		
	13.00	Count	1	0	0	0	0	0	1		
		% of Total	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%		
	19.00	Count	2	1	0	0	1	0	4		
		% of Total	2.3%	1.2%	0.0%	0.0%	1.2%	0.0%	4.7%		
	21.00	Count	0	0	0	0	1	0	1		
		% of Total	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	1.2%		
	23.00	Count	0	1	0	0	0	0	1		
		% of Total	0.0%	1.2%	0.0%	0.0%	0.0%	0.0%	1.2%		
	28.00	Count	0	1	0	0	0	0	1		
		% of Total	0.0%	1.2%	0.0%	0.0%	0.0%	0.0%	1.2%		
	31.00	Count	1	1	1	0	3	0	6		
		% of Total	1.2%	1.2%	1.2%	0.0%	3.5%	0.0%	7.0%		
	32.00	Count	1	3	1	0	2	0	7		
		% of Total	1.2%	3.5%	1.2%	0.0%	2.3%	0.0%	8.1%		
	39.00	Count	0	1	0	1	0	0	2		
		% of Total	0.0%	1.2%	0.0%	1.2%	0.0%	0.0%	2.3%		
	48.00	Count	0	0	0	0	1	0	1		
		% of Total	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	1.2%		
Total		**Count**	**19**	**20**	**4**	**11**	**30**	**2**	**86**		
		% of Total	**22.1%**	**23.3%**	**4.7%**	**12.8%**	**34.9%**	**2.3%**	**100.0%**		

Distribution of TRIPS Scores Across ABGs findings Categories:

- **Respiratory Acidosis:** TRIPS scores are distributed across various levels, with the highest frequency observed at TRIPS score 5 (3.5%) and TRIPS score 11 (3.5%). Overall, this indicates that respiratory acidosis is spread across low and moderate risk of physiological instability during transport.

- **Metabolic Acidosis:** Similar to respiratory acidosis, metabolic acidosis exhibits a varied distribution of TRIPS scores. The most frequent scores among newborns diagnosed with metabolic acidosis are 11 (2.3%) and 5 (2.3%).
- **Respiratory Alkalosis:** TRIPS scores for respiratory alkalosis are relatively lower, with TRIPS scores of 5 (1.2%) being the most common. However, the sample size for these ABGs findings is small.
- **Normal:** Newborns with normal ABGs findings show a diverse distribution of TRIPS scores, with a TRIPS score of 5 (4.7%) being the most frequent, followed by a TRIPS score 11 (2.3%).
- **Combined Respiratory Alkalosis and Metabolic Acidosis:** This ABGs findings category has a broader distribution of TRIPS scores, with TRIPS score of 5 (5.8%) and TRIPS score of 11 (3.5%) being the most prevalent.

  Non-Significance: The Chi-Square tests indicate that there is no statistically significant association between TRIPS scores and ABGs findings ($p = 0.940$). This suggests that the distribution of TRIPS scores does not significantly vary across different ABGs findings categories within the scope of this study.

  Interpretation: The distribution of TRIPS scores across different ABGs findings categories highlights the variability in illness severity among newborns with different medical conditions.

While certain TRIPS scores may be more common within specific ABGs findings categories, the overall distribution of TRIPS scores does not significantly differ across ABGs findings codes.

The lack of significance in the Chi-Square tests suggests that TRIPS scores are not strongly associated with specific diagnoses among the study population.

In summary, TRIPS scores exhibit a varied distribution across different ABGs findings categories, reflecting the diverse illness severity among newborns. However, the lack of a significant association between TRIPS scores and ABGs findings suggests that TRIPS scores alone may not be indicative of specific medical conditions among newborns in this study.

4.10 Analysis of TRIPS Score by Blood Sugar Level Results

The cross-tabulation of TRIPS score by Blood Sugar Level provides insights into the distribution of TRIPS scores across different blood sugar categories.

Table 11: TRIPS Score by Blood Sugar Level Results

			Blood Sugar Code			Total		
			Normal	Hypoglycemia	Hyperglycemia		χ^2	p-value
TRIPS Score	0.00	Count	8	1	2	11	38.698[a]	0.266
		% of Total	8.3%	1.0%	2.1%	11.5%		
	1.00	Count	5	1	1	7		
		% of Total	5.2%	1.0%	1.0%	7.3%		
	5.00	Count	15	2	2	19		
		% of Total	15.6%	2.1%	2.1%	19.8%		
	6.00	Count	3	0	3	6		
		% of	3.1%	0.0%	3.1%	6.3%		

		Total						
	7.00	Count	1	0	2	3		
		% of Total	1.0%	0.0%	2.1%	3.1%		
	8.00	Count	2	0	0	2		
		% of Total	2.1%	0.0%	0.0%	2.1%		
	11.00	Count	12	0	2	14		
		% of Total	12.5%	0.0%	2.1%	14.6%		
	12.00	Count	3	3	3	9		
		% of Total	3.1%	3.1%	3.1%	9.4%		
	13.00	Count	1	0	0	1		
		% of Total	1.0%	0.0%	0.0%	1.0%		
	19.00	Count	0	1	3	4		
		% of Total	0.0%	1.0%	3.1%	4.2%		
	21.00	Count	1	0	0	1		
		% of Total	1.0%	0.0%	0.0%	1.0%		
	22.00	Count	0	0	1	1		
		% of Total	0.0%	0.0%	1.0%	1.0%		
	23.00	Count	0	0	1	1		
		% of Total	0.0%	0.0%	1.0%	1.0%		
	28.00	Count	1	0	0	1		
		% of Total	1.0%	0.0%	0.0%	1.0%		
	31.00	Count	4	1	1	6		
		% of Total	4.2%	1.0%	1.0%	6.3%		
	32.00	Count	5	0	2	7		
		% of Total	5.2%	0.0%	2.1%	7.3%		
	39.00	Count	1	0	1	2		
		% of Total	1.0%	0.0%	1.0%	2.1%		
	48.00	Count	0	0	1	1		
		% of Total	0.0%	0.0%	1.0%	1.0%		

Total	Count	62	9	25	96		
	% of Total	64.6%	9.4%	26.0%	100.0 %		

Distribution of TRIPS Scores across Blood Sugar Levels:

- **Normal Blood Sugar:** The majority of TRIPS scores are associated with normal blood sugar levels, with 64.6% of newborns having normal blood sugar levels across various TRIPS scores.
- **Hypoglycemia:** Hypoglycemia observed in 9.4% of cases, with TRIPS scores ranging across different levels. However, the frequency of hypoglycemia decreases as TRIPS scores increase.
- **Hyperglycemia:** About 26.0% of newborns exhibit hyperglycemia across different TRIPS scores. The prevalence of hyperglycemia tends to increase with higher TRIPS scores, although it is not as common as normal blood sugar levels.

Non-Significance: The Chi-Square tests indicate that there is no statistically significant association between TRIPS scores and blood sugar levels ($p = 0.266$). This suggests that the distribution of TRIPS scores does not significantly vary across different blood sugar level categories within the scope of this study.

Interpretation: The majority of newborns in the study population have normal blood sugar levels across various TRIPS scores, indicating an overall metabolic stability. Hypoglycemia and hyperglycemia were observed in a smaller proportion of cases, with varying frequencies across different TRIPS scores. However, these deviations from normal blood sugar levels do not significantly influence the distribution of TRIPS scores.

The non-significant result of the Chi-Square tests suggests that TRIPS scores are not strongly associated with specific blood sugar levels in this study population.

In summary, while there are variations in the prevalence of hypoglycemia and hyperglycemia across different TRIPS scores, the majority of newborns in the study exhibit normal blood sugar levels. Additionally, the lack of a significant association between TRIPS scores and blood sugar levels suggests that TRIPS scores alone may not be indicative of specific blood sugar abnormalities among newborns in this study.

4.11 Analysis of ABGs Findings by Gender Results

The cross-tabulation of ABGs findings by Gender provides insights into the distribution of diagnoses among males and females.

Table 12: ABG Findings by Gender Results

			Gender		Total		
			Male	Female		χ^2	p-value
ABGs findings	Respiratory acidosis	Count	14	5	19	3.552[a]	0.616
		% of Total	16.3%	5.8%	22.1%		
	Metabolic acidosis	Count	11	9	20		
		% of Total	12.8%	10.5%	23.3%		
	Respiratory Alkalosis	Count	2	2	4		
		% of Total	2.3%	2.3%	4.7%		
	Normal	Count	6	5	11		
		% of Total	7.0%	5.8%	12.8%		
	Combined (Respiratory alkalosis	Count	22	8	30		
		% of Total	25.6%	9.3%	34.9%		

	+Metabolic acidosis)						
	Combined (Respiratory Acidosis+ Metabolic Alkalosis)	Count	1	1	2		
		% of Total	1.2%	1.2%	2.3%		
Total		Count	56	30	86		
		% of Total	65.1%	34.9%	100.0%		

Distribution of Diagnoses across Genders:

- **Respiratory Acidosis:** Among males, 16.3% diagnosed with respiratory acidosis, compared to 5.8% of females.
- **Metabolic acidosis:** Metabolic acidosis observed in 12.8% of males and 10.5% of females.
- **Respiratory Alkalosis:** Both genders have a similar prevalence of respiratory alkalosis, each accounting for about 2.3% of the total.
- **Normal ABGs findings:** The distribution of normal diagnoses is slightly higher in males (7.0%) compared to females (5.8%).
- **Combined Diagnoses:** Combined diagnoses of respiratory alkalosis and metabolic acidosis (Respiratory Alkalosis + Metabolic Acidosis) are more prevalent in males (25.6%) compared to females (9.3%).

Non-Significance: The Chi-Square tests indicate that there is no statistically significant association between ABGs findings and gender ($p = 0.616$). This suggests that the distribution of diagnoses does not significantly vary between males and females within the scope of this study.

Interpretation: Respiratory acidosis and metabolic acidosis are the most common diagnoses among both males and females, although there are slight differences in prevalence.

The prevalence of combined diagnoses, particularly respiratory alkalosis and metabolic acidosis, is notably higher among males compared to females. Despite these differences, the lack of a significant association between ABGs findings and gender suggests that gender alone may not be a strong predictor of specific diagnoses in this study population.

In summary, while there are variations in the distribution of specific diagnoses between males and females, the overall distribution of diagnoses does not significantly differ by gender within the context of this study.

4.12 Analysis of ABGs findings by Blood Sugar Levels Results

The cross-tabulation of ABGs findings by Blood Sugar Levels provides insights into the distribution of diagnoses across different blood sugar categories.

Table 13: ABGs findings by Blood Sugar Levels Results

			Blood Sugar Code					
			Normal	Hypoglycemia	Hyperglycemia		χ^2	p-value
ABGs findings	Respiratory acidosis	Count	9	3	7	19	9.153[a]	0.518
		% of Total	10.5%	3.5%	8.1%	22.1%		
	Metabolic acidosis	Count	10	3	7	20		
		% of Total	11.6%	3.5%	8.1%	23.3%		
	Respiratory Alkalosis	Count	4	0	0	4		
		% of Total	4.7%	0.0%	0.0%	4.7%		
	Normal	Count	8	0	3	11		
		% of Total	9.3%	0.0%	3.5%	12.8%		
	Combined (Respiratory alkalosis +Metabolic	Count	21	2	7	30		
		% of Total	24.4%	2.3%	8.1%	34.9%		

	Acidosis)							
	Combined (Respiratory acidosis+ Metabolic alkalosis)	Count	2	0	0	2		
		% of Total	2.3%	0.0%	0.0%	2.3%		
Total		Count	54	8	24	86		
		% of Total	62.8%	9.3%	27.9%	100.0%		

Distribution of Diagnoses across Blood Sugar Levels:

- **Respiratory Acidosis:** Among individuals diagnosed with respiratory acidosis, the majority have normal blood sugar levels (10.5%), followed by hyperglycemia (8.1%). Hypoglycemia is less common in this group (3.5%).
- **Metabolic acidosis:** Similar to respiratory acidosis, individuals with metabolic acidosis also predominantly have normal blood sugar levels (11.6%). Hyperglycemia and hypoglycemia are equally less common (8.1% each).
- **Respiratory Alkalosis:** The majority of cases of respiratory alkalosis have normal blood sugar levels (4.7%), with no cases of hypoglycemia or hyperglycemia reported in this group.
- **Normal ABGs findings:** patients with normal ABGs findings mostly have normal blood sugar levels (9.3%), with a smaller proportion experiencing hyperglycemia (3.5%) and none experiencing hypoglycemia.
- **Combined Diagnoses:** Cases with combined diagnoses of respiratory alkalosis and metabolic acidosis have a similar distribution of blood sugar levels as observed in the individual ABGs findings groups.

Non-Significance: The Chi-Square tests indicate that there is no statistically significant association between ABGs findings and blood sugar levels ($p = 0.518$). This suggests that

the distribution of diagnoses does not significantly vary across different blood sugar categories within the scope of this study.

Interpretation: Normal blood sugar levels are the most common across all ABGs findings categories, followed by hyperglycemia and then hypoglycemia. Respiratory alkalosis cases are less frequent overall and predominantly have normal blood sugar levels. While there are variations in the distribution of blood sugar levels across different diagnoses, the lack of a significant association suggests that blood sugar levels alone may not be a strong predictor of specific diagnoses in this study population.

In summary, while there are differences in the distribution of blood sugar levels across different diagnoses, the overall distribution of diagnoses does not significantly differ across different blood sugar categories within the context of this study.

4.13 Analysis of Blood Sugar Levels by Gender Results

The cross-tabulation of Blood Sugar Levels by Gender provides insights into the distribution of blood sugar levels among males and females.

Table 14: Blood Sugar Levels by Gender Results

			Gender		Total		
			Male	Female		χ^2	p-value
Blood Sugar Code	Normal	Count	38	24	62	1.002[a]	0.606
		% of Total	39.6%	25.0%	64.6%		
	Hypoglycemia	Count	7	2	9		
		% of Total	7.3%	2.1%	9.4%		
	Hyperglycemia	Count	15	10	25		
		% of Total	15.6%	10.4%	26.0%		
Total		Count	60	36	96		
		% of Total	62.5%	37.5%	100.0%		

Distribution of Blood Sugar Levels by Gender:

- **Normal Blood Sugar Levels:** Among males, 39.6% have normal blood sugar levels, while among females; it is slightly lower at 25.0%.
- **Hypoglycemia:** A small proportion of both males (7.3%) and females (2.1%) exhibit hypoglycemia.
- **Hyperglycemia:** More males (15.6%) than females (10.4%) have hyperglycemia.

Non-Significance: The Chi-Square tests indicate that there is no statistically significant association between blood sugar levels and gender ($p = 0.606$). This suggests that the distribution of blood sugar levels does not significantly differ between males and females within the scope of this study.

Interpretation: While there are slight differences in the distribution of blood sugar levels between males and females, these differences are not statistically significant. Normal blood sugar levels are the most common between both genders, followed by hyperglycemia and then hypoglycemia. This lack of significant association implies that gender alone may not be a strong predictor of blood sugar levels in this study population.

In summary, while there are differences in the distribution of blood sugar levels between males and females, these differences are not statistically significant within the context of this study.

4. 14 Analysis of Blood Sugar Levels by Weight Results

The cross-tabulation of Blood Sugar Levels by Weight provides insights into how blood sugar levels are distributed across different weight categories.

Here's an analysis of the findings:

Table 15: Blood Sugar Levels by Weight Results

			Weight Recode			Total		
			1500 and less	1501 - 2200	more than 2200		χ^2	p-value
Blood Sugar Code	Normal	Count	10	23	29	62	2.848[a]	0.584
		% of Total	10.4%	24.0%	30.2%	64.6%		
	Hypoglycemia	Count	1	4	4	9		
		% of Total	1.0%	4.2%	4.2%	9.4%		
	Hyperglycemia	Count	7	6	12	25		
		% of Total	7.3%	6.3%	12.5%	26.0%		
Total		Count	18	33	45	96		
		% of Total	18.8%	34.4%	46.9%	100.0%		

Distribution of Blood Sugar Levels by Weight:

- **Normal Weight (1500 and less):** About 10.4% of individuals with normal blood sugar levels fall into this weight category.
- **Moderate Weight (1501 - 2200):** The majority of individuals with normal blood sugar levels (24.0%), hypoglycemia (4.2%), and hyperglycemia (6.3%) belong to this weight category.
- **High Weight (more than 2200):** Among individuals with normal blood sugar levels, 30.2% fall into this weight category, while for hypoglycemia and hyperglycemia, the percentages are 4.2% and 12.5%, respectively.

Non-Significance: The Chi-Square tests indicate that there is no statistically significant association between blood sugar levels and weight ($p = 0.584$). This suggests that the

distribution of blood sugar levels does not significantly differ across different weight categories within the scope of this study.

Interpretation: While there are variations in the distribution of blood sugar levels across different weight categories, these differences are not statistically significant. Newborns with normal blood sugar levels are distributed across all weight categories, with a slightly higher proportion in the more than 2200 weight category. This lack of significant association implies that weight alone may not be a strong predictor of blood sugar levels in this study population.

In summary, while there are differences in the distribution of blood sugar levels across different weight categories, these differences are not statistically significant within the context of this study.

4.15 Analysis of Blood Sugar Levels by Gestational Age (GA) Results

The cross-tabulation of Blood Sugar Levels by Gestational Age (table 16) provides insights into how blood sugar levels are distributed across different gestational age categories.

Table 16: Blood Sugar Levels by Gestational Age Results

			GA Code				Total	χ^2	p-value
			Extremely preterm (28 and less)	Very Premature = 29 - 32	Late Premature = 32.1 - 37.6	Term = 38 and more			
Blood Sugar	**Normal**	**Count**	3	10	32	17	62	10.591[a]	0.102
		% of Total	3.1%	10.4%	33.3%	17.7%	64.6%		

Code									
	Hypoglycemia	Count	0	2	6	1	9		
		% of Total	0.0%	2.1%	6.3%	1.0%	9.4%		
	Hyperglycemia	Count	3	6	5	11	25		
		% of Total	3.1%	6.3%	5.2%	11.5%	26.0%		
Total		Count	6	18	43	29	96		
		% of Total	6.3%	18.8%	44.8%	30.2%	100.0%		

Distribution of Blood Sugar Levels by Gestational Age:

- **Extremely Preterm (28 and less):** Only a small percentage of individuals with normal blood sugar levels (3.1%) and hyperglycemia (3.1%) are in this gestational age category. No cases of hypoglycemia are recorded in this group.
- **Very premature (29 - 32):** A substantial proportion of individuals with normal blood sugar levels (10.4%), hypoglycemia (2.1%), and hyperglycemia (6.3%) fall into this gestational age range.
- **Late Premature (32.1 - 37.6):** The majority of cases, across all blood sugar levels, are found in this category. Specifically, 33.3% of normal blood sugar cases, 6.3% of hypoglycemia cases, and 5.2% of hyperglycemia cases are in this group.
- **Term (38 and more):** A significant portion of individuals with hyperglycemia (11.5%) are in this category, along with smaller proportions of individuals with normal blood sugar levels (17.7%) and hypoglycemia (1.0%).

Non-Significance: The Chi-Square tests suggest that there is no statistically significant association between blood sugar levels and gestational age ($p = 0.102$). This implies that the distribution of blood sugar levels does not significantly differ across different gestational age categories within the scope of this study.

Interpretation: While there are variations in the distribution of blood sugar levels across different gestational age categories, these differences are not statistically significant. Gestational age alone may not be a strong predictor of blood sugar levels in this study population.

In summary, although there are differences in the distribution of blood sugar levels across gestational age categories, these differences are not statistically significant within the context of this study.

Chapter Five
Discussion

5.1 Introduction

This chapter summarizes the study's findings regarding the physiological stability of newborns transported to Caritas Baby Hospital's NICU. It compares these findings to the current literature, focusing on TRIPS scores and clinical parameters. The discussion focuses on key associations, implications study limitations, and recommendations for enhancing newborn transport and care.

Discussion of TRIPS Score Results

The TRIPS (Transport Index of Physiological Stability) scores presented in Table 6 offer valuable insights into the physiological stability of newborns during transport to the Neonatal Intensive Care Unit (NICU) at Caritas Children's Hospital in Bethlehem.

Firstly, examining the distribution of TRIPS scores, it was evident that the scores vary widely among the study population, ranging from 0 to 48. This wide range reflects the diverse physiological conditions of newborns upon arrival at the NICU, as noted by Lee et al. (2001), who emphasized the significance of evaluating newborns' physiological stability during transport.

Regarding the prevalence of low TRIPS scores, a considerable portion of newborns had low scores, with 11.5% scoring 0, 7.3% scoring 1, and 6.3% scoring 6. These findings align with previous research by Narang et al. (2013) and Richard Okonkwo et al. (2020), which highlighted the potential hazards and physiological challenges faced by newborns

during transport, including exposure to noise, temperature differences, and physiological changes.

Conversely, there is also a notable prevalence of moderate and high TRIPS scores. For instance, 14.6% scored 11, 9.4% scored 12, and 7.3% scored 32. These findings suggest relatively unstable physiological conditions among a subset of newborns during transport, which resonates with studies by Kulkarni et al. (2019) and Shah et al. (2020), emphasizing the importance of enhancing newborn physiological stability to reduce mortality rates during transport.

The implications of these TRIPS score results for neonatal transport are significant. Moderate and high TRIPS scores indicate the need for immediate intervention and specialized care upon arrival at the NICU, in line with the recommendations of Lee et al. (2012) and Luna-Hernández (2015) regarding the importance of predicting critical neonatal transport outcomes and enhancing newborn physiological stability to reduce mortality rates.

On the other hand, lower TRIPS scores suggest a more favorable prognosis and relatively stable physiological conditions during transport, as suggested by Grass et al. (2020). These scores underscore the importance of assessing and addressing newborns' physiological stability during transport to optimize neonatal outcomes, consistent with the findings of Qu et al. (2022), which highlighted the predictive value of TRIPS scores for mortality risk in full-term out-born neonates.

Discussion of Demographic and Clinical Characteristics

The analysis of this study has highlighted critical insights into the demographic and clinical characteristics of newborns transported via grounded ambulances to the NICU /CBH in Bethlehem. CBH is a referral center, receiving sick newborns from governmental and private hospitals, and homes. In Caritas Baby Hospital, and according to the investigator's observation and experience regarding receiving newly transferred babies by ambulance, most of the arrived NBs were having hypothermia and hypoglycemia (blood sugar less than 50 mg/dl and 45mg/dl in preterm), and no IV access was established at the hospital they were transferred from. Other newborns arrived with intraventricular hemorrhage (IVH), cyanosis, distress, and very few numbers reached the hospital dead.

This chapter will delve into these findings, discuss the observed demographics and clinical characteristics' implications, and explore potential improvements in neonatal transfer protocols and care practices to enhance outcomes for these vulnerable patients.

Firstly, the gender distribution among the newborns showed that 62.5% were male and 37.5% were female. This distribution is in line with previous studies like those conducted by Fenton and Leslie (2009), which indicated no significant difference in outcomes based on gender. However, it's essential to note that gender may play a role in certain health outcomes, as suggested by Xu et al. (2019), who emphasized the importance of involving NICU staff in the birth process to improve outcomes for high-risk infants.

Secondly, the analysis of weight distribution revealed that 46.9% of newborns weighed more than 2200 grams, 34.4% weighed between 1501 and 2200 grams, and 18.8%

weighed 1500 grams or less. This distribution provides insights into the neonatal health status and potential risk factors. Previous studies, such as Narang et al. (2013), highlighted the significance of weight in neonatal transport, indicating that high birth weight contributes to the risk of neonatal mortality.

Thirdly, the gestational age distribution showed that the majority of newborns (44.8%) fell into the category of "Late Premature" (32.1 - 37.6 weeks), followed by "Term" (30.2%), "Very Premature" (18.8%), and "Extremely Preterm" (6.3%). Gestational age is a critical determinant of neonatal health outcomes, as emphasized by Helenius et al. (2019), who found worse outcomes for very premature newborns transferred within 48 hours of birth compared to those born in tertiary care facilities.

Lastly, regarding ABGs findings, the majority of newborns had combined respiratory alkalosis and metabolic acidosis (34.9%), followed by metabolic acidosis (23.3%) and respiratory acidosis (22.1%). This distribution underscores the prevalence of specific health conditions among newborns in our study population. Previous research by Okonkwo et al. (2020) highlighted the inadequate systems for neonatal transport, which require improved staffing, monitoring, and safety measures to address critical health issues during transportation.

Discussion of TRIPS Score by Gestational Age (GA)

The results of the analysis of TRIPS scores by gestational age categories provide valuable insights into the physiological stability of newborns during neonatal transport, particularly concerning their gestational age. The findings indicate a statistically significant

association between TRIPS scores and gestational age categories ($p = 0.028$), suggesting that gestational age influences the physiological stability of newborns during transport.

In examining extremely preterm newborns (28 weeks and less), the most common TRIPS scores observed were 5, 6, and 12, each representing 2.1% of the total. Despite being the smallest subgroup, these newborns face significant low and moderate risks for physiological instability during transport due to their extreme prematurity. While in very premature (29-32 weeks), TRIPS score exhibited a diverse distribution, with the highest frequency observed at 32 (7.3%) this variability underscores the high risk of physiological instability among newborns between 29- and 32-weeks GA. These findings resonate with previous studies emphasizing the vulnerability of extremely preterm infants during transport (Noje et al., 2019; Gupta et al., 2019). The hazards associated with transportation, such as noise, vibration, and temperature fluctuations, pose significant risks to these fragile infants (Marlow et al., 2014; Partridge et al., 2021). Early infant death, respiratory distress, and perinatal asphyxia, along with kangaroo mother care, are an important public health problem, and gestational age is independent (Girma et al., 2023).

In contrast, late premature (32.1 - 37.6 weeks) and term (38 weeks and more) newborns exhibited a higher prevalence of moderate TRIPS scores, indicating relatively unstable physiological conditions during transport. This aligns with studies highlighting the importance of gestational age in predicting neonatal outcomes during transport (Helenius et al., 2019; Shipley et al., 2019). Additionally, the use of standardized tools like the TRIPS score has been emphasized in evaluating and predicting outcomes in neonatal transport, particularly in tertiary care centers (Kulkarni et al., 2019; Luna-Hernández, 2015).

The literature also underscores the impact of factors such as birth weight and transport mode on neonatal outcomes during transport. For instance, Narang et al. (2013) highlighted the contribution of weight and transport mode to neonatal mortality risk, while Bailey et al. (2018) emphasized the challenges posed by noise and vibration levels during transport. Moreover, studies have emphasized the importance of timely interventions and specialized care to mitigate risks during neonatal transport (Singh et al., 2021; Bellini, 2021).

Discussion of TRIPS Score by Weight

The analysis of TRIPS scores by weight recode in the study provides valuable insights into the physiological stability of newborns during neonatal transport, particularly concerning their weight categories. This analysis reveals significant associations between TRIPS scores and weight recode categories, underscoring the importance of considering newborns' weight when evaluating their transport-related physiological stability.

Previous studies have highlighted the critical role of neonatal transport in ensuring favorable outcomes for infants, but they also point out various challenges and risks associated with the process. For instance, the study by Richard Okonkwo et al. (2020) emphasizes the inadequacies of current transport systems, necessitating improvements in staffing, monitoring, and safety measures. Similarly, the study by Gupta et al. (2019) emphasizes the hazards introduced during transport, such as noise, vibration, and temperature fluctuations, which can affect neuro-developmental outcomes in newborns.

In the context of the current analysis, the findings suggest that different weight categories of newborns may experience varying levels of physiological stability during transport, as indicated by their TRIPS scores. For instance, the prevalence of moderate TRIPS scores among newborns weighing 1500 grams or less highlights potential physiological instability for extremely low birth weight infants during transport, similarly, newborns weighing 1501-2000grams also exhibit moderate risk of physiological instability, further emphasizing the critical impact of weight on transport outcome. This aligns with the findings of Narang et al. (2013) regarding the increased risk of neonatal mortality associated with low birth weight and inadequate transport resources.

On the other hand, newborns weighing more than 2200 grams exhibited a relatively higher prevalence of low TRIPS scores, indicating potential physiological stability during transport, consistent with the notion that birth weight influences transport-related risks, as discussed by Narang et al. (2013). Additionally, the study by Shipley et al. (2019) underscores the increased risk of intraventricular hemorrhage associated with inter-hospital transfer of very low birth weight infants, further emphasizing the importance of considering weight categories in neonatal transport protocols.

The significant association between TRIPS scores and weight recode categories, as indicated by the Chi-Square test results, suggests that tailored care protocols and interventions may be necessary based on newborns' weight to optimize outcomes and minimize risks during transport. This aligns with the recommendations of previous studies emphasizing the need for specialized neonatal transport teams, continuous competency

maintenance, and improvements in medical standards for child transportation (Billimoria& Woodward, 2024; Ashokcoomar & Bhagwan, 2022).

Discussion of TRIPS Score by GenderResults

The fifth section of the results discusses the analysis of TRIPS scores by gender and its implications for neonatal transport. The findings reveal that there is no statistically significant association between TRIPS score and gender, suggesting that gender may not be a significant factor influencing physiological stability during neonatal transport in the context of the study.

This conclusion aligns with previous research indicating that factors other than gender play a more substantial role in neonatal transport outcomes. For instance, studies emphasize the importance of comprehensive neonatal transport systems with a focus on specialized care teams, regardless of the gender composition of the team (Billimoria& Woodward, 2024). Additionally, the significance of local understanding, caregiver training, and coordination between healthcare providers and transport teams is highlighted (Ashokcoomar & Bhagwan, 2022).

Furthermore, the lack of a significant association between TRIPS score and gender underscores the complexity of neonatal transport. While gender may not directly impact physiological stability during transport, other factors such as gestational age, weight, and underlying medical conditions are crucial determinants, as noted in previous studies (Fenton and Leslie, 2009; Xu et al., 2019).

Moreover, the discussion on TRIPS scores can be enriched by considering the risks associated with neonatal transport highlighted in prior research. For example, studies have pointed out the hazards of transportation, including exposure to noise, vibration, and temperature fluctuations, which can adversely affect neonatal outcomes (Noje et al., 2019; Partridge et al., 2021).

Additionally, the significance of the TRIPS score as a predictor of neonatal mortality and morbidity is emphasized in the literature. Studies have demonstrated the utility of the TRIPS score in assessing physiological stability and predicting outcomes during neonatal transport, underscoring its importance in guiding clinical decision-making and improving neonatal care (Lee et al., 2001; Luna-Hernández, 2015; Shah et al., 2020).

In summary, while the analysis of TRIPS scores by gender in the current study does not indicate a significant association, understanding the broader context provided by previous research enhances our interpretation. Gender may not directly influence physiological stability during neonatal transport, but factors such as comprehensive transport systems, caregiver training, and the predictive value of tools like the TRIPS score play crucial roles in improving neonatal outcomes.

Discussion of ABG Findings by Gestational Age Results

The sixth section of the results analyzes the distribution of ABGs findings across different gestational age categories, indicating the prevalence of various medical conditions among newborns at Caritas Children's Hospital in Bethlehem. This analysis is crucial for

understanding the impact of gestational age on neonatal health outcomes within the neonatal intensive care unit (NICU).

The findings reveal that while there are differences in the distribution of diagnoses across gestational age categories, gestational age itself does not appear to be a significant factor influencing the prevalence of specific medical conditions among newborns. This interpretation aligns with previous studies examining neonatal transport and its associated risks and outcomes.

Several previous studies underscore the complexities and hazards involved in neonatal transport. For instance, Narang et al. (2013) highlighted the risks associated with the transportation of neonates, especially in ambulances, which may contribute to neonatal mortality, particularly in cases of high birth weight and prolonged carrying times. Similarly, Partridge et al. (2021) emphasized the adverse effects of vibrations, noise, and accelerations during transportation, which can lead to serious brain damage, especially in preterm newborns.

Furthermore, Gupta et al. (2019) discussed how specialized neonatal transport teams play a critical role in stabilizing high-risk infants during transfers. However, they also noted that transport introduces hazards such as noise and temperature fluctuations, which can impact neuro-developmental outcomes. This aligns with the findings regarding the distribution of diagnoses across gestational age categories, as gestational age alone may not account for the complexities introduced during transport.

The TRIPS score, as discussed in various studies, serves as a valuable tool for predicting critical neonatal transport outcomes. Lee et al. (2001) demonstrated the reliability and predictive ability of the TRIPS score, emphasizing its importance in evaluating neonatal transport care. The TRIPS score assesses physiological stability before, during, and after transfer, highlighting the need to enhance newborn stability to reduce mortality rates (Luna-Hernández, 2015).

In summary, while the analysis of ABGs findings by gestational age at Caritas Children's Hospital provides insights into the distribution of medical conditions among newborns, it is essential to consider the broader context of neonatal transport and its associated risks. Gestational age alone may not fully capture the complexities introduced during transport, emphasizing the importance of comprehensive approaches to neonatal care and transport management. The integration of tools such as the TRIPS score can aid in predicting and mitigating adverse outcomes during neonatal transport.

Discussion of ABG Findings by Birth Weight Results

The results from the analysis of ABGs findings by birth weight categories provide valuable insights into the distribution of medical conditions among newborns, particularly in relation to their birth weights. This analysis underscores the significance of birth weight as a factor influencing the prevalence of specific diagnoses and sheds light on the potential implications for neonatal care.

Starting with the findings from the current study, it's evident that birth weight plays a pivotal role in determining the distribution of diagnoses among newborns. For instance,

newborns with lower birth weights, such as those in the 1500 grams or less category, exhibited a higher frequency of diagnoses, particularly metabolic acidosis and combined respiratory alkalosis/metabolic acidosis. This aligns with previous research indicating that infants with lower birth weights are more susceptible to medical complexities (Universal Standard of Neonatal Transporting Process).

Moreover, the statistically significant association revealed by the Chi-Square tests emphasizes the importance of considering birth weight when diagnosing and managing medical conditions in newborns. This finding resonates with studies emphasizing the critical role of neonatal transport in ensuring patient safety and optimizing outcomes (Consequences Related to Neonatal Transporting).

Specifically, studies have highlighted the challenges and risks associated with neonatal transport, including exposure to hazards such as noise, vibration, and temperature fluctuations, which can adversely affect the clinical stability of newborns during transit. Furthermore, the literature emphasizes the need for specialized neonatal transport teams and infrastructure to mitigate these risks and ensure the safe transfer of infants (TRIPS Score).

The distribution of diagnoses across birth weight categories also underscores the complexity of neonatal care and the need for tailored interventions based on individual patient characteristics. While certain diagnoses may be more prevalent in specific birth weight groups, it's crucial to recognize that neonatal transport carries inherent risks regardless of birth weight. Studies have consistently highlighted the association between

transport-related factors and adverse outcomes, emphasizing the importance of optimizing transport protocols and resources to minimize risks (Consequences Related to Neonatal Transporting).

Discussion of TRIPS Score by ABGs findings Results

The analysis of the TRIPS Score by ABGs findings reveals important insights into the distribution of illness severity among newborns within different ABGs findings categories. This distribution is crucial in understanding the varied impacts of transferring newborns in grounded ambulances on neonatal mortality and morbidity within the Neonatal Intensive Care Unit (NICU).

Firstly, it's notable that the TRIPS scores exhibit a diverse distribution across various ABGs findings categories, indicating the variability in illness severity among newborns with different medical conditions. This finding aligns with previous studies highlighting the heterogeneity in critical care transport environments and the importance of understanding this variability (Noje et al., 2019; Corina Noje, MD, Jennifer L. Turi, MD, 2019).

For instance, respiratory acidosis and metabolic acidosis, which are critical conditions, show a range of TRIPS scores, with some newborns exhibiting higher scores indicative of more severe illness. This finding corroborates previous research emphasizing the necessity of specialized neonatal transport teams and intensive care during high-risk transfers to stabilize infants with critical conditions (Gupta et al., 2019).

Additionally, the lack of significance in the Chi-Square tests suggests that TRIPS scores are not strongly associated with specific diagnoses in this study population. This aligns with previous findings that there is no evidence supporting a significant association between prior work experience of transport staff and improved infant outcomes (Fenton and Leslie, 2009).

However, despite the lack of statistical significance in the association between TRIPS scores and ABGs findings, it's crucial to note the potential consequences of neonatal transporting highlighted in previous studies. For instance, the hazards present during transportation, such as noise, vibration, and temperature fluctuations, pose risks to both patients and transport crews (Richard Okonkwo et al., 2020).

Moreover, the risk of serious brain damage during transportation, particularly for sick preterm newborns, underscores the importance of ensuring safety measures and specialized care during transfers (Partridge et al., 2021).

Furthermore, the association between neonatal transport and increased morbidity and mortality rates, especially in very low birth weight infants (VLBW), emphasizes the need for effective strategies to mitigate these risks (Narang et al., 2013).

In summary, while the TRIPS scores provide valuable insights into illness severity among newborns, their distribution across ABGs findings categories may not significantly vary within the scope of this study. However, the findings underscore the importance of

considering the broader context of neonatal transporting and implementing measures to ensure the safety and well-being of transported infants, as highlighted by previous research.

Discussion of TRIPS Score by Blood Sugar Level Results

The analysis of TRIPS scores in relation to blood sugar levels provides valuable insights into the physiological stability of newborns during transport, particularly concerning the impact on neonatal mortality and morbidity. The findings indicate a predominant association between normal blood sugar levels and TRIPS scores, with 64.6% of newborns exhibiting normal blood sugar levels across various TRIPS scores. This aligns with previous research emphasizing the importance of physiological stability during neonatal transport (Lee et al., 2001).

Hypoglycemia and hyperglycemia, though observed in smaller proportions (9.4% and 26.0% respectively), demonstrate varying frequencies across different TRIPS scores. Notably, the frequency of hypoglycemia decreases as TRIPS scores increase suggesting a potential correlation between metabolic stability and transport outcomes (Kulkarni et al., 2019). However, despite these deviations from normal blood sugar levels, the distribution of TRIPS scores does not significantly vary across different blood sugar level categories, as indicated by non-significant Chi-Square test results ($p = 0.266$).

These findings resonate with previous studies highlighting the challenges and hazards associated with neonatal transport, such as exposure to noise, vibration, and temperature fluctuations, which can potentially impact physiological stability (Noje et al., 2019). Additionally, the study underscores the critical role of neonatal transport teams in

providing intensive care during high-risk transfers to stabilize clinical conditions, thereby reducing the risk of adverse outcomes during transport (Gupta et al., 2019).

Furthermore, the discussion of TRIPS scores as a predictor of neonatal mortality aligns with existing literature emphasizing the importance of enhancing newborn physiological stability before, during, and after transfer to mitigate mortality rates (Shah et al., 2020). While TRIPS scores offer valuable predictive insights, it's crucial to consider the multifaceted nature of neonatal transport and the various factors that contribute to outcomes, such as staffing, monitoring, and safety measures (Richard Okonkwo et al., 2020).

In summary, while the analysis reveals associations between TRIPS scores and blood sugar levels, the overall findings suggest that TRIPS scores alone may not be indicative of specific blood sugar abnormalities among newborns during transport. Rather, a comprehensive approach considering various factors, including physiological stability, transport environment, and neonatal care team competence, is essential for optimizing neonatal transport outcomes (Lee et al., 2001).

Discussion of ABGs Findings with Gender

The gender-based prevalence rates of specific conditions observed during neonatal transport, such as respiratory acidosis and metabolic acidosis being more frequent among males, while respiratory alkalosis and normal diagnoses show more balanced distributions between genders, align with findings from previous studies. For example, Narang et al. (2013) and Okonkwo et al. (2020) have highlighted the adverse conditions of neonatal

transport, including vibration, noise exposure, and temperature fluctuations, which can influence the prevalence of respiratory acidosis and metabolic acidosis observed in this analysis. Narang et al. (2013) specifically emphasized the impact of weight and transport conditions encountered in ambulances on neonatal mortality risks.

Additionally, the significance of the TRIPS score, as discussed in various studies (Lee et al., 2001; Luna-Hernández, 2015; Shah et al., 2020), underscores the importance of assessing neonatal physiological stability during transport. This scoring system is crucial for predicting outcomes and guiding transport decisions to mitigate mortality risks associated with specific diagnoses observed in this study, such as respiratory acidosis and metabolic acidosis.

Furthermore, the studies by Gupta et al. (2019) and Partridge et al. (2021) have highlighted the impact of transportation hazards on neonatal outcomes, which could explain the gender-based differences in ABGs findings prevalence observed in this study. For instance, vibrations and accelerations during transport might disproportionately affect male infants, contributing to the higher rates of respiratory acidosis and metabolic acidosis among males.

In summary, the gender-based variations in neonatal diagnoses observed during transport in this study can be better understood by considering the broader context of transportation-related hazards, the use of tools like the TRIPS score for assessing physiological stability, and previous research on the impact of transport conditions on neonatal health outcomes.

Discussion of ABG Findings by Blood Sugar Results

The results from this study's eleventh section, which analyze the distribution of diagnoses across different blood sugar levels, provide valuable insights into the relationship between neonatal conditions and blood sugar status. The findings show that while there are variations in the distribution of blood sugar levels among different diagnoses, the overall distribution does not demonstrate a statistically significant association between ABGs findings and blood sugar levels within this study's scope.

These results can be contextualized and discussed in relation to previous studies highlighted in this work. Several studies emphasize the challenges and risks associated with neonatal transportation, particularly concerning the adverse effects of transport conditions on infant health outcomes.

For instance, Narang et al. (2013) and Noje et al. (2019) emphasize the hazardous conditions during transport, including vibrations, noise, and temperature fluctuations, which can contribute to increased neonatal mortality and morbidity. The study by Partridge et al. (2021) underscores the risk of brain damage due to vibrations and accelerations during transportation, while Okonkwo et al. (2020) highlight the need for improved safety measures and staffing in current transport systems.

Regarding the TRIPS score discussed in this study, Lee et al. (2001) and subsequent researchers (Lee et al., 2012; Luna-Hernández, 2015; Shah et al., 2020) emphasize the importance of assessing neonatal stability during transport to predict outcomes accurately. This ties in with the challenges outlined in this study's results, such as the potential impact of physiological stressors during transportation on neonatal health.

In summary, while this study does not find a significant association between blood sugar levels and specific diagnoses, the discussed studies shed light on broader challenges and risks in neonatal transportation. The implications of these findings emphasize the importance of optimizing transport conditions and care protocols to minimize adverse effects on neonatal outcomes, especially in vulnerable populations.

Discussion of Blood Sugar Results Blood Sugar Levels by Gender Results

This study on the analysis of blood sugar levels by gender within the context of neonatal transport and care outcomes provides valuable insights into the complexities of neonatal health management. The findings, which indicate a non-significant association between blood sugar levels and gender, are intriguing when considered alongside prior research in the field.

Firstly, it's important to discuss the lack of statistically significant differences in blood sugar levels by gender, as highlighted by this study's Chi-Square tests ($p = 0.606$). This suggests that gender alone may not be a strong predictor of blood sugar levels among neonates within the study population.

To further contextualize these findings, several previous studies shed light on the broader challenges and consequences associated with neonatal transport:

Transport-Related Hazards: This study indirectly touches on the hazards of neonatal transport, such as exposure to noise, vibration, and temperature fluctuations during transfers

(Noje et al., 2019). These factors can potentially influence physiological parameters like blood sugar levels, adding complexity to the interpretation of this study results.

Impact on Neuro-developmental Outcomes: Gupta et al. (2019) emphasize the critical role of specialized neonatal transport teams in stabilizing clinical conditions during high-risk transfers. They mention that transport itself introduces hazards like noise and vibration, which could impact neuro-developmental outcomes—a factor possibly related to blood sugar regulation.

Mortality and Health Outcomes: Narang et al. (2013) and Marlow et al. (2014) discuss the increased risk of mortality and serious illnesses associated with neonatal transfers. These studies highlight the urgent need for improved transport systems, staffing, and safety measures to mitigate adverse outcomes observed during neonatal transfers.

1. **Predictive Tools like TRIPS Score:** The TRIPS score, validated and extensively tested in neonatal patients, emerges as a valuable predictive tool for neonatal transport outcomes (Lee et al., 2001). This score underscores the importance of physiological stability during transfers, which could indirectly relate to factors like blood sugar levels and overall neonatal health.

Considering these studies in conjunction with this study results, several parallels and distinctions emerge:

- **Transport Hazards and Physiological Impact:** The findings regarding noise, vibration, and other transport-related factors (Noje et al., 2019) suggest that

physiological parameters, including blood sugar levels, might be influenced during transfers.

- **Neonatal Mortality and Morbidity:** Studies highlighting increased mortality and adverse outcomes during transfers (Narang et al., 2013; Marlow et al., 2014) underscore the importance of optimizing transport protocols and resources—a factor that could indirectly influence blood sugar regulation.
- **Predictive Tools for Outcome Assessment:** The use of tools like the TRIPS score (Lee et al., 2001) reflects ongoing efforts to assess and predict neonatal health outcomes during transfers, which could be linked to underlying physiological variables like blood sugar levels.

In summary, while this study identifies non-significant gender-related differences in blood sugar levels among neonates, the broader context of transport-related challenges and health outcomes, as highlighted by previous research, underscores the multifactorial nature of neonatal care.

Discussion of Blood Sugar Levels by Weight Results

The analysis of blood sugar levels by weight categories in the neonatal population at Caritas Children's Hospital in Bethlehem revealed intriguing insights, particularly in understanding the distribution of blood sugar levels across different weight groups. The study demonstrated that while there are differences in blood sugar levels across weight categories, these differences did not reach statistical significance within the scope of this

investigation ($p = 0.584$). This finding suggests that weight alone may not be a strong predictor of blood sugar levels in this specific neonatal cohort.

To contextualize these findings and draw comparisons with previous studies, several relevant studies on neonatal transport and care can be referenced:

- **Transport-related Hazards and Impacts on Neonatal Outcomes:** The study highlighted the hazards associated with neonatal transport, including exposure to noise, vibration, and temperature fluctuations, which could potentially influence physiological parameters like blood sugar levels.
- **Effectiveness of Neonatal Transport Systems:** Studies emphasized the importance of well-equipped and staffed neonatal transport systems in ensuring better outcomes for critically ill neonates. Despite the challenges posed during transport, improvements in staffing, monitoring, and safety measures are vital.
- **Risk Factors in Neonatal Mortality during Transport:** Research indicated that factors like birth weight and transport duration significantly contribute to neonatal mortality risks during transfers.
- **Transport-related Physiological Stress:** Exposure to noise and vibration during transport was found to increase the risk of brain damage in preterm newborns.
- **TRIPS Score for Transport Evaluation:** The TRIPS score, designed to assess neonatal transport care, is validated and valuable in predicting critical outcomes during transport. It emphasizes the importance of physiological stability before, during, and after transport.

Drawing from these studies, the findings from the blood sugar analysis at Caritas Children's Hospital underscore the complexities of neonatal transport and care. While weight did not emerge as a significant predictor of blood sugar levels in this study, other factors such as environmental stressors during transport, infant health status, and physiological stability (as evaluated by tools like the TRIPS score) are critical in understanding and improving neonatal outcomes during transit.

Discussion of Blood Sugar Levels by Gestational Age (GA) Results

The results presented in the section regarding the analysis of blood sugar levels by gestational age provide valuable insights into how blood sugar levels are distributed among different gestational age categories within the neonatal population. This analysis, however, indicates that while there are differences in blood sugar levels across gestational age groups, these differences do not show statistical significance within the scope of this study.

Several previous studies shed light on factors related to neonatal transport and its potential impact on outcomes, particularly highlighting challenges associated with transporting newborns, including vibration, noise exposure, temperature fluctuations, and physiological stressors. The study by Narang et al. (2013) points out that transportation, especially by ambulances, can contribute significantly to the risk of neonatal mortality, underscoring the importance of proper transportation methods and trained personnel.

Furthermore, Gupta et al. (2019) emphasizes the critical role of specialized neonatal transport teams in stabilizing clinical conditions during high-risk transfers, although they

acknowledge the introduction of potential hazards during transport. Partridge et al. (2021) highlighted the risks associated with transportation, such as vibrations and accelerations, which may lead to brain damage in sick preterm newborns.

In the context of the current study's findings on blood sugar levels by gestational age, there are connections to these prior studies. For instance, Narang et al. (2013) identified that ambulance use can significantly contribute to neonatal mortality, possibly relating to the challenges observed in the distribution of blood sugar levels across gestational age categories, where factors like transport conditions might impact outcomes. Additionally, the findings of Partridge et al. (2021) on brain damage risk during transport could be linked to the variation in blood sugar levels among different gestational ages, emphasizing the importance of optimizing transport conditions for better neonatal outcomes.

In summary, while the current study did not find statistically significant associations between blood sugar levels and gestational age, previous research underscores the complex challenges and risks involved in neonatal transport, which could indirectly influence the factors studied here.

5.2 Conclusions

Based on the findings, the following points can be summarized as key recommendations and conclusions from the study:

1. Transportation Risks: The study underscores the substantial risks associated with transporting critically ill neonates in ambulances lacking specialized equipment and

expertise. These challenges can lead to delays in accessing critical care interventions, contributing to increased mortality and morbidity among transported neonates.

2. Impact on Neonatal Health: Neonates transported under such conditions face significant challenges in maintaining physiological stability during transit. The lack of adequate medical support and monitoring capabilities in ambulances further exacerbate these risks.

3. Resource-Limited Settings: Understanding the impact of transportation challenges is crucial in resource-limited settings like Bethlehem, where access to specialized neonatal transport services may be constrained. This underscores the urgent need for targeted interventions to enhance the quality and safety of neonatal transport.

4. Ambulance Preparedness: Improving ambulance preparedness, including equipping vehicles with necessary medical equipment and ensuring the availability of trained personnel, is essential to optimize neonatal transport services and mitigate risks associated with transit.

5. Policy Implications: The findings have important policy implications for improving neonatal care delivery, emphasizing the need for investments in transport infrastructure, training, and coordination between healthcare facilities to ensure timely and safe neonatal transfers.

5.3 Recommendations

Based on the results, the study recommends to:

1. Standardized protocols: Are crucial for ensuring safety and stability during transportation. The Palestinian Ministry of Health's standards and the National Neonatal Protocol must be followed strictly. Using a formally approved checklist that is linked with these principles regularly can help to ensure neonates' safety and well-being.

2. Comprehensive and Specialized Training Team: Ensure that every worker involved with neonatal transport receives ongoing, specialized training, simulations for handling scenarios before, during, and after transport. Such instruction is crucial for developing a knowledgeable team that can assess the ambulance's readiness and oversee neonatal care during the transport procedure.

3. Provide specialized training for ambulance personnel in neonatal care, including all critical management and emergency interventions specific to neonates.

4. Coordination between Health Services: Streamline protocols for communication amongst all medical services that are engaged in the transport of neonates. This will guarantee a smooth transfer procedure and prompt access to the right care when the patient gets to the receiving facility. Improving outcomes and managing newborn emergencies require effective communication.

5. Follow-Up Procedures: Emphasize the need for thorough follow-up procedures post-transport to monitor the neonate’s condition and address any arising issues.Establishing a

strong follow-up system will guarantee that the required interventions are given on time and assist in the early detection of problems.

6. Quality Assurance Measures: Implement quality assurance measures to regularly assess and monitor the performance of neonatal transport services, ensuring adherence to safety standards and best practices.

5.4 Strengths Points and Limitations of the Study

Strengths

- Comprehensive Data Collection: The study utilized a retrospective cohort design and analyzed data from a computerized health information system covering newborn admissions to the NICU throughout 2021, providing a comprehensive dataset for analysis.
- Use of TRIPS Tool: By incorporating the Transport Risk Index of Physiological Stability (TRIPS) tool, the study assessed vital signs and physiological parameters, enabling a detailed evaluation of neonatal transport challenges.
- Focused Objectives: The study's objectives were clearly defined, aiming to investigate the impact of using grounded ambulances for transporting critically ill neonates and associated challenges, providing valuable insights into a specific area of neonatal care.
- Sample Selection: The study employed purposive convenience sampling, emphasizing the availability and relevance of participants to the study objectives, which may have facilitated a targeted analysis of pertinent cases.

5.5 Limitations

- Retrospective Design: The retrospective nature of the study design may have introduced biases related to data availability, completeness, and accuracy, limiting the ability to control for confounding variables.
- Sample Size: The study's sample size of 100 records may be relatively small, potentially limiting the generalizability of findings and statistical power for detecting significant associations.
- Exclusion Criteria: Certain diagnoses were excluded from the analysis, which may have influenced the representativeness of the study population and the interpretation of results.
- Resource Constraints: The study was conducted in a resource-limited setting, which could have impacted the availability of specialized neonatal transport services and equipment, potentially influencing study outcomes.
- Generalizability: Findings from this single-center study may have limited generalizability to other settings or populations with different healthcare infrastructures or neonatal transport systems.

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Appendices

Appendix 1: Approval letter

Arab American University
Institutional Review Board - Ramallah

الجامعة العربية الأمريكية
مجلس اخلاقيات البحث العلمي – رام الله

IRB Approval Letter

Study Title: "Assessing the Impact of Neonatal Transport via Unqualified Grounded Ambulance on Infant Mortality and Morbidity Rate at Caritas Baby Hospital, Bethlehem, Palestine"

Submitted by: Renan Hanna Jeries Marqass

Date received: 10th January 2024

Date reviewed: 4th February 2024

Date approved: 13th February 2024

Your Study titled **"Assessing the Impact of Neonatal Transport via Unqualified Grounded Ambulance on Infant Mortality and Morbidity Rate at Caritas Baby Hospital, Bethlehem, Palestine"** with the code number **"R-2024/A/27/N"** was reviewed by the Arab American University Institutional Review Board - Ramallah and it was approved on the 13th of February 2024.

Sajed Ghawadra, PhD
IRB-R Chairman
Arab American University of Palestine

الجامعة العربية الأمريكية . فلسطين
مجلس اخلاقيات البحث العلمي . رام الله
IRB-R
ARAB AMERICAN UNIVERSITY-PALESTINE
INSTITUTIONAL REVIEW BOARD - RAMALLAH

General Conditions:

1. Valid for 6 months from the date of approval.
2. It is important to inform the IRB-R with any modification of the approved study protocol.
3. The Bord appreciates a copy of the research when accomplished.

رام الله – فلسطين
Tel: 02-294-1999 **E-Email:** IRB-R@aaup.edu **Website:** www.aaup.edu

Appendix 2: AAUP-IRB-R Participant Information Sheet-Arabic Version (1)

نموذج معلومات المشاركين

AAUP–IRB–R Code No.: .....

AAUP–IRB–R Date: .....

عنوان الدراسة:

معرفة تأثير نقل الأطفال الرضع بواسطة سيارة الاسعاف على معدل مراضة و وفيات الرضع في مستشفى كاريتاس للأطفال، بيت لحم، فلسطين.

ستتم هذه الدراسة الاسترجاعية في مستشفى كاريتاس للاطفال ، باستخدام البيانات التي سيتم استخراجها من نظام المعلومات الصحية ، ادارة مستشفى كاريتاس ستكون هي المشاركة في هذه الدراسة .

..... "

.....

يسرّنا دعوتك للمشاركة في دراسة بحثية. قبل أن تقرر ما إذا كنت ستشارك أم لا، عليك أن تفهم سبب اجراء البحث وماذا يمكن أن يتضمن. خذ وقتا كافيا لقراءة المعلومات التالية بعناية، يمكنك التحدث مع الاخرين حول هذه الدراسة إذا أردت.

يمكنك سؤالنا عمّا إذا كان هناك شيء غير واضح أو في حال كنت ترغب بالمزيد من المعلومات. خذ وقتك لتقرير ما إذا كنت ترغب في المشاركة أم لا.

---

1. ما الهدف من هذه الدراسة؟

هدف هذه الدراسة هو تقديم توصيات لمقدمي الرعاية الصحية لتحسين جودة طرق وعمليات النقل، ولتقليل معدل وفيات حديثي الولادة الناتجة عن عمليات النقل بواسطة الإسعاف.

2. لم تعتبر هذه الدراسة مهمة؟

"هذه الدراسة مهمة لأنها تبحث في كيفية تأثير سيارات الإسعاف غير المجهزة على صحة وحياة الرضع. نحن ندرس أهمية عربات الإسعاف في تقليل خطر الوفاة والمشاكل الصحية للأطفال أثناء نقلهم للمستشفى. هذا العمل يُعد الأول من نوعه في

فلسطين ويستند إلى معلومات حقيقية عن الأطفال الذين نُقلوا إلى مستشفى كاريتاس للأطفال".

3. ما هو الاجراء الذي يتم اختباره؟ (ان كان ينطبق)

لإجراء الذي يتم اختباره في هذه الدراسة هو تأثير نقل الأطفال حديثي الولادة في سيارات إسعاف غير مؤهلة على معدلات الوفيات والمراضة لديهم.، عن طريق الاطلاع على العلامات الحيوية عند الوصول الى قسم العناية المكثفة للاطفال

4. لم تمت دعوتي للمشاركة في هذه الدراسة؟

المعلومات الضرورية لهذا البحث متوفرة بدقة في مستشفى الكاريتاس ، و عادة يكون على اتم الاستعداد لتوفيرها ، لا سيما عندما يكون الهدف هو تحسين جودة الرعاية المقدمة،حيث يتم بذل جهود مستمرة لرفع مستوى صحة الأطفال والرضع.

5. من يجب أن لا يشارك في الدراسة؟

.....

.....

.....

6. هل يمكنني رفض المشاركة في الدراسة؟

.....

.....

.....

7. ماذا سيحدث لي إذا شاركت؟

.....

.....

.....

8. كم المدة التي سأكون فيها مشاركاً في هذه الدراسة؟

.....

.....

.....

9. ما هي الاضرار والمخاطر المحتملة؟

.....

.....

.....

10. ما هي الفوائد المحتملة لي؟

.....

.....

.....

11. من سيكون لديه صلاحية الوصول لسجلاتي الطبية وبيانات البحث؟

.....

.....

.....

12. هل سيتم الحفاظ على سرية بياناتي؟

.....

.....

.....

13. ماذا سيحدث لأي عينات أقوم بتقديمها؟ (إذا كان يطبق)

.....

ما.....

ذا سيحدث إذا لم أرغب في مواصلة الدراسة؟

.....

.....

14. ماذا سيحدث لنتائج الدراسة البحثية؟

.....

.....

.....

15. هل سأحصل على مكافئة مقابل المشاركة في هذه الدراسة؟

.....

.....

.....

16. بمن يجب أن أتصل إذا كانت لدي أسئلة إضافية أو حدثت مشاكل أثناء الدراسة؟

تفاصيل الاتصال للباحث:

.....

.....

17. بمن يجب أن أتصل اذا لم أكن راضياً عن كيفية إجراء الدراسة؟

مجلس أخلاقيات البحث العلمي–رام الله

الجامعة العربية الأمريكية

الايميل: IRB–R@aaup.edu

Appendix 3: AAUP-IRB-R Informed Consent-Arabic Version (2)

نـمـوذج الـمـوافـقـة

AAUP-IRB-R Code No.: .....

AAUP-IRB-R Date: 2024\2\11.....

أنا.....

..... (اسم المشارك / اختياري) أوافق بموجبه على المشاركة في البحث السريري (الدراسة السريرية / دراسة الاستبيان / تجربة الأدوية) المحددة أدناه:

. معرفة تأثير نقل الأطفال الرضع بواسطة سيارة الاسعاف على معدل مراضة و وفيات الرضع في مستشفى كاريتاس للأطفال، بيت لحم، فلسطين.

لتحقيق درجة: الماجيستير. ، في برنامج تمريض حديثي الولادة..في الجامعة العربية الامريكية.

تم شرح وتفسير طبيعة الدراسة وهدفها عن طريق الباحث: رنان مرقص.

لقد تم إخباري عن طبيعة البحث من حيث المنهجية والآثار السلبية المحتملة والمضاعفات (حسب ورقة معلومات المشارك).

بعد معرفة وفهم جميع المزايا والعيوب المحتملة لهذا البحث، أوافق طواعية بمحض إرادتي على المشاركة في البحث السريري المحدد أعلاه.

أفهم أنه يمكنني الانسحاب من هذا البحث في أي وقت دون إبداء أي سبب على الإطلاق.

التاريخ: ..... إمضاء المشارك:

.....

في حضور:-

اسم: .....

التسمية / اللقب: . ..... إمضاء:

.....

(شاهد على توقيع المشارك)

أؤكد أنني أوضحت للمشارك طبيعة وهدف البحث المذكور أعلاه.

تاريخ: ..... إمضاء: Reran Hawwash.

(الباحث)

Appendix 4: Transport Protocol and transport check list according to the Palestine Medical Council. (2019). National Neonatal Protocol.

Introduction

The aim of a safe transfer policy is to ensure the highest standard, streamlined care. In the majority of cases, transfer will be performed by a dedicated transfer team but, in certain cases, the referring team may perform the transfer.

Aim:

Safe passage of newborn from one location to another:

 Transport of critically ill baby from NICU to higher level NICU

 Transport of stabilized growing newborn from higher level NICU to Intermediate care Unit

Process:

ALL cases need to be transferred in a safe environment (skilled team, transport equipment, Ambulance).

In All cases, you can follow **ACCEPT model**:

- ✓ **Assessment**: Assess breathing, airway, circulation, and try to stabilize before getting into ambulance, Examples:
- ✓ If on CPAP or FiO2 >40% or RDS score of >5 intubate, if on ETT fix it properly.
- ✓ Thermal regulation especially LBW infants (use warm pads, pre-warmed Incubator, plastic wraps for ELBW infants).
- ➢ Secure IV lines (central and peripheral lines very well).

- If there are signs of hemodynamic instability, give fluids bolus and start inotropes accordingly.
- Keep medication and fluid infusions during transport (i.e. fluids and inotropes of Prostaglandin).
- Vitamin K should be given (if not already given after birth) before transport.
- Monitor temperature throughout the transport process.
- Discuss the process with parents.

✓ **Control**: Identify a qualified person for emergency situation who can deal with any situation that may develop during transport.

✓ **Communication**: The referring center should provide all related information to the center of referral, including demographics, history, exam, current status and medications.

✓ **Evaluation** of the urgency of transfer (within hours, the same day or can wait longer?)

✓ **Preparation and packing**: Transport equipment, secure tubes and lines, oxygen source.

Baby must be secured in the transport incubator.

✓ **Transport**: Before leaving, recheck equipment, and vital signs and record them. Ensure the temperature of ambulance to be warm enough. If any deterioration happens during Transport, better to stop at any safe place and work with baby for safety of the team.

Patient Name_____ Referral Date_____

Referring Hospital_____ Referring

Doctor_____

Referral

Diagnosis_____

DOB_____ *Birth Time_____ *Birth Weight_____

*GA_____ Present Weight_____ Allergies_____

*Apgars_____ Parents Name_____

Parents Phone_____

Cultures (include date obtained):

Blood_____ Urine_____ CSF_____

ETT_____ Other_____

Laboratory Data (include date & time):

CBC_____

Diff/Plts_____

Electrolytes_____

Oxygenation/Ventilation:_____

FiO2_____ Hood_____ NC_____ LPM____

CPAP_____ Face Mask_____

Mechanical Ventilation_____

Vent Settings_____

ETT Size_____ Lip-Tip_____

X-ray Placement_____

Latest ABG: (date/time)_____

Present Status:

VS: T_____ HR_____ RR _____ BP _____

Level of Consciousness_____

Glucose_____ HCT_____

Last Void (time) _____ Last Stool (time)_____

Last Fed (time/type/amount)_____

Immunization _____ Vitamin K _____

Discharge Summary _____

Medications:

Name

Dose

Route

Time

Last given dose

IV Access/ Arterial

Type

Site

Fluid type

Rate

X ray

Position for central lines.

ملخص

الخلفية: في الضفة الغربية، تؤدي ندرة خدمات النقل المتخصصة لحديثي الولادة إلى نقلهم في سيارات إسعاف غير مجهزة وبغياب الخبرة الطبية، مما يزيد من خطر الوفيات والمضاعفات بسبب التأخر في الوصول إلى الرعاية الطبية المناسبة. فهم هذه المخاطر ضروري لتطوير التدخلات لتحسين نقل ورعاية حديثي الولادة في المناطق ذات الموارد المحدودة.

الأهداف: تهدف الدراسة إلى تقييم الاستقرار الفسيولوجي وتأثيره على وفيات ومضاعفات حديثي الولادة المنقولين بواسطة سيارات الإسعاف إلى وحدة العناية المركزة لحديثي الولادة في مستشفى كاريتاس للأطفال، باستخدام درجةTRIPS ، ونتائج الغازات الشريانية (ABGs)، ومستويات السكر في الدم. تسعى الدراسة إلى فهم مشاكل جاهزية سيارات الإسعاف وسلامة حديثي الولادة أثناء النقل.

المنهجية : تم تحليل البيانات من السجلات الطبية في نظام المعلومات الصحي (HIS) لحديثي الولادة الذين أدخلوا إلى وحدة العناية المركزة لحديثي الولادة في مستشفى كاريتاس للأطفال للعام 2021. ركزت الدراسة على الرضع الذين تتراوح أعمارهم بين 0–28 يومًا وتم نقلهم بسيارات الإسعاف. تم فحص المتغيرات الوصفية مثل العمر، الجنس، العمر الحملي، والوزن، والقياسات الفسيولوجية. تم تقييم درجة TRIPS التي تشمل درجة الحرارة، عمل الجهاز التنفسي، ضغط الدم الانقباضي، والاستجابة للمؤثرات، بالإضافة إلى قراءات السكر في الدم ونتائج الغازات في الدم الشرياني عند الدخول. تم اختيار عينة من 96 سجل بناءً على صلتها بأهداف الدراسة.

النتائج : وجدت الدراسة علاقات ذات دلالة إحصائية بين درجة TRIPS والعمر الحملي، الوزن، ونتائج الغازات الشريانية. ارتبطت الدرجات الأعلى في TRIPS بعدم الاستقرار الفسيولوجي الأكبر، وتفاوتت درجة الحرارة وعمل الجهاز التنفسي بشكل كبير مع العمر الحملي، وأظهرت الذكور عملاً تنفسيًا أعلى.

الاستنتاجات : ارتبطت الدرجات الأعلى في TRIPS بعدم الاستقرار الفسيولوجي الأكبر، مما يؤكد الحاجة الملحة لتحسين جاهزية سيارات الإسعاف ونقل حديثي الولادة. معالجة هذه التحديات ضرورية لتحسين رعاية حديثي الولادة في المناطق التي تفتقر إلى خدمات النقل المتخصصة.