

Staff Knowledge and Attitudes Regarding Clinical Risks in Neonatology at the Tengandogo University Hospital Center, Burkina Faso

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Abstract

Patient safety requires good clinical risk management in hospitals. Very few studies focus on clinical risks in neonatology. We conducted a descriptive cross-sectional study on staff knowledge and attitudes regarding clinical risks in the care of newborns at Tengandogo University Hospital. The results showed that 100% (22/22) of neonatology staff were aware of the risks of healthcare-associated infections, aspiration during feeding, bleeding from injection sites, and visual and genital damage during phototherapy. Good knowledge (>70%) was also observed regarding most sources of risk in neonatology, with, however, an average level of knowledge of risk sources related to drug prescription (68%), filling out monitoring materials (68%), and newborn discharge (59%). In addition, 36.3% (08/22) of staff performed inadequately with regard to the use of protective equipment when placing an umbilical venous line. In order to improve the care of newborns at the CHU-T, awareness-raising and training actions for neonatology staff are necessary to increase their level of knowledge and attitudes toward clinical risk.

Keywords

Newborns, Clinical Risks, Knowledge, Attitudes, Burkina Faso

1. Introduction

Clinical risk is the probability that a patient will experience an adverse event contrary to the processes and outcomes aimed at improving their health. During their stay in the hospital, newborns receive a range of curative care, including bathing, biological sampling, medication, feeding, imaging tests, and other care. While these services are necessary to improve health, they also carry risks. Every step in the care of newborns involves clinical risks. This is why, despite the use of hospital care, neonatal mortality remains high overall [1] [2]. This situation is even more concerning in developing countries such as Burkina Faso. Due to the policy of free care in Burkinabe health facilities, there are many hospitalizations of newborns, and neonatal mortality remains high. At the Tengandogo University Hospital Center (CHU-T), 641 hospitalizations of newborns were recorded over 5 years, with 126 deaths (19.7%) [3].

Neonatal units face numerous clinical risks, including medication errors [4], risks associated with the use of blood products, immunological complications [5], and risks associated with the presence of microorganisms in the healthcare environment, which are by far the most common. Due to the fragility of newborns and the use of invasive devices and procedures in their care, neonatal units face numerous infectious risks, which are usually severe. Studies show that the incidence of healthcare-associated infections in newborns ranges from 7.5% to 12.7% [6]. In 2013, Zoungrana *et al.* [7] found a prevalence of nosocomial infections of 23.7% at the Yalgado Ouédraogo University Hospital Center. These clinical risks lead to complications that compromise health improvement outcomes. They are a source of increased neonatal mortality, length of hospital stay, bed occupancy rates, and healthcare costs. Good control of the hospital environment and patient care is necessary to reduce the occurrence and severity of these risks.

Successful care for newborns depends on a healthy hospital environment and safe care processes. Achieving this level of control requires awareness among neonatal care providers of the extent and severity of clinical risks. It involves adopting healthy attitudes and proactive measures capable of protecting patients from the hazards inherent in the hospital environment and its care processes. The human factor is therefore paramount and constant at all stages of risk management. However, to date, very few studies have been conducted on the knowledge and attitudes of hospital staff regarding clinical risks in neonatal departments. Studies that take a holistic approach to clinical risks from admission to discharge in neonatal care are extremely rare and have not yet been conducted at CHU-T. Therefore, with the aim of contributing to a better understanding of hospital risk in the care of newborns, our study seeks to determine the knowledge and attitudes of staff regarding clinical risks in the neonatal unit at CHU-T.

2. Methodology

2.1. Type of Study

This was a descriptive cross-sectional study conducted in the neonatal unit of the

Tengandogo University Hospital.

2.2. Study Setting

The Tengandogo University Hospital is one of four tertiary hospitals in Burkina Faso's healthcare system. It has a pediatric department with a neonatal unit that receives newborns from the obstetrics unit and other health centers. This unit includes an incubator room, an intensive care room, an isolation room for infectious patients, a reception room for mothers, a storage room for equipment, and a storage room for consumables and cleaning products.

2.3. Study Population

The study population consisted of neonatal care staff present during the survey period. Due to their limited knowledge in the field of clinical patient care, support staff (ward assistants) were not included in this study.

2.3.1. Inclusion Criteria

The following were included in this study:

- Healthcare personnel who had been working in the neonatal unit for at least three months;
- Personnel who agreed to participate in the study.

2.3.2. Exclusion Criteria

Not included:

- Staff on leave during the data collection period;
- Interns.

2.3.3. Sampling

Sampling was carried out by conducting an exhaustive census of the department's staff. This made it possible to include a pediatric health officer, 12 state-registered nurses (IDE), 1 pediatric health officer, 5 nursing assistants (AS), and 4 pediatricians.

2.4. Study Variables

The reference framework for managing adverse events associated with healthcare in Burkina Faso [8], the patient safety guide for surgical, maternity, and neonatal services in Burkina Faso [9], and the checklist for preventing infection risk in neonatology [10] were used to identify the study variables. These variables were related to staff knowledge and attitudes toward hazards and risks in the neonatal unit.

The variables related to staff knowledge were:

- Definition of risk;
- Identification of types of risks;
- Definition of the source of risk;
- Identification of sources of risk.

The variables related to staff attitudes were:

- Staff attitudes toward clinical risks;
- Staff attitudes toward sources of risk.

2.5. Data Collection Techniques and Tools

The data collection techniques and tools used were:

- content analysis using a document analysis grid;
- structured individual interviews using a self-administered questionnaire;
- direct observation using an observation grid.

2.6. Data Collection Process

Staff interviews, document analysis, and direct observation of practices were conducted by an investigator with a master's degree and knowledge of quality management and patient safety. He was trained in the use of data collection tools and was supervised by the principal investigator. The tools used were pre-tested in the pediatric/hospitalization unit (which also cares for newborns).

The questionnaire for assessing staff knowledge and attitudes was administered during the same period (January 29, 2024, to February 12, 2024) at the end of the medical visit.

2.7. Determination of Perception Indices

To assess knowledge and attitudes regarding risks and sources of risk, two types of responses were selected: "correct answers" and "inadequate answers".

Based on the percentage of correct answers, we used the scores proposed by ESSI and NJOYA (11) for the assessment indices:

- <25% correct answers = Poor
- [25% 50% [correct answers = Insufficient]
- [50% 70% [correct answers = Average]
- ≥70% correct answers = Good

The study adopts a rating system inspired by the Simplified Scale of Satisfaction and Involvement (ESSI) and the model proposed by NJOYA [11]. This framework was chosen because of its methodological validity and contextual relevance for assessing the knowledge, perceptions, and attitudes of healthcare personnel.

2.8. Data Processing and Analysis

The data were entered and analyzed using Epi Info 7 and Excel software.

2.9. Ethical and Regulatory Considerations

Authorization from the Director General of the CHU-T was requested and obtained to conduct the study among neonatal staff. In addition, consent was obtained from each caregiver for their voluntary participation in the study. Data collection and processing respected the anonymity of participants and patient safety.

3. Results

All neonatal staff present during the study period were surveyed, representing 100% (22/22) of the expected target. Two (2) staff members were on leave, and there were also two (2) interns.

3.1. Characteristics of the Staff Surveyed

Table 1 presents the characteristics of the staff surveyed.

Table 1. Characteristics of the neonatal staff surveyed.

Qualification	Number of employees
Pediatrician	4
Pediatric health officer	1
State-registered nurse	12
Nursing assistants	5
Total	22

State-registered nurses were the most represented.

3.2. Nature of Known Clinical Risks to Neonatal Staff

Table 2 lists the known clinical risks to neonatal staff.

Table 2. Known clinical risks to neonatal staff.

Nature of the risk	Frequency Percentage (%)	Frequency Percentage (%)
Choking during feeding	22	100
Procedure-related infections	22	100
Bleeding at the injection site (invasive)	22	100
Medication prescription errors	18	82
Dosage errors in medication administration	20	91
Confusion of newborn identities	4	18
Separation of newborns from their parents	1	5
Visual and genital damage during phototherapy	22	100
Pulmonary embolism	2	9
Acute pulmonary edema	3	14
Transfusion incompatibility	4	18

Numerous risks were identified by neonatal staff. The clinical risks known to all staff (100%) concerned procedure-related infections, aspiration during feeding, bleeding at the injection site, and visual or genital damage during phototherapy.

3.3. Neonatal Staff Knowledge of Clinical Risk Sources

Table 3 presents an assessment of staff knowledge of sources of clinical risk.

Table 3. Assessment of staff knowledge of sources of clinical risk in neonatology (year) N = 22.

Sources of clinical risks	Adequate knowledge		Index
	Frequency	Percentage (%)	
Admission of a newborn	17	77	Good
Insertion and/or presence of a peripheral or umbilical venous catheter	22	100	
Insertion of a nasogastric tube	22	100	Good
Prélèvements biologiques	20	91	Good
Prescription of medication	15	68	Average
Administration of medication	21	95	Good
Oxygenation of a newborn	16	73	Good
Nutrition with breast milk substitutes	22	100	Good
Administration of labile blood products	21	95	Good
Implementation of phototherapy	17	77	Good
Stay in an incubator for a newborn.	16	73	Good
Filling out monitoring forms	15	68	Average
Parents visiting newborns	20	91	Good
Discharge of a newborn	13	59	Average
Total	257	83	Good

Staff knowledge levels were good for most sources of clinical risk in neonatology. Knowledge levels were average for sources of risk related to medication prescriptions (68%), filling out monitoring forms (68%), and newborn discharges (59%).

3.4. Experience: An Asset for Clinical Risk Management

Table 4 presents an assessment of staff knowledge of sources of clinical risk based on seniority in neonatology.

3.5. Good Attitudes toward Sources of Clinical Risk

Table 5 presents an assessment of staff attitudes toward sources of clinical risk in neonatology.

The neonatal staff adopted the correct attitudes toward clinical risk factors related to the transfusion of labile blood products (91%), bathing newborns (86%), administering treatment to patients (82%), and visits from parents (73%). No inadequate attitudes toward sources of clinical risk in neonatology were observed among the staff.

Table 4. Assessment of staff knowledge of sources of clinical risk based on seniority in neonatology.

Length of service in the position	Knowledge of sources of clinical risk		
	Adequate	Inadequate	Total
1 to 5 years old	125	30	154
6 to 10 years old	78	19	98
>10 years old	54	2	56
Total	257	51	308

Chi-square = 7.61, p-value = 0.022. p-value = 0.022 (less than 0.05) is significant. Knowledge of clinical risk sources is statistically linked to seniority in the neonatal workplace. Providers who had more than 10 years of seniority in the workplace at 95% (54/56) had more adequate knowledge of sources of clinical risk in neonatology.

Table 5. Assessment of staff attitudes toward sources of clinical risk in neonatology (N = 22).

Sources of clinical risks	Appropriate attitude		Index
	Frequency	Percentage	
Patient registration	12	55	Average
Physical examination of the patient	14	64	Average
Insertion of peripheral venous access	15	68	Average
Administration of treatments to patients	18	82	Good
Transfusion of labile blood products	20	91	Good
Bathing of newborns	19	86	Good
Patient's stay in the incubator	13	59	Average
Visits from parents	16	73	Good
Patient discharge	13	59	Average

3.6. Experience: An Asset for Adopting the Right Attitudes

Table 6 presents the assessment of staff attitudes toward clinical risk based on seniority in neonatology.

3.7. Existence of Poor Attitudes toward Risks in Neonatology

Table 7 presents an assessment of staff attitudes based on measures taken to address clinical risks in neonatology.

The positive attitudes adopted by staff in relation to risk involved taking precautions when collecting biological samples (82%) and reporting adverse events observed in patients (77%). An inadequate attitude adopted by staff toward clinical risk concerned the use of PPE (gowns and masks) when inserting umbilical venous catheters (36%).

Table 6. Assessment of staff attitudes toward clinical risk based on seniority in neonatology.

Seniority in neonatology	Attitudes toward clinical risk		
	Adequate	Inadequate	Total
1 - 5 years old	52	25	77
6 - 10 years old	21	28	49
>10 years old	21	7	28
Total	94	60	154

Chi-square = 10.47, p-value = 0.005. p-value = 0.005 (less than 0.01) is highly significant. We can conclude that staff attitudes toward risk are statistically linked to their seniority in neonatology. Providers with more than 10 years' experience (75% or 21/28) had more appropriate attitudes toward clinical risks in neonatology.

Table 7. Assessment of attitudes based on measures taken to address clinical risks in neonatology (N = 22).

Risk mitigation measures	Adequate attitude		Index
	Frequency	Percentage	
Hydroalcoholic hand rubbing, wearing of gowns, and distribution of tasks	13	59	Average
Use of PPE (gowns and masks) when placing umbilical venous lines	8	36	Insufficient
Disinfection of biological sampling sites	19	86	Good
Notification of adverse events observed in patients	18	82	Good
Wearing gloves when administering milk substitutes to newborns	12	55	Average
Following technical instructions on patient stays	13	59	Average
Isolation of newborns suspected of infection	11	50	Average

4. Discussion

This study on staff knowledge and attitudes regarding clinical risk in neonatology highlighted that certain clinical risks were known to all staff, while knowledge levels were average regarding sources of risk related to medication prescriptions, filling out monitoring forms, and the discharge of newborns. Staff attitudes were good with regard to sources of risk related to the transfusion of labile blood products, bathing newborns, administering medication, and visits by parents of newborns. They were insufficient with regard to the risk of infection when placing umbilical venous lines. The joint implementation of prescription and discharge checklists, targeted double-checks on high-risk medications, and pharmacy-led medication reconciliation integrated into a transition protocol constitutes a coherent set of high-level evidence-based interventions to improve prescribers' operational knowledge and discharge safety, with expected benefits in terms of medication errors and 30-day readmissions.

4.1. The Presence in Neonatology of Risks of Healthcare-Associated Infections, Aspiration during Feeding, Bleeding at Injection Sites, and Damage to the Eyes and Genitals during Phototherapy

All neonatal staff (22/22) were aware of the risks of healthcare-associated infections, aspiration during feeding, bleeding at injection sites, and damage to the eyes and genitals during phototherapy. The risk of infection is higher in neonatology due to the fragility of newborns and the use of invasive methods in the diagnosis and treatment of patients. The incidence of healthcare-associated infections in newborns varies from 7.5 to 12.7% [6]. In hospitals in developing countries such as Burkina Faso, premises and equipment are very often contaminated with numerous bacterial species that cause healthcare-associated infections. Poor hand hygiene among staff, patients, and their companions is believed to be the cause of these complications. Due to their basic training, healthcare personnel are fully aware of the frequency and severity of these infectious risks. ADHIKARY and KHANAM [12] found that 100% of people knew the definition of nosocomial infection and 88% knew the causes of these infections. Despite this knowledge, measures aimed at hand hygiene and the hygiene of patient care equipment were insufficiently applied. Furthermore, in Burkina Faso in general, due to the low standard of living of the population, personal hygiene and clothing hygiene measures are insufficiently applied by the parents of newborns. Awareness-raising activities against this risk should be carried out on an ongoing basis among staff and parents of newborns.

Hospitalized newborns are fed milk through nasogastric tubes. Due to the fragility of the digestive tract and the underdeveloped swallowing reflex, this invasive procedure can cause them to choke. In our study, the neonatal staff were also unanimously aware of this risk. In addition, bleeding at injection sites was mentioned by all staff. Due to the numerous blood samples taken from newborns and the immaturity of the organs that regulate hemostasis, bleeding at injection sites is common in neonatal units.

The use of ultraviolet rays for phototherapy is a treatment for free bilirubin jaundice in newborns. This procedure is not without risk if it is not strictly adhered to. Protection of the eyes against ultraviolet rays and of the genitals is always recommended. Staff who are aware of the risk systematically apply these safety measures. This is why this risk was also mentioned by all neonatal staff.

4.2. Average Level of Knowledge of Risk Factors Concerning Medication Prescriptions, Completion of Monitoring Forms, and Discharge of Newborns

In our study, staff knowledge levels were good (>70%) for most sources of risk in neonatology. However, this level was average (68%) for sources of risk related to medication prescriptions. Prescribing medication is a highly complex medical procedure that gives rise to numerous risks [13] [14]. It involves many steps, including knowledge of the patient's complete medication history, integration of decision-making guidelines for therapeutic management, legible transcription of

precise orders, choice of medications and doses, and adjustment of medication dosages according to the patient's clinical parameters (age, renal function, hepatic function) [15]. It is a significant source of error in everyday medical practice. Indeed, many authors have found that prescribing medication has a high potential for causing risks. OUEDRAOGO *et al.* [16] found that prescribing and administering medication were the stages with the highest number of errors, accounting for 53.07% and 40.78% respectively. Similarly, JAIN *et al.* [17] found in a study on medication errors that "one in ten prescriptions contained a medication error at the time of ordering or dispensing. Dosage errors were the most common type of error detected." The complexity of drug prescribing, which involves taking into account numerous patient characteristics, drug combinations, and many other considerations, is even more pronounced in neonatology because patients are low in weight and have immature organs. In this context, prescribing margins are very narrow and errors are common. Overdoses are serious errors that occur frequently [13] [18]. Due to the frequency of medication risks and the introduction of new molecules onto the market, it is necessary to update staff knowledge on the use of medications.

In our study, staff knowledge levels were also average regarding sources of risk related to filling out monitoring forms (68%) and discharging newborns (59%). Habits in healthcare provision sometimes establish a routine that leads staff to be less aware of certain sources of risk. This is probably the case for filling out information forms and discharging patients. These seemingly simple acts involve many details that are sources of risk. In particular, they can lead to the omission of discharge instructions, the failure to provide discharge documents, and the under-reporting of cases of illness. Although the consequences are not immediate, these risks undermine the continuity of patient care and reduce the effectiveness of treatment and the satisfaction of parents of newborns. In addition, risks related to identity vigilance can have serious consequences when newborns are discharged. In a country where there are perfect homonyms, identity errors are possible when patients are discharged, compromising the continuation of treatment and creating social conflicts or even legal proceedings.

4.3. Good Attitudes toward Sources of Risk Related to the Transfusion of Labile Blood Products, Bathing Newborns, Administering Medication, and Visits from Parents of Newborns

The staff has adopted good practices with regard to sources of risk related to transfusions, medication administration, and parental visits. For blood transfusions, the prerequisites for practicing neonatology are generally in place. All healthcare personnel learn this type of emergency treatment during their basic training. As for medication administration, it is based on rigorous prescribing and strict adherence to instructions that enable care to be provided. Following medical instructions and adhering to care protocols are generally standard nursing practices [19]. The same applies to the physical care of newborns. Most of the providers performing this task are also mothers of children and have good domestic

experience of the activity in addition to their hospital experience. This could explain their positive attitudes. Visits by parents, which are part of patient care, are also a source of germs from outside the hospital environment. This situation is constantly monitored by providers, which is why appropriate attitudes have been developed.

4.4. Inadequate Attitude toward the Risk of Infection Associated with the Use of PPE When Placing Umbilical Venous Lines

Umbilical venous catheterization is one of the invasive procedures that commonly cause very serious infections in neonatology. Inadequate compliance (36.3% [08/22]) was observed among staff regarding the use of PPE when inserting this catheter. This inadequacy reflects a low awareness of the consequences of this very serious risk, which can cause fulminant sepsis in newborns. Failure to use PPE when placing umbilical venous catheters increases the likelihood of this infectious risk by promoting the inoculation of germs via the umbilical cord. In a context of frequent PPE shortages, staff may develop habits of not using this equipment. This coping mechanism leads to an underestimation of the consequences of the risk of infection via the umbilical cord in newborns.

4.5. Limitations

This study addressed staff knowledge and attitudes toward clinical risks in neonatology in a holistic manner. In assessing attitudes, staff may have changed their behavior due to the presence of the observer (Hawthorne effect). Furthermore, the relatively small sample size (N = 22) constitutes another methodological limitation. Although this is an exhaustive census of all neonatal unit staff, this small sample size limits the generalizability of the results to other neonatal contexts or structures. The results should therefore be interpreted with caution, taking into account the organizational and contextual specificities of the center studied.

5. Conclusion

This study, which focuses on assessing staff knowledge and practices regarding clinical risks in neonatology, is part of an ongoing effort to improve the quality and safety of care for newborns. The results show that staff have a good overall awareness of the main risks associated with neonatal care, particularly those of infection, aspiration, bleeding at the injection site, and eye or genital injuries. However, knowledge of drug prescribing and the completion of monitoring forms remains at an average level, indicating a need for targeted reinforcement. Similarly, while staff attitudes are generally satisfactory, certain practices remain insufficiently mastered, in particular the systematic wearing of personal protective equipment when inserting umbilical venous catheters. These findings highlight the need for concrete corrective action, including the implementation of regular, practical training modules focused on aseptic catheter insertion techniques, medication safety, the prevention of healthcare-associated infections, and the development of

standardized protocols and checklists to make risky procedures safer and improve the traceability of care, and periodically monitoring professional skills and behaviors through audits and formative supervision sessions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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