Original research article

ENSURING SAFETY AND PREVENTING THE SUDDEN UNEXPECTED COLLAPSE OF NEWBORNS IN DELIVERY ROOMS

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Abstract

Contemporary situation: The priority of nursing care for a newborn in the delivery room is to ensure its safety, and clinical observation and instrumental monitoring can be used for this purpose. Early education in the prenatal period allows the mother and accompanying person to be involved in the safe care of the newborn.

Goal: The main goal of this research was to map the nursing care of newborns in the delivery room immediately after birth, emphasising safety and preventing sudden unexpected postnatal collapse (SUPC).

Methods: A semi-structured interview with nursing staff caring for newborns in delivery rooms in selected hospitals in South Bohemia ($n_1 = 21$) was used for the qualitative research. The staff were also trained in using the RAPPT (Respiratory, Activity, Perfusion, Position and Tone) scoring system to assess the risk of SUPC and asked about the possibility of its use in practice in delivery rooms ($n_2 = 12$).

Results: Based on data analysis, we identified some key areas: Practical procedures of nursing staff in delivery rooms in SUPC prevention, Implementation of assessment tools and monitoring in SUPC prevention, Education and involvement of mothers after childbirth in the SUPC prevention system during skin-to-skin contact in the delivery room, and Possibilities of using the RAPPT scale in newborn care in the delivery room.

Conclusion: The need to assess the newborn after birth using the Apgar score to ensure bonding does not correspond to the condition of the newborn. Newborns are calmer during skin-to-skin contact, and other monitoring of the child's safe adaptation is needed.

Keywords: *Newborn; Nursing Staff; RAPPT; Safety; SUPC*

INTRODUCTION

Skin-to-skin contact (SSC) is a necessary intervention contributing to the overall postnatal adaptation of cardiopulmonarily stable newborns. The WHO (2022) and American Academy of Paediatrics recommendations emphasise that bonding should be initiated immediately after birth. All other routine procedures should be postponed until after the first hour of contact between the newborn and the mother or accompanying person. In all newborns, it is essential to carefully assess the health status of the mother and child, as well as ensure thermoregulation and control of vital functions. The advantage of bonding is strengthening the bond between the mother and the newborn. Bonding contributes to the smooth development of breastfeeding and accelerates postnatal adaptation (Fendrychová, 2021). SUPC of a physiological newborn is characterised by sudden cardiopulmonary failure in the first two hours to seven days of life (Jouza et al., 2020). In cases of sudden heart and lung failure without previous prenatal and perinatal pathology, subsequent diagnostics did not reveal any clear aetiology (Machová et al., 2024).

The British Association for Perinatal Care has defined the SUPC criteria as full-term/slightly preterm (>35 weeks of gestation) and Apgar score above 7 at 5 minutes; normal

clinical condition of the infant; sudden collapse requiring cardiopulmonary resuscitation followed by positive airway pressure ventilation within seven days requiring intensive care (Feldman-Winter and Goldsmith, 2016).

The most commonly diagnosed causes in newborns include bacterial sepsis, pneumonia, congenital heart disease, arrhythmia, intracranial haemorrhage, and severe chronic anaemia (Becher et al., 2012). Risk factors for SUPC include the position of the newborn on the mother's abdomen or chest during breastfeeding and SSC, maternal fatigue, primiparous mother, analgesia during labour, maternal BMI >25 kg/m², maternal smoking during pregnancy, bed sharing with the newborn, and completely covering the child's head, face, mouth, nose, and neck in flexion (Colvin et al., 2024). Nursing staff play a key role in the prevention of SUPC. Parental education about risk factors should be conducted during antenatal courses or immediately in postpartum (Fendrychová, 2021).

The American Association of Women's Health, Midwives, and Neonatal Nurses recommends monitoring the newborn and checking bonding using telemonitoring by qualified personnel within the first two hours after birth (AWHONN, 2020). Monitoring O2 saturation with a saturation sensor attached preductally to the newborn's upper limb can be used to ensure the newborn's safety (Du Plessis et al., 2021).

Ludington-Hoe et al. (2015) present the newborn RAPPT scoring system, which assesses the state of adaptation of the newborn in the first two hours (Table 1). This assessment tool is designed to monitor newborns in the early postpartum period, especially during bonding, when the child is in contact with the mother. Its goal is the early recognition of risks associated with SUPC (Machová et al., 2024). The RAPPT scale monitors five key areas of physiological adaptation of the newborn: regularity and efficiency of breathing, spontaneous movements and muscle tone, body and head position (concerning airway patency), skin colour and thermoregulation. The RAPPT includes a nurse's intervention record sheet, which contains the following information: time of birth of the child, time of initiation of SSC, and the aforementioned key areas of adaptation (breathing, activity, blood flow, position, and tone), which are performed at five-minute intervals for two hours. Each examined area is rated "0", "1", or "2". A score of 0 or 1 in any criterion requires adjustment of the position of the child or mother. If two or more criteria (breathing, activity, blood circulation, tone) have a value of "0" or "<2", the SSC is terminated and rapid medical intervention is required, including recording the time of termination of the SSC and calling a doctor (Ludington-Hoe et al., 2015). Fendrychová (2021) state that during SSC, children have bradycardia, bradypnea, and completely lack crying, movement, and reactions to irritation due to thermal comfort and contact with the mother's body, which does not allow for adequate use of the Apgar score.

MATERIALS AND METHODS

This research aimed to map the nursing care of newborns in the delivery room immediately after birth, with an emphasis on safety and prevention of sudden unexpected collapse of the newborn.

Characteristics of the research sample

The selection of the research group was intentional, consisting of paediatric nurses and midwives working in the delivery room in selected hospitals in South Bohemia (SB). Five hospitals in SB were approached, and 21 informants (n_1 = 21) participated in the survey in the first and second phases. 12 informants (n_2 = 12) actively participated in the third and fourth phases, who practically tested the RAPPT scale on two to three newborns during treatment in the delivery room.

The method of questioning and in-depth semi-structured interviews was chosen to collect qualitative data. First, the managers of neonatal departments were contacted, and they approached their employees for voluntary participation in the research project. The inclusion criteria were profession (paediatric nurse or midwife), job title (non-doctoral medical staff in the neonatal department), job description (first treatment of newborns in the delivery room), and medical facilities (selected hospitals of SB). Individual interviews took place at selected workplaces after prior agreement by the staff of the neonatology departments. The research surveys were conducted in several phases.

Table 1 – Revised RAPPT™ Infant Assessment Scoring Tool

Sign	0	1	2
Respiratory	Apneic	grunting / flaring/ retracting /tachypneic	Easy, no distress
Activity	non-responsive	crying &/or active motion	Quiet Alert, sleeping or breastfeeding
Position	nares &/or mouth or fully occluded or not visible; &/or neck fully extended or flexed	nares or mouth partially occluded or partially visible; &/or neck partially extended or flexed	nares and mouth uncovered and visible; neck midline
Perfusion	pale, dusky	acrocyanosis	pink all over
Tone	flaccid extremities no recoil	extremities partially flexed; slow recoil	Extremities fully flexed; swift recoil

Source: Ludington-Hoe et al., 2015

In the *first phase*, we focused on the practical procedure for the first treatment of a newborn in the delivery room, with an emphasis on safety and prevention of SUPC during bonding.

In the *second phase*, an online lecture was conducted focusing on the risks of SUPC and the practical use of the RAPPT scale in bonding.

In the *third phase*, delivery room nursing staff who were caring for the newborn worked with documentation. This included the RAPPT scale, which assessed the state of adaptation of newborns during bonding.

In the *fourth phase*, we investigated the experiences of nursing staff in delivery rooms using the RAPPT scale in practice.

Data collection took place from March to June 2023. The open coding method using the "pencil and paper" technique was used for detailed data analysis. Standard features were sought in individual responses and synthesised into similarly focused units. These units were analysed into categories. The criterion for terminating data collection was the achievement of data saturation, when new information, themes, or categories no longer appeared in new interviews. Saturation was reached after 12 interviews, when responses began to repeat, bringing only marginal additions to existing codes.

Limitations:

1. The purposive sample consisted of selected informants from five hospitals in South Bohemia. Interviews were conducted at workplaces and informants were approached through managers.
2. In the first and second phases, the number of informants was limited to 21, and in the third and fourth phases, 12 actively participated. This may limit the variability of opinions and experiences regarding the informants' age and length of practice in the delivery room.

RESULTS

As part of the analysis of the interviews, the information was organized into four categories:

1. Practical procedures of delivery room nursing staff in the prevention of SUPC

Nursing staff demonstrated general knowledge of SUPC and its risk factors. The results showed that mothers most often use SSC immediately after birth or after basic treatment of the newborn. In all monitored hospitals, the newborn remains permanently observed for two hours by the delivery room staff, and if this is not possible, they use instrumental monitoring of physiological functions. In some hospitals, a paediatric nurse who is not permanently part of the delivery room delegates observation to a midwife who supervises the ongoing bonding. The staff knows SSC is one of the most critical risk factors for SUPC. The

most important interventions in preventing complications include adjusting the position of the newborn's head and neck, the mother's position, and her focus on the newborn. If the mother wishes to treat the newborn in dim light, they consider this check-up inadequate. Nursing staff are interested in further possible training on SUPC prevention, including timely and high-quality neonatal resuscitation. Annual practical training in neonatal resuscitation in cooperation with the medical team is perceived as an essential part of education according to current ERC (European Resuscitation Council) recommendations.

2. Implementation of assessment tools and monitoring in SUPC prevention

Nursing staff routinely use the Apgar score. A stethoscope is used to assess heart rate, touch is used to elicit a response to stimulation, and a bent lower limb is gently stretched to assess muscle tone. The assessment is performed on a naked newborn in a supine position in good lighting. In some facilities, the first treatment of the newborn takes place in a warming bed, where the child is treated, the Apgar score is assessed, and the child is then transferred to bonding. According to the mother's wishes, basic treatment of the newborn can be performed on her body. Some hospitals use telemonitoring for continuous observation of the newborn, which allows for uninterrupted contact between the mother and the newborn. Others use instrumental monitoring only in justified cases.

3. Education and involvement of mothers in the prevention of SUPC during SSC in the delivery room after delivery

Nursing staff agree on the importance of early education about the benefits and risks of bonding as part of antenatal courses and pregnancy counselling. It is also appropriate to visit the neonatal department, including the delivery room, before the upcoming birth, which some hospitals allow. Nursing staff draw attention to the lack of information among mothers about the risk of SUPC. They see the solution in an educational brochure related to the risk factors of this collapse. Education in delivery rooms is focused on the early postpartum period, especially on the correct position of the newborn during bonding, the mother's position, and the possibility of calling for help from staff. According to nurses, mothers who have completed antenatal courses and visited the obstetrics ward are better prepared for safe bonding.

4. Possibilities of using the RAPPT scale for newborn care in the delivery room

The RAPPT scoring system is a valuable tool for assessing the behaviour of the newborn in the delivery room. Among the negatives of using the RAPPT scale, nurses mentioned the ultimate skin colouration due to gradual blood flow, which is physiological, when the child had a score of 0 or 1. Nursing staff rated the RAPPT scale as applicable, but criticised its frequency of assessment and constant supervision of the mother and child during SSC, which violated their privacy. As positives, nurses mentioned the consideration of the breathing quality, when the Apgar score only considers its frequency. They use the Silverman score to assess the breathing quality in case of indication. Nursing staff rated the RAPPT scale as applicable. One of the nurses noted that working with the RAPPT scale allowed her to become more aware of the issue of SUPC.

DISCUSSION

Bonding is an integral part of postpartum care in all maternity hospitals. However, SSC is one of the significant risk factors for SUPC (Machová et al., 2024). Nursing staff are therefore given considerable responsibility for the clinical assessment of the newborn throughout its stay in the delivery room (AWHONN, 2020). Nursing staff should be able to identify risk factors for the development of SUPC in the newborn and the mother. The nursing staff we spoke to demonstrated excellent knowledge in this area. The Apgar score is used to assess the newborn, and some of the nursing staff know that this assessment tool is ineffective in the case of bonding. Prevention of SUPC is a multidisciplinary task, and nursing staff play a key role in identifying and preventing this serious condition. As stated by Fendrychová (2021), the education of nursing staff and the education of the mother through subsequent involvement in the monitoring process are essential in the prevention of SUPC.

According to the nurses we spoke to, the basis of safe bonding is the correct position of the newborn's head and neck. At the same time, they pay attention to the proper position of the mother in a semi-sitting position and her absolute focus on the newborn. Excellent knowledge of safe positioning during bonding was demonstrated by nursing staff in the research of Ludington-Hoe and Morgan (2014). The authors also suggest educating nursing staff in obstetric departments to prevent SUPC (Ludington-Hoe et al., 2018). According to the ERC recommendations, medical staff should be trained in neonatal resuscitation (Hrdlička, 2022). Regular training in neonatal resuscitation is carried out in all the hospitals we spoke to. This is considered beneficial, especially the opportunity to try out teamwork.

The nursing staff we interviewed use instrumental monitoring to monitor the newborn, most often measuring O2 saturation with a sensor attached preductally to the right upper limb. Telemonitoring sometimes monitors the newborn to ensure check-ups and not violate privacy during bonding. The use of continuous pulse oximetry (CPOM) to monitor the newborn is recommended by Du Plessis et al. (2021), whose results showed that most midwives accepted the introduction of CPOM into practice positively, primarily due to increased safety of the newborn – the Ludington-Hoe et al. (2018) project aimed to test the new RAPPT scoring system. The interviewed nurses demonstrated its correct evaluation and agreed to its introduction into practice. Fendrychová (2021) recommends using the standardised RAPPT tool in Czech healthcare conditions, given that the Apgar score is primarily intended for assessing newborns in a heated bed. Ludington-Hoe et al. (2018) showed that monitoring the current health status of the newborn according to the Apgar score is often indicative and limited in time. When using the RAPPT assessment scale, the staff monitor the newborn for longer and record the results in the nursing documentation. If the newborn shows signs of airway occlusion, nursing staff terminate the SSC and perform interventions that lead to the correct adaptation of the newborn.

The results of Paul et al. (2019) showed that after implementing a comprehensive intervention to eliminate the occurrence of SUPC in the delivery room, which included newborn monitoring with the Massimo device and the RAPPT method, the number of SUPC cases decreased. Another study (Bergman et al., 2024) emphasises the importance of developing multidisciplinary procedures containing recommendations for the prevention of SUPC. After the lecture on the prevention of SUPC, the nurses we contacted had the opportunity to try out the nursing documentation. This included the RAPPT scale and they mostly evaluated its use in practice positively, although some of them pointed out its time-consuming nature. The Apgar score is intended to assess a newborn in an open heating bed and is inadequate for bonding conditions.

To ensure safe bonding and intimacy, mothers and their companions must be educated proportionately, sensitively, and individually in antenatal courses. During education, the staff focus on the baby's correct position and the mother's absolute focus. Nurses warn mothers about the dangers of using a phone as this distracts their attention. Fendrychová (2021) emphasises education in early recognition of risk factors, such as assessing the newborn's skin colour, monitoring the respiratory activity and position of the baby during breastfeeding and SSC. In their research, Du Plessis et al. (2021) used an educational brochure on the risk of SUPC, increasing mothers' awareness. The staff we spoke to realised that creating a standard for safe SSC is inevitable and essential for ensuring safe nursing care.

Bonding in the delivery room is a vital nursing intervention that benefits both mother and baby. Given the risks of SUPC in SSC, continuous observation of the newborn is necessary (Addison and Ludington-Hoe, 2020). For this purpose, nursing staff can use the clinical assessment of RAPPT or instrumental monitoring. The ideal monitoring method combines the above techniques (Paul et al., 2019). At the same time, educating nursing staff on the risks of SUPC and its prevention is also necessary.

CONCLUSION

Educated nursing staff can provide professional and safe care and adequately educate mothers and their companions in the delivery

room to prevent SUPC. The authors propose practice recommendations to create a nursing standard, 'Safe Bonding in the Delivery Room', to unify nursing care in all hospitals in South Bohemia, which fall under one founder. Another recommendation for practice is the introduction of oral education supplemented by written material (a brochure), which would include familiarisation with the issue of SUPC and the individual steps of safe bonding.

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Ethical aspects and conflict of interest
The authors have no conflicts of interest to declare.

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