

Position paper

Camera systems for live streaming in the neonatal intensive care unit (NICU)



Position paper

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1. Introduction

Every year, around 85,000 newborn babies are hospitalised in Germany¹ and around 6,500 in Austria². These preterm and ill babies receive intensive medical care in specialised children's hospitals, spending the first days, weeks, or even months of their lives in a neonatal intensive care unit (NICU). In paediatrics, preterm babies belong to the group of patients with the longest hospitalisation stays.^{3,4}

During such long hospital stays, parents and families are confronted with emotional, organisational, and financial challenges. Most of the affected families are very distressed by the situation in the NICU.^{5,6} Besides the best possible medical treatment for the child, family-centred care plays a vital role in supporting parents and strengthening parent-infant bonding during these exceptional circumstances. This is achieved through promoting skin-to-skin contact, involving the parents in the baby's care from the very beginning, and providing them with the opportunity to be with their child around the clock.⁷⁻⁹ However, for a variety of reasons, it is not always possible for parents or family members to stay with their child in the hospital around the clock, or to visit the child. Some parents return to work or are absent for a longer period of time for professional reasons (e.g. soldiers, pilots, engineers, long-distance lorry drivers). In some neonatal care units, siblings have no, or only very limited, access. As a result of globalisation, grandparents, family members, and friends may live in another country, or even on another continent, and therefore not close-by. Moreover, hospitals may not have enough space for parents to stay with their child overnight or the mother may also need intensive care herself. Comprehensive, family-centred care, and especially rooming-in on NICUs, is not yet available in all hospitals, and the respective implementation might still take several years.

During the times in which parents cannot be with their child in person, new technologies such as camera systems for live streaming in the NICU can be an appropriate and supportive option in this challenging situation. In addition to personal visits, they enable parents and family members to "virtually" visit their new family member via encrypted video transmission on their computer, tablet or smartphone during the child's hospital stay. Grandparents who live far away, siblings, or the parent who must return to work are able to watch their grandchild, sibling, or child over video. Concerns and anxiety of parents and family members can be reduced this way.¹⁰⁻¹³

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In the course of installing and using such technologies, it is important to acknowledge and discuss the questions and uncertainties which primarily affect the nursing staff, as well as the issue of data protection.¹⁴ To this end, an interdisciplinary expert panel composed of nurses, doctors, and parent representatives from Austria and Germany came together to share their opinions and experiences, to summarise the advantages, challenges, and requirements for establishing and operating camera systems for live streaming in the NICU. This position paper considers the following questions:

What are the challenges and requirements associated with using camera systems for live streaming considering the needs of the parents and their child, nurses and doctors, as well as the hospital?

How can technologies such as camera systems for live streaming in the NICU function as an appropriate and supportive addition to family-centred care?



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2. Background

2.1. Camera systems for live streaming

Camera systems for live streaming in the NICU offer parents of preterm and ill babies, and their family members, the opportunity to virtually visit their child via a secure online system. Hospitals which offer this service place small cameras next to the child's bed. The cameras are placed in such a way that just the child is filmed, and only the hands of the nurses and doctors can be seen. It is thus possible for parents and family members to share the first days and/or weeks of the child's life at any time and from anywhere, in cases when they cannot be by the bedside in person.

When the baby is admitted to the NICU, the camera system is presented to the parents and they receive a comprehensive introduction to the system and its features. Parents and family members can enter a personal username and a password in order to access the online system from home on desktop computers and notebooks, and also on tablets and smartphones, via a VPN (virtual private network)-encrypted and secure internet connection while on the move. No audio signals are transmitted or recorded. Moreover, the system offers additional features including access to current vital signs, the child's most recent weight, size, and temperature developments, live streaming during both the day and night, and a messaging feature allowing exchange between nurses/doctors and parents. It is important that such features comply with data protection requirements (see point 3.1.), and that they are coordinated with the parents in advance.



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2.2. Relevance and advantages of camera systems

2.2.1. For preterm and ill babies, their parents, and family members

There is a variety of reasons why it is not always possible for parents and family members to stay with their child in the hospital around the clock, or to visit their child. With the help of camera systems for live streaming, parents can see their child at any time, such as in the evening before they go to sleep, or in the morning right after they wake up. This is a very enriching opportunity for parents, and easy to integrate into the family's everyday routine. It provides the family with a degree of normality, even if the child still needs to stay at the hospital. This is of particular importance for parents of preterm and ill babies, because their concern for the health of their child and the pain of separation caused by a prolonged hospital stay are very high.¹⁰

Experience report from a NICU staff member

"The webcam gives the parents the chance to see their child, even if they live far away and can't come to the NICU every day. As nurses, we always know when the parents are 'watching'; because we switch on the camera and then point it at the child. Camera systems for live streaming have proven their worth on our ward and are used frequently. They are particularly useful for working fathers as we're also happy to switch on the camera again in the evening or during the night. That gives dads the chance to say 'good night' to their babies or to watch them for a little while, even if they come home late from work."

Katharina Guski, Hauner Children's Hospital in Munich



Moreover, the use of camera systems for live streaming can reinforce parents' trust in the care of their child. This may help them to be more relaxed during the day, knowing they can visit their child "virtually" at any time, and encourages parental autonomy and competence.¹² If parents can get a quick glimpse of their child via video transmission during their daily routines, they are more reassured that their child is well, and this in turn can reduce family stress. Besides reducing family stress, virtual visits also have a positive effect on the siblings who often have to cope with the absence of the parents¹⁵, especially if they themselves are not yet allowed to visit their brother or sister.

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This helps parents to integrate their newborn baby into the family's daily life, even though their child has never been at home. Moreover, it is considered essential that parents of preterm infants receive support from family and friends, who, thanks to virtual streaming, can now "meet" the new family member before the child even leaves the hospital. Additionally, camera systems can contribute to parent-infant bonding: video streaming makes it easier for parents to intensify the bond with their child and supports them in adjusting to their new role. Video streaming makes the parents feel closer to their child, helping them develop a relationship with their child more quickly.^{11,15-17} As well as psychological advantages, there are also medical advantages for the parents and the child: mothers reported that their breast milk flow was (more quickly) stimulated when watching their baby, and that the quantity of breast milk increased.¹⁴ Furthermore, a decrease in the length of the child's hospitalisation has also been shown.¹²

Experience report from a mother

"Our son was born too early and had to be treated in the neonatal intensive care unit for several weeks. My husband and I spent every free minute in person with him. However, there were also times when we had to be apart from him. During these times, we were able to use a new service: 'virtual visits' via a webcam that was fixed above his incubator and which transmitted images in real time. We enjoyed using this tool, especially my husband who had to return to work after two weeks, and used it to have a look at our son during his lunch break. However, the camera couldn't replace direct contact and caressing, cuddling, and smelling our son. Despite the knowledge that we would see our son at least virtually, it was always hard for us to go home and leave him at the hospital."

2.2.2. For nurses and doctors and the hospital

Nurses and doctors may have concerns regarding the installation and use of camera systems for live streaming in the NICU, seeing this as a cause of extra work, for example needing to switch the camera on and off, turning it away, and having to respond to additional calls from parents.¹⁴⁻¹⁶

However, camera systems can open up a new, and perhaps more comprehensive form of clear communication with the parents, reinforcing trust and cooperation. Moreover, they allow the NICU to demonstrate its willingness to be transparent, in turn increasing parental satisfaction with the treatment and care of their child.¹⁰



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Experience report from a physician

"Video streaming in the neonatal unit offers many positive effects for parents, siblings, and family members. Some mothers, for example, use the video streaming system to stimulate their breast milk flow when they pump at home. Moreover, video streaming is one more way in which we can make parents part of the team on our ward, and another step towards maximising transparency when it comes to medical and nursing services for our smallest patients."

Dr. Till Dresbach, University Hospital of Bonn



3. Challenges and requirements

The following is an outline of the challenges associated with installing and using camera systems for live streaming, as well as the necessary requirements. The approach considers parents and children, nurses and doctors, the hospital, and data protection.

3.1. Data protection

Where camera systems for live streaming are installed and used in the NICU, relevant safeguarding measures must be taken in order to protect all those who are involved. Online access is protected with a password, and neither personal data nor the messages between nurses/doctors and the parents, or supplementary messages, are stored. Only users with an individually assigned username and personal password have access to the secured system and can see the child in a live transmission. This access is only given to the parents, who are informed about its use. Parents are free to share this access with other persons such as grandparents and friends. For data protection reasons, all data transmissions are encrypted. In Europe, equipment for video streaming may only be sold if it meets European data protection regulations (EDPR), and this must be guaranteed by the respective suppliers.



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3.2. Parents and the child

Challenges

- Parents and family members may have concerns regarding the handling of the data, and possible handling of this data by a commercial supplier of camera systems
- It can be psychologically distressing for parents to watch a painful treatment on camera (e.g. taking blood samples), or to see the child crying for a long period in which no nurses or doctors are present or visible on the screen, while the parents themselves are unable to intervene from afar
- Parents may have concerns about the equipment's radiated emissions

Requirements

- Camera systems cannot replace the physical presence of parents in the NICU and direct contact with the child
- Information and regulations for using the camera are clearly communicated to the parents (e.g. that neither the hospital nor the parents are allowed to record or store the data)
- Parents and family members are informed that distressing situations may occur and be seen on the screen (e.g. by using information materials)
- Parents are notified by the system when the camera is switched off due to a medical examination
- The wishes and expectations of the parents are discussed and respected
- The system is user-friendly and provides technical support for parents, e.g. presenting FAQs on the interface and further useful links
- Parents can receive help via free telephone assistance when they have questions regarding the use of the system (e.g. internet access, password problems)
- The system is compatible with standard operating systems and internet-enabled devices (computer, tablets, smartphones)
- A highly sensitive light sensor ensures that the child is not exposed to additional light in the dark
- The equipment meets the hygiene standards of the respective NICU
- The camera systems do not expose the child to any electromagnetic radiation which exceeds medical norms

3.3. Nurses and doctors

Challenges

- For nurses and doctors, live streaming may cause the feeling to be observed or monitored
- This additional option may be perceived as involving additional work, e.g. answering extra calls and (more demanding) questions from the parents, entering vital signs and the latest developments into the system, familiarisation with the new technology, and adjusting clinical routine
- Healthcare professionals may fear legal consequences
- Providing information to parents with a migrant background may be more time-consuming due to linguistic barriers or cultural specifics
- Healthcare professionals may worry that parents will visit their child less frequently in the NICU

Requirements

- The camera system can easily be integrated into the clinical routine
- As soon as the first steps in the planning process are initiated, all advantages, challenges, and requirements are clearly presented to the entire team
- As far as possible, the new system is established as a joint project by the entire team
- Nurses and doctors can switch the camera on and off in certain situations and explain to parents why they see a blocked screen
- Training sessions are available to introduce the entire team to the system and to explain the features
- The camera system is user-friendly
- Nurses trained to use the system are present in every working shift

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3.4. Hospital

Challenges

- All decision makers need to be convinced of the internet-based camera system and its advantages, and any initial scepticism must be dispelled
- The implementation of the system is associated with additional work for the hospital's administration and IT departments
- The extra work (more work for healthcare professionals, additional training sessions, human resources, working time, administration, financing) generates additional costs
- The system must be seamlessly integrated into the clinical routine and existing IT programmes
- Costs of acquisition

Requirements

- All interested groups are involved in the first steps of the planning process: nurses and doctors, staff council, hospital IT, data protection representatives, hygiene specialists, and the management
- The system is installed in the hospital by the supplier: the installation consists of cameras as well as their mountings, the ward's server and the internal administration programme which generates the access data and the passwords
- The financing (kick-off financing and long-term financing, including human resources) has been secured in advance (financing by the hospital or development of a financing model, e.g. by a call for donations on the homepage, support by an own hospital association, information sheets, VIP patronage)
- Data protection regulations are in accordance with work protection law, and both the staff council and the hospital's data protection representative must agree to the installation in advance
- No personal data is stored and all data transmissions are encrypted
- Authorisation of the password and the username is the responsibility of the hospital
- The system fulfils the hospital's hardware and software requirements

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Requirements

- Legal protection for the hospital: parents are not permitted to film or store video material and sign a written agreement to these conditions (information sheet and declaration of agreement)
- The project is supervised and evaluated scientifically from the beginning

4. Conclusion and outlook

Comprehensive, family-centred care, and especially rooming-in, is not yet possible or offered in all neonatal units. Placed next to the nursery beds of preterm and ill babies, camera systems for live streaming can provide appropriate, supplementary support, and have a positive effect on the child, parents, and family members. Camera systems contribute to improving parent-infant bonding, to reducing stress within the family, and to better integrating parents in family-centred care by giving them greater competence and autonomy.

The expert panel favours the installation and use of camera systems for live streaming in the NICU. However, the requirements listed in this position paper must be fulfilled if such systems are to be used, and all participating parties must be involved as soon as the first steps in the planning process are initiated. Irrespective of these factors, it is important that parents are welcome in the NICU at all times, and that it is possible for parents to stay overnight where spatially and structurally possible. Camera systems thus serve as an additional and supportive option in family-centred care, but cannot substitute personal contact. All parties involved must be sufficiently informed in order to clarify questions, alleviate concerns and dispel any possible preconceptions. Furthermore, more studies are needed to examine the impact of visual visits on the parents and their child.

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*Despeena, born at 24 weeks
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