Considerations for Successful Implementation of Camera Streaming Technology in the NICU

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Introduction

Neonatal Intensive Care Units (NICUs) in the US are evolving; until recently, most units were structured with an open bay or pod concept. Though this layout allows providers to maximize the available space to support many infants in a relatively small area, it is not conducive to family integrated care. Cramped spaces and lack of privacy may deter families from spending a significant amount of time at their infant's bedside, and there is limited, if any, opportunity for overnight stays. With growing evidence to support family integrated care and the associated benefits to both parents and the infant (O'Brien et al., 2015), parents are encouraged to be active participants and tandem-decision makers in their infant's care. Emphasis on providing family integrated care within the constraints of an open concept NICU gave birth to live-streaming camera technology allowing parents to stay connected to their infant when they cannot physically be in the NICU.

Technology continues to evolve and penetrate the everyday lives of all people, including in the healthcare setting. Parents today are more tech-savvy than ever and expect continuous connection and convenience. Most parents have smart devices and depend on technology to support their daily functions. They expect this level of access to technology that must be assimilated into the healthcare setting and the NICU.

Although camera streaming technology has existed for more than ten years in the NICU environment, there is still much to learn about its impact on patients, parents, extended family, and staff. Based on publicly available information, adoption before the COVID-19 pandemic was slow, with fewer than 20% of NICUs across the country using this technology. In response to the pandemic, NICU's are challenged to preserve the parent-infant connection while prioritizing infection control. Most hospitals have further limited or completely restricted visitation. As a solution, NICUs have more readily implemented live-streaming camera technology which supports the parent-baby dyad throughout an infant's hospitalization and allows extended family support (Epstein et al., 2017; Hawkes et al., 2015; Joshi et al., 2016; Kerr et al., 2017; Rhodes et al., 2015).

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Most NICUs have restricted non-parent visitors (Muniraman et al., 2020), eliminating the ability for extended family to share in the experience and support parents throughout their NICU journey. Though families benefit from this relatively sudden and recent diffusion of live-streaming technology, the impact on staff remains unknown.

Kilcullen et al. (2020) completed a thorough literature review which concluded that although the literature confirms the benefits of camera streaming technology for both parents and infants, there remains little information on the impact on staff of using live-streaming video cameras in the NICU environment. Additional research needs to be conducted to further evaluate the impact on staff as the technology becomes more widely adopted. A current study is underway by Hilliard and Nauman evaluating neonatal nurse perceptions of live-streaming camera technology using a mixed methods approach. A survey was developed and distributed to approximately 1,500 neonatal nurses using digital platforms (including email and social media) and professional organizations. Preliminary data are mixed but show several key themes:

- A considerable number, approximately 70% of early respondents, have exposure to live-streaming camera technology in the NICU setting.
- Managing live-streaming technology impacts nursing workflows and attitude.
- Most nurses acknowledge the benefits of the technology to families, especially during the current pandemic.

Study data will be analyzed to better understand the impact of live-streaming technology on NICU nurses in an effort to optimize its use in the NICU environment.

Top 3 things to consider when evaluating camera-streaming technology in the NICU:

1) The Product. Both the hardware and the software platform should be evaluated thoroughly in relation to daily workflow. From a hardware perspective, functionality and ease of use play an equally important role in how easily and efficiently staff can utilize the camera. The device will likely be turned on and off several times a day, so it must be easliy accessible when needed, but also quickly moved out of the way during emergency situations. It's important to assess where key functions (i.e., power button) are located on the device in relation to the patient, the staff work area, and other medical equipment. The ability to maneuver and manipulate the hardware and the

footprint of the hardware itself should also be evaluated. Lastly, the durability of the device, its life expectancy, and any warranty should be considered.

From a software perspective, the platform should be assessed for overall functionality and ease of use from both the staff and family perspectives. First and foremost, security and HIPAA compliance should be reviewed to ensure protection of patients, families, and the organization. It is critical to understand the workflows associated with creating and managing a family account from the staff perspective such as how family accounts are created and managed and how families are linked to the appropriate patient. Special consideration is necessary for the following scenarios: families of multiples, how family account access is handled (i.e., who controls access for multiple family members or friends to view the infant), and how non-native (English) speaking families are supported. Next, focus on evaluating integration options which allow for a simple, turn-key experience for staff. Ask about single sign-on and active directory integrations which support account management for staff. Integration into the facility's bed management system (likely part of the EHR) can be critical in reducing the time to onboard families, in moving/reassigning cameras when infants move bed spaces, and automating the infant/family discharge process from the software. Evaluate the process for updating software and the length of time devices can be expected to be out of service if hardware must be repaired or replaced.

Additionally, it is imperative to understand the entire platform and all solutions available from the vendor. For example, some platforms offer services in addition to the camera streaming technology that may be beneficial to NICU or other departments in the organization. This could offer a considerable cost savings through bundling, as well as organizational alignment of products.

2) The Implementation Process. The second element to consider is technical and clinical implementation support offered. It is essential to have a project management plan to ensure effective implementation, training, and adoption. Special attention should be given to how implementation will impact staff workflows from account creation and management to camera positioning and utilization. This technology becomes an integral part of the bedside equipment for patients and is frequently utilized approximately 16 hours per day. Consideration should also be given to staff support not just through basic education of how to use the device, but the resources available to support safe, uninterrupted patient care after go-live. Staff support involves having the appropriate resources and documents to consent and set clear expectations for families, guidelines to ensure the appropriate use of the technology, and annual training and competencies that will lead to consistent adoption and high satisfaction by the staff.

Change management that focuses on staff adoption is vital for the successful implementation and utilization of camera streaming technology. There is a fine balance between providing technology that addresses both family needs and safe, efficient staff workflows while ensuring safety and confidentiality. How the camera technology is introduced to staff, how they are supported throughout the implementation process, and how leaders are guided in identifying workflows and processes prior to implementation are all important aspects of the evaluation process.

Who you're working with throughout implementation and go-live is crucial. It is ideal to work with a multi-disciplinary team including project managers, technical professionals, and clinicians with a NICU background who can collaborate with hospital leadership throughout the implementation process. This can save significant time for those implementing the technology and improve satisfaction from staff.

3) Ongoing Support: Technical and Strategic. Due to the high frequency of use and dependency by families, ongoing technical support cannot be underestimated. Ensure the device and platform are reliable. Utilize peers that have experience with the vendor to evaluate the overall performance history of the device including understanding the amount of downtime to expect during upgrades and the anticipated turnaround time if a camera must be repaired or replaced. Families learn to rely on the technology for peace of mind during their child's stay so it is important to consider all the factors that could impede the device from working and ensure that risk is minimized to keep staff and families satisfied. Discuss who is providing technical support and when it is available for both families and staff. Additionally, evaluate the process for requesting enhancements or software updates.

Relationship management is equally important and may involve providing support for any technical issues, keeping your team abreast of upcoming updates, ensuring staff adoption and utilization of the technology, as well as monitoring for success. Some companies may also provide support for research and quality improvement projects as they strive to learn more about the impact of live-streaming camera technology in various settings.

Conclusion

It is evident that the use of live-streaming camera technology is here to stay. The increasing momentum of the family integrated care movement coupled with a more tech savvy workforce and equally technologically inclined parents support the continued use of cameras. The increased value placed on patient and family satisfaction and the experience during hospitalization compounds pressure as organizations aim to satisfy the needs and expectations of families. Adding to this pressure, a global pandemic resulting in drastic visitation restrictions creates a paradigm shift for NICUs around the country. Live-streaming camera technology is becoming a standard of care. It is more important than ever to thoroughly evaluate camera streaming technologies prior to implementing them.

Ten Questions to Ask

1. How easy is the hardware to maneuver and position?
2. What type of project management support is available?
3. Do you provide resources and tools to ensure a successful implementation?
4. Are clinical advisors available to speak peer-to-peer for support?
5. What type of education and training is provided?
6. How much time does it take for staff to create and manage family accounts?
7. What ongoing, post-implementation support is provided?
8. Is technical support available 24/7?
9. What is the estimated downtime if hardware must be replaced or repaired?
10. What is the process for updating software?

References

1 Epstein, E.G., Arechiga, J., Dancy, M., Simon, J., Wilson, D., Alhusen, J., 2017. Integrative review of technology to support communication with parents of infants in the NICU. J. Obstet. Gynecol. Neonatal Nurs. 46 (3), 357–366. https://doi.org/10.1016/j.jogn. 2016.11.019.

2 Hawkes, G.A., Livingstone, V., Ryan, C.A., Dempsey, E.M., 2015. Perceptions of webcams in the neonatal intensive care unit: here's looking at you kid! Amer. J. Perinatol. 32, 131–136. https://doi.org/10.1055/s-0034-1376388. 02.

3 Joshi, A., Chyou, P.-H., Tirmizi, Z., Gross, J., 2016. Web camera use in the neonatal intensive care unit: impact on nursing workflow. Clin. Med. Res. 14 (1), 1–6. https://doi.org/10.3121/cmr.2015.1286.

4 Kerr, S., King, C., Hogg, R., McPherson, K., Hanley, J., Brierton, M., Ainsworth, S., 2017. Transition to parenthood in the neonatal care unit: a qualitative study and conceptual model designed to illuminate parent and professional views of the impact of webcam technology. BMC Pediatr. 17 (1), 158. https://doi.org/10.1186/s12887-017-0917-6.

5 Kilcullen, M.L., Kandasamy, Y., Evans, M., Kanagasignam, Y., Atkinson, I., van der Valk, S., Vignarajan, J., Bacxter, M. 2020. Neonatal nurses' perceptions of using live streaming video cameras to view infants in a regional NICU. Journal of Neonatal Nursing 26, 207–211. https://doi.org/10.1016/j.jnn.2020.01.012

6 Muniraman H, Ali M, Cawley P, et al. 2020. Parental perceptions of the impact of neonatal unit visitation policies during COVID-19 pandemic. BMJ Paediatrics Open 2020;4:e000899. doi: 10.1136/bmjpo-2020-000899

7 O'Brien K, Bracht M, Robson K, Ye XY, Mirea L, Cruz M, Ng E, Monterrosa L, Soraisham A, Alvaro R, Narvey M, Da Silva O, Lui K, Tarnow-Mordi W, Lee SK., 2015. Evaluation of the Family Integrated Care model of neonatal intensive care: a cluster randomized controlled trial in Canada and Australia. BMC Pediatr 15; 15:210. doi: 10.1186/s12887-015-0527-0.

8 Rhoads, S.J., Green, A., Mitchell, A., Lynch, C.E., 2015. Neuroprotective core measure 2: partnering with families - exploratory study on web-camera viewing of hospitalized infants and the effect on parental stress, anxiety, and bonding. N.born Infant Nurs. Rev. 15 (3), 104–110. https://doi.org/10.1053/j.nainr.2015.06.011.