Live stream webcams on the neonatal unit: ‘An additional responsibility’ for nursing workload?

Kathy Chant a, Judith Meek b, Ruby Hayns-Worthington b, Laura Harris b, Patrizia Pajak b, Neil Marlow b, Katie Gallagher b

a Division of Academic Neonatology, Institute for Women’s Health, University College London, UK
b Neonatal Intensive Care Unit, EGA Wing, University College London Hospitals, UK

1. Background

Nearly 100,000 babies are admitted annually to neonatal units (NNU) in England, the equivalent of 1 in 7 births (RCPCH, 2019). The often unexpected admission of a baby for neonatal care may be distressing for parents naturally concerned for their baby’s health and survival, whilst struggling with the disrupted transition to parenthood (Caporali et al., 2020). Parental distress may be further compounded by a loss of parental role and the necessary cultural adaptation to the neonatal unit, accompanied by complex communication about their baby’s condition with neonatal healthcare professionals (Gallagher et al., 2018). More recently this was exacerbated by restricted access policies for both parents and extended family throughout the COVID-19 pandemic of 2020 and 2021 (Ciotti et al., 2020; Fonfe et al., 2021). For many parents, this may lead to anxiety, depression, and even post-traumatic stress (Shaw et al., 2013; Malouf et al., 2022).

To reduce the effect of separation and improve parental bonding and wellbeing, some neonatal units have introduced novel technology such as virtual diaries and live streaming video cameras. ‘Webcams’ enable parents to view their baby in ‘real time’ using their smartphone or tablet at times when they are unable to be physically present with their baby. While studies have reported benefits for parents, including improved bonding and reduced stress and anxiety (Kubicka et al., 2021; Kilcullen et al., 2022; Psychogiou et al., 2020), nursing staff have identified concerns about the integration of webcam technology into routine care including concerns surrounding security and privacy (Hawkes et al., 2015), and increased nursing workload and stress (Kilcullen et al., 2020). In a study of webcam implementation on a neonatal unit in the United States, Joshi et al. (2016) surveyed 42 nursing staff observing that time spent repositioning cameras, technological difficulties and receiving additional phone calls from concerned parents were perceived to negatively impact the quality of care provided to infants and their families. Additional tasks can increase stress for nursing staff and interrupt nursing workflow. Previous research has highlighted increased nursing workload is associated with missed nursing care and could raise patient safety concerns (Tubbs-Cooley et al., 2019).

The impact of live streaming technology upon the relationship between healthcare professionals and parents has also been questioned; neonatal healthcare professionals report perceptions of being ‘under surveillance’ when webcams are in use on the neonatal unit (Le Bris et al., 2020). However, in an interview study of 40 parents, “surveillance” was reported positively as parents considered this would increase...
staff vigilance of their baby during webcam sessions, improving the relationship between parents and staff (Reimer et al., 2021).

Few studies have focused on the impact of live streaming technology on clinical nursing practice, and none to our knowledge have explored the effect of webcams on infant handling, despite recommendations from the European Foundation for the Care of Newborn Infants (EFNCI, 2018) that neonatal units integrating webcams into clinical practice undertake an evaluation of their implementation. This study aimed to explore the impact of live streaming webcam technology on nursing workload. This is part of a larger programme of research exploring staff perceptions and parent experiences of webcam use in neonatal care.

2. Methods

2.1. Study setting

The Angel Eye Camera System (https://angeleye.health) was introduced to a 28-cot Level 3 tertiary neonatal intensive care unit in the UK in 2020. Initially the webcams were piloted in one nursery with four intensive care cot spaces. Toward the end of 2020 the webcams were made available for all cot spaces across the unit. The webcams were offered to parents following the admission of their baby to the neonatal unit. Written consent was taken from parents wishing to use the webcam technology, following which the webcam was set up on the side of the incubator/cot space and an online account created for parents by the nursing team. Live streams of the baby were made every day for 2 h in the morning and 2 h in the evening, with personalised viewing times available depending on individual family circumstances. The Angel Eye cameras on our unit transmit viewing only; no sound option is available.

A workload survey was designed to capture the impact of the webcams upon nursing workload and infant handling. The survey was developed using previous literature and comprised 12 questions (appendix 1), which explored basic information relating to current workload (babies cared for per shift, presence of webcams per infants cared for), and any webcam related changes or additions to routine nursing practice (including repositioning the baby and/or camera, equipment set up and cleaning, dealing with technological issues, and webcam related parent phone calls). Content validity was ensured through review by clinical and academic neonatal experts, and piloting of the survey with a small group of neonatal nurses and practice educators prior to its official launch. Following review, two questions were reworded for clarity. The study was approved by the West of Scotland Research Ethics Committee (ID: 20/WS/0155), the Research and Development Department of the participating NHS Trust (ref: 134712) and registered under the National Institute for Health Research (NIHR) Portfolio.

2.1.1. Participant recruitment and data collection

Nursing staff were introduced to the study via email, presentation at ward meetings and one-to-one discussions with the clinical research nursing team. Participation included completion of one workload survey during each nursing shift worked, with a small number of nurses (2.5% n = 128) of nurses reported receiving one or more webcam related tasks undertaken during their shift. Frequency analysis highlighted that the majority of these tasks (95%) took 15 min or less per shift (Table 1).

Nurses were invited to expand upon their responses for questions exploring their perceptions of the impact of webcams upon: (1) webcam related telephone calls (2) infant handling during and around webcam use, and (3) quality of nursing care provided to infants while webcams are in use.

1. Telephone calls

When asked about webcam related telephone calls, 20% (n = 128) of nurses reported receiving one or more webcam related telephone calls from parents per shift, with a small number of nurses (2.5% n = 18) reporting three or more webcam related calls per shift. Nurses provided further information about the perceived content of the telephone calls during open-ended responses; frequency analysis of comments identified four themes and two subthemes: (1) parental expectations of service provision, (2)

<table>
<thead>
<tr>
<th>Task</th>
<th>Time per webcam task (% of responses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial explanation</td>
<td>0 min &lt;15 min 15–30 min 30–60 min</td>
</tr>
<tr>
<td>Cleaning equipment</td>
<td>80.4 16.9 2.4 0.3</td>
</tr>
<tr>
<td>Interacting with families</td>
<td>35.5 63.2 1.3 0</td>
</tr>
<tr>
<td>Repositioning camera</td>
<td>81.3 16 2.6 0.1</td>
</tr>
<tr>
<td>Resolving technical problems</td>
<td>71.4 25.1 3.2 0.3</td>
</tr>
</tbody>
</table>

April 2021).
parental concerns including (2i) infant comfort and (2ii) treatment queries, (3) technical difficulties, and (4) camera repositioning (Table 2).

2. Infant handling

Nurses were asked to report any additional handling of infants outside of routine care undertaken in relation to the webcams. A quarter of participants (25% n = 159) reported handling infants 1–2 times more often, with a very small number of participants (2% n = 14) reporting an additional 3–4 times of infant handling in relation to the webcam.

Nurses provided further information exploring the reasons for increased infant handling, when identified, through open-ended responses. Frequency analysis of comments identified 3 themes: (1) infant repositioning, (2) preparing baby for live streaming, and (3) nursing workload concerns (Table 3).

3. Quality of care

Nurses were asked about the perceived impact which integrating webcams into clinical practice had upon the quality of care they could provide to infants and families. Sixty eight percent of nurses reported an improvement (n = 17, 6%) or no perceived difference (n = 175, 62%) to the nursing care they were able to provide whilst the webcams were in use. In contrast, 89 responses (32%) indicated a reduced ability to provide quality nursing care to infants and families during webcam use. Nurses provided further information exploring the perceived impact upon nursing care through open-ended responses. Frequency analysis of comments identified 3 themes: (1) no impact, (2) negative impact and (3) positive impact (Table 4).

4. Discussion

The aim of this study was to explore the impact of live streaming webcam technology on nursing workload on a tertiary level neonatal unit in the UK. Our findings highlight that nursing time spent per camera related task was generally low and there was minimal impact from the use of webcams upon perceived ability to provide quality nursing care to infants and families.

Our findings contrast with those from other studies, which highlight a perceived increase in nursing workload, and a perceived negative impact upon the quality of nursing care (Kubicka et al., 2021; Joshi et al., 2016). These differences could potentially be explained by the length of time webcams were in use per study; Kubicka et al. (2021) used webcams continuously, in comparison to our unit which had 2-h live

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Themes representing the perceived content of telephone calls from parents related to webcam use during their working shift, as reported by nurses.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme</strong></td>
<td><strong>Frequency count of responses (n)</strong></td>
</tr>
<tr>
<td>Parental expectations of service provision</td>
<td>42</td>
</tr>
<tr>
<td>Parental concerns</td>
<td>22</td>
</tr>
<tr>
<td>Infant Comfort</td>
<td>15</td>
</tr>
<tr>
<td>Treatment queries</td>
<td>10</td>
</tr>
<tr>
<td>Technical difficulties</td>
<td>20</td>
</tr>
<tr>
<td>Camera repositioning</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Themes representing additional infant handling related to webcam use, as reported by nurses.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme</strong></td>
<td><strong>Frequency count of responses (n)</strong></td>
</tr>
<tr>
<td>Infant repositioning</td>
<td>57</td>
</tr>
<tr>
<td>Preparing baby for live streaming</td>
<td>45</td>
</tr>
<tr>
<td>Nursing workload concerns</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Themes representing perceived quality of care during webcam use, as reported by nurses.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme</strong></td>
<td><strong>Frequency count of responses (n)</strong></td>
</tr>
<tr>
<td>No impact</td>
<td>175</td>
</tr>
<tr>
<td>Negative impact</td>
<td>89</td>
</tr>
<tr>
<td>Positive impact</td>
<td>17</td>
</tr>
</tbody>
</table>
sessions each morning and evening, which also may reduce the amount of time nurses spent attending to webcam related tasks. It is also possible that the results from our study could reflect attitudes during the COVID-19 pandemic, when nurses appreciated the need to improve parent access to their babies, although the number of parents using webcams whilst in isolation during our study period was low. Nurses reported benefits to using the webcams as part of nursing care, including using the cot side screens to monitor infant comfort without lifting incubator covers, but reported concerns included increased handling in relation to parent phone calls and preparation for viewing outside of routine care times. In our study, nurses reported a tendency to turn off cameras during clinical procedures and routine cares (such as nappy changes, re-positioning, blood pressure measurements), or ‘preparing infants prior to starting the webcam; for example, reorganisation of the timing of infant cares to avoid doing them during the period of live streaming. Such actions indicate a perception that parents may not want to see procedures and cares, a finding which was similarly reported by Kilcullen et al. (2020). It is necessary to explore parents’ attitudes towards viewing these activities, as parents may prefer to see their baby during routine handling to enhance feelings of inclusion.

Clear communication between nurses and parents around expectations and preferences for live streaming use could potentially help to address these issues. Parent concerns when the webcam start times were delayed and expectations surrounding this service provision were not always met due to clinical workload, that may be exacerbated with additional telephone calls. Nurses indicated a range of reasons for webcam related telephone calls in this study. Improving parent explanation when introducing webcams would help to manage initial expectations, reduce parental anxiety when infant viewing is later than anticipated, and therefore prevent additional strain on nursing workload.

The introduction of new technological innovations requires preparation, and the readiness of a team to take on new technology (de Veer et al., 2011; Hoffmann et al., 2022). Preparation and teaching may concentrate on the use of the technology, but also needs to address potential changes to workflow. Several challenges were reported relating to workflow interruptions, specifically technological difficulties. Increased workflow negatively influences stress for nurses, potentially resulting in increased opportunities for missed nursing care (Tubbs-Cooley et al., 2019). This could be exacerbated in neonatal units where nurse-to-patient ratios fall short of recommended levels (RCPCH, 2019). When new initiatives and technology are introduced into routine nursing practice, it is imperative that they are introduced in a safe and effective manner to minimise any effects on patient care and safety.

There were several limitations to this study. We explored nursing workload because typically webcams impact those at the cot side (Hawkes et al., 2015; Joshi et al., 2016), but their use may affect non-clinical staff members such as the equipment support team, ward clerks and housekeepers. Responses from nurses working in intensive care in comparison to high dependency and special care was proportionally much higher, but expected, given the staff ratio per shift in a tertiary neonatal unit. Previous research has suggested the higher the number of babies with webcams in a nursery, the higher the workload and therefore nursing stress (Joshi et al., 2016), so our results may be more representative of neonatal units with a higher intensity of care. Familiarity with the webcam equipment following the pilot study may have resulted in shorter durations to complete webcam related tasks, possibly biasing some nurses’ responses. Our results may also be influenced by the duration of webcam use (only used for 2 h per shift), when making comparisons to studies that had the cameras on for longer durations.

Overall, we found that webcam use did not negatively impact nursing workload or affect quality of nursing care, but we were able to highlight some clear areas for improvement. Recommendations for neonatal units considering the provision of such live streaming technology include preparation for service changes in advance of webcam implementation involving all staff, staff education and familiarity of new equipment prior to use, clear communication with parents to enhance their understanding, and the consideration of a dedicated person or team to manage inevitable technological challenges needed to sustain this service provision longitudinally.

5. Conclusion

The impact of webcams on nursing workload in the neonatal unit was low per camera related task. Benefits for parents were recognised, but nurses reported webcam-related changes to nursing workflow in terms of infant handling, concern for parents and other webcam viewers, and technological difficulties, all of which may be resolved through preparation, staff and parent education and good communication.

Author contributions

IG, KC JM and NM conceived the idea and obtained funding. KC wrote the first draft and produced the final version. KC, RHW, LH and PP collected data. Each has reviewed and contributed to this paper.

Funding

The study was fully funded by The General Nursing Council for England and Wales (GNCT); the funders have taken no role in the design, running of the study or interpretation of the results.

Declaration of competing interest

None disclosed

Acknowledgement

We would like to thank all of the nurses who contributed to this study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jnn.2023.04.011.

References


