

CLINICAL RESEARCH ARTICLE


The new normal: parental use of online health communities in the NICU

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BACKGROUND: The aim of this study was to identify if and why NICU families use online health communities (OHCs) and to assess how participation in these virtual spaces impacts relationships between parents and their child's medical team.

METHODS: Surveys were administered to eligible persons. Quantitative analysis was conducted using standard statistical methods. Publicly accessible posts from the platform Reddit were aggregated and analyzed for recurring themes.

RESULTS: In all, 58.3% ($n = 141$) of NICU parents surveyed endorsed OHC use, primarily for the purpose of connecting with other NICU families and alleviating distress regarding their child's health. Risks of OHCs as discussed in previous studies including health information privacy and medical misinformation were similarly identified. However, parents did not report a harmful association between OHC use and their relationship with their child's providers, with only 2.8, 4.3, and 2.8% of participants reporting an overall negative effect of OHC use on communication, trust, and confidence, respectively.

CONCLUSIONS: OHCs are a commonly used resource that help NICU families build communities and reduce anxiety. These data suggest that OHCs do not inherently pose a threat to the parent-provider relationship and should be validated by the medical team as a valuable potential resource, while acknowledging the legitimate risks that exist.

Pediatric Research (2022) 91:1827–1833; <https://doi.org/10.1038/s41390-021-01684-3>

IMPACT:

- Use of OHCs is increasingly common among NICU parents; however, it has been met with concern by many medical professionals. Existing literature has not yet explored the effect on dynamics in the NICU.
- Overall, our data show that OHCs have become a vital resource for families looking to build community among NICU parents and reduce anxiety. Though risks do exist around patient privacy and access to medical misinformation, fears regarding the impact of OHC use on parent-provider relationships may be largely unfounded.
- By using data to demonstrate how OHCs benefit the NICU parent experience, we hope to reframe OHC use and allow physicians to validate engagement and therefore mitigate legitimate concerns.

INTRODUCTION

Today, one of the primary functions of the Internet is communication, and social media, referring here to those websites and applications that enable users to create and share content, is a big part of that movement. According to data collected from the Pew Research Center, in 2019, 72% of American adults use at least one social media site, compared to 5% of U.S. adults in 2005.¹ One of the budding sectors within social media networking is the online health community (OHC), defined here as virtual social networking spaces where patients and families can interact with others regarding specific diagnoses and health conditions.

OHCs have developed as a part of the very common patient practice of turning to the Internet for medical advice. In 2013, the Pew Research Center found that 35% of U.S. adults say they have used the Internet to try to figure out what medical condition they may or may not have, while 59% said they had looked online for any health information in the past year.² Like many others,

parents, and particularly parents of young children, also turn to OHCs, utilizing technology and the Internet as a source of medical information that is easy to access and up to date.³ Many parents believe that OHCs allow them unique access to data tailored specifically to their child's health issues that can be difficult to access outside of the medical community.⁴ A 2015 Canadian study found that 98% of parental respondents used the Internet to search for information regarding their child's health, while a 2019 study conducted out of Ireland found that parents of children with rare disease "frequently and habitually" turn to the Internet and social media to seek guidance regarding their child's condition.^{5,6}

There are numerous potential benefits to be derived from these social-media-based communities. Patients and their families can learn medical information, seek peer support, and even become involved in research that may benefit both themselves and the scientific community at large. Some studies have shown that

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Received: 11 May 2021 Revised: 12 July 2021 Accepted: 17 July 2021
Published online: 17 August 2021

access to OHCs empower patients to become more involved in their care, encouraging active rather than passive consumption of health information.⁷ However, there are also many drawbacks. As one physician in the *AMA Journal of Ethics* writes, "It can be difficult to control the quality of the information shared on these sites, causing concern about dissemination of inaccurate information."⁸ A 2019 study looking at the reliability and quality of online resources for parents of preterm infants seeking information found that, of the 197 websites analyzed using the DISCERN tool, less than half (41.1%) were considered to have high reliability and less than a third (30.5%) were considered to have high quality of treatment information.⁹ Though in many cases there are guidelines and rating systems that have been put into place in an attempt to regulate these spaces, there is very real potential harm in the publication of incorrect or inappropriate data that patients and their families can use to guide their healthcare decisions.¹⁰

In pediatrics, and particularly in high-stress, high-acuity settings such as the neonatal intensive care unit (NICU), one additional area of concern is the effect that increased Internet use by parents may have on the doctor–patient relationship. A 2019 study in *Clinical Pediatrics* found that parents were more likely to trust their child's pediatrician and less likely to seek a second opinion when online information supported their diagnosis. They were consequently less trusting and more likely to seek a second opinion if Internet results were contradictory.¹¹ Similarly a study published that same year looking at the Internet's effect on parental trust in pediatrician diagnosis of autism found that parents were less likely to trust their child's physician and more likely to seek a second opinion when exposed to conflicting medical diagnoses online.¹²

In the NICU, the integrity of the parent–provider relationship plays a critical role in a family's ability to cope with the trauma of having a critically ill newborn.¹³ Furthermore, poor communication between families and NICU staff can have a negative impact on patient care.¹⁴ As OHCs continue to grow, with instant access and constant discussion, it is important for clinicians to understand what NICU families are talking about online, and how participation in these virtual spaces impacts and potentially interferes with parent–provider relationships. Currently, there is very limited data in the literature on this subject, particularly as it pertains to this specific patient population. With this in mind, our study aimed to further explore the use of OHCs among NICU parents, with the hope of gaining insight into the ramifications of what has become the new normal.

METHODS

This was a two-part study. The first part of the study involved the electronic distribution of surveys to NICU parents. NICU parents were selected via Internet searches conducted to identify active support or advocacy groups that specifically targeted NICU families. "NICU Parent" for the purpose of this survey was defined as "anyone who identifies as a biologic, adoptive, or foster parent, guardian, or primary caregiver of a child who is or has been a NICU patient."

Groups were defined as "active" if they had one or more posting online within the previous 3 months. Surveys were also administered via the "NICU Families" Reddit stream with permission of subgroup administrators. Data collection occurred over a 3-month period.

Survey participants were asked whether they used either social media or OHCs geared toward NICU families to discuss their child, as well as the frequency of and reason for their usage of these platforms. Those who reported OHC utilization were subsequently asked to delineate how engagement in these virtual spaces affected different aspects of their relationship with their child's medical care team in the NICU, including communication with, trust in, and confidence in, as well as overall quality of relationship. Demographic information was also collected from both study groups.

The second part of the study involved the collection and evaluation of NICU-centered OHC content posted on the popular platform, Reddit. Reddit is social news aggregation and discussion website that facilitates dialogue among its global users. It has 430 million average monthly users

with 21 billion screen views per month for its many communities and discussion pages. Reddit has many "subreddits," or web forums specific to a particular topic of discussion. The subreddit "NICU Parents," includes 4400+ active subscribers, as well as thousands more readers and contributors. Though many other platforms that parents and families turn to including Facebook and Twitter have significantly more daily average users, the forums and groups on these sites are private spaces. Therefore, to maintain the integrity of these confidential and often deeply personal virtual communities, Reddit, and specifically the "NICU Parents" subreddit forum, was chosen as the proxy for OHC content for the purpose of our study due to its publicly accessible nature. All posts from two 1-month periods, 6 months apart (February 2020 and August 2019) were pulled for analysis.

Data analysis

Comparison of survey responses was done using chi-squared test.

All Reddit posts were analyzed by the research team looking for thematic patterns, including frequency, intensity, and perception of importance as stated by post authors and OHC participants. Theme development was directed by the content of the data. Theme notes from transcribed scripts were analyzed by two members of the research team. Recurrent patterns in meaning were derived from the data, and the most prevalent themes are presented.

RESULTS

Survey

In total, 248 people participated in our survey. Six of those participants answered "no" when asked if they identified as a NICU parent and were therefore ineligible for the remainder of the survey. Table 1 describes the study population of those 242 remaining.

Of those remaining, 58.3% ($n = 141$) answered yes when asked if they used specific social media sites or OHCs geared toward NICU parents and families to discuss their child in anyway during their NICU stay. These individuals were then given a list of ten reasons why they used OHCs during their child's hospitalization and asked to check those they identified as true. The most commonly selected responses were as follows: I wanted to make contact with other NICU families with similar problems at 78% ($n = 110$), I wanted to reduce anxiety regarding information given to me by my medical team at 66.7% ($n = 94$), I wanted to share my successes with other NICU families with similar experiences at 63.1% ($n = 89$), I wanted to vent my frustrations to other NICU families with similar experiences at 53.2% ($n = 75$), and I wanted to know more about the information provided by my medical team at 44% ($n = 62$) (Table 2).

When asked to describe the effect of OHC use on various components of the relationship with their child's medical team, 61.0% of participants noted an overall positive effect on communication with the team, 56.1% noted an overall positive effect on trust in the team, and 59.6% noted an overall positive effect on confidence in the team. In all, 58.1% documented that use of OHCs had an overall positive effect on the general quality of their relationship with their child's NICU team. Only 2.8, 4.3, and 2.8% of participants reported an overall negative effect of OHC use on communication, trust, and confidence, respectively (Fig. 1).

Reddit posts

In total, 176 Reddit posts were extracted across two 1-month periods, each 6 months apart: 95 posts from February 2020 and 81 posts from August 2019. Each post had varying levels of engagement in the form of likes and comments made by other Reddit users.

Posts were divided into five subcategories or nodes based on topic: (1) requesting or sharing medical advice; (2) venting frustrations regarding the medical care, team, or setting; (3) sharing positive news or accomplishments; (4) seeking general support or advice; and (5) other. In total 27.8% of posts ($n = 49$)

Table 1. Demographic data comparison.

Characteristic	Participants n = 242 n (%)
Female	223 (92.1)
Age, years	
16–30	52 (21.5)
30–50	174 (71.9)
50+	14 (5.8)
Race	
Asian	2 (0.8)
Black/African-American	5 (2.1)
Caucasian	201 (83.1)
Hispanic	21 (8.7)
Native American	2 (0.8)
Other	7 (2.9)
Marital status	
Married	214 (88.4)
Divorced	6 (2.5)
Single/never married	16 (6.6)
Region of residence	
New England	17 (7.0)
Mid-Atlantic	37 (15/3)
Midwest	48 (19.8)
Southeast	41 (16.9)
South-Central	29 (12.0)
Mountain	22 (9.1)
Pacific	30 (12.4)
Other	17 (7.0)
Highest level of education	
Some HS	1 (0.4)
HS degree	8 (3.3)
Some college	35 (12.5)
Assoc. degree	20 (8.3)
Bach. degree	99 (40.9)
Grad. degree	76 (31.4)

Remaining percentage preferred not to answer.

fell under the node 4, followed by node 3 at 27.3% ($n = 48$) and node 1 at 26.7% ($n = 47$) (Table 3).

Node 1 represented 26.7% of all posts and included solicited or shared medical advice specific to NICU patients and their birth mothers. Inquiries regarding the latter group were specific to fetal wellbeing, breastfeeding, or other issues related to the health of the neonate. Questions posed by post authors often included personal medical information specific to the child, including gestational age, birth weight, and diagnoses, as a means of seeking out targeted advice from members of the online community. Examples included:

- “The doctors don’t recommend getting the corticosteroids until week 24. We talked them down to 23 & 5. They said it won’t work until week 24. Today I was feeling really anxious about not making it until then and started researching about the shots. According to ACOG you can give the shots as early as 23 weeks. One study showed it dropped mortality rates from 73.5% to 59.1% in week 23. My husband wants to wait until the 23 & 5 but my anxiety (intuition?) is wanting to do it ASAP. Does anybody have any experience getting the shots that early? I am 23 weeks exactly today.”
- “...The doctors are starting to really push for a g-tube and I just don’t know what to do. At what point is it better to give him surgery and bring him home to work on feeds versus staying here for who knows how much longer? The NICU he’s in is very hesitant to discharge with an ng and say a g tube is the safer option even though it’s much more invasive, but a lot of his nurses have told me that they don’t agree with the doctors and that I should push them to teach me to place/check an ng and take him home to work on feeds instead of going with the g tube. I don’t know what to do. On one hand, I would like to take the least invasive option possible and at least try the ng and if we can’t increase feeds substantially at home by the time he needs to get his hernia repaired in April, then we could give him the g tube at the same time we fix his hernia. On the other hand, the doctors have made me a little afraid of an ng at home because of issues like possible aspiration...What is everyone’s experience with ng tubes or g tubes? Should I fight for an ng or just agree to let them give him a g tube?”

Node 2 was the most infrequently identified at 5.7% and included posts centered around expressing frustrations or sharing grievances pertaining to the NICU experience. Examples included:

- “Begin vent session: Yesterday I got to the NICU at 7:15 and found my baby on her crib completely uncovered, naked

Table 2. Reason for use of OHCs.

Question	Responded yes (n)	Responded yes (%)
I had questions that my medical team had not answered	16	11.3
I did not understand information provided by my medical team	8	5.7
I wanted to reduce anxiety regarding information given to me by my medical team	94	66.7
I wanted to know more about the information provided by my medical team	62	44.0
I did not see my child’s medical team enough during the hospitalization to ask all of my questions	16	11.3
I wanted to find alternate therapies for my child	17	12.1
I did not trust the information provided by my medical team	4	2.8
I wanted to make contact with other NICU families with similar problems	110	78.0
I wanted to vent my frustrations to other NICU families with similar experiences	75	53.2
I wanted to share my successes with other NICU families with similar experiences	89	63.1

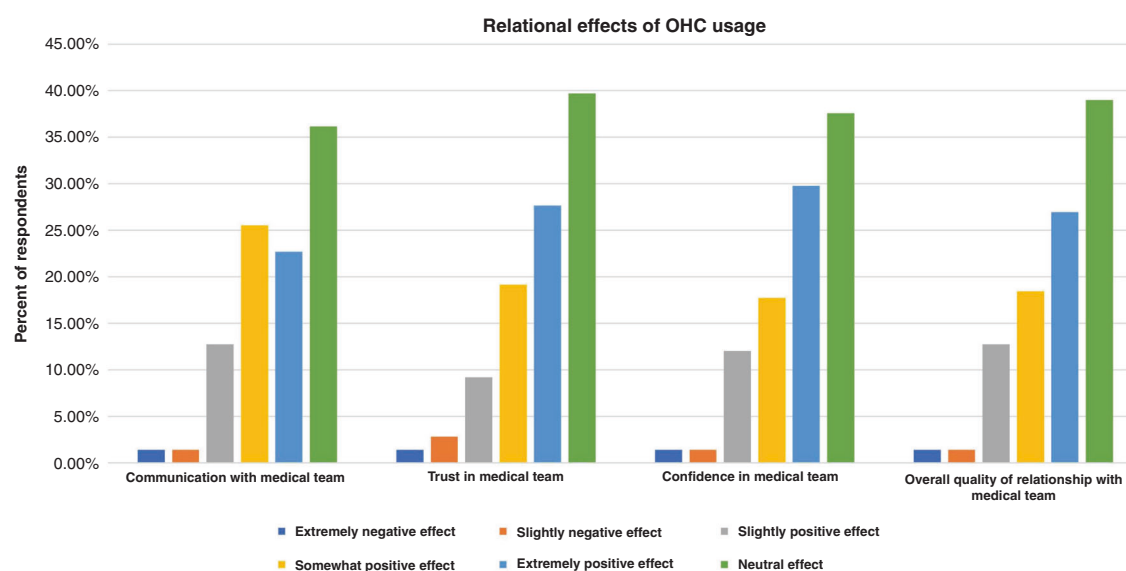


Fig. 1 This graph demonstrates the relational effect of OHC usage as reported by NICU parents. Specifically, it depicts parent assessment of OHC utilization on communication with their medical team, trust in their medical team, confidence in their medical team, as well as overall quality of the relationship with their medical team. Each color bar represents a different participant response ranging from “extremely negative effect” to “extremely positive effect”.

Table 3. Reddit posts: node classification.

Node #	Node name	February 2019 (n)	July 2021 (n)	Total (n)	Total (%)
1	Requesting or sharing medical advice	20	27	47	26.7%
2	Venting frustrations	3	7	10	5.7%
3	Sharing positive news	27	21	48	27.3%
4	Seeking general support or advice	28	21	49	27.8%
5	Other	17	5	22	12.5%
Total		95	81	176	100%

except for her diaper, and laying very still on her side - not her normal self. Upon closer examination, I saw her diaper in such bad shape...I also saw her G tube was completely disconnected, one half was hanging around her with the end falling behind her back, while the other end was at her feet. Her entire bed was soaked with formula and extremely cold...I wanted to cry out of frustration and anger, but managed to stay calm for my baby so I could focus on getting her clean, warm, and comfortable... I stayed with my baby until 9 pm until she was sleeping, thanked the nurse and left almost running. Once in my car I started crying. I felt so much guilt and was angry with myself. I wish I could be with her more often but can't and finding her like that really broke my heart."

- "Our son has an elongated skull...He'll grow out of it but for now you can't lay him on his back without putting a neck roll under him or he suffocates. It's important that he does not suffocate. However, it doesn't seem to be important to the nursing staff to pass that information along. Today when the very young nurse who was still training with another nurse didn't pay much attention to me when I told her she couldn't lay him on his back without a neck roll. She started to see my point about 5 seconds later when he had a desat and his heart rate started dropping. This led to several minutes of desat, him spitting up and just generally not doing great...After I calm down a bit who do I need to have a polite conversation with about my son's care? Dr? Charge nurse? Who?"

It should be noted that there were other posts not categorized under node 2 that also contained comments from community

members with similar language (e.g., frustrations with the care team, treatment course, etc.). However, only those posts whose central premise aligned with the subcategory theme were included in the node 2 classification.

Node 3 involved posts in which parents and family shared accomplishments and good news about their children with the community. In all, 27.3% of posts were categorized under node 3. Posts typically received substantial engagement from online community members in the form of likes and comments and often included photos of the author's children and families. Sample posts included:

- "My 24 weeker amazes me! 5 months adjusted 9 months actual"
- "Our little 25 weeker born Dec 2, 1 pound 10 oz. Now weighs 4 pounds 7 oz. Doing great!"

Node 4 was the most common categorization, representing 27.8% of all posts, and included advice sought that was not medical or treatment specific. Content most commonly included topics related to psychologic wellbeing and emotional coping for parents and families, as well as advice on how to navigate the NICU environment and experience. Examples included:

- "I was induced at 37 weeks, and our baby spent the first week of her life in the NICU. I know that so many parents have a much harder and longer stay than ours and my heart goes out to all of you... She is still on oxygen, and is doing well, but I'm not. I feel so overwhelmed by anxiety and fear that something bad will happen to her I'm losing sleep and I think I'm

exhausting my husband...I'm scared. I'm anxious. I'm tired. I'm guilty. And I'm missing out on the joys of being a family because of it. Did anyone else experience this when they came home from the NICU? How were you able to get back to functioning?"

- "...The day he was born was the best day of my life and also the worst and I'm still so angry about that. I'm angry that we were robbed of the birth experience we wanted. I was doing so well until this last week. My anxiety seems to be at an all-time high. The rational part of me knows that he is happy and healthy but anytime he has as much as a diaper rash, I fall apart. The first few days in the NICU were the only time in my life I have truly felt broken, and I feel like I'm reliving that all of a sudden for no good reason, especially since it has been a little bit since he has come home. Have any other dads (or mothers) felt this way? Any advice would appreciated..."

Node 5 or "other" represented 12.5% of posts, all of which could not be otherwise categorized in nodes 1–4. Topics for this node ranged widely. Examples include:

- "A relative of a relative is in the hospital right now, about to give birth @ about 6 months. Mom has all sorts of issues-health, drug, and mental, and right now not sure if either are you going to make it. My husband and I are considering adopting, as the original family that was going to take them is doing it out of obligation. They would absolutely love the baby, and give it a good life, but really thought they were just about done, and would be grateful for someone else willing to love it. Is there anyone who knows where I would even get started looking into adopting across state lines, dealing with the hospital, and what I'd need to figure out?"
- "Can I refuse my partners family from visiting my baby when I am not there?...I do not particularly care for his mother and sister and do not want them visiting my baby unless I am present. Legally is this possible?"

DISCUSSION

To begin the analysis of our results, it is important to first look at parental motivations behind use of OHCs. When asked to identify the motivations behind OHC usage during their child's hospitalization, the most common responses fell into two general categories: desire to connect or communicate with other NICU families and need for additional resources.

Regarding the former, 78.0% of respondents reported OHC use because "[they] wanted to make contact with other NICU families with similar problems," while 63.1% said "I wanted to share my successes with other NICU families with similar experiences" and 53.2% said "I wanted to vent my frustrations to other NICU families with similar experiences." These results indicate a strong desire to bond and communicate with other individuals in their peer group seemingly unfulfilled by any in-person resources at their child's hospital. This sentiment was similarly reported in a 2016 study looking at use of social media by NICU fathers. Researchers found that conversations held in targeted OHCs were better able to relieve emotional distress when compared to discussions with friends, due to the ability to share experiences with others who have faced similar challenges.¹⁵

Regarding the latter, 66.7% of families checked yes for "I wanted to reduce anxiety regarding information given to me by my medical team," and 44.0% checked yes for "I wanted to know more about the information provided by my medical team." These responses demonstrate an eagerness for supplementary materials to alleviate angst surrounding data provided in the clinical setting. Interestingly, only 11.3% endorsed that they had questions unanswered by their medical team, while only 5.7% stated that

they did not understand information provided by their medical team. This juxtaposition may indicate that, though adequate medical information is being shared with families, there is a lack of comprehensive support to make them feel comfortable with the volume they absorb each day.

Overall, the content discussed by NICU parents and families on Reddit was relatively diverse with medical advice, general support, and positive news constituting equivalent proportions of posts. However, there were two common themes that should be noted.

The first is the vulnerability and level of specificity of the content shared. Despite the public nature of the forum, parents were consistently willing to provide intimate details about their child's medical care, their own medical care, challenging family dynamics, and struggles with mental health. Though Reddit provides a layer of anonymity through the use of aliases rather than the legal names and a lack of institutional or geographic identification, users often included unambiguous details and shared extensive narratives incorporating their own personal information. Some families took this openness a step further, integrating images of their children while inpatient or upon their return home into their posts. In total 29.5% ($n=52$) of posts included some photo component, either in the body of the post itself or in the comments.

The second theme is the consistency of engagement with other members of the subreddit. In total, across 176 posts there were 2154 comments from the community, with an average of 12.2 comments per post. As parents shared their photos, asked for advice, and revealed their struggles, they were met with a steady stream of kind words, encouragement, and well wishes. In one example, the author says,

"Hardest week of my life. We are seven weeks into our NICU journey. Our 30 + 2 SIUGR has been doing great until a hiccup with liver sent us to the Children's Hospital... We knew we would face challenges, but I never dreamed anything like this."

In the comment section, they receive,

"Sending hugs if you want them. My daughter was born emergency c-section 2months early due to other complications mostly severe IURG too. We got to bring her home not too long ago. She was 3lbs and is now up to 8. I hope you get to bring your little one home soon. Stay strong!"

"I'm so sorry. Sending you love and good vibes. I will pray for you tonight."

"I'm so sorry you're going through this. It honestly sounds like your NICU is staying on top of everything and he's in the very greatest of care..."

This pattern was consistent across the platform.

Regarding the impact of OHC participation on parent-provider relationships as outlined in the study objective, in aggregate, participants did not report a harmful association between OHC use and their relationship with their child's providers. As stated previously, while only 2.8, 4.3, and 2.8% of participants reported an overall negative effect of OHC use on communication, trust, and confidence, respectively, 61.0% of participants noted an overall positive effect on communication with the team, 56.1% noted an overall positive effect on trust in the team, and 59.6% noted an overall positive effect on confidence in the team. In all,

58.1% documented that use of OHC's had an overall positive effect on the general quality of their relationship with their child's NICU team, with the remaining participants reporting a neutral effect. These results were similarly reflected with only 2.8% of respondents endorsing OHC use because they "did not trust the information provided by my medical team."

It is true that some of the reservations regarding OHCs remain. As our data show, user comfort level with the dissemination of personal information reflects pre-existing concerns regarding health information privacy and confidentiality in the age of social media.^{16–19} Additionally, given the proportion of OHC content involving requests for or provision of medical advice specific to the medical–surgical management of newborns, it is problematic how unreliable much of the data accessible on these virtual platforms tends to be.^{9,20,21} However, our results demonstrate that the deleterious effects of OHCs in the NICU community do not in fact include overarching damage to the patient–provider relationship. Rather, we found a largely positive impact, or no impact at all, meaning that the fear that OHCs act as a wedge between families and their medical team may be largely unfounded.

Though these findings may indicate the need for augmentation of hospital-based resources such as in-person support groups or peer bonding opportunities, our data show that OHCs are being used by parents and families to address their concerns in a way that they have deemed efficient and valuable.^{22,23} Therefore, it is our assertion that providers should both acknowledge and validate OHC use by NICU families, knowing that the risk to provider–parent rapport is low, and that doing so may allow room for the development of a more patient-centered relationship in which supplemental information sought out by the family is seen as meaningful,⁷ and parents are encouraged to tap into these potentially supportive, empathetic communities. Next steps may include providing information to families regarding appropriate use of these spaces, as well as conducting due diligence to identify reliable, parent-endorsed OHCs to offer as a resource, thereby combating issues of information credibility and confidentiality head on.^{24,25}

Limitations

It is important that we acknowledge the significant limitation posed by the use of Reddit as our sole proxy for OHC content. Though the platform does see millions of users each day, other websites such as Facebook and Twitter attract different populations within the larger NICU parent community, meaning that content drawn from any one source cannot be perceived as representative of the community as a whole.

The reasoning behind the use of Reddit was twofold: the Reddit NICU Parents subgroup is a specific and active forum with widespread reach, and all Reddit posts are publicly accessible. The latter point is perhaps the most important to emphasize in this context. Though content discussed in private forums may be perceived as more protected by participants and therefore consist of different conversations or representative proportions of the themes presented here, they are by definition private. After speaking with moderators from several private NICU parent-oriented Facebook groups, we as a research team made the decision not to breach the confidence of these virtual communities, whose integrity is predicated on the maintenance of safe, confidential spaces for individuals of shared experiences. Though we recognize that this limits the scope and generalizability of our study, we feel that this was the most ethical approach.

CONCLUSION

This study demonstrates that OHCs are commonly used by NICU families, primarily for the purpose of community building, experience sharing, and anxiety reduction through online

discussion. Our data does not indicate that OHC use has a negative impact on the parent–provider relationship, thereby suggesting that OHCs do not inherently pose a threat to the rapport between NICU families and their medical teams. However, many of the existing concerns regarding OHC use are legitimate, specifically patient privacy and medical misinformation. Though in-person relationships and hospital-based resources should remain the priority, given the motivations behind use, frequency of use, and content of OHCs, it is evident that NICU parents and families have identified a need for these virtual spaces, therefore engagement in OHCs by families should be acknowledged and validated by their providers.

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AUTHOR CONTRIBUTIONS

S.Y.A. helped to conceptualize and develop this project and was responsible for the acquisition and interpretation of data, as well as drafting, reviewing, and revising the manuscript. R.T. was responsible for the analysis and interpretation of data as well as reviewing the manuscript. B.E.L. helped to conceptualize this project and was involved in the interpretation of data as well as reviewing and revising the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

COMPETING INTERESTS

The authors declare no competing interests.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Patient consent was not required for the purpose of this study.

ADDITIONAL INFORMATION

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