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Pain Management During Newborn Screening

Using YouTube to Disseminate Effective Pain Management Strategies

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ABSTRACT

To assess the reach, acceptability, and effect of the BSweet2Babies video showing breast-feeding, skin-to-skin care, and sucrose during blood sampling on intention to recommend the video or advocate for use of the interventions. In July 2014, the video and an electronic survey were produced and posted. After 1 year, the online viewer survey responses and YouTube analytics were analyzed. One year after posting, the BSweet2Babies video had 10 879 views from 125 countries and 187 (1.7%) viewers completed the survey. Most respondents were aware of the analgesic effects of breast-feeding, skin-to-skin care, and sucrose. Nearly all respondents ($n = 158$, 92%) found the BSweet2Babies video to be a helpful resource and 146 (84%) answered that they would recommend the video to others. After viewing the video, 183 (98%) respondents answered that they would advocate for 1 or more of the interventions. The BSweet2Babies video showing effective pain treatment during blood sampling had a large reach but a very small response rate for the survey. Therefore, analysis of acceptability and effect on intention to recommend the video and advocate for the interventions depicted are limited. Further research is warranted to explore how to best evaluate videos delivered through social media and to determine the effect of the video to promote knowledge translation into clinical practice.

Key Words: blood specimen collection, infant, newborn, pain management, social media, translational medical research

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Blood sampling by heel lance or venipuncture for newborn screening is performed for nearly all babies within the first 48 hours of birth,[1] and preterm and sick babies require repeated blood sampling and other painful procedures during their hospitalization.[2,3] Blood sampling is painful and causes distress at the time of the procedure, and repeated painful procedures are associated with an increased risk of poor neurological outcomes in preterm babies.[4] There are simple, effective, free, or very cost-effective ways to reduce pain, based on high-quality synthesized evidence.[5] Breast-feeding[6] or holding babies in skin-to-skin care (SSC),[7] before and during blood tests, or giving babies small volumes of sweet solutions, either sucrose[8] or glucose,[9] reduces pain and distress. All 3 are effective when used independently. The choice of

which to use depends on whether the mother is breastfeeding, the health of the infant, and availability of the mother, father,[10] or other caregiver[11] to hold the infant in SSC. Despite national and international recommendations and clinical practice guidelines recommending these strategies,[12,13] published studies of practices show that uptake of recommendations has been poor and infants continue to receive inconsistent pain treatment during single or repeated painful procedures in many settings.[2,3,14] As such, a knowledge-to-action gap exists, suggesting that there is a discrepancy between evidence of best practice and its implementation. Developing and evaluating novel knowledge translation strategies to address this knowledge-to-action gap are therefore, important.

To date, knowledge translation interventions to address this gap have focused on strategies to alter the behavior of healthcare providers.[15] However, other key stakeholders—namely, parents—may have an important role to play in terms of understanding, and advocating for, pain management practices during painful blood draw procedures.

One potential avenue to reach parents, or potential parents, is through social media and video-sharing sites such as YouTube. YouTube has become an increasingly popular medium for healthcare researchers to disseminate consumer-targeted health-related educational messages and to study the quality, reach, and effect of healthcare messages on behavior.[16] With more than a billion users, there is ample opportunity to reach viewers, particularly in the young adult population, who have documented viewing habits totaling hundreds of millions of hours of video watching, generating billions of views.[17] In a previous systematic review of YouTube videos, our team included 142 consumer-posted videos of infants being immunized.[18] Another research team conducted a review of publicly accessible educational videos on needle pain treatment in children, which included 25 videos, of which 16 (64%) were targeted at educating parents.[19]

Evaluating the reach and effect of a consumer-targeted video demonstrating use of effective and widely recommended pain treatment during newborn blood sampling is important. Such evaluation can further inform the use of YouTube as a medium for knowledge dissemination. To develop this evidence base, our team produced a brief parent-targeted (giving parents knowledge of how to comfort their infant during painful procedures) and parent-mediated (supporting parents to advocate for effective pain management for their infant to healthcare providers)[20] educational video, titled BSweet2Babies. The video included 3 scenarios depicting infants undergoing blood tests while being breastfed, held SSC or given sucrose, and showed the analgesic effects of each strategy.

The aim of the present study was to evaluate the reach and acceptability of the BSweet2Babies video as posted onto YouTube. Additional aims were to ascertain viewers' intention to recommend the video to others and to ascertain viewers intent use or advocate for using the demonstrated pain management strategies.

METHODS

Video development

Between 2012 and 2013, in collaboration with parents of newborn infants and clinicians in maternal/newborn centers, our team worked with our affiliated organization's audiovisual department to professionally produce the BSweet2Babies video. Three families with an infant in the affiliated neonatal intensive care units who were undergoing routine blood work were recruited to be featured in the video. The 3 newborns in the video are shown receiving their blood work while (1) being breastfed, (2) held in SSC, and (3) given sucrose. In total, the video is 4 minutes 12 seconds in duration, with the following components (start and end time on video indicated beside segment title):

- Introduction: 0:00 to 0:15
- Breast-feeding segment: 0:16 to 1:08
- SSC segment: 1:09 to 2:34
- Sucrose segment: 2:35 to 3:32
- Credits: 3:33 to 4:12

Two camera angles are shown so that the viewer can simultaneously see the pain-reducing intervention and the ease of the blood-taking technique for the nurse while the pain management strategy is used. The BSweet2Babies video includes a voice-over in easy-to-understand lay person's language giving parents information on how they can use the recommended strategies. The video has been shown to clinicians and researchers in 3 large international scientific conferences[21–23] and has been evaluated for quality and usability by parent representatives across Canada. The BSweet2Babies video was posted on YouTube on July 31, 2014, in English.

Data collection

After 1 year of being posted on YouTube, we used YouTube analytics to assess the number of views; countries where the video was viewed from; length of viewing time (to establish percentage of video viewed); and number of likes, dislikes, and comments. In addition,

the video contained a link to a brief online survey. The survey was created in Research Electronic Data Capture[24] and accessed via a link in an annotation banner throughout the video. The survey contained 7 brief questions, which asked who the viewers were (healthcare provider, parent, researcher), previous viewing of the video, previous knowledge of infant pain treatment, future intention to use pain treatment in infants, and perception of how useful the video is.

Data analysis

Descriptive summary statistics were used to report YouTube analytic data and survey responses. Frequencies in numbers and percentages are reported. For survey responses regarding prior knowledge of the 3 pain management strategies, and association with intent to use each pain management strategy, the paired-sample McNemar test was used to compare proportions, with a significance level set at .05. All survey data were entered into Research Electronic Data Capture and exported to SPSS[25] for analysis.

Ethics approval

Parents and nurses included in the videos gave written consent for public display of the videos. Ethics approval to post the videos and study the reach and impact was granted by the affiliated hospital's research ethics board.

RESULTS

One year after being posted on YouTube, the BSweet2Babies video received a total of 10 879 views. The video was viewed in 125 countries, with the top viewing countries being Canada (4229 views, 39%), the Unites States of America (2640 views, 24%), Australia (621 views, 5.7%), the United Kingdom (340 views, 3.1%), and India (258 views, 2.4%). On average, viewers watched 1 minute and 48 seconds of the video, or 43% of the total video, with a range of 1 second to the full video. Table 1 shows the percentage of views that lasted until the end of each segment.

In addition, the video received 31 "likes," 2 "dislikes," and 3 comments. Of the 3 comments made, 1 was by the lead author of this article commenting back to the original comment. The original comment had questioned the evidence concerning the analgesic efficacy of sweet solutions; therefore, the response concerned the abundant evidence from the 2 large systematic reviews of sucrose[8] and glucose.[9] The other comment was a negative comment in relation to the time it would take to implement the suggested pain management strategies. Specifically—"wow that staff has alot of free time !!!!!![sic]." A response to this comment was not made by this author team.

During the 1-year period following posting of the video, 187 viewers completed the online survey. Based on the number of views (10 879), this is a response rate of 1.72% of the total viewers. Although the video was targeted at parents of infants, only 13 (7%) identified themselves primarily as parents. The remaining 93% of survey respondents identified themselves as healthcare providers ($n = 141$; 75%), researchers ($n = 15$; 8%), or both healthcare providers and researchers ($n = 2$; 1%). Two (1%) respondents did not specify their role and 14 (8%) identified themselves as "other."

The large majority of respondents were aware of the effectiveness of each of the 3 pain treatment strategies and most would use or advocate for use of each of the pain treatment strategies after viewing the video. After viewing the video, 170/173 (98%) respondents answered that they would advocate for 1 or more of the interventions. Most respondents stated that they would use or advocate for all 3 of the pain management strategies shown in the video (see Table 2).

There was no statistically significant difference between participants' intent to use or promote use of breast-feeding or SSC for procedural pain based on their prior knowledge. Of the 160 respondents who answered that they were previously aware that breast-feeding during painful procedures reduces infants' pain, 140 (87.5%) stated that they intended to use or advocate for breast-feeding in the future. Of

Table 1. **Absolute audience retention**[a]

Segment viewed	Time point in video	Percentage of views
Viewed until end of introduction	0:15	75
Viewed until end of breast-feeding segment	1:08	52
Viewed until end of SSC segment	2:34	37
Viewed until end of sucrose segment	3:32	28
Viewed until end of credits	4:12	13

Abbreviation: SSC, skin-to-skin care.
[a]Absolute audience retention defined as the number of views for every moment of a video as a percentage of the total number of video views.[26]

Table 2. **Number of respondents who intend to use or advocate for 1, 2, or 3 of the strategies shown in video**

Question	*N*	%
After viewing the BSweet2Babies video, intend to use or advocate for 1 of the 3 pain management strategies?	Yes = 170/173 No = 3/173	98 2
Intend to use or advocate for all 3 pain management strategies	103/170	61
Intend to use or advocate for 2 of the 3 pain management strategies	40/170	24
Intend to use or advocate for 1 of the 3 pain management strategies	25/170	15
Missing	2/170	1

the 18 respondents who answered that they were not previously aware of analgesic effects of breast-feeding during procedures for babies, 13 (72%) stated that they intended to use or advocate for breast-feeding in the future (related-samples McNemar test; $P = 1.00$). Similarly, 146 respondents were previously aware of analgesic effects of SSC during procedures for babies and 113 (77%) answered that they intended to use or advocate for SSC in the future.

Of the 33 respondents who stated that they were not previously aware of analgesic effects of SSC during painful procedures for babies, 27 (82%) stated that they intended to use or advocate for SSC in the future ($P = .78$).

For sucrose, however, the difference was statistically significant. Of the 147 respondents who stated that they were previously aware that sucrose reduced pain during painful procedures, 108 (73%) stated that they intended to use or advocate for sucrose in the future. Yet, of the 31 people who stated that they were not previously aware of the analgesic effects of sucrose, only 12 (39%) stated that they intended to use or advocate for sucrose in the future ($P = .04$).

Nearly all respondents ($n = 158/171$; 92%) answered that the BSweet2Babies video was a helpful resource and 146/173 (84%) answered that they would recommend the video to others. Most ($n = 154/171$, 90%) felt that the video was the right length; 158/171 (92%) felt that the video was easy to understand, and 164/172 (95%) felt that the video was easy to apply in real-life situations.

DISCUSSION

Twelve months after posting a brief parent-targeted video showing 3 effective strategies to reduce newborn infants' pain during blood sampling (breast-feeding, SSC, and sucrose) on YouTube, the video had more than 10 000 views. This large number of views highlights the potential for vast reach of an educational intervention. This evaluation of reach, acceptability, and effect of the parent-targeted educational YouTube video reflects research dissemination methods that healthcare researchers in diverse clinical areas have recently begun to use.[16,18,27]

However, the average length of viewing indicated that the first 2 pain management interventions (breast-feeding and SSC) were mostly viewed, and by the time the sucrose scenario ended, just after 3 minutes and 30 seconds, there were only 28% of viewers remaining. If the video was an effective intervention for attitudes toward practice, the lower level of support seen for the use of sucrose may, at least in part, be due to limited viewing of the benefits of this intervention. Our ability to cross-check viewing time and survey responses was limited as YouTube provides only aggregated statistics that cannot be associated with specific survey responses.

As there were only 187 responses to the viewers' survey accessed directly from the YouTube video, from a potential pool of 10 879 viewers (a response rate of only 1.7%), the value of administering surveys to ascertain the usefulness of video content through YouTube must be questioned. Although very little data currently exist on response rates of surveys administered through YouTube, our study results are consistent with other similar studies. In a study evaluating usefulness of educational nephrology-focused YouTube videos,[28] 232 surveys were completed for 4041 YouTube video views, a response rate of only 5.7%. In a previous study conducted by our team, evaluating the reach and dissemination of a brief (1 minute 35 seconds) video showing effectiveness of breast-feeding and sucrose during infant vaccination, the video was viewed by more than 68 000 viewers in the 12-month period following posting.[29] Yet, the brief survey, administered by the same methods as this current study, was completed by only 156 viewers—a response rate of only 0.23%. These low response rates highlight that YouTube can be an effective method of disseminating information but an ineffective way of collecting survey data from viewers. Although participant feedback suggests that the video may have an effect on intention to advocate for and use the pain management strategies demonstrated, the actual effectiveness in changing practices is not known.

In addition, fidelity of the "intervention" is unable to be controlled. In our study, although the primary target audience for the BSweet2Babies video was parents of infants, the majority of viewers who completed the survey identified themselves as healthcare providers. We cannot be sure of who the majority of viewers were as most did not respond to the survey. The reasons for the higher proportion of healthcare providers completing the survey are not known but may reflect a survey response bias, with healthcare providers more willing to complete online surveys. Regardless, the survey responses were very positive, with respondents indicating strong support for future implementation of the pain management practices shown in the video. As we cannot know from this study to what extent the practices were actually implemented, better ways of evaluating the impact of health education videos posted onto YouTube is required. There remain limitations to knowledge regarding whether or how social media-delivered educational interventions can improve patient outcomes.[27]

As highlighted by the negative viewer comment about the time it may take to use effective pain management strategies during painful procedures, a number of barriers exist to consistent provision of recommended pain management interventions. The perception that supporting parents to comfort their infants during painful procedures is too time-consuming was also identified as a barrier in a survey of newborn pain management practices in Ontario special care nurseries.[14] Such perceptions and subsequent actions that result in inadequate treatment of procedural pain in newborn infants go against the principles of family-centered, or family-integrated care. It is hoped that providing parents with the evidence in a way that allows them to advocate for their infant, alongside ongoing healthcare provider–targeted education and knowledge translation strategies, will ultimately result in improved pain management for newborn infants.

Since the completion of this study, the BSweet2Babies video was revised in partnership with Baby Friendly Initiative (BFI) according to BFI recommendations. An additional message in the video now clearly states that if breast-feeding or SSC cannot be used, sucrose, with or without a pacifier, can be used. The updated video has been posted onto YouTube (https://www.youtube.com/watch?v=L43y0H6XEH4&feature=//youtu.be), and the original video that was evaluated in this study has been removed from general public viewing. The updated video, along with another video focusing on the power of parents' touch for newborn infants, posted onto YouTube by the Centre for Pediatric Pain Research (https://www.youtube.com/watch?v=3nqN9c3FWn8), is now endorsed by the BFI and included in educational materials used for accrediting hospitals with BFI status. The effectiveness of these 2 videos in improving use of recommended effective pain management strategies remains unknown. Combining such social media–delivered interventions with traditional randomized controlled trials may be required to address this knowledge gap.

With the aim of making the parent-targeted BSweet2Babies video widely available and accessible, it has since been produced and posted on YouTube in 7 languages in addition to English (French, Spanish, Portuguese, German, Mandarin, Arabic, and Inuktitut). This current study focused only on the reach, acceptability, and effect of the English video; however, further studies are planned to evaluate similar outcomes for the videos produced in languages other than English.

STRENGTHS AND LIMITATIONS

This study of the reach, acceptability and effect of a parent-targeted video depicting effective newborn pain management demonstrated a large and wide-spread reach of the video; however, there was a very low response rate to the viewer survey, accessed via a link directly from the YouTube video. This limits the usefulness of this method of data collection. In addition, as the majority of respondents self-identified as healthcare providers, this in all probability led to a response bias. We therefore, remain unsure about parents' existing knowledge of effective newborn pain management, their perceptions of the video as an educational tool, or their intent to advocate for and use breast-feeding, SSC, or sucrose during newborn screening or other blood work. Developing more effective means of evaluating the effect of knowledge dissemination strategies using social media platforms is important to inform future use of social media by healthcare providers and researchers as a means of improving outcomes.

CONCLUSION

The BSweet2Babies YouTube video showing effective pain treatment during newborn blood sampling had a large reach, and findings suggest a potential positive effect on intention to advocate for and use pain management strategies in the future. However, the response rate to the online survey was extremely low, limiting the generalizability of the findings. Although targeted at parents of newborn infants, the viewer survey was largely completed by healthcare providers. As YouTube is being increasingly used by healthcare providers and researchers for widespread knowledge dissemination, more effective methods of evaluating the impact of

consumer-targeted videos posted onto YouTube are a necessary next step in the study of social media as a medium of knowledge dissemination.

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