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A Survey of Neonatal Clinicians' Use, Needs, and Preferences for Kangaroo Care Devices

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ABSTRACT

Background: Decades of research supports the benefits of kangaroo care (KC) for the parent and newborn. Supportive KC devices may be an important tool clinicians can use to assist parents with KC. In recent years, there has been a rise in the availability of KC devices. However, the use, needs, and preferences for these supportive devices by neonatal clinicians have not been documented.

Purpose: To survey clinicians' use, needs, and preferences of KC supportive devices, and examine whether differences exist based on clinician and organizational characteristics.

Methods: A cross-sectional, online survey was sent through neonatal organization Web sites, conferences, and social media.

Results: Many clinicians (n = 68, 43%; N = 158) facilitated KC with a supportive device, with 81% of devices provided by the clinician's employer. The most important "Must Have" feature of a KC device was "Safety: Reduces patient falls if caregiver sleeps or needs to use hands" (84% of respondents) followed by washability (82%), and "immediate, effective access to the baby" (78%). Clinicians' responses did not differ based on hospital setting, type of unit, KC experience, or experience using a KC device.

Implications for Practice: To support safe use of KC devices in neonatal intensive care unit (NICU) clinical care, a device must hold the proper KC position consistently, allow immediate access to the infant, and hold the infant in place without the parent's hands to prevent falls. Training is needed to ensure safe device use.

Implications for Research: Future research should evaluate the safety, efficacy, and cost-effectiveness of these devices.

Key Words: devices, infant, kangaroo care, patient safety, skin-to-skin contact

Decades of research supports the benefits of kangaroo care (KC) for both the parent and the newborn, including improved breastfeeding initiation and maintenance, parent mental health, bonding, attachment, infant cardiorespiratory stability, brain maturation, and development.[1-10] Yet, there is considerable variation in the adoption and implementation of KC in clinical practice.[11-13] Frequently cited barriers to implementing KC include the concern over patient safety, the lack of tools to overcome safety barriers, and the lack of clear implementation guidelines when promoting KC.[14-19] To address these barriers, many hospitals are promoting the use of KC supportive devices.[20-23]

A KC supportive device is defined as a wrap, fabric, or garment whose main purpose is to aid the caregiver with holding the infant in the proper KC position for safe, prolonged, and comfortable sessions.[20,21] Products that claim to be KC safe and effective supportive devices for use in practice settings have become increasingly available in recent years. Yet, little is known about KC device use in practice settings. Importantly, the prevalence and nature of the use of KC supportive devices has not been reported in the literature. Before we can begin to understand the role that these devices may have in KC implementation, we must first have a better understanding of how and why these devices are being used, and in what practice settings.

In this study, we examined prevalence of clinician use of KC devices by asking the question, "Have you facilitated KC for your patients with a device (yes/no)?" We also explored how and why these devices were being used, as we asked clinicians to elaborate on their experiences and rationale for using KC devices with a free-text response. We also examined clinicians' needs when using a KC device by having clinicians rate features as needs (Must Have/Must Not Have) or preferences (Nice to Have/Not Important).

Because this was an exploratory study, we wanted to better understand where these devices

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were being used and who was using them. Therefore, we examined whether the clinician's use of KC devices (yes/no) differed based on clinician and organizational characteristics. We also hypothesized that neonatal clinicians who work in different clinical settings may have different needs—and preferences—on the features of these devices that help facilitate implementation of KC, while keeping patients safe. For example, a nurse caring for infants in a level I neonatal intensive care unit (NICU) might have different needs than nurses who care for critically ill, intubated, and/or premature infants in level III/IV NICUs. We also hypothesized that nurses' needs and preferences of KC device features may evolve and thus differ based on their experiences facilitating KC.

The purpose of this study is to survey clinicians' use, needs, and preferences of KC supportive devices, and examine whether differences exist based on clinician and organizational characteristics. The knowledge gained from this study will serve as a first step in understanding whether and how these devices can assist with safe, systematic implementation of KC.

What This Study Adds

- Use of KC devices is not widespread in NICUs.
- Overall, the most important feature of a KC device was "Safety: Reducing patient falls..
- Training on KC devices is needed to promote their safe use during KC.

METHODS

Design, Study Settings, and Participants

This was a cross-sectional, exploratory, and descriptive survey study that was deployed online using Research Electronic Data Capture (REDCap). Survey questions did not include any identifiable information and all responses were thus anonymous.

We used the snowball recruitment method to reach our target sample, as viewers of the online survey were encouraged to share the survey link with other eligible participants. Our target sample was clinicians from a variety of disciplines (ie, nurses, physicians, respiratory/occupational/physical therapists, etc) who practiced in the United States and self-identified as playing a role in the care of the neonates. We used questions in the survey to block responses from participants who were not eligible for study participation. REDCap survey invitations were distributed electronically to NICUs across the country and to neonatal clinicians at professional conferences. The International Gravens' Conference, National Association of Neonatal Nurses, and National Perinatal Association are 3 of the organizations and conferences that facilitated distribution of the survey through online neonatal community groups and organization Web sites.

The authors (A.W. and Y.C.J.) created the survey with questions designed to learn about individual and organizational demographics, clinician experiences with KC in practice, and their personal opinions about the needs of parents, infants, healthcare workers, and administration related to KC devices. The survey is designed to help clinicians reflect on why a KC device is needed for their respective practice setting and patient population and reflect on what the clinician is trying to achieve with the use of a KC device. The survey was originally developed by Yamile Jackson, PhD, PE, PMP, CKC in partnership with key stakeholders, including parents, ergonomists, experts in the field of neonatology, and neonatal clinicians from a variety of disciplines. In collaboration with Ashley Weber, PhD, RN, the entire survey was then separately tested and refined for face validity and clarity. Dr Weber provided the entire survey to over 40 neonatal experts, who practiced in 3 NICUs across the state of Ohio. Experts were asked to address the following questions:

1. Are there any items missing in the evaluation tool that should be added? (If so, please state.)
2. Are there any items in the evaluation tool that are duplicative or irrelevant, and should be deleted? (If so, please state.)
3. Are there any items that are unclear or need to be reworded? (Please make suggestions.)

While no clinicians suggested items to be deleted or added, several wording changes were incorporated into the final survey based on expert feedback.

Measures

Clinician Demographics

Neonatal clinicians were asked a variety of demographic questions to adequately describe the sample and to understand whether clinicians' use, needs, and preferences differed based on clinician and organizational demographics. We looked at whether device use, needs, and preferences differed based on organization characteristics, because devices are typically used by an entire unit or organization, rather than used by some parents and not others. However, to account for the fact that nurses with less KC experience might not have had a chance to use devices, we also examined device use, needs, and preferences based on the clinician's KC experiences.

Kangaroo Care Device Evaluation Survey

The Kangaroo Care Device Evaluation Survey is a 35-item tool that assists in identifying aspects of a KC device that are most needed to facilitate KC in

each practice setting and patient population. Subscales include perspectives from the parent, infant, clinician, and administration. Items are on a 4-item Likert scale, in which the choices are Must Not Have, Not Important, Nice to Have, and Must Have. The survey also includes free-text responses asking respondents to describe their experiences (if any) with KC devices.

Data Analysis

Frequencies and percentages were used to quantify and summarize participants' responses to each question in the survey. The χ^2 or Fisher exact tests (in cases where the number of respondents in a cell was fewer than 5) were used to analyze relationships between categorical variables. Independent *t* tests and 1-way analysis of variance were used to analyze normally distributed continuous dependent variables. Because responses from this survey-based study were kept anonymous, meant to describe existing practice, and did not collect any identifiable information, the Institutional Review Board of Nationwide Children's Hospital (FWA00002860) considered this survey study "exempt." An overall α level of .05 was used for analysis. All data were exported from REDCap into STATA 15 software.

Kangaroo Care Device Use

First, we first examined the prevalence of device use based on the question, "Have you facilitated KC for your patients with a device (yes/no)?" To better understand who was using the devices and in what settings, we examined whether device use (yes/no) differed based on clinician and organizational characteristics with χ^2 and Fisher exact tests. Finally, to better understand how and why devices were being used, we asked respondents to provide a free-text response elaborating on their experiences and rationale for using KC devices. Free-text responses were analyzed using well-established content analysis procedures.[24-26] Two team members independently reviewed open text responses and confirmed results of the context analyses.

Kangaroo Care Device Needs and Preferences

We examined needs and preferences by having clinicians rate device features as needs (Must Have/Must Not Have) or preferences (Nice to Have/Not Important). We then examined whether differences existed based on clinical and organizational characteristics.

RESULTS

Demographics

Table 1 describes the demographic characteristics of our sample. Of the 158 neonatal clinicians who responded to the survey (Table 1), the majority of

TABLE 1. Respondent Demographics (N = 158)

	n (%)
Where do you currently practice?	
Northeast	32 (20.2)
Midwest	86 (54.4)
South	21 (13.3)
West	19 (12.1)
	n (%)
How many hours do you work caring for newborns and their mothers?	
Full-time	116 (73.4)
Part-time	35 (22.2)
Contingent	7 (4.4)
	n (%)
What is the highest level of education you have attained?	
Diploma	7 (4.4)
Associates' degree	20 (12.7)
Bachelors' degree	84 (53.16)
Masters' degree	41 (25.9)
Practice doctorate (DNP)	3 (1.9)
Research doctorate (PhD)	3 (1.9)
	n (%)
What is your primary responsibility?	
Academic	2 (1.3)
Administration	2 (1.3)
Education	11 (7.0)
Clinical	136 (86.1)
Other	7 (4.4)
	Mean (SD)
Age and experience, y	
Age	42.8 (13.5)
Experience	17.1 (13.0)
	n (%)
What is your primary position?	
Administration (ie, director, case manager, discharge coordinator, and educator)	10 (6.3)
Nurse practitioner (other)	14 (8.8)
Researcher	3 (1.9)
Nurse (ie, staff, transport)	103 (65.2)
Therapist (ie, physical, occupation, and respiratory)	14 (9.9)
Physician	1 (0.6)
Other (ie, lactation consultant, consultant, and academic faculty)	13 (8.2)
	n (%)
Have you obtained certification in your field?	n (%)
Yes	53 (33.5)
No	105 (66.5)

clinicians were staff nurses (64%), whose main role was clinical (86%), held bachelor's degrees or higher (87%), and worked full-time (74%). Only 40% of respondents had taken a formal KC course, and roughly 50% had facilitated KC transfers more than 100 times (Table 2). Finally, 50% stated they encourage parents to provide KC every time a parent is present at the bedside (Table 2).

Kangaroo Care Device Use

Roughly 43% of respondents had experienced facilitating KC with a supportive device (Table 2). Clinicians' use of KC devices (yes/no) did not differ based on individual or organizational characteristics (Table 2). When asked to elaborate on their experiences and rationale for using KC devices, a majority of KC device users stated that their employer

TABLE 2. Kangaroo Care Device Use by Organization and Clinician Demographics

Have You Facilitated Kangaroo Care for Your Patients With a Device?	Device User (Yes) n = 68 (43%)	Nondevice User (No) n = 90 (57%)	*P* Value[a] Totals n = 158 (%)
What is your healthcare setting?			*P* = .45
Academic medical center	29 (41.4%)	41 (58.6%)	70 (44.3%)
Community hospital (teaching)	29 (49.1%)	30 (50.9%)	59 (37.3%)
Community hospital (nonteaching)	8 (34.8%)	15 (65.2%)	23 (15.1%)
What is your primary work setting?			*P* = .07
Level II/I NICU, special care nursery, labor/delivery, mother/baby[b]	9 (42.9%)	12 (57.1%)	21 (13.3%)
Level III NICU	28 (35.4%)	51 (64.6%)	79 (50.0%)
Level IV NICU	31 (55.4%)	25 (44.6%)	56 (35.4%)
Where is your hospital located?			*P* = .73
Urban (≥50,000 people)	58 (44.6%)	72 (55.4%)	130 (82.3%)
Suburban (2500-50,000 people)	8 (34.8%)	15 (65.2%)	23 (14.6%)
Rural	2 (40%)	3 (60%)	5 (3.2%)
Is your hospital Magnet-designated?			*P* = .14
Yes	46 (44.7%)	57 (55.3%)	103 (65.2%)
No	22 (40%)	33 (60%)	55 (34.8%)
Is your hospital baby friendly?			*P* = .31
Yes	38 (40.9%)	55 (59.1%)	93 (58.9%)
No	30 (46.2%)	35 (53.8%)	65 (41.1%)
Have you taken a formal KC course?			*P* = .92
Yes	27 (43.6%)	35 (56.5%)	62 (39.2%)
No	41 (42.7%)	55 (57.3%)	96 (60.8%)
How many KC transfers have you facilitated?			*P* = .55
>100 times	35 (45.5%)	42 (54.6%)	77 (48.7%)
<100 times[b]	33 (40.7%)	48 (59.2%)	81 (51.3%)
How often do you facilitate KC?			*P* = .69
Every time a parent is present at the bedside	9 (36.0%)	16 (64.0%)	25 (15.8%)
Every time a parent has time to kangaroo	23 (42.6%)	31 (57.1%)	54 (34.1%)
If the parent requests it, never[b]	36 (45.6%)	43 (54.4%)	79 (50.0%)

Abbreviations: KC, kangaroo care; NICU, neonatal intensive care unit.

[a]P values reflect results of χ^2 tests testing categorical differences between device users and nondevice users during kangaroo care. In instances where cells had less than 5 observations, P values represent results of Fisher exact tests. Continuous dependent variables were analyzed using independent 2-sample t tests.

[b]Categories were collapsed when observations were less than 5 observations. Collapsing did not change statistical outcome of test.

provides the devices to parents (n = 55; 81% of KC device users). Several clinicians stated in the free-text section that KC devices used on their unit were made by their patients' families. Some clinicians also stated that they used chairs, pillows, blankets, and positioning aids to act as a supportive KC device (although we did not define KC devices in this way). Clinicians reported a wide variety of wraps, garments, and fabrics used as KC devices. Fabrics included lightweight cotton, stretch cotton, spandex jersey, and cotton/Lycra blend. Clinicians described KC devices that functioned like zip-up tube tops, T-shirts with a pouch to place the infant within, sleeved shirts with wrap around Velcro and supportive belts, or simple Velcro bands. KC devices varied by their closing/support mechanism (ie, zipper, Velcro, ties, buttons, or fabric). Clinicians' comments about their experiences with using KC devices were similar whether they liked the device they had used, or not. Specifically, clinicians frequently mentioned safety, security, support, and ease of use as both negative and positive attributes of the devices. Clinicians rationale for using KC devices included "securing the baby to prevent slipping of the parent's chest," "holding the baby in place," "securing multiple lines like endotracheal tubes and intravenous lines," and to "keep lines safe during transfer."

Kangaroo Care Device Needs and Preferences

Table 3 summarizes participant responses to the Kangaroo Care Device Evaluation tool. Out of the 4 subscales (Baby, Parent, Clinician, and Administration), the most frequently cited "Must Have" need for a KC device was "Safety: Reduces patient falls if caregiver sleeps or needs to use their hands" (84%), followed by washability (82%), and "immediate, effective access to the baby" (78%). The most frequently cited need from the perspective of the infant was "Device holds the proper KC position consistently" (75%). Clinicians' needs and preferences on top-rated items did not differ based on any individual or organizational characteristics.

DISCUSSION

Kangaroo Care Device Use: Prevalence, Nature (Who/Where/How), and Rationale (Why)

Less than half of the respondents had an experience in facilitating KC with a supportive device, which may speak to the lack of importance given to these devices in US neonatal practice. Current developmental care standards for infants in intensive care[27,28] now recommend that "parents shall be encouraged and supported in early, frequent, and prolonged skin-to-skin contact (SSC) with their babies" (Standard 1, Skin-to-Skin Contact).[29] Furthermore, "parents should be allowed to sleep during KC when safety measures are in place that include … a baby well secured by an appropriate wrap" (Standard 1, Skin-to-Skin Contact: Competency 1.10).[29] The necessity of a KC device is becoming increasingly evident, as the acuity of neonatal patients and the duration of KC sessions increase over time.[30-32]

In the free-text response, many clinicians commented on how KC devices were used to secure and stabilize patients with endotracheal tubes, respiratory devices, and/or intravenous lines. These comments are consistent with the increasing trend to implement KC with complex, critically ill neonates, including extremely low birth-weight,[33] intubated infants[34,35] who may also have central lines.[36] There is also an increasing need to address risks that have been previously attributed to KC, including accidental falls,[37-39] sudden unexpected postnatal collapse,[40,41] and dislodgement of equipment or unplanned extubation.[34,35,42] Lowering risk associated with KC is just one of the reasons why many hospitals are promoting KC devices.[20,21]

We were surprised that KC device use was not associated with any clinician or organizational characteristics, including clinician experiences with KC. This may serve as an indication that KC device use does not necessarily increase KC implementation. Rather, a KC device is one tool that clinicians can use to promote safety and increase duration of KC sessions.[29] Another reason why neither clinician nor organizational characteristics were not related to device use may be that bedside clinicians and unit managers are typically not the ones to decide whether to provide KC devices for the unit. Rather, based on our clinical and management experience (A.W. is a PhD-prepared NICU nurse and Y.J. is a NICU parent, Certified Kangaroo Caregiver [CKC], and PhD ergonomics and safety engineer who designs KC devices), decisions are often made by administration, comparing the null cost of using parents' hands/blouse versus the cost of a KC device. Thus, individual and organizational implementation of KC at the bedside may not be related to whether management/leadership purchased devices.

Kangaroo Care Device Needs and Preferences

The most frequently cited need for a KC device was to promote patient safety and prevent falls. Safety concerns have been consistently reported as a barrier contributing to wide variation in the implementation of KC.[14,15,17] Similarly, implementation scientists have identified the inability to address safety concerns as a key barrier to implementation of evidence-based interventions.[43] However, neonatal researchers have also indicated that safety and medical eligibility

TABLE 3. Clinicians' Responses to the Kangaroo Care Device Evaluation Form

	Must *Not* Have, n or n (%)	Not Important, n or n (%)	Nice to Have, n or n (%)	Must Have, n or n (%)
Features of a kangaroo care device: important for infant				
Device holds the proper kangaroo position consistently	1 (0.6)	1 (0.6)	38 (24.0)	118 (74.7)
Only the fabric touches the infant (eg, not buttons/zippers/snaps/stiches)	0 (0)	4 (2.5)	39 (24.7)	115 (72.8)
Supports proper kangaroo position without pressure points on the infant's body	2 (1.3)	3 (1.9)	40 (25.3)	113 (71.5)
Avoids stuffing the infant down into the device (ie, works around the infant)	1 (0.6)	0 (0)	50 (31.7)	107 (67.7)
Fabric is stretchable, yet strong	0 (0)	1 (0.6)	52 (32.9)	105 (66.5)
Device maximizes chest-to-chest contact	1 (0.6)	1 (0.6)	51 (32.3)	105 (66.5)
Fabric is breathable	1 (0.6)	1 (0.6)	53 (33.5)	103 (65.2)
Minimizes infant movements that may dislodge equipment/lines	1 (0.6)	6 (3.8)	49 (31.0)	102 (64.6)
Protects the infant from air drafts	0 (0)	8 (5.1)	59 (37.3)	91 (57.6)
Device holds the infant's weight during sitting, standing, reclining	1 (0.6)	9 (5.7)	59 (37.3)	89 (56.3)
Provides containment without restraining infant movement	1 (0.6)	3 (1.9)	67 (42.4)	87 (55.1)
Is readjustable as the infant grows	0 (0)	5 (3.2)	91 (57.6)	62 (39.2)
The device closing mechanism is quiet to minimize disruption	1 (0.6)	5 (3.2)	95 (60.1)	57 (36.1)
Device has only one layer of fabric over the infant	1 (0.6)	42 (26.6)	76 (48.1)	39 (24.7)
Device covers any part of the infant's head	36 (22.8)	52 (32.9)	63 (39.9)	7 (4.4)
Features of a kangaroo care device: important for parents				
Safety: Reduces accidental falls if parent falls asleep or uses hands during kangaroo care	1 (0.6)	1 (0.6)	22 (13.9)	134 (84.8)
Easy for parents to use	0	0	55 (34.8)	103 (65.2)
Comfortable for parents	0	1 (0.6)	57 (36.1)	100 (63.3)
Fabric is antiallergenic	0	3 (1.9)	66 (41.8)	89 (56.3)
Supports privacy: device is not see-through and covers parents' nipples	0	5 (3.2)	73 (46.2)	80 (50.6)
Keeps parent comfortable in a hot/cold room	0	3 (1.9)	91 (57.6)	64 (40.5)
Supports parental independence: parents can put device on and off alone, without support from staff	1 (0.6)	11 (7.0)	85 (53.8)	61 (38..6)
Supports privacy: minimizes time parent is exposed during transfer/interventions	0	5 (3.2)	94 (59.5)	59 (37.3)
Supports parental independence: with the device, parents may safely transfer the infant as clinically appropriate	2 (1.3)	12 (7.6)	97 (61.4)	47 (29.8)
Parents can put device on while standing, laying down, sitting	1 (0.6)	13 (8.2)	103 (65.2)	41 (25.9)
Allows for breastfeeding/pumping during kangaroo care	0	21 (13.3)	104 (65.8)	33 (20.9)
Device can hold multiple infants simultaneously	1 (0.6)	21 (13.3)	114 (72.1)	22 (13.9)

(continues)

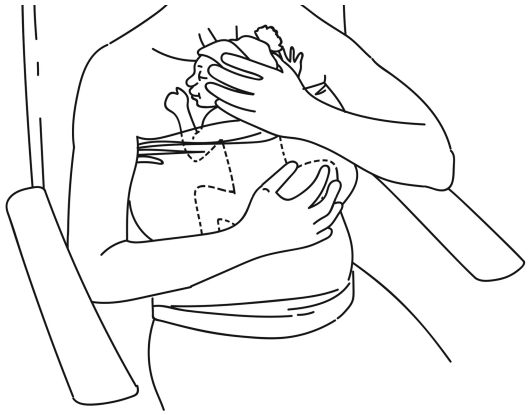
TABLE 3. Clinicians' Responses to the Kangaroo Care Device Evaluation Form *(Continued)*

	Must *Not* Have, n or n (%)	Not Important, n or n (%)	Nice to Have, n or n (%)	Must Have, n or n (%)
Features of a kangaroo care device: important for the healthcare team				
Immediate and effective access from the top, bottom, and side of the infant (for emergencies and interventions)	0	0	35 (22.1)	123 (77.85)
Device supports quick and easy transfers	0	2 (1.3)	64 (40.5)	92 (58.2)
Device supports sitting and standing transfers	0	3 (1.9)	76 (48.1)	79 (50)
There are publications, studies, and scholarly evidence to support use of the device	0	7 (4.4)	74 (46.8)	77 (48.7)
Minimum disruptions to the infant if immediate access is needed	0	3 (1.9)	81 (51.3)	74 (46.8)
Color of fabric: ability to see if the infant is bleeding, if equipment is leaking, or if infant's position needs adjusted	2 (1.3)	10 (6.3)	96 (60.8)	50 (31.7)
Features of a kangaroo care device: important for administration				
Device is washable	0	1 (0.6)	27 (17.1)	130 (82.3)
Device is unisex (for male and female caregivers)	0	16 (10.1)	56 (35.4)	86 (54.4)
Quality control is demonstrated by the manufacturer	0	4 (2.5)	69 (43.7)	85 (53.8)
Training is provided by the manufacturer to use the device	2 (1.3)	21 (13.3)	72 (45.6)	63 (39.9)
Use of the device is intuitive with minimal training	4 (2.5)	1 (0.6)	90 (57.0)	63 (39.9)
A variety of sizes to fit the individual caregiver (eg, not one size fits all caregivers)	2 (1.3)	13 (8.2)	84 (53.2)	59 (37.3)
Device is safe during caregiver transport (eg, from delivery room to postpartum room)	5 (3.2)	21 (13.3)	75 (47.5)	57 (36.1)
Versatile to use the device in any unit and at home	6 (3.8)	11 (7.0)	89 (56.3)	52 (32.9)
Device is able to be reused for multiple patients	27 (17.1)	29 (18.3)	55 (34.8)	47 (29.8)
Reduces supply chain costs (costs of determining inventory, storage space, providing training, maintaining quality control)	1 (0.6)	15 (9.5)	102 (64.6)	40 (25.3)
Healthcare providers can easily use the device to kangaroo patients if the unit loses power	6 (3.8)	24 (15.2)	92 (58.2)	36 (22.8)
Device is available for retail for parents to buy	9 (5.7)	29 (18.3)	87 (55.1)	33 (20.9)
Caregivers could take the device home after proper training and continue kangaroo at home with device	13 (8.2)	25 (15.8)	89 (56.3)	31 (19.6)
Device has one size that fits all caregivers	29 (18.3)	48 (30.4)	63 (39.9)	18 (11.4)

criteria for KC can be widely defined and even used inappropriately to justify avoiding KC while matching clinician comfort and convenience.[44] Of utmost importance is the ability of the clinician to see KC as an essential component of providing evidence-based, neuroprotective care, and a willingness to understand and address risks to promote safe KC.[44]

Before purchasing, clinicians need to critically evaluate whether a device safely, consistently, and properly holds the KC position (Figure 1), because adverse events like accidental falls,[37-39] sudden unexpected postnatal collapse,[40,41] and dislodgement of equipment or unplanned extubation[34,35,42] are significantly more likely to occur when the proper KC position is not maintained. When choosing to purchase any piece of equipment, it is imperative that the purchaser critically evaluate not only the cost of the product, but also the safety and value the product brings to the organization.[45,46] To ensure safety, we recommend that clinicians carefully and comprehensively evaluate the features of the device, taking into consideration the needs of all stakeholders, including patients, families, clinicians, and hospital administration.

FIGURE 1



Proper kangaroo care position. Proper position of the infant during kangaroo care.

Standardization for evaluating new products is one method that can promote robust review processes, which eliminate purchasing decisions driven by a few people without regard for safety and the needs of key stakeholders.[47] For example, organizations and/or neonatal units could create a purchasing/product evaluation committee, or value analysis team (VAT),[46] which would include all key stakeholders and facilitate decision-making through a transparent, data-driven approach that includes comparative assessments of similar items available on the market.[45] Teams should perform a comprehensive analysis of whether the KC device promotes safety and adds value (eg, usability, features, patient and staff satisfaction, and overall cost to supply chain).[45-47] The Kangaroo Care Device Evaluation Survey could be one resource that VATs use to help examine the needs of their key stakeholders and what their unit is trying to achieve by using a KC device.

Training Is Needed for KC and KC Devices

Our respondents' experience with facilitating KC is consistent with previous literature documenting clinicians' lack of knowledge and training in the provision of KC.[14] Only 40% of respondents received formal training on KC. As a standard of care, dedicated content on KC should be included in clinical orientations and training sessions offered to neonatal clinicians.[13,48,49] Lack of knowledge surrounding KC devices was also evident, as 24% of respondents stated that "Holding the proper KC position consistently" was a "Nice to Have" feature and 15% stated "Safety: Reduces patient falls" was "Nice to Have."

Management should ensure that both families and staff are trained and understand the purpose of a KC device: to hold the infant's weight and proper KC position consistently so that the caregiver can kangaroo as soon as possible, as prolonged as possible,[28,29] and as safe as possible. Device training is especially important because some KC devices are not intended or appropriate for every patient population and for every context (eg, parent sleep during KC). Thus, training needs to be tailored to the patient population, clinic setting, and goals for what the unit is trying to achieve with a KC device. For example, safe and appropriate device use can depend on the size and medical condition of the infant and parent, and whether the device will be used in the hospital and/or home settings.

Device training should highlight features like the visibility of the infant, material composition and warmth, unisex options (male/female), accessibility for breastfeeding/pumping interventions, and the infant's weight limit, to ensure safe use with the intended population. For instance, if KC with umbilical lines is a new NICU initiative and frequent monitoring is needed, the device design, fabric, and color should allow the clinician to easily assess and access the infant if there is bleeding, equipment is leaking, or the KC position needs adjusted.[36] Wet stains from blood or leaking equipment are more difficult to

Summary of Recommendations for Practice and Research	
What we know:	• KC is a well-supported intervention with numerous benefits for newborns and caregivers. • KC has not been consistently implemented in NICUs. • Devices designed to assist and support KC are available for clinician use.
What needs to be studied:	• The safety, efficacy, and cost-effectiveness of KC devices. • The prevalence and nature of KC device usage in different practice settings. • Whether and how the use of these devices increases safe, systematic implementation of KC in clinical practice.
What we can do today:	• Before purchasing, evaluate KC devices from multiple perspectives, including the perspectives of the infant, parent, clinician, and hospital administration. • When evaluating devices, know that a KC device must safely hold the infant and the proper KC position consistently. • Teams should perform a comprehensive analysis of whether the KC device adds value to the organization, considering safety, usability, features, supply chain costs, and patient and staff satisfaction.

visualize on darker fabrics (eg, black and navy).[50] Carefully read and follow the device manufacturer's instructions and warnings.

Future researchers should qualitatively examine why clinicians need some device features versus others, and the relative importance of various features to the safety of the patient. Future researchers also need to investigate whether and how KC devices facilitate the implementation of KC. Finally, neonatal researchers need to investigate the safety, efficacy, and cost-effectiveness of these devices for different clinical settings. Our study represents one small step in gathering evidence to answer these questions.

Limitations

There are several limitations in our study that we must acknowledge. First, we relied on a convenience sample of neonatal clinicians across the United States, but mostly from the Midwest. Because massive online posts and snowball recruitment strategies were used, we could not collect data on survey response rates. Thus, our sampling strategy made it impossible to know how many respondents viewed the survey invitation and decided not to complete our survey. Moreover, our respondents consisted mostly of staff nurses who practiced in level III/IV NICUs, with a limited number of other disciplines and other settings represented in our sample. Although we did not include parents and other caregivers in our study, future researchers should survey parents to investigate their needs, preferences, and use of KC devices. Finally, we did not include specific questions that examined whether the frequency, comfort, and duration of KC sessions had changed before and after clinicians began using KC devices in their practice setting. However, we did collect information about our respondent's current and prior practices of KC facilitation. Formal psychometric testing was not performed on this evaluation survey, as the different sections of the evaluation survey are not meant to represent a single concept or construct. Rather, the evaluation survey is meant to guide neonatal clinicians in considering all the aspects of a KC supportive device that may (or may not) be relevant to their patient population and practice setting. Currently, researchers only have anecdotal evidence about whether the use of KC devices increases the frequency, comfort, and duration of KC sessions for patients. Our study addresses an important gap in the literature by first documenting clinicians' use, needs, and preferences of KC devices.

CONCLUSION

Less than half of our sample reported using KC devices. As the use of KC devices increases in the United States, there will be an increased need for dedicated training on the purpose and proper use of these devices to ensure patient safety. Importantly, clinicians need to be trained on how to critically evaluate whether a device safely, consistently, and properly holds the KC position. The greatest reported need in using a KC device was to promote safety and reduce patient falls if the caregiver sleeps or needs to use their hands. To meet this need, key stakeholders should evaluate the features of each device, taking into consideration the perspectives of patients, families, clinicians, and hospital administration. Carefully read and follow the device manufacturer's instructions and warnings, as some KC devices are not intended for every patient population or for every context (eg, parent sleep during KC). By taking a proactive stance on KC device safety, clinicians can be comfortable promoting longer and more frequent KC sessions, and the result may be increased implementation of an effective KC program that realizes the documented benefits for every infant and parent.

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