

ORIGINAL RESEARCH ARTICLE

Barriers to implementation of placental transfusion of babies at birth in Zambia

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Abstract

Delayed cord clamping (DCC) and umbilical cord milking (CM) have many benefits. However, a previous study done in Zambia showed that it was not a common practice among midwives. This study investigated possible barriers to DCC and CM, at the University Teaching Hospital in Lusaka. This was a qualitative study. A convenience sample was chosen, and snowball sampling was used. The midwives were interviewed using semi-structured interviews. Burnard's method of thematic content analysis was used. Through 14 interviews it became clear that the midwives were aware of DCC and used it whenever possible. The participants reported that the main barriers were the high workload and a variation in knowledge. A lack of facilities, such as heaters and resuscitation equipment in the delivery room also led to earlier cord clamping. The midwives were motivated to continue improving the routines. They expressed a need for more training as well as equipment and resources to facilitate DCC. (*Afr J Reprod Health 2022; 26[2]: 58-67*).

Keywords: Placental transfusion, delayed cord clamping, umbilical cord milking, newborn, barriers, implementation, qualitative study, maternal and child health

Résumé

Le serrage retardé du cordon (DCC) et la traite du cordon ombilical (CM) ont beaucoup d'avantages. Une étude précédente réalisée en Zambie a montré que ce n'était pas une pratique courante chez les sages-femmes. Cette étude a examiné les obstacles possibles au DCC et à la MC, à l'hôpital universitaire de Lusaka. Il s'agissait d'une étude qualitative. Un échantillon de commodité a été choisi et un échantillonnage boule de neige a été utilisé. Les sages-femmes ont été interrogées au moyen d'entretiens semi-structurés. La méthode d'analyse thématique du contenu de Burnard a été utilisée. Au cours de 14 entrevues, il est devenu clair que les sages-femmes connaissaient DCC et l'utilise quand possible. Les participants ont indiqué que les principaux obstacles étaient la charge de travail élevée et la variation des connaissances. Un manque d'installations, telles que des appareils de chauffage et du matériel de réanimation dans la salle d'accouchement, a également entraîné un serrage du cordon plus tôt. Les sages-femmes étaient motivées à continuer d'améliorer les routines. Ils ont exprimé le besoin de plus de entraînement ainsi que d'équipement et de ressources pour faciliter DCC. (*Afr J Reprod Health 2022; 26[2]: 58-67*).

Mots-clés: Transfusion placentaire, clampage retardé du cordon ombilical, nouveau-né, barrières, mise en œuvre, étude qualitative, santé maternelle et infantile

Introduction

Delayed cord clamping (DCC) is the practice of waiting at least 60 seconds after the baby is born before clamping the cord. Cord milking (CM) is actively pushing the blood gently through the cord towards the baby¹. DCC and CM result in more net blood flowing from the placenta to the baby. This can have many benefits; however, because it is a relatively recent discovery, many places have not

yet adapted the practice². Despite DCC being an efficient and low-cost practice³, previous research suggests that it is not a common practice among midwives in Zambia⁴⁻⁵. This study aimed to discover what barriers the midwives experience to the practice of DCC and CM at the University Teaching Hospital (UTH) in Lusaka. It investigated why the midwives chose to delay or not to delay cord clamping in various situations, as well as what they think could be done to encourage DCC and CM.

Benefits of DCC and CM

DCC increases the baby's blood volume directly after birth, which reduces the risk of the baby needing blood transfusion. In addition to ensuring an adequate blood volume, DCC provides the necessary iron stores. The increased iron stores can have long-term developmental benefits, by lessening the risk of iron deficiency anemia for up to six months after birth¹. Iron deficiency during infancy can influence the development of the child⁶. DCC supplies an increase in the baby's hematocrit and hemoglobin¹. Furthermore, DCC leads to a significantly increased birth weight for the baby⁷. The lungs receive more blood after birth. Many experts reason that a lot of this blood is provided from the placenta if the cord clamping is delayed or cord milking utilized². Additionally, DCC can help prevent hypothermia by improving the circulation and perfusion².

DCC and CM can be particularly beneficial for premature babies¹. DCC in premature babies increases hemoglobin, hematocrit, red blood cell flow, cerebral oxygenation and blood pressure. This leads to a decreased risk of intraventricular hemorrhage, late onset sepsis and necrotizing enterocolitis. Premature babies who receive DCC are less likely to need surfactant, blood transfusions or mechanical ventilation^{1,2}. Delaying cord clamping in premature babies has been shown to reduce mortality, regardless of whether the baby was born by caesarian section or by vaginal birth³. Nearly all babies born before weeks 33 of gestation suffer from anemia and as a result premature babies often need a transfusion of red blood cells. Both DCC and CM can reduce the risk for needing a transfusion in preterm infants⁸. The extra blood from the placenta can help stabilize the circulatory system in the first day of life⁹. Rabe *et al.* found that milking the cord four times achieved similar results as delaying cord clamping by 30 seconds⁹.

Challenges

While there are a few theoretical complications to DCC, not many of these have been observed². There has been recorded less than a 2% higher risk of jaundice when DCC is preformed^{3,7}. However, very few studies have reported an increased need for phototherapy². Hypothermia is also of concern. It is

an important contributor to neonatal mortality, particularly in sub-Saharan Africa¹⁰. Studies have so far not shown any increase of hypothermia when DCC is utilized^{2,3}. To help prevent hypothermia while delaying the cord clamping, the baby can be wrapped in a warm, sterile, blanket. Gentle stimulation can also help².

DCC in relation to resuscitation is much discussed. Clinicians might worry that DCC can prevent resuscitation from starting immediately. On the other hand, the babies who would benefit the most from DCC are the babies who are sick or premature. After the baby is born, the placenta continues to function as a form of respiratory support for the baby, and can help the onset of breathing². Many settings require the baby to be transferred for resuscitation. In this case, the WHO recommends clamping the cord early¹. Milking the cord can produce similar results as DCC, in a shorter time and can in some cases be an alternative if it is not possible to delay².

Implementation

To implement DCC successfully the operational and logistical issues need to be assessed and addressed and the stakeholders need to be educated on why DCC is good for the baby. The practical aspects need to be addressed and guidance in a practical situation would be beneficial^{11,12}. There needs to be an understanding of the obstacles and the approach needs to encompass multiple disciplines, including midwives¹². To sustain the changes in cord clamping practice there is a need for continuing reeducation and support¹³.

Some studies emphasized the importance of clear guidelines for implementation of DCC. Education and discussion on how, when and why the use of DCC is important, as well as training on the practical techniques seemed to have positive effects on^{12, 14}. For successful implementation, it is important to have a protocol with clear guidelines on the use of DCC¹².

Zambian context

In 2011 58% of children under 5 in Zambia were anemic¹⁶ and as DCC is a low-cost way to reduce iron deficiency³, it could greatly benefit infants in Zambia. However, a study done among midwives,

in different settings around Zambia, showed that DCC was not a common practice. One of the reasons given for clamping the cord early was a fear that delaying might lead to an increased risk of mother-to-child transmission of HIV⁵. The UTH had a guideline regarding DCC that stated that the clamping should be delayed by one to three minutes. This guideline was, however, not available at the ward due to renovations and our study period.

Methods

A qualitative approach was chosen because qualitative data seeks to create a more in depth understanding of the participants' thoughts and opinions about the subject^{17,18}. The setting was the University Teaching Hospital in Lusaka. Given the pressures on midwives and anticipated difficulties accessing participants, convenience sampling by snowballing was utilised^{19,20}. The already established contact with the UTH facilitated the finding of a local gatekeeper and supervisor. The gatekeeper had a position at the hospital that enabled them to introduce the research and help with recruitment.

The inclusion criteria for participants in this study were:

- 18 years or older
- Practicing midwife
- Working at the UTH, Labour ward, in Lusaka
- Involved in more than one delivery a month
- Able to give consent
- Speaks English

Semi-structured interviews were chosen as a method because it is well suited for gathering qualitative data. They give an insight, both into the topic of the conversation, the participants' thoughts, and opinions, and how they express them. It is an iterative process where new themes arising during interviews can be added to the topic guide for later interviews²⁰. The interviews were recorded and transcribed verbatim. To analyze the interviews, Burnard's method of thematic content analysis was chosen. The aim of this method is to organize the results in a category system, linking together the issues and themes that were addressed during the interviews. The data from the interviews should be thoroughly studied and divided into as many categories as necessary²¹.

All participants were given an information sheet to read before providing written informed consent prior to the interviews. They were given the opportunity to ask questions before they signed the consent form. The transcripts were fully anonymized and referred to by pseudonyms.

Results

Each interview lasted between 15 and 25 minutes and took place during the workday, when the participant was available. Thirteen of the 14 interviews were recorded as one participant declined to be recorded. Instead, extensive notes were taken during and immediately after the interview. The transcripts were analysed and organized into four different themes with subthemes (see Figure 1).

Knowledge

The participants mentioned different times when they thought clamping would be ideal (see Table 1). The UTH had guidelines on how/when the cord clamping should be performed. This guideline states that the clamping should be delayed by one to three minutes. The guideline was however not available at the ward because of ongoing renovations. There had also been a workshop on DCC at the UTH in 2016. Eight of the midwives had attended this workshop. Throughout the interviews, several participants stated that they would like to get more training on DCC, both to learn more, and to refresh the knowledge. Not everyone had heard of CM, and some who had heard of it did not use it. There was less knowledge of the benefits of CM and many mentioned less blood-spillage as the only benefit (see Table 2).

"You would avoid that splash of blood, so definitely you would milk it." (P10).

Workload

The workload was one of the main barriers brought up by the participants. They reported delivering between two and ten babies per shift. The workload would vary, and night shifts were often extra busy. The midwives stated that if they were very busy, they would often cut the cord early (see table 2).

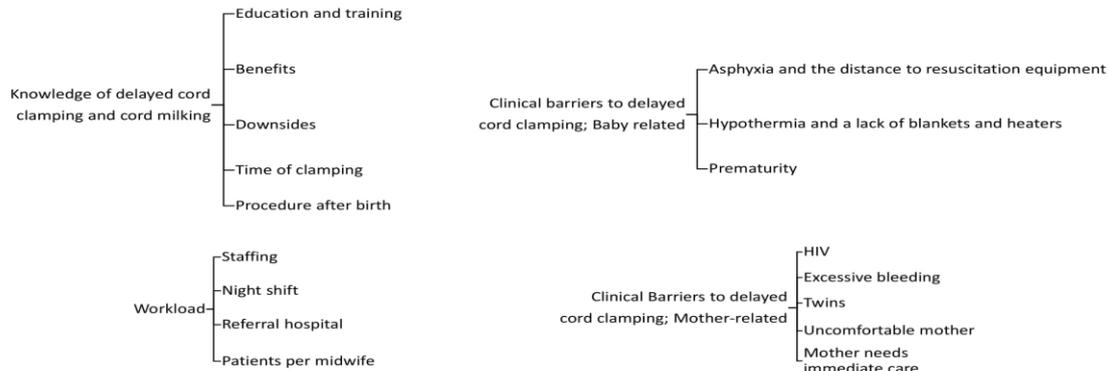


Figure 1: Analysis; Themes and subthemes

Table 1: Background of participants

Characteristic	Answer	Number/ frequency
Years as a midwife	0-2 years	6
	3-5 years	5
	6-8 years	3
Years at the university teaching hospital in Lusaka	0-1 year	4
	2-3 years	7
Worked anywhere else as a midwife	4-5 years	3
	Yes	5
Learned delayed cord clamping in midwifery school	No	9
	Yes	8
Time routinely waited before cord clamping after birth	No	6
	1-3 minutes	5
	3-5 minutes	6
	5-10 minutes	3

“You are delivering one, then you may find that there’s another one or two of them, they are also in second stage, they’re about to deliver, so in that case you can’t delay the clamping.” (P14).

“The number of midwives, at night there are very few compared to the number of patients that we receive.” (P1)

Baby-related factors

The participants reported clamping the cord early if the baby needed resuscitation.

“If I’m in a hurry, baby needs resuscitation, I just end up clamping and going.” (P8)

The resuscitation equipment was not situated in the same room as the laboring mothers. As a result, whenever a baby needed resuscitation, they had to be taken away from the mother (see table 2). One midwife stated that if the baby needed resuscitation, she would milk the cord once before clamping. Several of the participants expressed a wish for more resuscitation equipment closer to the mothers.

“I think we would need resusciteas near the, the mothers.” (P14)

Throughout the interviews, hypothermia was talked about as a challenge to DCC.

“Half the time you want, by all means to get the baby to the warmer room as fast as possible. So, you just cut there and then” (P10)

Table 2: Quotes

Topic	Quote
Procedure	“After two to three minutes you measure two centimeters from the stump, the cord stump, yeah, then you your forceps there. Then you measure about three to five centimeters and put another forceps. You clamp, then you cut the cord.” (P1)
Benefits of DCC	“It’s also the prevention of hypothermia. [...] It also reduces the risk of need for blood transfusion. And also improves the baby-mother bonding, and it also improves the baby’s immune system.” (P10) “I don’t know, it’s just that activity that the baby gives that is different when you just clamp. That’s what I noticed anyway.” (P7).
Cord Milking	“Just for the bonding of the baby and the mother. Just those few minutes.” (P3) “Most of the times I do both. It’s very rare that I just milk. In the event that the baby is gasping, I don’t delay; instead I milk, and then apply the cord clamp.” (P11) “I saw someone do it yesterday, in theatre, yeah. One of the doctors showed me how to do it.” (P4) “So just have it clear away from where you are supposed to cut from, so you don’t have the spillage and all...” (P4) “At first, I thought it was because they were avoiding when the flush of blood when cutting, but they were like, no it is to assist the baby have more blood and improve the HB.” (P8)
How they learned	“When I was at school they taught us to delay the cord for three to five minutes, before we clamp.” (P5) “In our midwifery course they never mentioned about delayed cord clamping.” (P13). “When I came to the UTH there was a workshop on delayed cord clamping. Yes, it was very educative, so since that time that I delayed cord clamping.” (P5) “With time it sank in and with more practice” (P10). “The first time I tried it I thought maybe I was just wasting time” (P7)
Workload	“When we have enough staff, with students around, it is easier. You can practice the delayed cord clamping. When we are short staffed maybe we are just four-, a few midwives, the other two have gone to theatre, and there are two remaining, it’s a challenge.” (P13) “Especially in the night you find that you have about three or four women pushing at the same time.” (P10). “So, we receive a lot of referrals, especially in the afternoons and night, or the weekends. [...] because they don’t have a doctor on call.” (P3). “This is a referral hospital, so everyone is sent here. For complications” (P7).
Resuscitation	“Delaying the cutting of the cord, it also helps, it’s another way of resuscitating the baby.”(P12). “If everything is okay, then you defiantly have to do it. But if there is need for resuscitation, either on the mother or on the baby, you just have to go ahead and clamp.” (P10) “We are expecting that there will be an asphyxiated baby, there is a team that is called around to help in the delivery.” (P13). “Cause there is a distance from where we conduct deliveries, to where the resuscitaire is. We only have one, stationed in the nursery. So, if you find that baby may need advanced resuscitation, we have to carry that baby. Making sure that the baby is warm to the nursery, from the delivering bed, which is about seven, eight or nine or ten meters away.” (P11)
Hypothermia	“Sometimes I think we might expose the babies to hypothermia, because of the distance” (P14). “It’s is not much nappies or linen for the baby, so... in that case you need to rush to clamp the cord and keep the baby warm in the nursery.” (P13). “We have to ensure at all times that the baby is kept as warm as possible.” (P13).
Prematurity	“Actually, with a premature baby we really need to do that [delay].” (P6). “The premature, then we tend to act fast, yeah, so we can properly provide warmth.” (P4) But it’s important that we delay, but in the proses of delaying, I think, we also delay care that the baby is supposed to receive from other experts.(P4)
HIV-positive mother	“I think for me I don’t take chances, I don’t wait, even if the mother is on medication.” (P14)
Mothers reaction	“There is fear that the baby can be exposed to the virus.” (P13) “Others are okay, but others-. like I said, one of the challenges is that we also receive adolescent mothers. You’d explain to them, the baby will be laying here on the abdomen, then we will delay the cord clamping, but others would, they would withdraw. They wouldn’t want to get the baby right there and then, wouldn’t want to touch the baby; I know that, so, that is one of the things.” (P10) “Cause they are there as fourteen year olds, twelve year olds delivering... ” (P10) “They may be already scared [...] some just, actually freak out when you put the baby on... they actually just... so you have to be careful ... yeah... they might move and they even fall down...” (P7)

Mother in need of resuscitation	“Maybe she needs resuscitation; there is no need for you to delay cord clamping.” (P8).
Suggestions	<p>“In case the baby is asphyxiated I should not delay to cut the cord. Cause that baby will need resuscitation immediately.” (P5).</p> <p>“We need more, maybe trainings, or just meetings, maybe workshops, so at least they emphasize on the importance of delayed cord clamping.” (P1)</p> <p>“We could have someone come and then on each shift, talk about the delayed cord clamping. So that we have more knowledge, more understanding and as to why, add more benefits also. [...] because I believe, in the medical world, the learning does not end.” (P3)</p> <p>“I think ah, the best thing is staffing. More midwives need to be employed” (P2)</p> <p>“So, I can just recommend that every room, it’s possible that every room should have a resuscitaire.” (P6)</p>

The midwives explained that the only room with proper heating was the nursery. This was particularly a problem in the winter months and at night. Several of the midwives reported clamping the cord early, so they could hurry the baby to the nursery.

“Cause at some point you find when it’s about 4am or 3am it is very cold, then you are rushing, you want to keep the baby warm.” (P12)

Some of the other midwives did however stated that drying the baby and leaving it on the mother’s abdomen could be sufficient while delaying the clamping. Access to more heaters and blankets, was mentioned as a possible improvement.

There were different opinions among the participants on whether cord clamping should be delayed if the baby was premature. Many thought it was okay to delay if there was no immediate danger to the baby.

“We try our best to delay. The same applies to the preterm babies.” (P2)

Nevertheless, there was a consensus that premature babies were more often in need of resuscitation and other lifesaving treatment that might lead to the cord being clamped early. While many delayed if the baby was in no immediate danger, three believed cutting the cord early was best for premature babies.

“A premature baby you expect that erm, any minute or any time, that baby may fail to breathe (P14).

One of these expressed concerns that, in delaying the cord clamping, she would delay the care the baby was supposed to receive from experts (see table 2). One participant mentioned having read that

DCC could lead to a premature baby getting too much blood.

“That’s what I was told. It’s not good to wait. It’s like, when you just let the blood flow, it’s like its overloading the system, but from what I think, I don’t think so. But that is what I read.” (P7).

Mother-related factors

While eight of the participants said, they would still delay if the mother were HIV positive; the other six reported that they would not. The participants who did not delay explained that it was important to reduce the risk of mother-to-child transmission as much as possible.

“If the mother is HIV-positive I’ll quickly clamp the cord.” (P6)

For some it made a difference if the mother was on medication for HIV. They said that if the mother had taken her medication for six months they would delay.

“Yeah, I do the same [delay the clamping], unless the mother hasn’t been on the treatment.” (P5)

The issue of DCC during twin births did not come up until the fourth to last interview. As such, it was not explored with the previous participants. In the interviews where it became a topic, the participants stated that a second baby could affect the time of cord clamping on the first baby.

“In such an instance, it’s better to clamp, and then assess for the position of the second baby” (P11).

Two of the participants had experienced mothers who did not want their babies to be put on their

abdomen. They said that some would panic when the baby was placed on their abdomen.

“They may be already scared” (P7).

One of the midwives explained that these were often adolescent mothers.

“Cause they are there as fourteen-year-olds, twelve-year-olds delivering” (P10).

She went on to say that in some cases she would not delay the clamping and cutting, in fear that the mothers panicking could lead to the baby getting hurt.

There were mentions of other complications that could lead to early cord clamping as well. For instance, one midwife mentioned clamping early if the mother was bleeding excessively, or if she was having a seizure.

Discussion

The goal of this study was to find out what barriers the midwives at the UTH in Lusaka experience to performing DCC, as well as what they think can encourage the use of DCC. The main barriers that were expressed were a lack of facilities and a high workload. The lack of resuscitation equipment, blankets and heaters resulted in a need to move the baby to a different room quickly. The workload was a problem because many midwives felt they did not have time to delay the clamping. There was also a variation in knowledge, particularly regarding CM and its benefits. Lastly, there was a difference in opinions of whether underlying conditions like prematurity or an HIV-positive mother would warrant early cord clamping.

The workload appeared to be a significant barrier to DCC. The lack of health professionals, such as midwives, in Zambia²², might be contributing to the high workload. The midwives described situations where they had to run from one birthing mother to the next and therefore cut the cord early. One of McAdams *et al*¹¹ most important steps to implementing DCC was assessing and addressing logistical and operational issues¹¹. DCC is, however, not a time-consuming procedure and it can be argued that workload therefore should not be a big barrier. It is possible that compliance to

guidelines might be better with proper planning and time-management. The workload, and managing it, seems to be one issue that can be addressed at the UTH.

The need for resuscitation came up as one of the biggest barriers to DCC and CM. A study from Uganda has found similar tendencies, where a lack of equipment created difficulties in implementing new procedures²³. All the participants agreed that they would clamp early if the baby needed resuscitation. This is in accordance with the WHO’s recommendations¹. However, it could be beneficial to be able to perform DCC when the baby needs resuscitation, as DCC can help the onset of breathing^{11,2}. A few of the midwives had noticed that delaying could help the baby start crying (see table 2).

The cold delivery rooms were of concern to many of the midwives. While there has been no registered increase in hypothermia when utilizing DCC, it is a hypothetical risk^{2,3}. The extra blood the baby receives might help to prevent hypothermia by improving circulation and perfusion. This does not, however, mean hypothermia is not a valid concern². Hypothermia is a significant cause of neonatal mortality in sub-Saharan Africa¹⁰. An easy solution to this would be to have enough blankets available. A lack of blankets was brought up by one of the midwives, which is another example of how lack of equipment can affect the implementation of DCC²³.

It is possible to cut off a long segment of the umbilical cord right after birth and then milk it, so the baby receives some of the extra blood². Only two of the participants mentioned clamping and cutting of a long segment of the umbilical cord when they needed to resuscitate the baby. Another solution could be to milk the cord before cutting it and taking the baby to be resuscitated¹. However, few of the midwives in this study were aware of the benefits to milking the cord.

According to Mwamba⁴ and Vivio *et al*⁵, DCC is not a common practice among midwives in Zambia^{4,5}. By contrast, every midwife in this study practiced DCC. There could be various reasons for this difference. For instance, Mwamba⁴ and Vivio *et al*⁵ reported on midwifery practice from across the country. It is possible that there are different routines at the various clinics/hospitals in different regions. Moreover, there had been a workshop on

DCC at the UTH in 2016. CM was not as widespread as DCC. Notably, those who were aware of the benefits of CM, were among those who used it regularly. Only two of the participants used CM when in a hurry. Yet, it is when there is a need to be quick that CM is most useful as an alternative to DCC¹.

There are various opinions as to what cord clamping strategy is best when the baby is premature. On one hand, premature babies are among those who could benefit from DCC³. Premature babies are often anemic and in need of blood transfusion. DCC can help prevent this⁸. Even delaying by just 45 seconds can make a difference². On the other hand, premature babies are also at a higher risk of complications, such as hypothermia, and are more likely to need resuscitation or other intervention quickly¹. This dilemma was reflected in the various opinions of the participants, many of whom were afraid that delaying the cord clamping would also delay the urgent care the baby might need.

There were likewise different views on whether DCC was appropriate when the mother is HIV-positive. Studies done in Uganda and Zambia showed similar tendencies. There was a fear of mother-to-child transmission of HIV, resulting in early cord clamping^{5,23}. Only one study was found on whether DCC leads to an increased risk of mother-to-child transmission of HIV, suggesting there is a need for further research on the topic. They found no increased risk²⁴. A baby with a HIV-positive mother has an increased risk of anemia and can therefore benefit greatly from DCC²⁴. According to the WHO, the benefits of delaying the clamping for up to 3 minutes, outweighs the risks¹.

In order to increase the use of DCC at the UTH, these barriers would need to be addressed. Continued education, and discussion using the Plan-Do-Study-Act approach, is a potential way to tackle the varying degrees on knowledge about DCC and CM¹². Liu *et al*¹³, wrote that practical guidance and repeated reeducation over time is important for DCC to become routine¹³. In accordance with this, one participant found that changing her routine was a challenge when she learned about DCC. Saying it became easier with practice. Giving the information about DCC or CM only once, can result in the practice being adopted for a while, before the use of

it gradually decreases over time^{11,12,14,15}. Some of the participants talked about learning more of DCC and CM from discussions with their colleagues. Multiple studies support this, saying that being able to engage in the subject through discussions with educated champions, could encourage the use of DCC^{11,14,15}.

In addition to education and discussion on the subject, clear guidelines are an important step in implementing DCC¹². The variations in when the participants clamped the cord (see table 1), might indicate that not everyone is familiar with the UTH guideline. It should be noted that none of the participants mentioned the guidelines during the interviews. Lack of knowledge of the benefits and guidelines can lead to the cord being clamped earlier²³.

The distance to the resuscitation equipment is another issue that should be addressed in order to encourage DCC^{11,12}. The participants suggested having one set of resuscitation equipment in every room to make the distance shorter. Not delaying cord clamping when the baby needs resuscitation is the norm in most places, as is recommended by the WHO¹. The worry for hypothermia should also be addressed. More heaters could, as the midwives suggested, help solve this problem. More blankets and gentle stimulation can also be used while delaying the cord clamping². Educating the midwives on the low risk of increased hypothermia while practicing DCC² could also increase its use. Shorter distance to the resuscitation equipment would also lessen the baby's exposure while being transported. Addressing operational issues such as these could help encourage the use of DCC¹⁷.

There was no previous research available on the time of cord clamping being affected by a mother's age or her reaction, such as distress or panic. Likewise, little literature was found on twin births affecting the time of cord clamping. More research on these topics is needed before any conclusion can be drawn.

As a qualitative study this gives a detailed picture of the setting in which it was conducted, it does not, however, result in facts and figures that can be generalized outside this setting¹⁷. With semi-structured interviews with a limited sample size, there will be some differences to the questions and how they are asked from interview to interview^{19,20}.

The analysis method used, while providing an orderly way of looking at the relevant themes, does presuppose that the statements in the different interviews can be linked through themes. It is, therefore, important to keep in mind the settings and nuances of the different statements²¹. The study might also be limited by the main researcher being new to the field of study.

Conclusion

Overall, the midwives in this study had already come a long way in implementing DCC and were motivated to continue. To do this, they expressed a need for more training and equipment. One of the most mentioned challenges to DCC at the UTH was the workload. Furthermore, there was a need for resuscitation equipment close to the mothers. The midwives were also worried about hypothermia, because of the lack of heaters, and would sometimes clamp early so they could move the baby to warmer room. The mother's condition could sometimes lead to the cord being clamped early. Her being HIV positive or bleeding severely were mentioned as examples of this. Twins, and younger mothers reacting negatively, were mentioned as challenges to DCC as well. There was however little information on these topics, and more research is needed. Prematurity would sometimes lead to early cord clamping. This was partly due to the need for immediate medical attention, but likewise because of lack of knowledge around the benefits of DCC for premature infants. Several of the participants uttered a wish for more training and information on DCC, both to refresh their knowledge and to learn more. There was particularly a need for more information about CM, as not everyone knew of it, or its benefits. Further education on when it is appropriate to cut early, and when it is possible to wait could contribute to DCC being performed more consistently. In conclusion, there appears to be a need for more resources, clear and available guidelines, and repeated training on DCC and CM.

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