Knowledge and practices of delivery room midwives on delayed umbilical cord clamping time: a descriptive study from Turkey

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ABSTRACT

This study aimed to evaluate the knowledge and practices of delivery room midwives on delayed umbilical cord clamping (DCC). This descriptive study was conducted with a total of 1,274 delivery room midwives from five regions of Turkey. The data were collected using a Google survey form. Most of the midwives defined DCC as clamping the umbilical cord in term newborns after cessation of pulsations (47.2%), and as clamping the umbilical cord in preterm newborns within 15-30 seconds of birth (31.2%). Their highest DCC time ranged between 0-10 seconds for term and preterm newborns (34.7% and 54.8%, respectively). The rates of applying DCC were 17.6% and 5.3% in term and preterm newborns, respectively. Dealing with the mother (75.6% and 33.4%, respectively), having workload (27.5% and 24.6%, respectively), considering that the newborn would have respiratory distress (16.1% and 33.4%), considering that the newborn would get cold (10.7% and 13.9%, respectively), preventing polycythemia and hyperbilirubinemia (6.7% and 9.7%, respectively), and being afraid of dropping the newborn (5.3% and 19%, respectively) are the most common reasons for midwives not to apply DCC to term and preterm newborns. The majority of the midwives reported that they had no DCC protocol in their institution (80.5%) and did not receive in-service training on DCC (76.5%). This study has concluded that most midwives do not know the correct definition of DCC, do not apply DCC correctly, have quite short DCC times, have no DCC protocol in their institutions and do not receive in-service training on DCC.
I. INTRODUCTION

The third stage of labor refers to the time period from the birth of the newborn to the delivery of the placenta and its appendages (National Institute for Health and Clinical Excellence, 2017). This a unique period in the transition from fetal physiology to extrauterine physiology, requiring midwives to have up-to-date information about newborn care practices. In this period, bidirectional blood flow continues in the placenta, and various changes occur in providing spontaneous blood circulation and respiration of the newborn (Mercer & Erickson-Owens, 2014; Rabe et al., 2022). Therefore, it is extremely important for healthcare professionals to find the appropriate time for cord clamping.

Umbilical cord clamping (UCC) is among the oldest and most widely practiced medical interventions in the third stage of labor, and its timing still remains a controversial issue around the world (Jeewan et al., 2021; Mwakawanga & Mselle, 2020; Ortiz-Esquinas, Rodríguez-Almagro, et al., 2020). While umbilical cord pulping was expected to stop for UCC in the early 20th century, early umbilical cord clamping (ECC), which is defined as clamping the umbilical cord within 30 seconds of birth, has been the dominant practice worldwide since the 1940s (Isacson et al., 2022). Regarding UCC time, the definitions of ECC and DCC are widely used for newborns and have changed over the years. In the 1950s, ECC referred to clamping of the umbilical cord within one minute of birth, and delayed clamping to clamping of the umbilical cord within five minutes of birth (ACOG Committee Opinion, 2020). The World Health Organization (WHO) defines ECC as clamping of the umbilical cord within the first 60 seconds after delivery, and delayed cord clamping as clamping of the umbilical cord within 1 to 3 minutes after delivery or when umbilical cord pulsations have stopped (World Health Organization [WHO], 2014).

The WHO and the American College of Obstetricians and Gynecologists (ACOG) recommend DCC for all deliveries because it can increase hemoglobin level in term newborns at birth, improve iron stores in the first months of life, and have a positive effect on developmental outcomes (ACOG Committee Opinion, 2020; Aziz et al., 2020; World Health Organization [WHO], 2014). In addition, there are several studies suggesting that DCC provides many positive contributions to term newborns (Zhao et al., 2019), increasing Hgb and Htc levels and reducing neonatal anemia (Angelo et al., 2021; Bruckner et al., 2021). In contrast to ECC, DCC maintains constant blood flow from the placenta to neonatal blood circulation, increases ventricular preload, and contributes to a more stable hemodynamic transition when lung aeration occurs prior to cord clamping (Lara-Cantón et al., 2022; Padilla-Sánchez et al., 2020). In addition, several studies suggest that ECC and DCC cause significant differences in iron stores in the early ages of newborns. In particular, one meta-analysis study found that DCC slightly increased serum ferritin levels in premature newborns, but significantly increased serum ferritin levels in term newborns, and could significantly reduce neonatal anemia (Zhao et al., 2019). Singh et al. (2022) reported that DCC significantly increased hemoglobin, serum ferritin and hematocrit levels in newborns at four weeks of age (Singh et al., 2022). Deficiency in iron stores in the early stages of life can lead to neurodevelopmental disorders. Neurodevelopmental impairment at an early age may become more pronounced with increasing age and trigger some adverse conditions in childhood. Therefore, DCC can improve neurodevelopmental outcomes in term infants aged 12 months and 4 years (Andersson & Mercer, 2021; Berg et al., 2021; Mercer et al., 2022). Umbilical cord blood contains a high concentration of stem cells. A study about the
amount of stem cells that have potential to pass to the baby by placental transfusion methods such as DCC and umbilical cord milking (UCM) showed that newborns with DCC had higher transfer of stem cells and better cerebral oxygenation in the first minutes of life (Okulu et al., 2022). As DCC management does not require any cost or technology, it can be a source of preventive treatment for neonatal diseases, especially in socio-economically underdeveloped or developing countries (Okulu et al., 2022; Qian et al., 2019; Singh et al., 2022).

Although there are many studies that reveal the positive effects of DCC on health in newborns, there are also studies suggesting that DCC is not performed adequately and there is confusion on its administration (Isacson et al., 2022; Mwakawanga & Mselle, 2020; Peberdy et al., 2020, 2022). Madhavanprabhakaran et al. (2018) found that the majority of midwives and obstetricians in Oman practiced ECC (Madhavanprabhakaran et al., 2018). Payne et al. (2021) reported that nearly half (52%) of healthcare professionals in Pakistan practiced DCC for healthy newborns (Payne et al., 2021). On the contrary, one study conducted in the USA reported that 98% of health professionals used DCC for term vaginal deliveries and 65% for premature newborns, and 54% felt time pressure as an obstacle to administer DCC as they needed to deliver the newborn as soon as possible (Leslie et al., 2020).

There is no comprehensive study to determine the knowledge and practices of midwives about DCC in Turkey. DCC is not routinely used in practice. This study aimed to evaluate the knowledge and practices of delivery room midwives regarding DCC. For this purpose, answers to the following questions were sought: (1) What is the level of midwives’ knowledge of DCC in term newborns? (2) What is the level of midwives’ knowledge of DCC in preterm newborns? (3) What are the midwives’ DCC times in term newborns? (4) What are the midwives’ DCC times in preterm newborns? (5) What is the rate of DCC application by midwives in term newborns? (6) What is the rate of DCC application by midwives in preterm newborns? (7) What are the reasons for midwives not to apply DCC in term newborns? (8) What are the reasons for midwives not to apply DCC in preterm newborns?

II. METHODS

This descriptive study was conducted between February 9, 2021 and September 26, 2022, using a total of 1,274 midwives who were selected by stratified random sampling method and worked in delivery rooms of hospitals affiliated to the Ministry of Health in Turkey. The population of the study consisted of delivery room midwives in hospitals affiliated to the Ministry of Health in Turkey. According to the data of the Ministry of Health for 2020, a total of 55,972 midwives work in Turkey (Başara Bora et al., 2021). However, it has not been determined how many of these midwives are actively working in the delivery room. The sample of the study aimed to include midwives working in delivery rooms in different regions of Turkey. However, since it was not possible to reach every city in Turkey, we aimed to collect data from five regions used by Hacettepe University Institute of Population Studies (TNSA, 2018). The number of midwives in provinces was collected to reach the total number of midwives in the regions. Approximately 10% of the midwives in regions were employed in delivery rooms. The sample size was calculated by using the rate of DCC application (33%) in a previous study in Turkey (Yaman et al., 2016). The sample size was determined by using the sample size formula in studies examining the ratio of a variable with known population and considering p=0.33, q=0.67 and d=0.05 values. It was calculated separately for each region and found to be 1,257 in total. It
was determined that a total of 1,257 midwives should be included in the sample by making a proportional distribution and considering 10% of the total number of midwives in each region. A total of 1,274 midwives were included in the study during the research process. Table 1 shows the size of samples needed to be obtained from each region according to this calculation. Midwives who were actively employed in delivery room for at least the last 6 months, had smart phone and internet access and agreed to participate in the study were included in the study. Those who did not work in delivery room between the dates of the study were excluded from the study.

The data were collected using a Google survey form that was prepared by the researchers in line with the literature (Boere et al., 2015; Devin & Larkin, 2018; Ibrahim et al., 2017). This form consisted of 20 questions about the midwives’ demographic and institutional characteristics and DCC knowledge and practices. A pilot study was conducted with 10 midwives to evaluate the intelligibility of the form, whereby all questions were determined as understandable.

The data were collected online using a Google survey form. The study preferred online survey as it was low-cost method being applied in a short time, allowing to rapidly make the results ready for analysis and to minimize contamination with individuals due to the pandemic. Another reason for using an online survey was that it required no interviewer to administer the survey, thus reducing social desirability bias (the tendency of respondents to give answers they consider the interviewer would expect to hear). The survey was shared via social networks such as Facebook, Twitter and Instagram and by sending a Google survey link from WhatsApp groups, containing information for participants about the purpose of the study and explaining that their personal information would be kept confidential. After they opened the online survey, gave the informed consent and stated to work in the delivery room, participants who agreed to participate in the study could access the survey questions. In addition, at the end of the survey, they were asked to share the survey link with other midwives who worked in the delivery room, allowing the survey to reach more people. The data were stored in an encrypted computer. The data collection process ended when the targeted sample size for 5 regions in the study was reached.

For conducting the study, an ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee at Kahramanmaras Sutcu Imam University (Date: February 08, 2022, protocol number: 37). The data were analyzed using the Statistical Package for the Social Sciences Version 22.0 (SPSS Inc., IL, USA) (SPSS 22.0) and presented using number, percentage, mean ± SD.

### III. RESULT

A total of 1,274 midwives participated in the study, and no participant was excluded from the study. Table 2 summarizes their characteristics. Of them, 53.1% were under the age of 27 years, 81.6% were high school graduates and 9.2% were college graduates. Their mean work experience in the delivery room was 8.9±6.4 years, and cared for an average of 5.2±3.4 pregnant women per working day (8 hours).

Figure 1 shows the regions where the midwives worked in Turkey. Of them, 23.2% worked in the western region, 21.2% in the southern region and 20.7% in the eastern region in Turkey. In addition, 93.5% of the midwives had heard of the concept of DCC before. Most of them (47.2%) defined DCC as clamping the umbilical cord in term newborns after cessation of pulsations and as clamping the umbilical cord in preterm newborns within 15-30 seconds of birth (31.2%). Considering their statements about the definitions of DCC in term and preterm
newborns, the rate of their correct knowledge about DCC in term and preterm newborns was 29.0% and 18.6%, respectively. Their DCC information sources were mostly school/course (57.9%), scientific article (44.6%), congress/symposium (33.8%), in-service training (27.3%) and colleague (26.2%) (Table 3).

Figure 2 summarizes the DCC times applied by midwives. Accordingly, the midwives clamped the umbilical cord of term and preterm newborns within 0-10 seconds at most (34.7% and 54.8%, respectively). The rates of midwives who applied DCC in term and preterm newborns were 17.6% and 5.3%, respectively.

Considering the reasons for midwives not to apply DCC to term newborns, dealing with the mother (75.6%), having workload (27.5%), considering that the newborn would have respiratory distress (16.1%), considering that the newborn would get cold (10.7%), preventing polycythemia and hyperbilirubinemia (6.7%), and being afraid of dropping the newborn (5.3%) were the most common reasons for them not to apply DCC to term newborns. In addition, dealing with the mother (75.6% and 33.4%, respectively), considering that the newborn would have respiratory distress (33.4%), physician request (28.1%), being afraid of the small size of the newborn (25.2%), having workload (24.6%), being afraid of dropping the newborn (19%, 8), considering that the newborn would get cold (13.9%), and preventing polycythemia and hyperbilirubinemia (9.7%) were the most common reasons for midwives not to apply DCC to preterm newborns (Figure 3).

Figure 4 summarizes the regulations regarding DCC in midwives’ institutions. Of the midwives, 80.5% reported that they had no DCC protocol in their institution, and 76.5% did not receive in-service training on DCC.

**IV. DISCUSSION**

This national study was conducted with a total of 1,274 midwives and examined the knowledge and practices of delivery room midwives on DCC. The study found that most of the midwives did not correctly know the concept of DCC in term and preterm newborns and the rate of application of DCC by them was low. This is a significant study as it is the first study about the DCC practices of delivery room midwives in newborns and consisted of the largest sample representing all regions of Turkey.

Only one international guideline recommends to clamp the umbilical cord after it has stopped beating (National Institute for Health and Clinical Excellence, 2017). Other guidelines recommend clamping the umbilical cord after 1-3 minutes of birth for term newborns and 30-60 seconds for preterm infants (American College of Obstetricians and Gynecologists (ACOG), 2017; Başara Bora et al., 2021; Royal College of Midwives (RMC), 2015; World Health Organization (WHO), 2018). So far, no evidence has been found regarding the upper limit of DCC time (Peberdy et al., 2020). In our study, most of the midwives defined DCC in term newborns as clamping the umbilical cord after cessation of pulsations. Similarly, in studies conducted in France, Sweden, Ireland and British Columbia, 47-72.4% of the midwives defined DCC as clamping the umbilical cord after cessation of pulsations (Devin & Larkin, 2018; Fulton et al., 2016; Isacson et al., 2022; Rousseau et al., 2022).

In addition, most of the midwives included in our study defined DCC in preterm newborns as clamping the umbilical cord within 15-30 seconds of birth (31.2%) and after cessation of
pulsations (26.1%). Similarly, one study conducted in Sweden reported that 11.6% and 35.8% of the midwives applied DCC within 30 seconds of birth and after cessation of pulsations, respectively (Isacson et al., 2022). Considering the definitions of DCC given by midwives for term and preterm newborns, the rate of those who defined DCC in term newborns as clamping the umbilical cord 1-3 minutes of birth was 29%, and the rate of those who defined DCC in preterm newborns as clamping the umbilical cord within 30-60 seconds of birth was 18.6%. Based on these results, the rate of having correct knowledge of DCC among midwives was quite low.

Several international and national health institutions and the available evidence recommend the use of DCC in term and preterm newborns (American College of Obstetricians and Gynecologists (ACOG), 2017; Begley et al., 2019; World Health Organization (WHO), 2018). However, our study found that the rates of applying DCC by midwives in term and preterm newborns were 17.6% and 5.3%, respectively. Considering the results of studies conducted in many other countries, the rate of applying DCC is quite low among the midwives in our study. Studies reported the rate of DCC application by midwives as 91.5% in Ireland, 97% in the Netherlands, 34.3% in Sweden, 80% in Spain and 38.2% in Saudi Arabia (Boere et al., 2015; Devin & Larkin, 2018; Ortiz-Esquinas, Gómez-Salgado, et al., 2020; Rousseau et al., 2022). These results indicate that there is a need for national guidelines on cord clamping timing, a DCC protocol in institutions, and in-service training to increase the rates of DCC application among midwives. This view is supported by the results of our study that the majority of midwives did not have a DCC protocol in their institution and did not receive in-service training on DCC. One study determined that the presence of a guideline and a written protocol on DCC increased the rate of DCC application approximately 5 times (Rousseau et al., 2022). Another study found that the high rate of DCC application in term and preterm newborns was associated with the presence of a written protocol (Boere et al., 2015).

In our study, most of the midwives reported to clamp the umbilical cord in term (34.7%) and preterm (54.8%) newborns within 10 seconds. One study conducted in Sweden reported that midwives did not clamp the umbilical cord in term newborns before one minute of birth and the clamping rate within 30 seconds in preterm newborns was quite low (1.6%) (Isacson et al., 2022). Another study reported the clamping rate within 30 seconds in preterm newborns as 15% (Boere et al., 2015). This suggests that the DCC time is quite short among midwives in our study.

In our study, dealing with the mother, having workload, considering that the newborn would have respiratory distress, and considering that the newborn would get cold were the most common reasons for midwives not to apply DCC to term and preterm newborns. Similarly, studies have reported that midwives do not apply DCC due to lack of knowledge, routine health practices, facilitating the newborn’s resuscitation, dealing with the mother, preventing hypothermia in the newborn, speeding up delivery, reducing postpartum hemorrhage and saving time (Devin & Larkin, 2018; Ibrahim et al., 2017; Rousseau et al., 2022).

Although studies have shown that DCC does not cause polycythemia and hyperbilirubinemia in newborns, the WHO argues that the most important obstacle to apply DCC is the risk of developing jaundice and polycythemia (Brocato et al., 2016; Chen et al., 2017; World Health Organization (WHO), 2014).
Our study found that a significant portion of the midwives did not apply DCC to prevent polycythemia and hyperbilirubinemia in term and preterm newborns. Similarly, one study conducted in Saudi Arabia has reported that polycythemia and hyperbilirubinemia prevention are among the reasons for midwives not to apply DCC (Ibrahim et al., 2017). These results suggest that it is necessary to explain the evidence-based practices on DCC with in-service training.

In addition, our study determined that the midwives did not apply DCC due to being afraid of dropping the newborn and having fear of the newborn being small. The midwives’ fear of dropping the newborn may be because most women in Turkey give birth in the lithotomy position on the gynecological table. In addition, some of the midwives in our study reported that they did not apply DCC due to its harms mentioned in the training they received on the Newborn Resuscitation Program (NRP). This may be because those who provide NRP training reflect their own attitudes and personal views about DCC to the training.

This study has some limitations. First, the data were collected using a Google survey, limiting access to midwives who did not have the internet and smart phones. Second, since there was no clear data on the number of midwives working in delivery rooms in Turkey, the number of delivery room midwives in each region was considered approximately 10% of the total number of midwives in these regions. This may have affected the sample size. Third, the reliability of the data was based on the self-report of midwives.

V. CONCLUSION

This study was conducted with a total of 1,274 midwives to evaluate the knowledge and practices of delivery rooms midwives from five regions in Turkey and found that most of them defined DCC as clamping the umbilical cord in term newborns after cessation of pulsations and within 15-30 seconds of birth in preterm newborns. The study determined that the rate of midwives who knew and applied DCC correctly in term and preterm newborns was quite low. In addition, the study found that the midwives most clamped the umbilical cord in term and preterm newborns within 0-10 seconds and did not apply DCC in term and preterm newborns because of dealing with the mother, workload, considering that the newborn would have respiratory distress, considering that the newborn would get cold, preventing polycythemia/hyperbilirubinemia, fear of dropping the newborn, and being afraid of the newborn being small. The study also determined that most of the midwives did not have a DCC protocol in their institution and did not receive in-service training on DCC. Based on these results, it is recommended (1) to develop and implement a guideline on DCC at the national level, (2) to require health institutions to have DCC policy and their managers to regularly follow up its implementation, and (3) to provide in-service training on DCC to delivery room midwives.

REFERENCES


**BIOGRAPHY**

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