Topic Expert Group: **Birth and transfer**

Cord management at the delivery of term infants

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Target group
Term infants (≥37 weeks), parents, and families

User group
Healthcare professionals, perinatal units, hospitals and health services

Statement of standard
In vigorous vaginally born term infants, management of the umbilical cord includes waiting before clamping and cutting the cord for at least three minutes or until the cord is pale and collapsed. For vigorous term infants born by caesarean section a one-minute wait is adhered to before clamping and cutting the umbilical cord.

Rationale
Following birth of term babies, approximately 30% of their blood volume is still circulating through the placenta. (1) After birth a number of changes takes place in order for a baby to adapt to extra-uterine life including aeration of the lungs, and in connection to this, the establishment of a full pulmonary circulation. (2) If the umbilical cord is left intact for more than three minutes, oxygenation of the blood is improved and a majority of the blood earlier circulating through the placenta will be redistributed to the baby's body, resulting in a net blood transfusion of 25-30 ml/kg. (3) A more individualised, gentler, physiological transition could be achieved by keeping the umbilical cord intact and observing the infant until the cord is collapsed and pale. Research in term infants has shown short-term benefits such as earlier establishment of breathing, an improved Apgar score and reduced risk of neonatal anaemia. (4,5) Long-term benefits are manifold and include improved iron stores reduced risk for anaemia as well as improved neurodevelopmental and behavioural outcome. (4,6–9) There is no evidence to support routine immediate cord clamping, but there is evidence for apprehensiveness regarding harm from the intervention.

Benefits

Short-term benefits

- Improved oxygenation, Apgar score and earlier establishment of regular breathing (5)
- Improved transition of circulation with better blood pressure (10)
- Increased haemoglobin concentrations after birth (4,11)
- Provides no negative impact on the mother’s health (12,13)
- Improved iron stores after delayed cord clamping for infants of HIV mothers with low viral load (11)
- Improved haemoglobin and haematocrit during the first days after birth (13–15)

Long-term benefits

- Improved iron stores and decreased iron deficiency at 2-8 months (4,7,16)
- Reduced risk of anaemia at 8 and 12 months of life (7)
- Improved myelinisation at 4 and 12 months of age (8,9)

- Improved development at 12 months of age in low-resource settings (17)
- Increased fine motor and social domain scores at 4 years of age, particularly for boys (6)
- Improved long-term outcome if resuscitation with cord intact (18)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about keeping the umbilical cord intact initially, the benefits and practical management.	B (High quality)	Patient information sheet
2. Parents are informed by healthcare professional about the role of cord clamping in cord blood banking.	B (High quality)	Clinical record
3. Cord clamping preferences of parents are reported in the birth plan.	B (High quality)	Clinical record
For healthcare professionals		
4. A unit guideline on umbilical cord management is adhered to by all healthcare professionals.	B (High quality)	Guideline
5. Delayed cord clamping (DCC) for vaginal (3 minutes) and for caesarean birth (1 minute) are recommended. (19)	A (High quality)	Training documentation
6. Sessions to motivate the teams and update the evidence regarding cord clamping is promoted by a multidisciplinary team including leaders (midwives, obstetricians, paediatricians, neonatologists, nurses, and anaesthetist).	B (High quality)	Training documentation, healthcare professional feedback
7. Training on optimising neonatal transition and cord clamping technique, including neonatal stabilisation, sample for UA pH strategies with intact cord is adhered to by all professionals. (20)	A (Moderate quality)	Training documentation, healthcare professional feedback
8. The definitions/terminology regarding cord clamping are shared.	B (Moderate quality)	Guideline
For perinatal unit		
9. A guideline to ensure a standardised approach to third stage management, including cord traction and DCC, is available both for low- and high-risk	A (High quality)	Guideline

pregnancies/deliveries, and both for vaginal and caesarean birth. (21)		
10. Mode and timing of cord clamping are reported in medical records.	B (Moderate quality)	Clinical records
11. A protocol for cord clamping approach in special situations (asphyxia, sentinel events, twins, infection, immunisation etc.) is available. (20)	A (High quality)	Guideline
12. The best strategy of cord clamping for every neonate both in low- and high-risk pregnancies/deliveries is planned/ensured (individualised) by a multidisciplinary team (midwives, obstetricians, paediatricians, neonatologists, nurses, and anaesthetist according to the case).	B (Moderate quality)	Audit report, clinical record, minutes of team meetings
For hospital		
13. Training on umbilical cord management is ensured.	B (High quality)	Training documentation
14. The hospital's policy regarding umbilical cord management is provided easily accessible at the official website.	B (High quality)	Training documentation
For health service		
15. A national guideline on umbilical cord management is available and regularly updated.	B (High quality)	Guideline
16. Local implementation tools such as teaching slides, leaflets, checklist at delivery are available to use for clinical services.	B (High quality)	Audit report

Where to go — further development of care

Further development	**Grading of evidence**
For parents and family	
• Parents are routinely educated by healthcare professionals about umbilical cord management.	B (High quality)
For maternity unit	
• Initiate documentation on timing of cord clamping at every delivery.	B (High quality)
• Initiate projects on quality indicators to monitor and investigate outcomes of infants and mothers in relation to umbilical cord management. (22)	A (High quality)
• Train and audit cord blood sampling practice on an unclamped cord.	B (High quality)
For perinatal unit	
• Audit the occurrence of jaundice, respiratory distress or need of resuscitation in correlation to timing of umbilical cord clamping and cutting.	A (High quality)
For hospital	
• Facilitate information, education and training to the complete perinatal team (midwives, nurses, obstetricians, neonatologists etc.) on umbilical cord management under different circumstances, such as caesarean delivery, maternal infection, and compromised babies.	C (High quality)
For health service	
• Monitor any health effects in national registries in relation to umbilical cord management.	B (High quality)
• Support and/or promote sound and evidence-based information to parents and healthcare professionals. (23,24)	A (High quality)
• Facilitate research or initiate research on unexplored areas of umbilical cord management, such as infants to mothers with diabetes, twins, as well as management at caesarean section and compromised newborn infants. (19,20,25)	A (High quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about umbilical cord management at the antenatal care centres and at the delivery department.
For healthcare professionals
• Document conversations with parents and family regarding cord management in the maternal notes.
• Attend training and education on umbilical cord management.
For perinatal unit
• Develop multidisciplinary guideline for optimal cord management at term deliveries.
For hospital
• Support healthcare professionals to participate in training on umbilical cord management in low- and high-risk deliveries.

For health service

- Develop and implement a national guideline on umbilical cord management with input by professional bodies.

Description

Harvesting umbilical cord stem cells:

There is no current evidence to support the use of autologous umbilical cord blood. Umbilical cord blood collection should not alter obstetric or neonatal care or intrude on routine practice of delayed cord clamping (DCC) with possible exception to directed (sibling/family) donation. Parents should be adequately informed on the opposition between the placental transfusion and collecting blood for stem cell banking. (26)

Non-vigorous neonates:

Pilot studies on intact cord resuscitation (ICR) provide new and important information on the positive effects of sustained cord circulation during transition. Newborn infants had improved oxygenation and higher Apgar score, and negative consequences were not recorded. More research is needed to provide evidence of effects and safety before a general recommendation can be issued. If teams practise ICR, it is important to audit patient outcomes prospectively or be part of a study. In non-vigorous infants it is important to ensure that ventilation can be initiated within 60 seconds after birth. (27)

Hyperbilirubinemia and jaundice:

There are reports on an association between DCC and the risk of jaundice requiring phototherapy. Several large studies the last decade have refuted this, the same studies have not shown any elevated risk for clinically relevant polycythaemia. (28–31)

Blood sampling from the umbilical cord:

Umbilical cord blood for gas analysis can be drawn from the pulsating cord immediately after birth. (12,32) A recent meta-analysis found umbilical cord milking and DCC to be comparable in improving short-term haematological outcomes in vigorous term and late-preterm infants. (33) As the quality of evidence was low more research needed before a clear statement can be issued in this standard.

Source

1. Farrar D, Airey R, Law GR, Tuffnell D, Cattle B, Duley L. Measuring placental transfusion for term births: weighing babies with cord intact. BJOG: An International Journal of Obstetrics & Gynaecology. 2011;118(1):70–5.

2. Hooper SB, Binder-Heschl C, Polglase GR, Gill AW, Kluckow M, Wallace EM, u. a. The timing of umbilical cord clamping at birth: physiological considerations. Maternal health, neonatology and perinatology. 2016;2(1):1–9.

3. Yao A, Moinian M, Lind J. Distribution of blood between infant and placenta after birth. The Lancet. 1969;294(7626):871–3.

4. McDonald SJ, Middleton P, Dowswell T, Morris PS. Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. Cochrane Database Syst Rev. 11. Juli 2013;2013(7):CD004074.

5. KC A, Singhal N, Gautam J, Rana N, Andersson O. Effect of early versus delayed cord clamping in neonate on heart rate, breathing and oxygen saturation during first 10 minutes of birth - randomized clinical trial. Maternal Health, Neonatology and Perinatology. 30. Mai 2019;5(1):7.

6. Andersson O, Lindquist B, Lindgren M, Stjernqvist K, Domellöf M, Hellström-Westas L. Effect of Delayed Cord Clamping on Neurodevelopment at 4 Years of Age: A Randomized Clinical Trial. JAMA Pediatr. 1. Juli 2015;169(7):631.

7. Kc A, Rana N, Målqvist M, Jarawka Ranneberg L, Subedi K, Andersson O. Effects of Delayed Umbilical Cord Clamping vs Early Clamping on Anemia in Infants at 8 and 12 Months : A Randomized Clinical Trial. JAMA pediatrics. 2017;171(3):264–70.

8. Mercer JS, Erickson-Owens DA, Deoni SC, Dean III DC, Collins J, Parker AB, u. a. Effects of delayed cord clamping on 4-month ferritin levels, brain myelin content, and neurodevelopment: a randomized controlled trial. The Journal of pediatrics. 2018;203:266-272. e2.

9. Mercer JS, Erickson-Owens DA, Deoni SC, Dean III DC, Tucker R, Parker AB, u. a. The effects of delayed cord clamping on 12-month brain myelin content and neurodevelopment: a randomized controlled trial. American Journal of Perinatology. 2022;39(01):037–44.

10. Katheria AC, Lakshminrusimha S, Rabe H, McAdams R, Mercer JS. Placental transfusion: a review. Journal of Perinatology. 2017;37(2):105–11.

11. Pogliani L, Erba P, Nannini P, Giacomet V, Zuccotti GV. Effects and safety of delayed versus early umbilical cord clamping in newborns of HIV-infected mothers. The Journal of Maternal-Fetal & Neonatal Medicine. 2019;32(4):646–9.

12. Andersson O, Hellström-Westas L, Andersson D, Clausen J, Domellöf M. Effects of delayed compared with early umbilical cord clamping on maternal postpartum hemorrhage and cord blood gas sampling: a randomized trial. Acta obstetricia et gynecologica Scandinavica. 2013;92(5):567–74.

13. Purisch SE, Ananth CV, Arditi B, Mauney L, Ajemian B, Heiderich A, u. a. Effect of delayed vs immediate umbilical cord clamping on maternal blood loss in term cesarean delivery: a randomized clinical trial. Jama. 2019;322(19):1869–76.

14. Cavallin F, Galeazzo B, Loretelli V, Madella S, Pizzolato M, Visentin S, u. a. Delayed cord clamping versus early cord clamping in elective cesarean section: a randomized controlled trial. Neonatology. 2019;116(3):252–9.

15. Consonni S, Vaglio Tessitore I, Conti C, Plevani C, Condo' M, Torcasio F, u. a. Umbilical cord management strategies at cesarean section. Journal of Obstetrics and Gynaecology Research. 2020;46(12):2590–7.

16. Ertekin AA, Nihan Ozdemir N, Sahinoglu Z, Gursoy T, Erbil N, Kaya E. Term babies with delayed cord clamping: an approach in preventing anemia. The Journal of Maternal-Fetal & Neonatal Medicine. 2016;29(17):2813–6.

17. Rana N, Ashish KC, Målqvist M, Subedi K, Andersson O. Effect of delayed cord clamping of term babies on neurodevelopment at 12 months: a randomized controlled trial. Neonatology. 2019;115(1):36–42.

18. Isacson M, Gurung R, Basnet O, Andersson O, Kc A. Neurodevelopmental outcomes of a randomised trial of intact cord resuscitation. Acta Paediatrica. 2021;110(2):465–72.

19. Andersson O, Mercer JS. Cord management of the term newborn. Clinics in Perinatology. 2021;48(3):447–70.

20. McAdams RM, Lakshminrusimha S. Management of Placental Transfusion to Neonates After Delivery. Obstetrics & Gynecology. 2022;139(1):121–37.

21. Weeks AD, Fawcus S. Management of the third stage of labour: (for the Optimal Intrapartum Care series edited by Mercedes Bonet, Femi Oladapo and Metin Gülmezoglu). Best Practice & Research Clinical Obstetrics & Gynaecology. 2020;67:65–79.

22. Anton O, Jordan H, Rabe H. Strategies for implementing placental transfusion at birth: a systematic review. Birth. 2019;46(3):411–27.

23. Sawyer A, Ayers S, Bertullies S, Thomas M, Weeks AD, Yoxall CW, u. a. Providing immediate neonatal care and resuscitation at birth beside the mother: parents' views, a qualitative study. BMJ open. 2015;5(9):e008495.

24. Katheria AC, Sorkhi SR, Hassen K, Faksh A, Ghorishi Z, Poeltler D. Acceptability of bedside resuscitation with intact umbilical cord to clinicians and patients' families in the United States. Frontiers in Pediatrics. 2018;6:100.

25. Gomersall J, Berber S, Middleton P, McDonald SJ, Niermeyer S, El-Naggar W, u. a. Umbilical cord management at term and late preterm birth: a meta-analysis. Pediatrics. 2021;147(3).

26. ACOG Committee Opinion No. 771 Summary: Umbilical Cord Blood Banking. Obstetrics & Gynecology [Internet]. 2019;133(3). Verfügbar unter: https://journals.lww.com/greenjournal/Fulltext/2019/03000/ACOG_Committee_Opinion_No__771_Summary__Umbilical.40.aspx

27. Madar J, Roehr CC, Ainsworth S, Ersdal H, Morley C, Rüdiger M, u. a. European Resuscitation Council Guidelines 2021: Newborn resuscitation and support of transition of infants at birth. Resuscitation. April 2021;161:291–326.

28. Andersson O, Hellström-Westas L, Andersson D, Domellöf M. Effect of delayed versus early umbilical cord clamping on neonatal outcomes and iron status at 4 months: a randomised controlled trial. Bmj. 2011;343.

29. Chen X, Li X, Chang Y, Li W, Cui H. Effect and safety of timing of cord clamping on neonatal hematocrit values and clinical outcomes in term infants: a randomized controlled trial. Journal of Perinatology. 2018;38(3):251–7.

30. Rana N, Ranneberg LJ, Målqvist M, Kc A, Andersson O. Delayed cord clamping was not associated with an increased risk of hyperbilirubinaemia on the day of birth or jaundice in the first 4 weeks. Acta Paediatrica. 2020;109(1):71–7.

31. Winkler A, Isacson M, Gustafsson A, Svedenkrans J, Andersson O. Cord clamping beyond 3 minutes: Neonatal short-term outcomes and maternal postpartum hemorrhage. Birth. 2022; doi: 10.1111/birt.12645. Epub ahead of print.

32. Wiberg N, Källén K, Olofsson P. Delayed umbilical cord clamping at birth has effects on arterial and venous blood gases and lactate concentrations. BJOG: An International Journal of Obstetrics & Gynaecology. 2008;115(6):697–703.

33. Jeevan A, Ananthan A, Bhuwan M, Balasubramanian H, Rao S, Kabra NS. Umbilical cord milking versus delayed cord clamping in term and late-preterm infants: a systematic review and meta-analysis. The Journal of Maternal-Fetal & Neonatal Medicine. 2021;1–11.

First edition, September 2022

Lifecycle
3 years/next revision: 2025

Recommended citation
EFCNI, Andersson O, Schlembach D et al., European Standards of Care for Newborn Health: Cord Management at the delivery of term infants. 2022.