National Women & Infants Health Programme

National Clinical Practice Guideline

Umbilical Cord Prolapse: Prevention, Diagnosis and Management

INSTITUTE OF OBSTETRICIANS & GYNAECOLOGISTS

ROYAL COLLEGE OF PHYSICIANS OF IRELAND

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National Clinical Guideline
Umbilical Cord Prolapse: Prevention, Diagnosis and Management

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National evidence-based guideline on umbilical cord prolapse covering prevention, recognition and management across Irish maternity and community settings. Defines cord prolapse/presentation, outlines antenatal and intrapartum risk factors and mitigation, and provides graded recommendations and an algorithm for emergency response, timing/mode of birth, communication, debriefing and service organisation.

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Algorithms

Management of Cord Prolapse

CORD PROLAPSE DIAGNOSED
- Cord palpable on vaginal examination
- Cord protruding outside of vagina
- Abnormal fetal heart rate/Abnormal cardiotocograph findings

CALL FOR HELP

In hospital
- Call for help
- Emergency bleep
- ISBAR – requesting Senior Registrar/ Consultant on call, Birthing Suite Midwife, Neonatologist, and Theatre, Portering staff if required.
- Auscultation of fetal heart – CTG where possible
- IV Access

In the community
- Dial 112 or 999
- Inform hospital team of transfer

RELIEVE PRESSURE ON THE CORD (See appendix 4)

Pushing up

Elevation of the presenting part – manual elevation transvaginally

Other methods to relieve pressure on the cord
- Knees to chest (Trendelenburg position)
- Left lateral with pillow under left hip (Exaggerated Sim's position)

Consider tocolysis if persistent fetal heart rate abnormalities

IMMEDIATE DELIVERY
- Assess cervical dilatation and clinical situation
- Delivery should be completed in the fastest method possible – this is usually Caesarean section, but may be facilitated by spontaneous vaginal birth/assisted vaginal birth if suitable
- Ensure clear communication between team members at all times using ISBAR
- A diagnosis to delivery interval of 30 minutes is recommended

POST BIRTH
- Paired umbilical cord gases
- Clinical incident form and Cord Prolapse proforma for documentation of events
- Debriefing of parents and relatives
- Debriefing for staff involved
- Birth Reflections Service available to women up to two years after the birth of their baby

Key Recommendations

Section 1: Definitions

1. We recommend that cord prolapse is defined as the descent of the umbilical cord through the cervix and beyond the presenting part. *Best Practice*
2. We recommend that cord prolapse be categorised into occult (occurring alongside the presenting part) or overt (prolapsing past the presenting part). *Best Practice*
3. We recommend that cord presentation is defined as the presence of one or more loops of the umbilical cord between the presenting part and the fetal membrane overlying the cervix. *Best Practice*

Section 2: Risk Factors

4. We recommend that it is best practice to identify pregnancies with antenatal risk factors for cord prolapse to allow measures to be taken to minimise its risk and the associated perinatal morbidity and mortality. *Best Practice*
5. We do not recommend routine ultrasound examination to identify cord prolapse or cord presentation, except in a research setting. *Grade 1C*
6. We recommend that elective hospital admission in pregnancies with high risk of cord prolapse after 37+0 weeks' gestation should be discussed with the woman. *Best Practice*
7. We recommend that a woman with preterm prelabour rupture of membranes with non-cephalic presentation should be managed as an in-patient. *Grade 1C*
8. We recommend that clinicians be aware of the risk factors for cord prolapse, so that it can be promptly recognised and managed. These include obstetric interventions such as induction of labour methods (amniotomy and balloon catheter), manipulation or rotation of fetal head on vaginal examination, application of fetal scalp electrode or intrauterine pressure catheter and external cephalic version in woman with ruptured membranes. *Best Practice*
9. We recommend that high-risk intrapartum procedures should be performed with caution, in a controlled environment with immediate access to an operating theatre. *Grade 1C*
10. We recommend that precautions should be taken to avoid excessively elevating the fetal head during head manipulation and placement of fetal scalp electrode or intrauterine pressure catheter. *Grade 1C*

Section 3: Management

11. Cord prolapse should be suspected when an abnormal fetal heart rate is auscultated, in the presence of ruptured membranes. *Best Practice*
12. We recommend that if there is a suspicion of cord prolapse, a vaginal examination should be performed as soon as possible with the woman's consent, to exclude or confirm the diagnosis. *Best Practice*
13. Multidisciplinary management, including senior midwives, obstetricians, neonatologists, anaesthetists and theatre team, is recommended. *Grade 1C*
14. We recommend that techniques and manoeuvres to relieve cord compression should be used immediately from diagnosis until the birth of the baby, including positioning the woman and elevating the presenting part off the prolapsed cord. *Grade 1C*
15. We recommend evidence-based manoeuvres to elevate the presenting part; manual elevation of the presenting part vaginally, knee-to-chest position, Trendelenburg position and exaggerated Sims position. *Grade 1C*
16. Bladder filling may have a role in a community setting or midwifery-led unit where delayed diagnosis to delivery is expected, longer than 30 minutes, and immediate access to theatre is not available. *Grade 1C*
17. We recommend that tocolytics are not used as first line management and that providers are aware of the risk of uterine atony with their use. *Grade 1C*
18. In terms of management of cord prolapse in pregnancies at the threshold of viability, a multidisciplinary approach acknowledging the individuality of each case should be taken. *Best Practice*
19. We recommend that a woman planning for a home birth should be assessed for suitability at the first visit and continue to be reassessed for any risk factors for cord prolapse throughout pregnancy. *Best Practice*
20. We recommend that immediate transfer to hospital should be arranged following recognition of cord prolapse outside of a hospital setting, with the estimated time of arrival provided by the paramedics when they are en-route. *Best Practice*
21. A diagnosis to delivery interval of less than 30 minutes is recommended to achieve optimal neonatal outcome. *Grade 1C*
22. Giving birth by the safest method possible is recommended. While this is usually by Caesarean section, vaginal birth may be facilitated if suitable. *Grade 1C*
23. We recommend the use of ISBAR tool as an effective, clear communication in this obstetric emergency. *Grade 1C*
24. We recommend clear communication between staff members involved in cord prolapse, as well as effective communication with the woman and her birthing partner throughout. *Best Practice*
25. Women should be provided with debriefing opportunities to address concerns and answer questions about the event. These should be offered both while the woman remains as inpatient postnatally, and at a postnatal review/clinic appointment in the weeks/months after the birth. *Best Practice*
26. We recommend debriefing the healthcare team involved to allow reflection and evaluation of the event as a team. *Best Practice*

Chapter 1: **Initiation**

The National Clinical Effectiveness Committee (NCEC) and Health Information and Quality Authority (HIQA) define clinical guidelines as systematically developed statements, based on a thorough evaluation of the evidence, to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances, across the entire clinical spectrum.[1]

1.1 Purpose

The purpose of this Guideline was to develop and provide a comprehensive evidence-based guidance for the prevention, recognition and management of cord prolapse. Cord prolapse is an obstetric emergency and it is essential that all staff working in the Maternity Services are trained in managing this potentially life-threatening situation for the fetus.

1.2 Scope

Target Users

The Guideline is a resource for all clinicians working in maternity hospitals/units and primary care in Ireland. This includes healthcare staff, doctors, advanced midwifery practitioners[2], midwives, nurses, health and social care professionals involved in the care of pregnant women.

Target Population

The target population for this Guideline is all pregnant women during the antenatal period.

1.3 Objective

To provide evidence-based recommendations for the care of women with cord prolapse, as well as promoting a standardised approach nationally across all maternity units/hospitals and primary care settings.

1.4 Guideline development process

The Guideline Developers agreed to undertake this work under the direction of the Guideline Programme Team (GPT). An Expert Advisory Group (EAG) was commissioned by the GPT. Their role was to critically review the Guideline prior to submission to the National Women and Infants Health Programme (NWIHP) for final approval. See Appendix 1 for EAG membership and Appendix 2 for Guideline Programme Process.

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1 National Clinical Effectiveness Committee (NCEC) and Health Information and Quality Authority (HIQA) (2015) National quality assurance criteria for clinical guidelines. Version 2. Dublin: NCEC and HIQA. https://www.hiqa.ie/sites/default/files/2017-01/National-Quality-Assurance-Criteria.pdf

2 Nursing and Midwifery Board of Ireland (NMBI) (2018) Advanced Practice (Midwifery) Standards and Requirements. Dublin. www.nmbi.ie/NMBI/media/NMBI/Advanced-Practice-(Midwifery)-Standards-and-Requirements-2018-final.pdf

The Guideline Development Group was made up of two Obstetricians and two midwives with a special interest in obstetrics emergency and clinical skills education.

The Guideline Developers are as follows:

- Dr Maeve White, Obstetrics & Gynaecology Specialist Registrar, The Rotunda Hospital
- Ms Valerie McInerney, Assistant Director of Midwifery, University Maternity Hospital Limerick
- Ms Andrina Neary, Clinical Midwife Manager, University Maternity Hospital Limerick
- Dr Khadijah Ismail, Consultant Obstetrician & Gynaecologist, University Maternity Hospital Limerick

1.5 Stakeholder involvement

Stakeholders are people who have a common interest in improving health services. This includes persons that are responsible for delivering and those who receive services related to the clinical Guideline.

The EAG has representatives from a broad range of professional backgrounds. Relevant to this Guideline there are representatives from Obstetrics, Neonatology and Midwifery. A public, patient representative is also included in the EAG from the Patient Advocacy Service Ireland and the Irish Neonatal Health Alliance.

The Guideline Developer Group are thankful to Dr Sabina Tabirca Consultant Obstetrician and Gynaecologist for her input at the beginning of the development of this guideline. We are also grateful to Dr Lucia Hartigan Consultant Obstetrician and Gynaecologist at University Maternity Hospital Limerick for her review of the final draft of the guideline.

The final draft of this Guideline was reviewed by Orlaith Spitere, Designated Midwifery Officer for Cork University Maternity Hospital, HSE Home Birth Service, Cork City & County, by Elke Hasner and Mary Cronin, Cork based Self Employed Community Midwives (SECM), and by Mary Rowland Assistant Director of Midwifery, NWHIP.

1.6 Disclosure of interests

Guideline developers and reviewers bring a range of experiences and perspectives to the work of the national Guideline Programme. It is likely that both Guideline developers and stakeholders/reviewers will have a variety of interests, arising from different contexts and activities done in a professional or personal capacity. These can include employment and other sources of income, speaking engagements, publications and research, and membership of professional or voluntary organisations. The involvement of individuals with relevant content expertise is essential for enhancing the value of Guideline recommendations, but these individuals may also have interests that can lead to conflicts of interest, as may peer reviewers, patient representatives and researchers.

All interests should be declared if, in the view of a reasonable person, they are relevant, or could be perceived to be relevant, to the work of the Clinical Practice Guideline in question.[3] Declaring an interest does not mean there is a conflict of interest.

3 NICE (2019) Policy on declaring and managing interests for NICE advisory committees https://www.nice.org.uk/Media/Default/About/Who-we-are/Policies-and-procedures/declaration-of-interests-policy.pdf

It is important that interests are openly declared so they can be appropriately managed. Conflicts of interest can bias recommendations and ultimately be harmful to women and the health system. Disclosures of interests and appropriate management of conflicts of interest, when identified, are therefore essential to producing high-quality, credible health guidelines.[4]

The Guidelines International Network (GIN), a global network of Guideline developers that aims to promote best practices in the development of high-quality guidelines, developed a set of 9 principles to provide guidance on how financial and non-financial conflicts of interest should be both disclosed and managed. It is recommended that Guideline developers follow the GIN principles.[5]

For this National Clinical Practice Guideline, all Guideline developers are asked to complete a conflict of interest declaration form. The response to declared interests will be managed by the Guideline programme team, in accordance with GIN principles. Conflicts of interest may be reported in the published Guideline and declarations of interest can be made available.

None of the contributors to this Guideline provided any conflicts of interest.

1.7 Disclaimer

These guidelines have been prepared to promote and facilitate standardisation and consistency of good clinical practice, using a multidisciplinary approach. Information in this Guideline is current at the time of publication.

The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the Clinician in light of clinical data presented by the woman and the diagnostic and treatment options available. Clinical material offered in this Guideline does not replace or remove clinical judgment or the professional care and duty necessary for each specific woman. Clinical care carried out in accordance with this Guideline should be provided within the context of locally available resources and expertise.

This Guideline does not address all elements of standard practice and assumes that individual clinicians are responsible for:

- Discussing care with women in an environment that is appropriate and which enables respectful confidential discussion. This includes the use of interpreter services where necessary
- Advising women of their choices and ensure informed consent is obtained
- Provide care with professional scope of practice, meeting all legislative requirements and maintaining standards of professional conduct
- Applying standard precautions and additional precautions, as necessary, when delivering care
- Documenting all care in accordance with local and mandatory requirements

4 Traversy G, Barnieh L, Akl EA, Allan GM, Brouwers M, Ganache I, Grundy Q, Guyatt GH, Kelsall D, Leng G, Moore A, Persaud N, Schünemann HJ, Straus S, Thombs BD, Rodin R, Tonelli M. CMAJ. 2021, 193(2):E49-E54. DOI: 10.1503/cmaj.200651 https://www.cmaj.ca/content/193/2/E49

5 Holger J. Schünemann, Lubna A. Al-Ansary, Frode Forland, *et al.*; for the Board of Trustees of the Guidelines International Network. Guidelines International Network: Principles for disclosure of interests and management of conflicts in guidelines. Ann Intern Med. 2015;163:548-553. doi:10.7326/M14-1885. https://www.acpjournals.org/doi/10.7326/m14-1885

1.8 Use of language

Within this guidance we use the terms 'woman' and 'women's health'. However, it is important to acknowledge that people who do not identify as cis-gender women are excluded from this descriptor, including people who identify as transgender, gender diverse and gender non-binary[6]. While there has been a trend to remove the word 'woman/women' and use 'gender neutral' language in policy and practice in relation to women's reproductive health and wellbeing, there is no evidence base to inform this change[7]. We also appreciate that there are risks to desexing language when describing female reproduction[8] [9].

Services and delivery of care must be appropriate, inclusive and sensitive to the needs of people whose gender identity does not align with the sex they were assigned at birth. This includes training and education regarding diverse pathways to pregnancy and the use of practices which affirm the sexual and gender identities of all people using Obstetrics and Gynaecology services. Finally, all those using maternal and reproductive health care and services should receive individualised, respectful care including use of the gender nouns and pronouns they prefer[7].

Language use is key to effectively communicate options, recommendations, and respectfully accept a woman's fully informed decision[10]. With this in mind, the use of birth is preferable to the term delivery in all circumstances and is used consistently where possible throughout the guidelines. It is acknowledged that in some circumstances (e.g., in the case of a medically indicated intervention or surgery) and in some contexts, substituting with the term delivery is considered appropriate and this term may be used instead.

6 Moseson H, Zazanis N, Goldberg E, *et al.* The Imperative for Transgender and Gender Nonbinary Inclusion. Obstet Gynecol. 2020;135(5):1059-1068. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7170432/

7 Council of Deans of Health. Midwifery Network position paper: use of sexed language. May 2023. https://www.councilofdeans.org.uk/2024/02/midwifery-network-position-paper-use-of-sexed-language/

8 Brotto LA, Galea LAM. Gender inclusivity in women's health research. BJOG: An International Journal of Obstetrics & Gynaecology. https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/1471-0528.17231

9 Gribble KD, Bewley S, Bartick MC, *et al.* Effective Communication About Pregnancy, Birth, Lactation, Breastfeeding and Newborn Care: The Importance of Sexed Language. *Frontiers in Global Women's Health*. 2022;3. Accessed June 9, 2022. https://www.frontiersin.org/article/10.3389/fgwh.2022.818856

10 https://blogs.bmj.com/bmj/2018/02/08/humanising-birth-does-the-language-we-use-matter/

1.9 Adopting a trauma-informed approach to maternity care

Many women accessing maternity services may have experienced historical or current trauma prior to, or during pregnancy – including emotional, physical, sexual abuse, rape and torture. The perinatal period (pregnancy, birth and the postpartum) can be a time when previous trauma is triggered[11]. Maternity care procedures which may seem routine and 'non-invasive' to healthcare professionals (HCPs), e.g., abdominal palpation, providing breastfeeding support can be triggering for some women with a history of trauma, as can intimate procedures such as vaginal examinations[12].

Trauma-informed care (TIC) is a developing approach to healthcare which recognises the importance of psychological safety, and the need to prevent or resist re-traumatisation of individuals[13]. It is based on 4 key principles (known as the 4Rs): (1) realisation of trauma; (2) recognition of trauma; (3) responding to trauma and (4) resisting re-traumatisation[14, 15]. A trauma-informed approach to maternity care means that all staff in an organisation have an understanding of the impact of trauma on individuals, families and organisations. While a universal approach is yet to be agreed, within clinical practice and research, many organisations recognise the need to move towards becoming trauma-informed in the provision of maternity care[15, 16.] Such an approach requires commitment, investment and transformation within maternity services.

In simple terms, HCPs should recognise the impact of women's previous or current history of trauma (whether disclosed or not), and adopt a universally sensitive approach to care provision that recognises the impact of trauma on service users and HCPs. Examples of this include ensuring clear communication and consent is sought before any procedures/interventions, ensuring women are provided with dignity and respect at all times.

11 Horsche A., Garthus-Niegel S., Ayers S, Chandra P., Hartmann K., Caisbuch E., Lalor J (2024). Childbirth-related posttraumatic stress disorder: definition, risk factors, pathophysiology, diagnosis, prevention, and treatment. Expert Review, American Journal of Obstetrics & Gynecology

12 Montgomery E. (2013). Feeling safe: a metasynthesis of the maternity care needs of women who were sexually abused in childhood. Birth 40:88-95. https://www.drugsandalcohol.ie/28377/

13 Vogel TM, Coffin E. (2021). Trauma-informed care on labor and delivery. Anesthesiol Clin 39: 779-91

14 Substance Abuse and Mental Health Services Administration. SAMHSA'a Concept of Trauma and Guidance for a Trauma-Informed Approach. HHS Publication No. (SMA) 14-4884. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2014

15 Dueger S. (2016). Protecting children and young people: trauma informed care in the perinatal period. J Prenat Perinat Psychol Health30:307

16 Ayers, S., Horsch, A., Garthus-Niegel, S., Nieuwenhuijze, M., Bogaerts, A., Hartmann, K., Karlsdottir, S. I., Oosterman, M., Tecirli, G., Turner, J. D., Lalor, J., & COST Action CA18211 (2024). Traumatic birth and childbirth-related post-traumatic stress disorder: International expert consensus recommendations for practice, policy, and research. *Women and birth: journal of the Australian College of Midwives*, *37*(2), 362-367. https://doi.org/10.1016/j.wombi.2023.11.006

Chapter 2: Clinical Practice Guideline

Background

Umbilical cord prolapse is rare and can be a life-threatening obstetric emergency for the fetus. It is largely an unpredictable, unpreventable and frightening event for the woman and her family, as well as the healthcare professionals involved [1]. It occurs when the amniotic membranes rupture and the umbilical cord passes through the cervix, either during the antenatal or intrapartum period [1]. The incomplete engagement of the fetal presenting part allows a gap into which the umbilical cord can descend [2].

Studies in the literature suggest that the incidence of cord prolapse has decreased significantly [3,4]. A retrospective cohort study by Gibbons *et al.* found a reduction in umbilical cord prolapse cases over the last decades from 6.4 per 1000 live births in 1940s to 1.7 per 1000 in 2000s [3]. A more recent retrospective cohort study in Ireland, published in 2017, examined over 20 years of data and found an umbilical cord prolapse rate of 0.8 per 1000 live births. The majority of cases (216/307, 70%) occurred in multiparaous women; however, nulliparous women were more likely to have a perinatal death [12% (11/91) vs. 4.6% (10/216)] as a consequence of cord prolapse. The rate of perinatal death in cases of cord prolapse was 6.8% (21/307). Over half of perinatal deaths (11/21) occurred in infants of mothers who presented with ruptured membranes, and seven of these infants were already deceased on reaching hospital. There was just one case of neonatal encephalopathy associated with cord prolapse, giving an incidence of 0.3%. The study concluded that cord prolapse carries a significant risk of perinatal death, approximately 7%, and that the corresponding rate of encephalopathy is low. A number of deaths were diagnosed on presentation to hospital and were not deemed preventable [4]. The reduction in grand multiparity alongside the increased use of caesarean section were found to be the likely cause contributing to this reduction [3].

Despite being a rare event, cord prolapse is the cause of 6-10% of perinatal mortality in developed countries and as high as 23-27% in African countries [3]. The difference in the rate between the two regions is linked to increasing number of caesarean births, improved neonatal resuscitation and availability of simulation training in the developed countries, while delayed presentation to healthcare settings in African countries leads to prolonged compression of the umbilical cord by the presenting part [3].

Fetal compromise occurs as a result of mechanical compression of the umbilical cord by the presenting part or vasospasm of the umbilical cord [5,6]. The compressed cord obstructs the fetal blood supply leading to compromised blood flow, and oxygen deprivation. This can lead to fetal morbidity such as perinatal hypoxia, encephalopathy, or even fetal death. Vasospasm of the umbilical cord exacerbated by the cooler temperature in the vagina contributes further to compromised blood flow [5, 7]. Other theories described that repeated or prolonged compression of the cord turns it flaccid and therefore more prone to prolapse [8]. Below average umbilical cord diameter, minimal to absent coiling and decreased volume of Wharton's Jelly were also described as precursors to cord prolapse [5].

More than half (57%) of umbilical cord prolapses occur within five minutes of spontaneous or artificial rupture of membranes [9]. The rush of the flow of amniotic fluid forces the umbilical cord past the fetal parts especially when the presenting part is not engaged. Early recognition and optimal management of this obstetric emergency are key to minimise perinatal morbidity and mortality. Simulation training and staff education sessions are vital to ensure that staff are aware of the management steps in this situation and the crucial role of team work [10].

The purpose of this Guideline is to provide evidence-based recommendations on best practice for the prevention, recognition and management of umbilical cord prolapse. This Guideline replaces a previous guideline on cord prolapse produced by the RCPI in 2015 [11].

Recommendations relevant to this Guideline can also be found in:

- National Clinical Guideline: Induction of labour[17]
- National Clinical Guideline: Unstable lie (expected 2026)[18]
- Stratification of clinical risk in pregnancy (NCEC National Clinical Guideline No. 23)[19]
- National Women and Infants Health Programme. National Training Standards for Fetal Monitoring, Obstetric Emergencies and Neonatal Resuscitation 2024[20]
- Intrapartum Care Guideline for women on the Supported Care Pathway 2025[21]
- National Clinical Practice Guideline: Assisted Vaginal Birth [22]
- National Clinical Practice Guideline: Fetal Heart Rate Monitoring [23]

17 Mitchell J.M, Nolan C, El Shaikh M, Cullinane, S, Borlase D. National Clinical Practice Guideline: Induction of Labour. National Women and Infants Health Programme and The Institute of Obstetricians and Gynaecologists. October 2023

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Section 1 – Definitions

Introduction

Both cord presentation and cord prolapse are recognised obstetric emergencies. This first section will address the definitions of cord prolapse and cord presentation.

Clinical Question 2.1: **What is cord prolapse and what is cord presentation?**

Evidence Statement

Cord prolapse has been defined as the descent of the umbilical cord from its usual position through the cervix when the amniotic membrane ruptures and exits the uterine cavity beyond the presenting part [1]. Cord prolapse has been described as either occurring alongside the presenting part (occult) or past the presenting part (overt) [5,6].

Occult cord prolapse is when the cord is alongside the presenting part and is palpable only by passing the examining finger into the cervical canal, while overt cord prolapse is when the cord passes through the cervix into the vagina or onto the vulva [5,6].

Cord presentation is defined as the presence of one or more loops of the umbilical cord between the presenting part and the fetal membrane overlying the cervix, with or without the rupture of membranes [6].

Definition of overt cord prolapse is consistent throughout literature, however, for occult cord prolapse, variation exists with regards to the presence or absence of intact membranes [14]. A 2021 expert review article by Wong *et al.* recommended that cord prolapse, cord presentation and compound cord presentation should be classified according to the positional relationship between the cord, the fetal presenting part, and the cervix [14]. They proposed that cord prolapse should be defined as when the cord is below the cervix, either with ruptured or intact membrane and can be further as cord inside or outside the vagina. Cord presentation should then be defined when the cord is above the cervix but below the presenting part, again with either ruptured or intact membranes. What was previously considered occult presentation was suggested to be defined as compound cord presentation where the cord is above the cervix and alongside the presenting part, either with ruptured or intact membranes [14].

Wong *et al.* also proposed the modification of traditional definitions, based on the risk to the fetus, with overt cord prolapse posing the highest risk to the fetus, followed by cord presentation, and then compound cord presentation (or occult cord prolapse) [14]. The Royal College of Obstetricians and Gynaecologists (RCOG) 2014 Green Top Guideline has not changed definitions, and continues to define cord prolapse as either occult, alongside the presenting part, or overt, past the presenting part, in the presence of ruptured membranes [15].

Clinical Practice

Cord prolapse should be defined as the descent of the umbilical cord through the cervix, past the presenting part, and can be divided into occult (occurring alongside the presenting part) or overt (prolapsing past the presenting part).

Cord presentation should be defined as the presence of one or more loops of the umbilical cord between the presenting part and the fetal membrane overlying the cervix.

Recommendations

1. **We recommend that cord prolapse is defined as the descent of the umbilical cord through the cervix and beyond the presenting part.**
2. **We recommend that cord prolapse be categorised into occult (occurring alongside the presenting part) or overt (prolapsing past the presenting part).**
3. **We recommend that cord presentation is defined as the presence of one or more loops of the umbilical cord between the presenting part and the fetal membrane overlying the cervix.**

Section 2 – Risk factors

Introduction

Identifying the risk factors for cord prolapse is crucial to reduce its incidence of occurrence and thus minimising the associated perinatal morbidity and mortality. This section focuses on the antenatal and intrapartum risk factors for cord prolapse.

Clinical Question 2.2: **What are the antenatal risk factors for cord prolapse?**

Evidence Statement

The overall risk of cord prolapse in pregnancy is 0.1-0.9% [1]. The majority of cases of cord prolapse occur in "normal risk" pregnancies at term, and many are unavoidable. Despite this, there are recognised risk factors that should trigger transfer from Supported Care Pathway to Assisted or Specialist Care Pathways – including, but not limited to small for gestational age babies, preterm births, polyhydramnios, oligohydramnios, unstable lie, malposition, breech presentation. [1,16,17]. Risk factors for cord prolapse are generally related to a maternal pelvis which is incompletely filled by the presenting part [6].

Non-vertex presentation

In a retrospective cohort study over a 14-year period examining 77 cases of cord prolapse, non-vertex presentation has been shown to increase the risk of cord prolapse. Umbilical cord prolapse occurred in association with vertex presentation 66 times (85.7%), breech presentation nine times (11.7%) and transverse presentation twice (2.6%). The occurrence of breech presentation among the control cases was 2.6%, and that of transverse lie was 1.7%. In twelve pregnancies, presenting parts were not engaged (15.5%), and there were no multiple pregnancies. In 20 patients, cervical dilatation was less than 4 cm (25.9%). Umbilical cord prolapse followed amniotomy in 23 cases (29.8%). Amniotomy was performed in 61 pregnancies in the control group (26.4%), and the difference was not statistically significant. [18]. Similarly, a population-based case-cohort study over a five year period by Hasegawa *et al.* found non-vertex presentation to be associated with a higher risk for cord prolapse than vertex presentation (OR 4.67; 95% CI 3.73, 5.86) [7].

The same study by Hasegawa *et al.* also found an increased abnormal positioning of the fetuses in multiple pregnancy as a risk factor for cord prolapse [7]. This is supported by findings of another population-based study by Kahana *et al.* [19]. Similarly, pregnancies complicated by fetal congenital anomalies causing a non-vertex presentation, also contributed to the increased risk of cord prolapse [20].

A 1986 study over a one-year period in a US tertiary centre indicated a significant association between pregnancies with transverse lie with ruptured membranes, and cord prolapse. Two of the 29 pregnancies presented with cord prolapse (7%). This again, may likely be due to the unengaged presenting part in these pregnancies with unstable and non-longitudinal lie. Twenty-four (83%) spontaneously converted to a longitudinal lie and presented in labour with either a vertex (15 [52%]) or breech (9 [31%]) presentation. The five (17%) remaining pregnancies presented in labour with a persistent transverse lie. Overall, the caesarean section rate was 13 of 29, or 45%. The indications for caesarean birth were breech presentation, eight (62%), and transverse lie, five (38%). Major complications included two prolapsed cords, one uterine rupture and one neonatal death [21].

Polyhydramnios

Polyhydramnios has also been identified as a risk factor for cord prolapse in multiple observational studies [7,16,19,22]. A case-control study in a large maternity unit looked at cord prolapse figures over a one year period in which there were 16,874 deliveries. They found that polyhydramnios (defined here as amniotic fluid index >20 cm) was found in 10.0% of cases complicated by cord prolapse, compared to 1.8% in the control group (P<0.001) [16]. This amounts to a 21-fold increased risk for umbilical cord prolapse when compared with pregnancies with normal liquor volume [16].

Prematurity and Preterm prelabour rupture of membrane (PPROM)

A population-based study by Hasegawa *et al.* demonstrated that cord prolapse is more likely to be observed in low birthweight infants, with prematurity (OR 2.28; 95% CI 1.83, 2.83) and preterm rupture of membranes (OR 3.84; 95% CI 3.10, 4.77) [7]. Similar findings were also seen in other observational studies (19,23-25). This may be related to the unengaged presenting part at earlier gestational ages.

Multiparity

In a large retrospective cohort study examining the US's National Centre for Health Statistics from more than 10 million births, the risk of cord prolapse was found to increase with increasing parity, with a 54% increase in risk after three births and a 67% increase in risk after four births [23]. This figure is consistent with other observational studies showing similar results [18,19,24]. This may be related to the unengaged head more commonly seen in multiparous women.

Clinical Practice

Healthcare professionals involved in maternity care should be aware of the risk factors which can lead to umbilical cord prolapse, these include anon-vertex presentation multiple pregnancy, unstable lie, congenital anomalies), polyhydramnios, prematurity, PPROM and multiparity.

Identifying pregnancies with risk factors allows for the optimal management plan to be put in place in order to minimise the risk of cord prolapse and its associated perinatal morbidity and mortality.

Recommendations

4. **We recommend that it is best practice to identify pregnancies with antenatal risk factors for cord prolapse to allow measures to be taken to minimise its risk and the associated perinatal morbidity and mortality.**

Clinical Question 2.3: **What are the antenatal measures to minimise the risk of cord prolapse?**

Evidence Statement

Although there are well documented risk factors for cord prolapse, as outlined previously in this Guideline, it is largely unpredictable and unpreventable [1,5,6]. However, possible antenatal measures to minimise the risk cord prolapse are discussed here.

Ultrasound examination

Ultrasound examination has widely documented benefits in Obstetrics [26]. However, it has low accuracy for diagnosis of cord presentation and prediction of cord prolapse. A retrospective study looked at medical records of 16,551 births over a 5-year period, which included 42 cases of clinical cord prolapse. Of these, only 12.5% cases of cord prolapse were preceded by ultrasound identification of cord presentation [27]. In the study, documented cord presentation in the third trimester necessitated repeat scans and intrapartum sonographic assessment to determine the mode of delivery [27].

A 2007 prospective cohort study examined the use of transvaginal ultrasound (TVUS) in predicting and preventing umbilical cord prolapse in term breech birth. They studied the incidence of cord presentation and its clinical course for 198 women who had breech births after 36 weeks, from 1995 to 2005 (group A). They compared the incidence of umbilical cord prolapse between group A and another 230 women who delivered breech at term from 1983 to 1994 (group B). No umbilical cord prolapse occurred in group A, while umbilical cord prolapse occurred in 4% of pregnancies in group B. This study has shown the benefit of TVUS in predicting umbilical cord prolapse in pregnancies with breech presentation[28]. However, the study involved weekly scans of women with breech presentations from 36 weeks' gestation onwards [28] and ultimately ultrasound monitoring in this cohort was not recommended.

Elective hospital admission

Women with abnormal fetal lie, such as transverse or unstable lie after 37 completed weeks of gestation were found to have a higher risk of cord prolapse [21]. In view of this, elective hospital admission after 37 completed weeks of gestation should be considered in pregnancies with transverse, oblique or unstable lie [15]. A retrospective study examining those with preterm prelabour rupture of membranes with non-cephalic presentations found a higher risk of cord prolapse in these cases. There was a 10.8% risk of umbilical cord prolapse in the study group of 74 pregnancies with nonvertex presentation, compared to 1.4% risk in the control group of 74 with vertex presentations. [29] Thus this cohort should also be managed as inpatients [15].

Clinical Practice

Clinicians need to be aware that ultrasound examination has low accuracy for predicting cord prolapse and diagnosing cord presentation, with the majority of cord prolapse diagnosed on vaginal examination.

Women with unstable, oblique or transverse lie should be considered for admission from 37+0-38+6 weeks' gestation to reduce the risk of a cord prolapse occurring in the community setting. The exact timing for admission should be based on a judgement made by the clinician considering factors such as distance from the hospital, parity and previous timing of birth. The plan of care in terms of timing of birth should be discussed with the woman and documented on her chart.

Woman with preterm prelabour rupture of membranes with non-cephalic presentations are at higher risk of cord prolapse and should be managed as an in-patient in a maternity unit/hospital.

Recommendations

5. We do not recommend routine ultrasound examination to identify cord prolapse or cord presentation, except in a research setting.
6. We recommend that elective hospital admission in pregnancies with high risk of cord prolapse after 37+0 weeks' gestation should be discussed with the woman.
7. We recommend that women with preterm prelabour rupture of membranes with non-cephalic presentation should be managed as an in-patient.

Clinical Question 2.4: **What are the intrapartum risk factors for cord prolapse?**

Evidence Statement

Cord prolapse has been associated with intrapartum obstetric procedures [1,5]. Obstetric interventions has been shown to precede nearly half of cases of umbilical cord prolapse [30]. These are linked to interventions that elevate the presenting part out of the pelvis [5]. A 2013 paper reported that with the rare nature of umbilical cord prolapse, there is no agreement on the scale of impact of each risk factor between large-scale studies [5].

Cord prolapse should be anticipated during the following interventions or situations:

Amniotomy or Artificial rupture of membrane

Amniotomy (artificial rupture of membrane) is amongst the commonly implicated procedure with cord prolapse[30]. Multiple observational studies have reported that cord prolapse poses its highest risk with amniotomy or artificial rupture of membranes [7,9,30,31]. In one of these studies, the rate of cord prolapse was 37/33,519 births (0.1%). Of the 37 cases of cord prolapse, 62% occurred following amniotomy versus 37% occurring after spontaneous rupture of membranes [31]. However, the diagnosis was made immediately after amniotomy in 70% of the cases, compared with only 28% diagnosed immediately in cases with spontaneous rupture of membrane [31]. Further, a study by Kwakita *et al.* found an increased risk of cord prolapse when an artificial rupture of membrane is performed with a dilation of less than 6 cm and a presenting part with station of -3 (adjusted OR of 2.29 (95% CI, 1.02-5.40)) [32].

A 2013 Cochrane review of artificial rupture of membranes for augmentation of spontaneous labour versus no artificial rupture of membranes, showed no difference in the rate of cord prolapse (RR 1.0, 95% CI 0.14-7.1). This suggests that in the context of spontaneous labour, artificial rupture of membrane has a low risk for cord prolapse [33]. However, in the context of an induction of labour, the fetal head may be more loosely applied to the cervix or at a higher station, making the risk for cord prolapse higher in this situation. Clinical judgement is necessary to determine the safety of artificial rupture of membrane on an individual basis [34]. NICE recommends that before induction of labour is started, engagement of the presenting part should be assessed, and umbilical cord presentation should be out ruled on vaginal examination to reduce the likelihood of a cord prolapse [35].

Induction of labour using balloon catheter

Placement of a balloon catheter as a method of cervical ripening for induction of labour has also been associated with cord prolapse [5]. This method of induction is included in the National Guideline on Induction of Labour17. A population-based study in Japan of 2,037,460 births and 369 pregnancies with cord presentation or cord prolapse, identified 93 cases of cord prolapse in 146,271 births associated with the use of balloons for cervical ripening versus 33 cases in the 1,891,189 births not associated with use of balloons. This showed a significantly increased risk of cord prolapse with cervical balloon catheter (0.064% vs 0.005%, OR 13.67)[36]. However, the same authors conducted a similar study 5 year later. The total number of births was 490,279, with 74 cases of umbilical cord prolapse reported (0.015%). There was no difference demonstrated between the incidence of cord prolapse between the two groups from the 2015 and 2020 studies, even when the use of balloon catheter induction was decreasing [37]. The incidence of cord prolapse was similar between the two groups regardless of the use of cervical ripening balloons (0.014% vs 0.015% with cervical ripening balloons, 0.005% vs 0.008% without cervical ripening balloons)[36,37].

Manipulation or rotation of fetal head

Manual rotation of the fetal head usually involves manipulation of the fetal head upwards with ruptured membranes. Where there is an unengaged presenting part or where the presenting part is poorly applied, it can be manipulated during vaginal examination and increases the risk of cord prolapse. In a 1999 study, the authors reviewed the maternal and neonatal charts of 87 pregnancies complicated by true umbilical cord prolapse during a 5-year period. Rotation of the fetal head, such as from an occipito-posterior to occipito-anterior position was seen to be associated with cord prolapse in just one of the cases, due to the disengagement of the fetal head [29].

Application of fetal scalp electrode or intrauterine pressure catheter

Placement of fetal scalp electrode for monitoring in labour or an intrauterine pressure catheter may displace the fetal head, thus increasing the risk of cord prolapse [5]. In a large retrospective cohort study of 57,204 women who underwent artificial rupture of membranes, the application of a fetal scalp electrode was shown to increase the risk of cord prolapse compared to cases where fetal scalp electrode was not used (34.5% vs 26.2%, p=0.04) [32]. The same retrospective cohort study also showed an increase in cord prolapse with use of an intrauterine pressure catheter, however, this difference was not statistically significant (27.4% vs 23.2%, p=0.29) [32].

Premature labour

In the previously mentioned large population-based retrospective study in Japan examining 369 cases of cord presentation and prolapse, they found a higher occurrence of cord prolapse in preterm births compared with term births. 121/369 cases (32.8%) were in the context of preterm labour prior to 37 weeks [7]. Another large population-base study looked at 456 cases of cord prolapse out of 121,227 deliveries over 12 years. They found that the odds ratio for preterm birth (<36 weeks) associated with umbilical cord prolapse was 2.9 and the 95% CI was 2.3-3.65 (P<0.001) [19]. Women presenting in premature labour were also found to have a higher risk of cord prolapse in other observational studies [16-18,22,23)]. This is likely due to the smaller size of premature infants who are less likely to engage, with their presenting part not well applied to the cervix, providing more space for the cord to prolapse[5,23].

Second twin

As discussed in the section on antenatal risk factors, multiple gestation is also a known risk factor for cord prolapse. During labour in twin pregnancy, cord prolapse occurs more common in the second twin compared to the first twin [7,9,19]. A large population-based study found the rate of cord prolapse in the first twin to be 4.6%, as compared to 6.5% in the second twin [7]. A similar findings was reported by Murphy and MacKenzie, with a 9% rate of cord prolapse with the first twin and 14% with the second twin [9]. This is again likely due to the fetus being less likely to engage in the maternal pelvis.

External cephalic version in woman with ruptured membranes

External cephalic version, a non-invasive procedure that manipulates fetal position through the woman's abdominal wall, can be a risk factor for cord prolapse if performed in pregnancies with ruptured membranes [5]. A systematic review of 6 papers with 13 case reports on external cephalic version in premature rupture of membrane after 24 weeks' gestation showed a success rate of 46.1%, however with a high rate of cord prolapse of 33.3% and a vaginal delivery rate of only 23.1% [38].

Clinical Practice

Healthcare professionals should be aware of the intrapartum risk factors for cord prolapse and these should be identified, especially prior to intrapartum interventions or procedures.

Intrapartum Risk Factors for Umbilical Cord Prolapse
• Amniotomy or Artificial Rupture of Membranes
• Induction of labour using balloon catheter
• Manipulation or rotation of fetal head
• Application of fetal scalp electrode or intrauterine pressure catheter
• Premature labour
• Second twin
• External cephalic version in women with ruptured membranes

Individual units/hospitals may implement measures to mitigate the risk involved with intrapartum procedures. This may include performing an amniotomy that is predicted to be difficult, for example where there is a high fetal station or in a multiple pregnancy. These measures should be performed on the labour ward with direct access to an operating theatre and within daytime working hours.

Healthcare professionals managing premature labours and labours in multiple pregnancies should be aware of the increased risk of cord prolapse due to the non-engaged presenting part.

Recommendations

8. **We recommend that clinicians be aware of the risk factors for cord prolapse, so that it can be promptly recognised and managed. These include obstetric interventions such as induction of labour methods (amniotomy and balloon catheter), manipulation or rotation of fetal head on vaginal examination, application of fetal scalp electrode or intrauterine pressure catheter and external cephalic version in woman with ruptured membranes.**

Clinical Question 2.5: **What are the intrapartum measures to minimise the risk of cord prolapse?**

Evidence Statement

Caution needs to be exercised in performing procedures associated with high risk of cord prolapse. Even if cord prolapse is not preventable, early diagnosis may minimise the associated fetal morbidity and mortality [5].

Controlled environment for high-risk intrapartum procedures

It is best practice to avoid amniotomy in cases where the presenting part is high or mobile[5]. In a reported literature review, controlled amniotomy has been suggested if amniotomy is required in these cases, allowing a slow release of fluid and avoiding sudden decompression [5]. This should be undertaken in a controlled clinical environment with an obstetric theatre on standby.

From the same literature review, it was reported that in cases where vaginal manipulation of the fetal head is necessary, such as from occipito-posterior to occipito-anterior position, caution is needed to avoid elevating the fetal head, as this will allow space into which the cord may prolapse [5]. Similarly, care must also be taken not to elevate the fetal head more than necessary during fetal scalp electrode placement or intrauterine pressure catheter placements. These procedures, again, need to be performed with an obstetric theatre nearby. Naturally, cervical ripening balloon catheters will elevate the fetal head, and clinician's understanding and awareness of the risk in this intervention is important [5].

External cephalic version with ruptured membranes

A systematic review examining 13 different case reports from six articles on external cephalic version with ruptured membranes found a rate of 33.3% for cord prolapse [38]. In these cases, due to the high risk for cord prolapse, the procedure should only be offered after appropriate counselling, and at an institution with the ability to perform the indicated emergency caesarean delivery [38].

Clinical Practice

In procedures where the risk of umbilical cord prolapse may be higher, such as high fetal station, preterm labour and/or polyhydramnios, efforts should be made to minimise the risk by having certain measures in place. These include using continuous CTG, securing intravenous access and performing the procedure in a controlled clinical environment with immediate access to an obstetric operating theatre.

In situations where manipulating the fetal head (e.g. manual rotation) is necessary, the healthcare professional performing the procedure should be vigilant in avoiding excessive elevation of the fetal head, which may lead to umbilical cord prolapse.

Healthcare professionals must be vigilant and prepared when performing procedures such as placing a fetal scalp electrode or intrauterine pressure catheter to reduce the likelihood of cord prolapse, and to respond appropriately if it occurs.

Recommendations

9. We recommend that high-risk intrapartum procedures should be performed with caution, in a controlled environment with immediate access to an operating theatre.
10. We recommend that precautions should be taken to avoid excessively elevating the fetal head during head manipulation and placement of fetal scalp electrode or intrauterine pressure catheter.

Section 3 – Management

Clinical Question 2.6: **In what situations should cord prolapse be suspected?**

Introduction

To minimise perinatal morbidity and mortality associated with umbilical cord prolapse, prompt and decisive management is required from the clinical teams involved. This section focuses on the management of cord prolapse, from diagnosis, during and after this obstetric emergency.

Evidence Statement

Umbilical cord prolapse must be excluded at every vaginal examination in labour [2] and should always be suspected where there is a change in fetal heart rate pattern after rupture of membranes, especially in pregnancies with risk factors for cord prolapse [1,2,6]. Cord prolapse is commonly associated with changes in the fetal heart rate pattern, such as recurrent variable decelerations or a prolonged bradycardia [1,6].

Early diagnosis of cord prolapse is vital to reduce the risk of hypoxia caused by prolonged umbilical cord compression or vasospasm owing to the impairment of the flow of oxygen and nutrients in the uteroplacental circulation[2]. An increased rate of lower Apgar scores, meconium aspiration, respiratory complications and seizure activity have been found in neonates born after cord prolapse[9]. Cord prolapse is almost always diagnosed on vaginal examination, but occult cord prolapse can easily be missed [1].

A suspicion of cord prolapse should prompt an immediate vaginal examination in order to exclude or confirm the diagnosis. In review articles, diagnosis of cord prolapse is described by the presence of a palpable soft pulsatile mass within the vagina on vaginal examination or the cord is seen visibly extruding from the introitus [5,6]. Presence of fetal limb, a face presentation or a severe caput succedaneum have been described as being confused as umbilical cord in a less experience healthcare provider [5]. In the case of fetal death, the palpable mass on vaginal examination might not be pulsatile [5].

Clinical Practice

Early recognition of cord prolapse is vital.

Cord prolapse should be suspected where there is an abnormal fetal heart rate following rupture of membranes.

Cord prolapse should be suspected in the following situations:

- if cord is felt following amniotomy
- when there are fetal heart abnormalities noted following rupture of membranes (This can be detected using intermittent auscultation or CTG)
- if cord is seen protruding at the vagina

Recommendations

11. Cord prolapse should be suspected when an abnormal fetal heart rate is auscultated, in the presence of ruptured membranes.

Clinical Question 2.7: **What is the management of cord prolapse in the hospital setting?**

Evidence Statement

When cord prolapse is diagnosed, the immediate management aim is to elevate the presenting part off the exposed cord and to expedite the birth by the fastest method possible. Diagnosis to delivery intervals of less than 30 minutes have been shown to be associated with better neonatal Apgar scores at 1 and 5 minutes of life [9].

A retrospective observational case-series examining the effect of fetal bradycardia in labour and long-term neurological outcomes found that the optimal neonatal outcome was achieved when delivery was performed within 25 minutes of the onset of sustained bradycardia. The study examined 2,267 deliveries in 2002-2003 at Kitasato University Hospital in Japan, with 19 pregnancies meeting the inclusion criteria. Episodes of fetal bradycardia were due to umbilical cord prolapse (n=5), placental abruption (n=4), uterine rupture (n=3), maternal respiratory failure (n=1), and other causes (n=6). Mean onset of fetal bradycardia to delivery interval (BDI) was 20.5±8.9 minutes. Mean decision-to-caesarean birth interval was 11.4±3.9 minutes. The delivery interval was negatively correlated with the umbilical arterial pH at birth [39].

Prompt action is possible in the hospital setting with appropriate obstetric, midwifery and anaesthetic staff readily available, and immediate access to an operating theatre [9].

Call for help

As stated in the PROMPT course manual, it is essential that help is called for immediately once cord prolapse is diagnosed [40]. This includes a senior midwife, additional midwifery staff, the most senior Obstetrician available, Anaethesiologist, Neonatologist and Theatre team [40]. A prepared obstetric theatre team is vital as Caesarean section is the most frequent method of emergency birth and preparations should be made for the birth to take place in the operating theatre if the cervix is not fully dilated, or if the station of the fetal head is above the level of the ischial spines. A Neonatologist/team should be present at the birth given the morbidity and mortality (6.8%) [4] associated with cord prolapse [41].

Relieving cord compression

Techniques and manoeuvres to relieve cord compression should be used immediately from diagnosis until delivery [1]. This include positioning the woman and elevating the presenting part off the prolapsed cord. The presenting part must be elevated off the cord until delivery to avoid vascular occlusion by reducing the pressure on the umbilical cord [1,6]. Elevating the presenting part has been shown to prevent perinatal morbidity and mortality. A retrospective study of 132 cases of cord prolapse all of which had efforts to reduce cord compression by knee-chest maternal position and/or by digitally elevating the presenting part showed a high survival rate[9].

Replacing the cord

Replacement of the umbilical cord has been associated with a significant risk factor for poor neonatal outcome [1]. Reduction of the cord was proposed as potential beneficial initial step in the management of cord prolapse, however, this was only based on a successful reduction in five cases, where all had prior successful vaginal birth and only a short segment of the cord had prolapsed [42]. There is no evidence to support replacing the umbilical cord and allowing the labour to continue, and this should not be performed outside of clinical trials [1,6]. Further, and to prevent vasospasm, there should be minimal manipulation of the loops of cord [5,6].

Elevating the presenting part

Manoeuvres to elevate the presenting part can be classified in two ways; 1) pushing up the presenting part of the prolapsed cord and 2) using gravity to elevate the presenting part by maternal positioning. These manoeuvres have been reported to minimise perinatal mortality. In a series of 132 cases of cord prolapse at varying gestational ages (23-42 weeks) treated with either elevation of the presenting part or knee-to-chest position, only one death was directly attributed to cord prolapse [9].

Pushing up

Manual elevation of the presenting fetal part to decompress the cord is a technique that is widely used[6]. This is not based on randomised controlled trials but its use has been associated with a high chance of good outcome [15]. The presenting part can be "pushed up", either with manual elevation (transvaginal) or filling of the maternal bladder. Manual elevation of the presenting part involves placing either two fingers or a whole hand in the vagina and on to the presenting part, physically elevating it off the cord, thus preventing compression of the cord [1,5]. A perinatal mortality rate of only 1.5% was reported in a retrospective study describing 67 cases of cord prolapse where elevation of the presenting part was used [43].

Filling of the urinary bladder

Filling of the bladder with 500-700ml saline was first proposed in 1970 and has also been shown to be an effective method of relieving pressure from the umbilical cord[44]. In a 1983 study, bladder instillation and caesarean section were performed in 88 cases where diagnosis-delivery interval was longer than 30 minutes, and no fetal deaths occurred[1]. Bladder filling raises the presenting part off the prolapsed cord, eliminating the need for the examiner's fingers to displace it. This is done by placing a Foley catheter into the urinary bladder with sterile physiological saline using an intravenous blood infusion set and clamping the catheter once instilled [15,40] (Appendix 3). The catheter will need to be emptied prior to any mode of birth.

In a hospital setting with immediate access to theatre, filling of the bladder is not advisable as this may delay the birth and increase the risk of bladder injury at Caesarean section. Bladder filling may instead have a role in a community setting or midwifery-led unit where direct access to obstetric theatre is not available.

Other methods to relieve pressure on the cord

Positioning the maternal head to be lower than her pelvis will relieve some of the pressure off the prolapsed cord. A "pulling" gravitational force can be applied by adopting a knee-to-chest position or Trendelenburg position, allowing gravity to aid in decompression of the umbilical cord [1,5,6]. This is recommended in a hospital setting as described in the PROMPT Course Manual [40]. If the position is not suitable, the exaggerated Sim's position (left-lateral with a pillow under the left hip) should be used instead [40,45]. Trendelenburg position is less suitable when transferring a woman on a trolley to theatre, and the exaggerated Sim's position may be more appropriate in this situation.

Tocolysis

In 1980s, Karz *et al.* in two separate case series have proposed the use of tocolytics to decrease uterine contractions and thus relieve pressure on the cord [46,47]. They proposed that a tocolytic is also likely to increase placental perfusion and thus lead to improved fetal outcomes. However, they noted that the use of tocolytics does not seem to be necessary in cases where immediate delivery can be accomplished.

The priority is immediate delivery, and therefore the use of tocolytics is not recommended [5,6]. However, there may be a role for tocolytics while preparing for delivery if there are persistent fetal heart rate abnormalities [5]. Healthcare professionals should also be aware of the risk of uterine atony after delivery with the use of tocolytics [48,49]. A 2020 population-based cohort study in Taiwan looked at 259,413 women who underwent Caesarean birth. The incidence (11.7% vs 2.6%, $P < 0.001$) of postoperative haemorrhage were significantly higher in the tocolysis group (n=15,317) than in the control group (n=244,096) in women having caesarean section in preterm labour. [48]. The use of tocolytics has also been found to be associated with lower haemoglobin level and higher blood transfusion rate [49].

Management of cord prolapse at the threshold of viability (23+0 to 23+6)

Cord prolapse may occur at the threshold of viability. Fetal survival was achieved in a case report of cord prolapse at 23+1 weeks' gestation and was managed conservatively for three weeks [50]. The fetus was delivered at 26 weeks by Caesarean section. Another case of fetal survival was reported in 2006 where the cord prolapse occurred at 22+6 weeks' gestation and was manged conservatively for two weeks [6]. These cases are exceptional cases and expectant management should be discussed between the woman, her partner and senior obstetrician and neonatologist in the context of cord prolapse between 23+0 – 23+6 weeks. There is no data to guide the timing of birth in these cases, and a multidisciplinary approach should be taken [6].

Clinical Practice

If there is a suspicion of cord prolapse, a speculum or vaginal examination should be performed as soon as possible with the woman's consent, to exclude or confirm the diagnosis.

Tocolytics should not be used as first line treatment for cord prolapse. Providers should be aware of the risk of uterine atony with its use.

There should a call for help immediately once cord prolapse is diagnosed, including a senior midwife, additional midwifery staff, the most senior obstetrician available, and members of the Anaesthesiology and Neonatology teams, as well as Obstetric theatre staff.

Immediate actions required:

- Commence CTG monitoring. Techniques and manoeuvres to relieve cord compression should be used immediately from diagnosis until birth, including positioning the woman and elevating the presenting part off the prolapsed cord.
- Manual elevation of the presenting part can be done by placing either two fingers or a whole hand in the vagina. Replacement of the umbilical cord should not be performed.
- Bladder filling can be used if delayed delivery is expected. This is done by placing a Foley catheter into the urinary bladder with sterile physiological saline (500mls) using an intravenous blood infusion set and clamping the catheter once instilled.
- The woman should be positioned in either in the exaggerated Sim's position or knee-to-chest position (Trendelenburg position) which allows maternal head to be lower than the pelvis. With a healthcare professional maintaining digital pressure to the presenting part, the exaggerated Sim's position work well for a safe transfer.

In pregnancies at/around the threshold of viability, a multidisciplinary approach should be taken and decisions ideally made after discussion with the Obstetric and Neonatal teams, and the woman involved.

Recommendations

12. **We recommend that if there is a suspicion of cord prolapse, a vaginal examination should be performed as soon as possible with the woman's consent, to exclude or confirm the diagnosis.**
13. **Multidisciplinary management, including senior midwives, obstetricians, neonatologists, anaesthetists and theatre team, is recommended.**
14. **We recommend that techniques and manoeuvres to relieve cord compression should be used immediately from diagnosis until the birth of the baby, including positioning the woman and elevating the presenting part off the prolapsed cord.**
15. **We recommend evidence-based manoeuvres to elevate the presenting part; manual elevation of the presenting part vaginally, knee-to-chest position, Trendelenburg position and exaggerated Sims position.**
16. **Bladder filling may have a role in a community setting or midwifery-led unit where delayed diagnosis to delivery is expected, longer than 30 minutes, and immediate access to theatre is not available.**
17. **We recommend that tocolytics are not used as first line management and that providers are aware of the risk of uterine atony with their use.**
18. **In terms of management of cord prolapse in pregnancies at the threshold of viability, a multidisciplinary approach acknowledging the individuality of each case should be taken.**

Clinical Question 2.8: **What is the management of cord prolapse in the out of hospital community setting?**

Evidence Statement

Cord prolapse in a hospital setting can be related to intrapartum procedures, however, cord prolapse in any setting, including the community, can occur with spontaneous rupture of membrane [51]. Perinatal mortality has an 18-fold increase when cord prolapse occurs outside the hospital setting [52]. Cord prolapse is a time-critical emergency, and prolonged diagnosis to delivery interval has been associated with adverse perinatal outcomes [9,53]. Prompt recognition and appropriate management in cases with cord prolapse is acknowledged in which urgent delivery is crucial [9]. However, rapid response times are only possible if the woman is in hospital when the cord prolapse is diagnosed, with the appropriate multidisciplinary team and a dedicated operating theatre readily available [9].

Most cord prolapses in the community occur spontaneously in the absence of a healthcare professional, often with poor recognition of the emergency situation, which may lead to delayed diagnosis. However, in a case series from the Netherlands on cord prolapse occurring in the community, even with increased diagnosis to delivery intervals compared to a hospital setting, no association with a less favourable perinatal outcome was found [54,55]. Risk factors for cord prolapse were found in four out of the six cases reported [55], showing that selecting women eligible for home birth is important. A woman's risk should be assessed at the first visit followed by continuous assessment throughout pregnancy using the HSE Policy exist to Support Self-Employed Community Midwives to Assess the Eligibility and Suitability of women for Inclusion/Exclusion for Planned Home birth with the HSE [56].

Recognition of cord prolapse

Recognising cord prolapse early is important to avoid any delay which may influence the perinatal outcome. Umbilical cord prolapse is a time-critical emergency and when this is recognised in the home, is an indication for immediate transfer to hospital [40]. (See Clinical Question 2.6)

Immediate management

Following recognition of umbilical cord prolapse, manoeuvres to elevate the presenting part should relieve the pressure on the cord. Elevation of the fetal presenting part is discussed in Clinical Question 2.7.

In a homebirth setting, where a delay in transfer to hospital is expected, bladder filling is recommended [40,45]. The cord should not be handled, and no attempt should be made to replace it inside the vagina.

Plan should be made for immediate transfer to the nearest hospital with the hospital team including senior anaesthetist, senior obstetrician, senior midwife, theatre team and neonatologist pre-alerted and ready for immediate delivery. Effective communication with the relevant multidisciplinary team stating the clinical situation, also providing the estimated time of arrival crucial in management of this emergency [40,45,57].

The woman can be positioned in knee-chest position while waiting for the ambulance. If knee chest position is not possible the woman should be positioned in exaggerated Sims/left lateral tilt [45]. Such manoeuvres are critical to reduce cord compression and the risk of fetal hypoxia [41]. Paramedics should be called in all cases, even when birth is imminent, in order to prepare for possible neonatal compromise.

Management during transfer

It is vital to ensure the woman's safety and security during transfer, however, evidence on management of transferring woman in this time-critical emergency is scarce [58].

Guidance on transfer management are mentioned in the RCOG cord prolapse guideline [15], PROMPT Course manual [40] and the Pre-Hospital Emergency Care Clinical Practice Guidelines [45]. Prompt hospital transfer is the highest priority and helping the woman to walk to the ambulance, and avoid the use of service carrying chair will save time [40]. Once in the ambulance, positioning the woman in exaggerated sims; on her side with pillows or padding placed under her hip to elevate the pelvis will relieve pressure on the cord [15,40]. Bladder filling by placing a Foley catheter in the urinary bladder with sterile physiological saline raises the presenting part off the prolapsed cord, eliminating the need for the examiner's fingers to displace it [15,40,45] and should be considered due to the potential delay of diagnosis to delivery interval.

Clinical Practice

Woman planning to give birth in the community should be assessed using the HSE Policy to Support Self-Employed Community Midwives to Assess the Eligibility and Suitability of women for Inclusion/ Exclusion for Planned Home birth with the HSE. This includes assessment at the first visit, followed by continuous risk assessment throughout pregnancy.

Women who develop risk factors for cord prolapse during the course of pregnancy will become ineligible for home birth. Risk factors such as non-vertex presentation, polyhydramnios, preterm prelabour rupture of membranes and multiparity should be considered.

Umbilical cord prolapse should be suspected with an abnormal fetal heart rate pattern, especially after rupture of membranes.

Immediate transfer to hospital should be arranged once cord prolapse is recognised, and effective communication with the receiving hospital is vital.

Following recognition, the pressure on the cord should be relieved by elevating the presenting part and maternal positioning.

The woman should be helped to walk to the ambulance on transfer, avoiding the use of service carrying chair. Once in the ambulance, the woman should be placed on her side with pillows or padding under her hip to elevate the pelvis (Appendix 4).

Bladder filling should be considered due to potential delay of diagnosis to delivery interval.

Recommendations

19. **We recommend that a woman planning for a home birth should be assessed for suitability at the first visit and continue to be reassessed for any risk factors for cord prolapse throughout pregnancy.**
20. **We recommend that immediate transfer to a hospital should be arranged following recognition of cord prolapse outside of a hospital setting, with the estimated time of arrival provided by the paramedics when they are en-route.**

Clinical Question 2.9: **What mode of birth should be recommended in cases of cord presentation and cord prolapse?**

Evidence Statement

Cord prolapse is an obstetric emergency that can potentially have fatal consequences and mandates delivery of the baby as quickly as possible[59]. A retrospective case-control study examined cases of cord prolapse over a five year period found that diagnosis to delivery intervals of greater than 10 minutes were shown to independently predict neonatal outcomes [22]. Diagnosis to delivery interval was also found to be an independent predictor of adverse neonatal outcome even after controlling for gestation age, presentation, and birthweight [22]. This is supported by other evidences from different observational studies showing higher risk of low Apgar scores and adverse perinatal outcomes such as asphyxia, cerebral palsy and Neonatal Intensive Care Unit (NICU) stay, with longer diagnosis to delivery intervals [16,24,60].

Diagnosis to delivery intervals within 30 minutes was shown to have little effect on the neonatal Apgar scores [9,61]. Thus, the RCOG guideline recommends a diagnosis to delivery interval of 30 minutes or less in order to optimise perinatal outcome [15].

Vaginal birth

When cord prolapse is diagnosed at full dilatation with the vertex visible, vaginal birth may be suitable as the quickest mode of delivery. In a retrospective study over a 23-year period, vaginal delivery was achieved in 75% of cases when the cervix was fully dilated [62]. However, this may also depend on the woman's parity and the station of the presenting part. In the case when assisted vaginal birth is contemplated, the criteria and pre-requisite for applying forceps or vacuum should be maintained [59].

Emergency caesarean section

A retrospective review conducted by the National Maternity Hospital, Dublin over a 69-year period from 1940-2009 identified an increase in perinatal survival in cord prolapse cases from 46 to 94% [3]. Caesarean section was the mode of birth by choice and as such was likely to have accounted for the improved outcomes [3]. This does not necessarily mean that a caesarean birth is necessary and vaginal birth may be more appropriate if deemed a quicker option when birth is imminent [59].

Clinical Practice

Once cord prolapse is diagnosed, a plan for birth should be made by a senior Obstetrician and expedited by the safest method possible.

The mode of birth is usually by Caesarean section; however, vaginal birth may be facilitated if the cervix is fully dilated and birth is imminent.

The usual criteria and pre-requisite for assisted vaginal birth should be maintained in cases where this is contemplated.

Recommendations

21. A diagnosis to delivery interval of less than 30 minutes is recommended to achieve optimal neonatal outcome.
22. Giving birth by the safest method possible is recommended. While this is usually by Caesarean section, vaginal birth may be facilitated if suitable.

Clinical Question 2.10: **What is the role of effective communication, training and organisation in the management of cord prolapse?**

Evidence Statement

According to the HSE National Health Communication Programme's Implementation Guide, communication is at the core of safe healthcare, and communication skills requires practice with ongoing professional development [57,63]. Good communication leads to positive outcomes for all; patient, staff and the healthcare system, with poor communication leading to complaints and potential adverse outcome [63].

In an obstetric emergency such as cord prolapse, communication is vital to ensure optimal management to reduce the associated adverse outcomes.

Communication during the event

The use of the ISBAR tool for communicating clinical patient handover has proved valuable, reliable and is easily implemented in the hospital setting [64]. ISBAR tool should be used to communicate the urgency of the case immediately as help arrives. All members of the team (obstetrics, midwifery, anaesthesia, neonatology) bring different sets of skills and expertise, and communication among the disciplines is critical for safe care.

It is suggested in the PROMPT Course Manual that a team member can be allocated to communicate with the parents if reasonably possible, not only to relay specific instructions, but also to provide a running commentary of the event to help them cope with the emergency situation [40].

It is essential to use closed loop communication and ensure that all members of the team are aware of their role and the clinical decision-making process. Recording of information including who is present, what is being done/decided, where the delivery will be taking place and when all plans will be executed is important.

Debriefing post event

The management of umbilical cord prolapse most often results in delivery by emergency Caesarean section. Unfortunately, in some cases, cord prolapse can lead to significant neonatal morbidity or even death. This can be a particularly traumatic experience for the woman and her family. The importance of clear, honest communication from medical staff involved should not be underestimated. This will include the obstetric and neonatal teams discussing the event openly with the woman and her family. Open disclosure should be implemented as per the HSE Incident Management Framework [65].

According to the findings of a qualitative study by Hinton *et al.*, long-term emotional effects may be experienced for months and years after a traumatic incident with some reporting flashbacks, depression, as well as post-traumatic stress disorder [66]. Women should be provided with opportunities to talk about the event both while they remain as an inpatient postnatally, and in a clinical setting in the weeks or months postnatally. They should be encouraged to ask questions about what happened and have gaps in their knowledge addressed. Debriefing should be performed by a senior obstetrician. In a literature review by Adams *et al.*, if the service users can make sense of what happened and when clinicians and services have also sought to do this, they feel less dismissed [67]. Women should be referred to the local Specialist Perinatal Mental Service if there are concerns about depression, anxiety, or post-traumatic stress disorder.

Debriefing staff involved post event

Whilst the priority and focus during any obstetric emergency is the delivery of safe care, it is imperative that the healthcare team reflect and evaluate as a team in the aftermath of an event. A systematic review in 2020 reported that communication training has been shown to improve communication of staff and students with women, thus improving patient safety [68].

Training

It is best practice that all staff involved with maternity care should receive training in management of cord prolapse. The training sessions should involve multidisciplinary team including midwives, obstetricians, anaesthetists and neonatal teams within the hospital, birth centres and community centres [40]. Regular training, in accordance with national recommendations, was shown in a retrospective cohort study examining the introduction of multi-professional simulation training, to be associated with improved management of cord prolapse with reduction in the diagnosis to delivery intervals from 25 to 14.5 minutes ($P < 0.001$) [10].

A systematic review of the literatures on simulation training showed that it is an effective teaching tool in obstetrics [69]. Additionally, for cord prolapse, a retrospective cohort study on the effect of team training and diagnosis-to-delivery intervals showed a significant reduction in the diagnosis-to-delivery intervals with team training by allowing the team to act faster [10].

Organisation

A multimodal and multidisciplinary approach is needed to develop organisational structure required to support teamwork and allowing a culture committed to reducing harm in healthcare [70]. Maternity service providers should support women and their families after a clinical incident has taken place, and provide information and multidisciplinary support [71]. A proforma to document the event in obstetric emergency has also been found to improve completeness of event documentation [72].

Clinical incident reporting

Clinical incident reporting in a timely manner is crucial to allow risk management recommendations in preventing potential harm in the future [73]. Clinical incident forms should be filled for all cases of cord prolapse.

Clinical Practice

The ISBAR tool should be used immediately to communicate the urgency of the case as help arrives during the event.

A proforma should be considered to record the cord prolapse event (see Appendix 8).

Communication between midwifery/medical disciplines should be clear as this is critical for safe care in this obstetric emergency.

Woman should be provided with opportunities to talk about the event to address gaps in their knowledge.

The healthcare team involved should also be debriefed to reflect and evaluate the event as a team.

Regular simulation training should be arranged in obstetric units as this may allow the team to act faster in emergency scenarios, thus reducing the diagnosis to delivery interval and optimising perinatal outcome.

Women with depression, anxiety, post-traumatic stress disorder, or other mental health problems following cord prolapse should be referred to their local Specialist Perinatal Mental Health Service.

Recommendations

23. **We recommend the use of ISBAR tool as an effective, clear communication in this obstetric emergency.**
24. **We recommend clear communication between staff members involved in cord prolapse, as well as effective communication with the woman and her birthing partner throughout.**
25. **Women should be provided with debriefing opportunities to address concerns and answer questions about the event. These should be offered both while the woman remains as inpatient postnatally, and at a postnatal review/clinic appointment in the weeks/months after the birth.**
26. **We recommend debriefing the healthcare team involved to allow reflection and evaluation of the event as a team.**

Chapter 3: Development Of Clinical Practice Guideline

3.1 Literature search strategy

A comprehensive literature review was undertaken which included national and international publications. The RCOG Green Top Guideline on Umbilical Cord Prolapse was referenced. A comprehensive search of electronic databases Cochrane Library and PUBMED were undertaken. These databases were searched using relevant medical subject headings and keywords. The main keywords used were "cord prolapse" and "cord presentation" in combination with "risk factors", "intrapartum management", "mode of delivery", "rupture of membranes", "morbidity" and "mortality". Searches were limited to humans and articles published between 1970 – May 2024. References lists for key papers were searched by hand. The results yielded from these searches were reviewed, and a detailed literature review was then carried out.

3.2 Appraisal of evidence

Following a comprehensive literature review the quality, validity and relevance of the evidence gathered were critically appraised by the Guideline developers under the following headings:

- Study design
- Relevance of primary and secondary outcomes
- Consistency of results across studies
- Magnitude of benefit versus magnitude of harm
- Applicability to practice context

A number of evidence-based recommendations for management of cord prolapse were agreed upon. They have been adapted to reflect care in the Irish healthcare setting.

3.3 AGREE II process

While being developed, the Guideline was assessed using the AGREE II checklist (Appendix 5) as recommended by the Department of Health in the 'How to Develop a National Clinical Guideline: a manual for guideline developers', 2019[24].

The purpose of AGREE II is to provide a framework to:

1. Assess the quality of guidelines;
2. Provide a methodological strategy for the development of guidelines; and
3. Inform what information and how information ought to be reported in guidelines

24 Department of Health (2019). How to develop a National Clinical Guideline: a manual for guideline developers. Available at: https://www.gov.ie/en/collection/cd41ac-clinical-effectiveness-resources-and-learning/

3.4 Literature review

Details of supportive evidence-based literature for this Guideline are reported in chapter two. The following steps were undertaken to ensure a comprehensive review of the literature on umbilical cord prolapse. A list of clinical questions was agreed by the Guideline Development Group early in the process. The literature search was conducted by Dr Maeve White, Ms Valerie McInerney and Ms Andrina Neary between November 2023 and May 2024. The final selected documents were reviewed by Dr Maeve White and Dr Khadijah Ismail.

There is evidence available to answer the clinical questions proposed, however, for most part, the evidence is from observational studies. The evidence reviewed comes from both national and international studies and has been interpreted to fit the Irish context. Literature was used when the evidence was relevant and applicable to the Irish context and omitted when this was not the case.

3.5 Grades of recommendation

GRADE offers a transparent and structured process for developing and presenting evidence summaries and for carrying out the steps involved in developing recommendations.[25]

While we acknowledge that for this particular work an extensive GRADE approach is not possible, we have used the suggested language set out in the GRADE table when making recommendations.[26] (Appendix 6)

3.6 Future research

An important outcome of the Guideline development process is in highlighting gaps in the evidence base.

The questions of relevance to this Guideline include, but are not limited to, these suggestions from the Guideline Development Group:

1. Can risk factors for cord prolapse be better predicted and prevented?
2. Should methods of cord replacement be used in cases of cord prolapse at the threshold of viability?
3. Could a prospective study be performed of diagnosis to birth for spontaneous and assisted vaginal births and category 1 Caesarean sections, including long term follow up of these infants?
4. What language is best used when counselling or giving information to women about cord prolapse.
5. What is the accuracy, quality, readability and credibility of the information regarding cord prolapse on web pages and/or in current patient information on cord prolapse.
6. How effective have the cord prolapse guidelines and educational material been in improving knowledge (among pregnant women and healthcare professionals) about cord prolapse.

25 Guyatt, Gordon, *et al.* "GRADE Guidelines: 1. Introduction – GRADE Evidence Profiles and Summary of Findings Tables." *Journal of Clinical Epidemiology*, vol. 64, no. 4, 2011, pp. 383-94, https://doi.org/10.1016/j.jclinepi.2010.04.026.

26 SMFM adopts GRADE (Grading of Recommendations Assessment, Development, and Evaluation) for clinical guidelines. Society for Maternal-Fetal Medicine (SMFM), Chauhan SP, Blackwell SC. Am J Obstet Gynecol. 2013 Sep;209(3):163-5. doi: 10.1016/j.ajog.2013.07.012. PMID: 23978245 https://pubmed.ncbi.nlm.nih.gov/23978245/

Chapter 4: Governance And Approval

4.1 Formal governance arrangements

This Guideline was written by the Guideline developers under the direction of the Guideline Programme Team (GPT). An Expert Advisory Group was formed to review the Guideline prior to submission for final approval with the National Women and Infants Health Programme. The roles and responsibilities of the members of each group and their process were clearly outlined and agreed.

4.2 Guideline development standards

This Guideline was developed by the Guideline Developer Group (GDG) within the overall template of the HSE National Framework[27] for developing Policies, Procedures, Protocols and Guidelines (2023) and under supervision of the Guideline Programme Team (GPT).

A review was conducted by a group of experts, specialists and advocates (the EAG) prior to approval by the Clinical Advisory Group (CAG) of the National Women and Infants Health Programme (NWIHP) with final sign off for publication by CAG Co-Chairs, the Clinical Director of NWIHP and the Chair of the IOG. See Appendix 7 for list of CAG members.

27 Health Service Executive (2023). How to develop HSE National Policies, Procedures, Protocols and Guidelines (PPPGs).

Chapter 5: Communication and Dissemination

A communication and dissemination plan for this Guideline has been developed by the GPT and endorsed by NWIHP.

Effective ongoing clear communication is essential in explaining why the Guideline is necessary and securing continued buy-in. It provides an opportunity to instil motivation within staff, helps overcome resistance to change and gives an opportunity for feedback[28].

The Clinical Guideline will be circulated and disseminated through the Guideline Programme Team as well as through the professional networks who participated in developing and reviewing the document.

Senior management within the maternity units are responsible for the appropriate dissemination of new and updated guidelines. Local hospital groups including Guideline committees are also instrumental in the circulation of new and updated guidelines and promoting their use in the relevant clinical settings.

The HSE will make this Guideline and supporting documents available to all employees through standard networks. Electronic versions available on the https://www2.healthservice.hse.ie/organisation/national-pppgs/ and RCPI websites https://www.rcpi.ie/faculties/obstetricians-and-gynaecologists/national-clinical-guidelines-in-obstetrics-and-gynaecology/ and other communication means can be used to maximise distribution.

28 Department of Health (2018). NCEC Implementation Guide and Toolkit. Available at: https://health.gov.ie/national-patient-safety-office/ncec/

Chapter 6: **Implementation**

6.1 Implementation plan

Implementation was considered at the beginning, and throughout the Guideline development process. The local multidisciplinary clinical team, senior executive and clinical management in each maternity and gynaecology unit are ultimately responsible for the appropriate structured adoption and implementation of the Guideline within their area of responsibility. They must ensure that all relevant personnel under their supervision have read and understood the Guideline and monitor both its effectiveness and adoption.

Within each site, local multidisciplinary teams are responsible for the clinical implementation of Guideline recommendations, and ensuring that their local clinical practices and processes reflect and are aligned with the Guideline recommendations

The following have been put in place to help facilitate the implementation of this Guideline.

- Quick Summary Document (QSD) for clinical staff (includes key recommendations, auditable standards, algorithms and recommended reading)
- Clinical Guideline mobile application
- Plain language summary

6.2 Education plans required to implement the Guideline

It is acknowledged that this Guideline should be complemented by ongoing education, training and assessment where required. This involved regular multidisciplinary skill drills and obstetric emergency training for management of cord prolapse.

6.3 Barriers and facilitators

To ensure successful implementation of guidelines, it is first necessary to look at potential barriers and facilitators. Taking these into account when developing the implementation plan should improve levels of support from relevant users. (DOH 2018, 2019)

Barriers may be categorised as internal (specific to the Guideline itself) or external (specific to the clinical environment).

The Guideline Development Group has aimed to address any internal barriers during the development of this Guideline.

Specific to this guideline, there is a lack of strong evidence to support the recommendation, and these are mostly based on expert opinions (Best Practice) or low-quality evidence including observational studies (Grade 1C).

Potential external barriers include:

- Structural factors (e.g. budget or service redesign)
- Organisational factors (e.g. lack of facilities or equipment)
- Individual factors (e.g. knowledge, skills, training)
    - All midwives (hospital and community) and obstetricians (all grades) are required to attend multidisciplinary team (MDT) training in obstetric emergencies every two years.
- Woman's perceptions
    - Appropriate aftercare to address the emergency event and associated complications

In the case of this Guideline it will be necessary to examine possible barriers and consider implementation strategies to address them. By example, this may include discussion with relevant management groups with regards budgetary impact or providing training to the relevant staff.

6.4 Resources necessary to implement recommendations

The implementation of this Guideline should be undertaken as part of the quality improvement of each hospital. Hospitals should review existing service provision against this Guideline, identifying necessary resources required to implement the recommendations in this Guideline.

Chapter 7: Audit and Evaluation

7.1 Introduction to audit

It is important that both implementation of the Guideline and its influence on outcomes are audited to ensure that this Guideline positively impacts on the care of the woman. Institutions and health professionals are encouraged to develop and undertake regular audits of Guideline implementation. Personnel tasked with the job of conducting the audit should be identified on receipt of the most recent version of the Guideline.

7.2 Auditable standards

Audit using the key recommendations as indicators should be undertaken to identify where improvements are required and to enable changes as necessary. Audit should also be undertaken to provide evidence of continuous quality improvement initiatives.

Auditable standards for this Guideline include:

1. Decision to delivery time in the context of cord prolapse
2. Completion of debriefing with a senior Obstetrician after a cord prolapse event
3. Percentage of midwives (hospital and community) and obstetricians (all grades) attending MDT training for obstetric emergencies every two years
4. Adverse maternal and perinatal outcomes associated with cord prolapse in the following settings:
    a. Homebirth
    b. Hospital

7.3 Evaluation

Evaluation is defined as a formal process to determine the extent to which the planned or desired outcomes of an intervention are achieved[29].

Implementation of this Guideline will be audited periodically at national level, with standards for this set by the NWIHP. Evaluation of the auditable standards should also be undertaken locally by senior hospital clinical management to support implementation.

29 Health Information Quality Authority (2012). National Standards for Safer Better Healthcare [Internet]. Available from: https://www.hiqa.ie/reports-and-publications/standard/national-standards-safer-better-healthcare

Chapter 8: Revision Plan

8.1 Procedure for the update of the Guideline

It may be a requirement to amend, update or revise this Guideline as new evidence emerges. This Guideline will be reviewed at national level every three years, or earlier if circumstances require it, and updated accordingly.[30]

The Guideline Development Group will be asked to review the literature and recent evidence to determine if changes are to be made to the existing Guideline. If the Guideline Development Group are unavailable, the GPT along with the NWIHP senior management team will select a suitable expert to replace them.

If there are no amendments required to the Guideline following the revision date, the detail on the revision tracking box must still be updated which will be a new version number and date.

The recommendations set out in this Guideline remain valid until a review has been completed.

8.2 Method for amending the Guideline

As new evidence become available it is inevitable that Guideline recommendations will fall behind current evidence based clinical practice. It is essential that clinical guidelines are reviewed and updated with new evidence as it becomes available.

In order to request a review of this Guideline one of the following criteria must be met:

a. 3 years since the Guideline was published

b. 3 years since last review was conducted

c. Update required as a result of new evidence

Correspondence requesting a review of the Guideline should be submitted to the National Women and Infants Health Programme. Any such requests should be dealt with in a timely manner.

30 Health Service Executive (2023). How to develop HSE National Policies, Procedures, Protocols and Guidelines (PPPGs).

Chapter 9: **References**

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Supporting Evidence

GRADE: http://www.gradeworkinggroup.org/

AGREE: http://www.agreetrust.org/agree-ii/

Glossary

AGREE Appraisal of Guidelines for Research and Evaluation

ACOG American College of Obstetricians and Gynaecologists

CAG Clinical Advisory Group

CTG Cardiotocography

EAG Expert Advisory Group

ECV External cephalic version

GIN Guidelines International Network

GPT Guideline Programme Team

GRADE Grading of Recommendations, Assessments, Developments and Evaluations

HCP Healthcare Professionals

HIQA Health Information and Quality Authority

HSE Health Service Executive

IOG Institute of Obstetricians and Gynaecologists

FIGO International Federation of Gynaecology and Obstetrics

MDT multidisciplinary team

NICE The National Institute for Health and Care Excellence

NICU neonatal intensive care unit

NCEC National Clinical Effectiveness Committee

NWIHP National Women and Infants Health Programme

PROMPT Practical Obstetric Multi-Professional Training

PPPG Policy, Procedures, Protocols and Guidelines

PPROM preterm prelabour rupture of membrane

RCOG Royal College of Obstetricians and Gynaecologists

RCPI Royal College of Physicians of Ireland

SECM Self Employed Community Midwives

TIC trauma-informed Care

TVUS transvaginal ultrasound

Appendix 1:
Expert Advisory Group Members 2021-

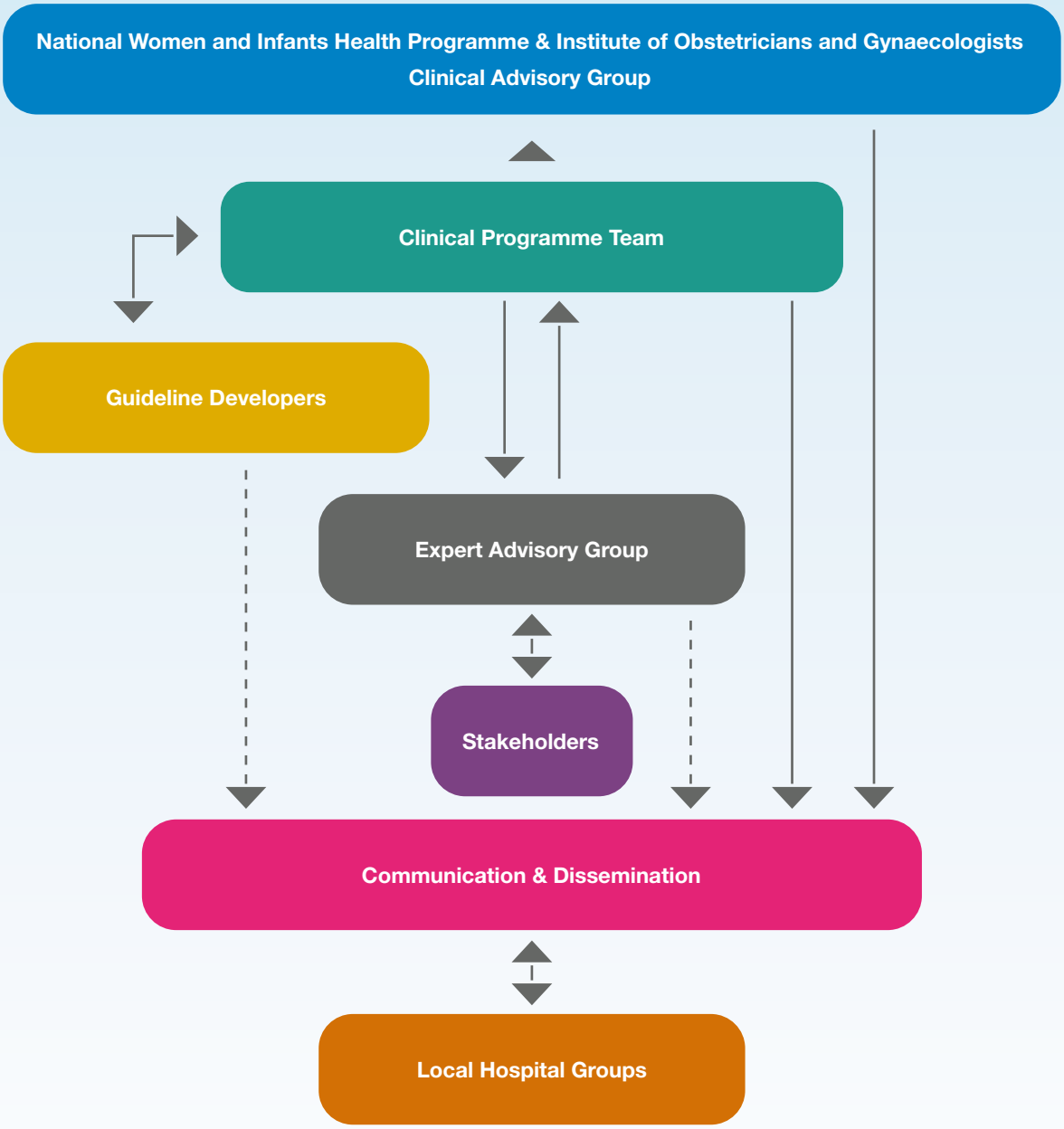
Member	Profession	Location
Dr Mairead Butler	Consultant Obstetrician and Gynaecologist	University Hospital Waterford
Dr Nicholas Barrett	Consultant Anaesthesiologist, Lead for Obstetric Anaesthesiology services	Limerick University Hospital
Dr Venita Broderick	Consultant Obstetrician and Gynaecologist	National Maternity Hospital Dublin
Ms Siobhan Canny	Group Director of Midwifery	Saolta University Health Care Group
Ms Triona Cowman	Director of the Centre for Midwifery Education	Centre for Midwifery Education, Coombe Women & Infants University Hospital
Ms Marie Culliton	Lab Manager/Chief Medical Scientist	National Maternity Hospital Dublin
Ms Niamh Connolly-Coyne and Ms Mandy Daly	Board of Directors Members *(Shared nomination)*	Irish Neonatal Health Alliance
Ms Sinéad Curran	Dietician Manager	National Maternity Hospital
Dr Niamh Conlon	Consultant Histopathologist	Cork University Hospital
Ms Georgina Cruise	National Manager	Patient Advocacy Service
Ms Jennifer Dempsey	Clinical Tutor in Midwifery	University College Dublin
Dr Orla Donohoe	Specialist Registrar, Obstetrics and Gynaecology and SWEC Fellow	St George Hospital, Sydney, Australia
Ms Alana Dineen	Senior Clinical Pharmacist	Cork University Maternity Hospital
Prof Maeve Eogan	Consultant Obstetrician and Gynaecologist National Clinical Lead SATU (HSE)	Rotunda Hospital Dublin
Dr Brendan Fitzgerald	Consultant Perinatal Pathologist	Cork University Hospital

Dr Daniel Galvin	Specialist Registrar, Obstetrics and Gynaecology	Cork University Maternity Hospital
Ms Stacey Grealis	Patient Research Partner	Independent Living Movement Ireland
Ms Fiona Hanrahan	Director of Midwifery and Nursing	Rotunda Hospital Dublin
Ms Laura Harrington	Principal Medical Social Worker	National Maternity Hospital Dublin
Ms Caroline Joyce	Principal Clinical Biochemist PhD Candidate	Cork University Hospital University College Cork
Dr Chaitra Jairaj	Consultant Perinatal Psychiatrist	Coombe Women & Infants University Hospital, Dublin Midland Regional Hospital Portlaoise
Dr Cathy Monteith	Consultant Obstetrician and Gynaecologist	Our Lady of Lourdes Hospital Drogheda
Oana Marian	PhD, Post-Doctoral Researcher	Pregnancy Loss Research Group, INFANT Centre, University College Cork
Prof John Murphy	Consultant Neonatologist Clinical Lead for the National Clinical Programme for Paediatrics and Neonatology	National Women and Infants Health Programme
Ms Janet Murphy	Advanced Midwifery Practitioner	University Hospital Waterford
Dr Jill Mitchell	Specialist Registrar, Obstetrics and Gynaecology	Cork University Maternity Hospital
Dr Aisling McDonnell	Specialist Registrar, Obstetrics and Gynaecology	Mater Misericordiae University Hospital Dublin
Dr Ciara McCarthy	General Practitioner ICGP and NWIHP Women's Health Lead	Irish College of General Practitioners
Ms Orla McCarthy	Clinical Specialist Physiotherapist in Pelvic Health	Cork University Maternity Hospital
Dr Sarah Nicholson	Locum Consultant Obstetrician and Gynaecologist	Sligo University Hospital
Dr Donough J. O'Donovan	Director Neonatal Intensive Care Unit Consultant Neonatologist/Paediatrician	University College Hospital Galway

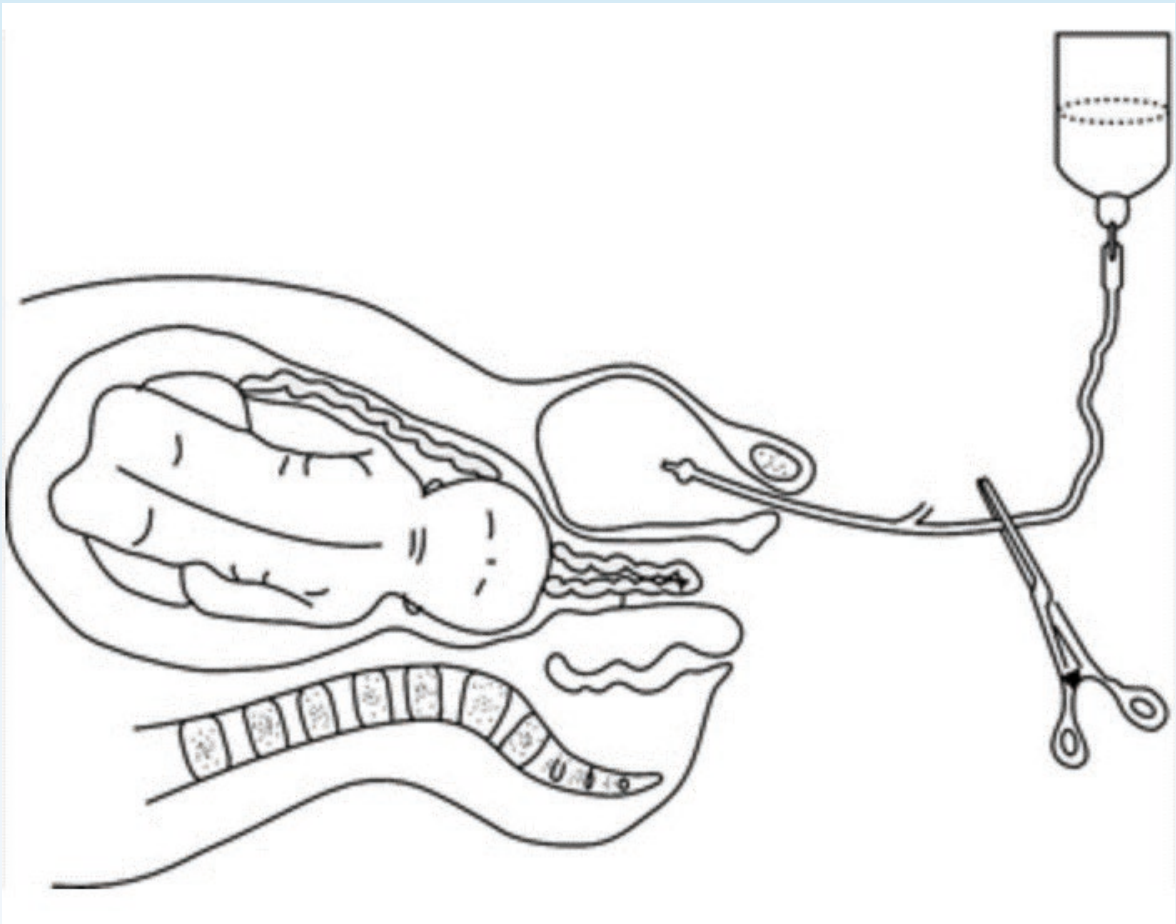
Mr Fergal O' Shaughnessy *And* Dr Brian Cleary *(Shared nomination)*	Senior Pharmacist, Honorary Lecturer *And* Chief Pharmacist, Honorary Clinical Associate Professor and Medications Lead, Maternal & Newborn Clinical Management System	Rotunda Hospital Dublin Royal College of Surgeons in Ireland
Dr Gillian Ryan	Consultant Obstetrician and Gynaecologist	University Hospital Galway
Ms Nora Vallejo	Advanced Midwife Practitioner	Coombe Women & Infants University Hospital, Dublin

Member 2021-2025	Profession	Location
Dr Katherine Astbury	Consultant Obstetrician and Gynaecologist	University Hospital Galway
Dr Richard Duffy	Consultant Perinatal Psychiatrist	Rotunda Hospital Dublin
Ms Clare Farrell	Physiotherapy Manager	Coombe Women & Infants University Hospital, Dublin
Ms Marie Finn	Medical Social Work Counsellor	Saolta University Health Care Group
Prof Declan Keane	Consultant Obstetrician, Gynaecologist, Professor of Obstetrics and Gynaecology	National Maternity Hospital Dublin, Royal College of Surgeons in Ireland
Ms Áine Kelly	Physiotherapy Manager	Coombe Women & Infants University Hospital, Dublin
Dr Fergus McCarthy	Consultant Obstetrician, Gynaecologist	Cork University Maternity Hospital, University College Cork
Dr Sarah Petch	Specialist Registrar, Obstetrics and Gynaecology	National Maternity Hospital Dublin
Ms Margaret Quigley	National Lead for Midwifery	Office of Nursing and Midwifery Services Director
Prof Valerie Smith	Chair of Midwifery	University College Dublin
Ms Marita Hennessy	Post-Doctoral Researcher	Pregnancy Loss Research Group, INFANT Centre, University College Cork

Appendix 2:
Guideline Programme Process



Appendix 3:
Filling of the urinary bladder



Goonewardene M. Obstetric and Intrapartum Emergencies. Cambridge University Press; 2012. p. 10 – Umbilical Cord Prolapse

Appendix 4: **Elevating the presenting part off the cord**

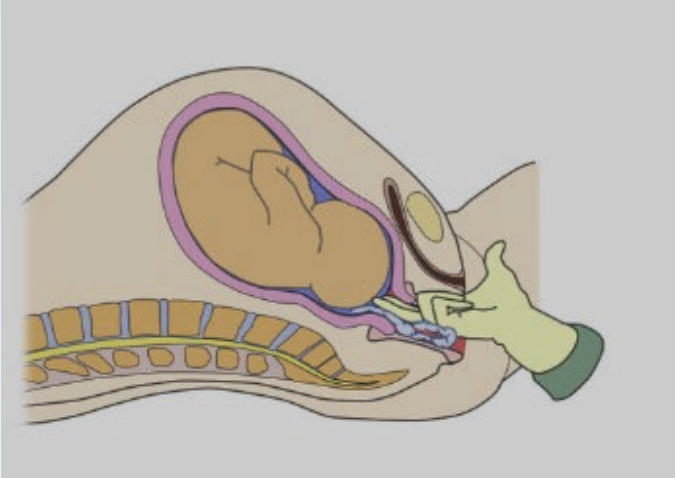


Image 1. Manual elevation of the presenting part

Wong L, Kwan AHW, Lau SL, Sin WTA, Leung TY. Umbilical cord prolapse: revisiting its definition and management. Am J Obstet Gynecol. 2021;225(4):357-66.

Image A:
Knee to chest position
(Trendelenburg)

Image B:
Left side with bed tilted head-down
(Exaggerated Sim's)

Image A and B from PROMPT Annual Update 2022/23 Scenario facilitation handbook for Cord Prolapse

Appendix 5: AGREE II Checklist[31]

AGREE Reporting Checklist 2016

This checklist is intended to guide the reporting of Clinical Practice Guidelines.

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
DOMAIN 1: SCOPE AND PURPOSE		
1. OBJECTIVES *Report the overall objective(s) of the guideline. The expected health benefits from the guideline are to be specific to the clinical problem or health topic.*	☐ Health intent(s) (i.e., prevention, screening, diagnosis, treatment, etc.) ☐ Expected benefit(s) or outcome(s) ☐ Target(s) (e.g., patient population, society)	
2. QUESTIONS *Report the health question(s) covered by the guideline, particularly for the key recommendations.*	☐ Target population ☐ Intervention(s) or exposure(s) ☐ Comparisons (if appropriate) ☐ Outcome(s) ☐ Health care setting or context	
3. POPULATION *Describe the population (i.e., patients, public, etc.) to whom the guideline is meant to apply.*	☐ Target population, sex and age ☐ Clinical condition (if relevant) ☐ Severity/stage of disease (if relevant) ☐ Comorbidities (if relevant) ☐ Excluded populations (if relevant)	
DOMAIN 2: STAKEHOLDER INVOLVEMENT		
4. GROUP MEMBERSHIP *Report all individuals who were involved in the development process. This may include members of the steering group, the research team involved in selecting and reviewing/ rating the evidence and individuals involved in formulating the final recommendations.*	☐ Name of participant ☐ Discipline/content expertise (e.g., neurosurgeon, methodologist) ☐ Institution (e.g., St. Peter's hospital) ☐ Geographical location (e.g., Seattle, WA) ☐ A description of the member's role in the guideline development group	

31 AGREE Reporting Checklist is available on the AGREE Enterprise website, a free and open access resource to support the practice guideline field (www. agreetrust.org)

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
5. TARGET POPULATION PREFERENCES AND VIEWS *Report how the views and preferences of the target population were sought/considered and what the resulting outcomes were.*	☐ Statement of type of strategy used to capture patients'/publics' views and preferences (e.g., participation in the guideline development group, literature review of values and preferences) ☐ Methods by which preferences and views were sought (e.g., evidence from literature, surveys, focus groups) ☐ Outcomes/information gathered on patient/public information ☐ How the information gathered was used to inform the guideline development process and/or formation of the recommendations	
6. TARGET USERS *Report the target (or intended) users of the guideline.*	☐ The intended guideline audience (e.g. specialists, family physicians, patients, clinical or institutional leaders/administrators) ☐ How the guideline may be used by its target audience (e.g., to inform clinical decisions, to inform policy, to inform standards of care)	
DOMAIN 3: RIGOUR OF DEVELOPMENT		
7. SEARCH METHODS *Report details of the strategy used to search for evidence.*	☐ Named electronic database(s) or evidence source(s) where the search was performed (e.g., MEDLINE, EMBASE, PsychINFO, CINAHL) ☐ Time periods searched (e.g., January 1, 2004 to March 31, 2008) ☐ Search terms used (e.g., text words, indexing terms, subheadings) ☐ Full search strategy included (e.g., possibly located in appendix)	
8. EVIDENCE SELECTION CRITERIA *Report the criteria used to select (i.e., include and exclude) the evidence. Provide rationale, where appropriate.*	☐ Target population (patient, public, etc.) characteristics ☐ Study design ☐ Comparisons (if relevant) ☐ Outcomes ☐ Language (if relevant) ☐ Context (if relevant)	

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
9. STRENGTHS & LIMITATIONS OF THE EVIDENCE *Describe the strengths and limitations of the evidence. Consider from the perspective of the individual studies and the body of evidence aggregated across all the studies. Tools exist that can facilitate the reporting of this concept.*	☐ Study design(s) included in body of evidence ☐ Study methodology limitations (sampling, blinding, allocation concealment, analytical methods) ☐ Appropriateness/relevance of primary and secondary outcomes considered ☐ Consistency of results across studies ☐ Direction of results across studies ☐ Magnitude of benefit versus magnitude of harm ☐ Applicability to practice context	
10. FORMULATION OF RECOMMENDATIONS *Describe the methods used to formulate the recommendations and how final decisions were reached. Specify any areas of disagreement and the methods used to resolve them.*	☐ Recommendation development process (e.g., steps used in modified Delphi technique, voting procedures that were considered) ☐ Outcomes of the recommendation development process (e.g., extent to which consensus was reached using modified Delphi technique, outcome of voting procedures) ☐ How the process influenced the recommendations (e.g., results of Delphi technique influence final recommendation, alignment with recommendations and the final vote)	
11. CONSIDERATION OF BENEFITS AND HARMS *Report the health benefits, side effects, and risks that were considered when formulating the recommendations.*	☐ Supporting data and report of benefits ☐ Supporting data and report of harms/side effects/risks ☐ Reporting of the balance/trade-off between benefits and harms/side effects/risks ☐ Recommendations reflect considerations of both benefits and harms/side effects/ risks	
12. LINK BETWEEN RECOMMENDATIONS AND EVIDENCE *Describe the explicit link between the recommendations and the evidence on which they are based.*	☐ How the guideline development group linked and used the evidence to inform recommendations ☐ Link between each recommendation and key evidence (text description and/or reference list) ☐ Link between recommendations and evidence summaries and/or evidence tables in the results section of the guideline	

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
13. EXTERNAL REVIEW *Report the methodology used to conduct the external review.*	☐ Purpose and intent of the external review (e.g., to improve quality, gather feedback on draft recommendations, assess applicability and feasibility, disseminate evidence) ☐ Methods taken to undertake the external review (e.g., rating scale, open-ended questions) ☐ Description of the external reviewers (e.g., number, type of reviewers, affiliations) ☐ Outcomes/information gathered from the external review (e.g., summary of key findings) ☐ How the information gathered was used to inform the guideline development process and/or formation of the recommendations (e.g., guideline panel considered results of review in forming final recommendations)	
14. UPDATING PROCEDURE *Describe the procedure for updating the guideline.*	☐ A statement that the guideline will be updated ☐ Explicit time interval or explicit criteria to guide decisions about when an update will occur ☐ Methodology for the updating procedure	
DOMAIN 4: CLARITY OF PRESENTATION		
15. SPECIFIC AND UNAMBIGUOUS RECOMMENDATIONS *Describe which options are appropriate in which situations and in which population groups, as informed by the body of evidence.*	☐ A statement of the recommended action ☐ Intent or purpose of the recommended action (e.g., to improve quality of life, to decrease side effects) ☐ Relevant population (e.g., patients, public) ☐ Caveats or qualifying statements, if relevant (e.g., patients or conditions for whom the recommendations would not apply) ☐ If there is uncertainty about the best care option(s), the uncertainty should be stated in the guideline	
16. MANAGEMENT OPTIONS *Describe the different options for managing the condition or health issue.*	☐ Description of management options ☐ Population or clinical situation most appropriate to each option	

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
17. IDENTIFIABLE KEY RECOMMENDATIONS *Present the key recommendations so that they are easy to identify.*	☐ Recommendations in a summarized box, typed in bold, underlined, or presented as flow charts or algorithms ☐ Specific recommendations grouped together in one section	
DOMAIN 5: APPLICABILITY		
18. FACILITATORS AND BARRIERS TO APPLICATION *Describe the facilitators and barriers to the guideline's application.*	☐ Types of facilitators and barriers that were considered ☐ Methods by which information regarding the facilitators and barriers to implementing recommendations were sought (e.g., feedback from key stakeholders, pilot testing of guidelines before widespread implementation) ☐ Information/description of the types of facilitators and barriers that emerged from the inquiry (e.g., practitioners have the skills to deliver the recommended care, sufficient equipment is not available to ensure all eligible members of the population receive mammography) ☐ How the information influenced the guideline development process and/or formation of the recommendations	
19. IMPLEMENTATION ADVICE/TOOLS *Provide advice and/or tools on how the recommendations can be applied in practice.*	☐ Additional materials to support the implementation of the guideline in practice. For example: • Guideline summary documents • Links to check lists, algorithms • Links to how-to manuals • Solutions linked to barrier analysis (see Item 18) • Tools to capitalize on guideline facilitators (see Item 18) • Outcome of pilot test and lessons learned	

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
20. RESOURCE IMPLICATIONS *Describe any potential resource implications of applying the recommendations.*	☐ Types of cost information that were considered (e.g., economic evaluations, drug acquisition costs) ☐ Methods by which the cost information was sought (e.g., a health economist was part of the guideline development panel, use of health technology assessments for specific drugs, etc.) ☐ Information/description of the cost information that emerged from the inquiry (e.g., specific drug acquisition costs per treatment course) ☐ How the information gathered was used to inform the guideline development process and/or formation of the recommendations	
21. MONITORING/ AUDITING CRITERIA *Provide monitoring and/or auditing criteria to measure the application of guideline recommendations.*	☐ Criteria to assess guideline implementation or adherence to recommendations ☐ Criteria for assessing impact of implementing the recommendations ☐ Advice on the frequency and interval of measurement ☐ Operational definitions of how the criteria should be measured	
DOMAIN 6: EDITORIAL INDEPENDENCE		
22. FUNDING BODY *Report the funding body's influence on the content of the guideline.*	☐ The name of the funding body or source of funding (or explicit statement of no funding) ☐ A statement that the funding body did not influence the content of the guideline	
23. COMPETING INTERESTS *Provide an explicit statement that all group members have declared whether they have any competing interests.*	☐ Types of competing interests considered ☐ Methods by which potential competing interests were sought ☐ A description of the competing interests ☐ How the competing interests influenced the guideline process and development of recommendations	

From: Brouwers MC, Kerkvliet K, Spithoff K, on behalf of the AGREE Next Steps Consortium. The AGREE Reporting Checklist: a tool to improve reporting of clinical practice guidelines. BMJ 2016;352:i1152. doi: 10.1136/bmj.i1152.

For more information about the AGREE Reporting Checklist, please visit the AGREE Enterprise website at http://www.agreetrust.org.

Appendix 6: **Grades of Recommendation**[32]

Grade of recommendation	Clarity of risk/ benefit	Quality of supporting evidence	Implications	Suggested Language
1A. Strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Consistent evidence from well-performed randomized, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk	Strong recommendations can apply to most patients in most circumstances without reservation. Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present	We strongly recommend… We recommend that …should be performed/ administered… We recommend that …. is indicated/ beneficial/ effective…
1B. Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate	Strong recommendation and applies to most patients. Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present	We recommend… We recommend that … should be performed/ administered… We recommend that … is (usually) indicated/ beneficial/ effective…

32 SMFM adopts GRADE (Grading of Recommendations Assessment, Development, and Evaluation) for clinical guidelines. Society for Maternal-Fetal Medicine (SMFM), Chauhan SP, Blackwell SC. Am J Obstet Gynecol. 2013 Sep;209(3):163-5. https://pubmed.ncbi.nlm.nih.gov/23978245/

Grade of recommendation	Clarity of risk/ benefit	Quality of supporting evidence	Implications	Suggested Language
1C. Strong recommendation, low-quality evidence	Benefits appear to outweigh risk and burdens, or vice versa	Evidence from observational studies, unsystematic clinical experience, or from randomized, controlled trials with serious flaws. Any estimate of effect is uncertain	Strong recommendation that applies to most patients. Some of the evidence base supporting the recommendation is, however, of low quality	We recommend… We recommend that … should be performed/ administered… We recommend that … Is (maybe) indicated/ beneficial/ effective…
2A. Weak recommendation, high-quality evidence	Benefits closely balanced with risks and burdens	Consistent evidence from well-performed randomized, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk	Weak recommendation: best action may differ depending on circumstances or patients or societal values	We suggest… We suggest that… may/might be reasonable...
2B. Weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burdens, some uncertainty in the estimates of benefits, risks and burdens	Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate	Weak recommendation; alternative approaches likely to be better for some patients under some circumstances	We suggest… We suggest that … may/might be reasonable...

Grade of recommendation	Clarity of risk/ benefit	Quality of supporting evidence	Implications	Suggested Language
2C. Weak recommendation, low-quality evidence	Uncertainty in the estimates of benefits, risks, and burdens; benefits may be closely balanced with risks and burdens	Evidence from observational studies, unsystematic clinical experience, or from randomized, controlled trials with serious flaws. Any estimate of effect is uncertain	Very weak recommendation: other alternatives may be equally reasonable	We suggest … is an option We suggest that … may/might be reasonable.
Best practice	A recommendation that is sufficiently obvious that the desirable effects outweigh undesirable effects, despite the absence of direct evidence, such that the grading of evidence is unnecessary			We recommend… We recommend that … should be performed/ administered… We recommend that… Is usually) indicated/ beneficial/effective

Appendix 7: **CAG membership 2025-**

Dr Cliona Murphy (Chair, 2023-). Consultant Obstetrician and Gynaecologist, Coombe Women and Infants University Hospital. Clinical Director, National Women and Infants Health Programme.

Dr Suzanne O'Sullivan (2023-). Consultant Obstetrician and Gynaecologist, Cork University Maternity Hospital. Director of Education and Training, Obstetrics and Gynaecology, Institute of Obstetricians and Gynaecologists. Chair, Institute of Obstetricians and Gynaecologists.

Dr Venita Broderick (2024-). Clinical Lead Gynaecology, National Women and Infants Health Programme.

Dr Brian Cleary (2023-). Chief Pharmacist, Rotunda Hospital. Medications Lead, Maternal and Newborn Clinical Management System Project.

Ms Angela Dunne (2023-). Director of Midwifery, National Women and Infants Health Programme.

Prof. Seán Daly (2023-). Master, Consultant Obstetrician and Gynaecologist, Rotunda Hospital.

Prof. Maeve Eogan (2023-). Consultant Obstetrician and Gynaecologist, Rotunda Hospital. Clinical Lead, Sexual Assault Treatment Units, National Women and Infants Health Programme.

Prof. Richard Greene (2023-). Consultant Obstetrician and Gynaecologist, Cork University Maternity Hospital. Clinical Director, National Perinatal Epidemiology Centre, University College Cork.

Prof. John Higgins (2023-). Cork University Maternity Hospital, Consultant Obstetrician and Gynaecologist, Clinical Director, Ireland South Women and Infants Directorate.

Prof. Shane Higgins (2023-). Master, Consultant Obstetrician and Gynaecologist, National Maternity Hospital.

Dr Mendinaro Imcha (2023-). Clinical Director, Consultant Obstetrician and Gynaecologist, University Maternity Hospital Limerick.

Prof. John Murphy (2023-). Clinical Lead Neonatology, National Women and Infants Health Programme.

Dr Aoife Mullaly (2023-). Consultant Obstetrician and Gynaecologist, Coombe Women and Infants University Hospital. Clinical Lead, Termination of Pregnancy Services, National Women and Infants Health Programme.

Prof. John Morrison (2023-). Consultant Obstetrician and Gynaecologist, University Hospital Galway. Clinical Director, Saolta Maternity Directorate.

Mr Kilian McGrane (2023-). Director, National Women and Infants Health Programme.

Prof. Keelin O'Donoghue (2023-). Consultant Obstetrician and Gynaecologist, Cork University Maternity Hospital. Clinical Lead, National Guidelines, National Women and Infants Health Programme.

Prof. Mike O'Connell (2023-). Master, Consultant Obstetrician and Gynaecologist, Coombe Women and Infants University Hospital.

Ms Davinia O'Donnell (2024-). General Manager | National Women and Infants Health Programme.

Dr Vicky O'Dwyer (2023-). Consultant Obstetrician and Director of Gynaecology, Rotunda Hospital.

Dr Mairead O'Riordan (2024-). Consultant Obstetrician and Gynaecologist, Cork University Maternity Hospital.

Dr Fergal O'Shaughnessy (2025-) Senior Pharmacist, Rotunda Hospital.

Prof. Nóirín Russell (2023-). Consultant Obstetrician and Gynaecologist, Cork University Maternity Hospital. Clinical Director, Cervical Check.

Dr Carmen Regan (April 2024). Clinical Lead Obstetrics, National Women and Infants Health Programme.

Dr Orla Shiel (2024-). Consultant Obstetrician and Gynaecologist, National Maternity Hospital.

Ms Clare Thompson (2023-). Consultant Gynaecological Oncologist, The Mater, Dublin.

Appendix 8: Cord Prolapse Proforma

Cord Prolapse Proforma

Please tick the relevant boxes

Diagnosed: LW ☐ Ward ☐

Time of diagnosis: _____

Cervical dilation at diagnosis: _____cm

If in hospital

Senior Midwife called Yes ☐ Time ☐ _____ Arrived: _____

Senior Obstetrician called Yes ☐ No ☐ Time: _____ Arrived: _____

Grade of Obstetrician: _____

Neonatologist called Yes ☐ No ☐ Time ☐ _____ Arrived: _____

If at home

Ambulance called Yes ☐ No ☐ Time: _____ Arrived: _____

Hospital informed of transfer Yes ☐ No ☐ Time: _____ Arrived: _____

Procedure used in managing cord prolapse	
Elevating the presenting part manually	**Yes** ☐ **No** ☐
Filling the bladder	**Yes** ☐ **No** ☐
Exaggerated Sims (left lateral)/Knee-Chest position / Head tilt / Trolley / Bed (Please circle)	
Tocolysis with sc Terbutaline 0.25mg or other	**Yes** ☐ **No** ☐
Decision to birth interval: _____ minutes	

Mode of Birth	**Mode of Anaesthesia**
Spontaneous vaginal ☐	GA ☐
Forceps ☐	Spinal ☐
Kiwi/Ventouse ☐	Epidural ☐
LSCS ☐	Other

Apgar score	**Baby's weight**	
:1 min	Cord pH	Base excess
:5 min	Venous:	
:10 mins	Arterial:	
Admission to NICU? Yes ☐ No ☐		
Clinical Incident Reporting form completed? Yes ☐		
Known Risk Factor? Yes ☐ No ☐ If yes, please state:		
Mother debriefed Yes ☐ No ☐		

Signature: _____ Print: _____

Designation: _____ Date: _____

1. Caspi E, Lotan Y, Schreyer PD. Prolapse of the cord: reduction of perinatal mortality by bladder instillation and cesarean section. Israel journal of medical sciences. 1983;19 6:541-5.
2. Goonewardene M. Obstetric and Intrapartum Emergencies. Cambridge University Press; 2012. p. 10 – Umbilical Cord Prolapse.
3. Wong L, Kwan AHW, Lau SL, Sin WTA, Leung TY. Umbilical cord prolapse: revisiting its definition and management. Am J Obstet Gynecol. 2021;225(4):357-66.