Algorithms for identification and management of delay in the progression of second stage of labour.

Table S1. Summary of Evidence Table.

Components	Source of evidence	Recommendations/actions	Selected as a decision point (box number)	Link to other algorithms
Definition				
Suspected slow progress of 2nd stage of labour.	NICE 2019 [1] Abalos E, et al.[2] Singh S, et al.[3]	The duration of the second stage varies from one woman to another. For a nulliparous woman birth would be expected to take place within 2 hours if no regional anaesthesia is used or 3 hours of the start of the active second stage. For a multiparous woman birth would be expected to take place within 1 hour if no regional anaesthesia is used or 2 hours of the start of the active second stage. As long as there is adequate progression of labour and there is no maternal and foetal compromise, it is needless to stick to a predetermined fixed time frame is necessary “individualized the case”.	1	
Monitoring				
Maternal assessment	NICE 2019 [1] FIGO 2012 [4] APPG 2017 [5]	Assess general condition: distress, anxious, pain	2	
	NICE 2019 [1] FIGO 2012[4]	Perform maternal observations: pulse, BP, temperature	2	
	NICE 2019 [1]	Palpate abdomen: palpate bladder.	2	

	APPG [5]	A prompt and thorough clinical assessment to rule out full bladder Palpate uterus: fetal presentation, position, engagement of the presenting part and descent. Frequency, intensity and duration of contractions in 10 minutes.		
	NICE 2019 [1] APPG [5]	Perform vaginal examination: asses membranes, liquour, bleeding, discharge, effacement, foetal presenting part, position and descent. Offer vaginal examination if progress is inadequate after 1 hour active 2nd stage in nulliparous women. Offer vaginal examination if progress is inadequate after 30 minutes active 2nd stage in multiparous women. Confirm full dilatation	2	
Fetal assessment	APPG [5]	Perform continuous fetal heart rate monitoring in the active phase of second stage of labour if pushing has progressed beyond 1 hour, and birth is not imminent.	2	
	NICE 2019 [1]	Advise continuous cardiotocography if any of the following risk factors are present at initial assessment or arise during labour confirmed delay in the first or second stage of labour (see suspected delay in established first stage and delay in second stage)	2	
Management				
Initial Management	NICE 2019 [6] FIGO 2012[4]	Inform the woman and companion of progress and explain possible reason for delayed 2nd stage of labour and present care options.	2	
	NICE 2019 [6] APPG [5]	Empty bladder if suspected full bladder.	2	
	NICE 2019 [6] FIGO 2012[4] APPG [5]	Provide adequate pain relief. Pain relief options must be discussed with the woman prior to the onset of labor and offered according to her wishes and using health facility protocols and norms.	2	

	Abenhaim H, et al. [7]	Local anesthesia should be used for perineal infiltration prior to cutting an episiotomy, and the practice of cutting an incision without anesthesia is to be deprecated. For instrumental delivery, a pudendal block may be indicated, especially for forceps delivery.		
Non-reassuring foetal heart rate? OR thick meconium?	WHO 2018 [8] NICE 2017 [9]	Suspected fetal distress The fetal heart rate abnormalities algorithms explain this in detail. -Medical review for individualized plan of care and decision on mode of birth -Prepare for neonatal resuscitation	3-4-5	FHR link. Amniotic fluid link.
Identify probable cause			6	
Vertex or face presentation (mento anterior position)?	Williams. Obstetrics[10]	Cephalic presentation: Fetus in a longitudinal lie with the head closest to the cervix. -Non- Cephalic presentation: Longitudinal, transversal or oblique lie. -Vertex position: “Vertex” diagnostic point is the occiput. -Non-Vertex position: Cephalic presentation other than vertex. -Brow: “Brow” diagnostic point is the fetal nose. -Face: “Face” diagnostic point is the chin.	7	
Malpresentation	Williams. Obstetrics[10]	Cephalic presentation: Fetus in a longitudinal lie with the head closest to the cervix. -Non- Cephalic presentation: Longitudinal, transversal or oblique lie. -Vertex position: “Vertex” diagnostic point is the occiput. -Non-Vertex position: Cephalic presentation other than vertex. -Brow: “Brow” diagnostic point is the fetal nose. -Face: “Face” diagnostic point is the chin. -Medical review for caesarean section. -Consider vaginal birth for breech presentation. -Prepare for neonatal resuscitation.	9-10-12	

Suitable for vaginal birth for breech?	NICE 2019 [6]	Evidence suggest that women who have an uncomplicated singleton breech pregnancy at term (over 36 weeks) and who has any contraindication or does not agree with or had an unsuccessful external cephalic version; health care providers should offer caesarean section. It is possible to consider to attempt vaginal birth for a breech presentation if the women rejects caesarean section and the skilled birth attendant is adequately trained to deliver a vaginal breech birth. -Medical review to consider caesarean section. -Prepare for neonatal resuscitation.	14-15-16	
Are there signs of cephalopelvic disproportion/ obstructed labour?	NICE 2019 [6]	Cephalopelvic disproportion is defined as secondary arrest of cervical dilatation and descent of presenting part in presence of good contractions. Obstructed labour is defined as secondary arrest of cervical dilatation and descent of presenting part with large caput, third degree moulding, cervix poorly applied to presenting part, oedematous cervix, ballooning of lower uterine segment, formation of retraction band, or maternal and fetal distress. Medical review: consider assisted vaginal birth if suitable (presenting part below the spines, trained personnel available).	8-9-11	
Suitable for assisted vaginal birth?	NICE 2019 [6]	Assisted vaginal birth -Medical review to consider caesarean section. -Prepare for neonatal resuscitation.	13-14-16	

References

1. NICE Pathway last updated: 29 November 2019. Delay and complications in second stage of Labour.
2. Abalos E et al. Duration of spontaneous labour in 'low-risk' women with 'normal' perinatal outcomes: A systematic review. Eur J Obstet Gynecol Reprod Biol. 2018 ; 223:123-132.

3. Singh S et al. Int J Reprod Contracept Obstet Gynecol. 2018 Jul;7(7):2527-2531
4. FIGO GUIDELINES Management of the second stage of labor 2012. https://obgyn.onlinelibrary.wiley.com/doi/full/10.1016/j.ijgo.2012.08.002
5. Perinatal Practice Guideline. South Australian Perinatal Practice Guidelines. April 2017
6. NICE Pathway last updated: 29 November 2019. Care in second stage of labour. http://pathways.nice.org.uk/pathways/intrapartum-care
7. Abenhaim H.A., et al. Impact of pain level on second−stage delivery outcomes among women with epidural analgesia: results from the PEOPLE study. Am J Obstet Gynecol. 199 (5): 2008; 500.e1–500.e6
8. WHO recommendations: intrapartum care for a positive childbirth experience. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.
9. NICE guidelines Intrapartum care: Care of healthy women and their babies during childbirth December 2014. Updated February 2017
10. Williams. Obstetrics. 24e

Table S2 Algorithm Reference Tables for identification and management of delay in the progression of second stage of labour.

Box Nº	Box text	Annotations	Source of evidence
1.	Suspected slow progress of second stage of labour: More than 3 hours with or more than 2 hours without regional anaesthesia in nulliparous. More than 2 hours with or more than 1 hour without regional anaesthesia in parous women.	The duration of the second stage varies from one woman to another. For a nulliparous woman birth would be expected to take place within 2 hours if no regional anaesthesia is used or 3 hours of the start of the active second stage. For a multiparous woman birth would be expected to take place within 1 hour if no regional anaesthesia is used or 2 hours of the start of the active second stage. As long as there is adequate progression of labour and there is no maternal and foetal compromise, it is needless to stick to a predetermined fixed time frame is necessary "individualized the case".	WHO 2018 NICE 2017 Abalos E et al. NICE 2019 Singh S, et al.
2.	**Maternal assessment** -Assess general condition: distress, anxious, pain. -Perform maternal observations: pulse, BP, temperature, urine output. -Palpate abdomen: palpate bladder. -Palpate uterus: fetal presentation, position, engagement of the presenting part and descent. frequency, intensity and duration of contractions in 10 minutes. -Perform vaginal examination: assess membranes, liquor, bleeding, discharge, effacement, foetal presenting part, position and descent. -Offer vaginal examination if progress is inadequate after 1 hour in nulliparous or 30 minutes in parous women. Confirm full	WHO recommendations suggest that in order to have a positive childbirth experience cervical dilatation, fetal presentation, position and attitude by digital vaginal examination and abdominal palpations by the health care provider is needed. Perform continuous fetal heart rate monitoring in the active phase of second stage of labour if pushing has progressed beyond 1 hour, and birth is not imminent. Advise continuous cardiotocography if any of the following risk factors are present at initial assessment or arise during labour confirmed delay in the first or second stage of labour (see suspected delay in established first stage and delay in second stage)	WHO 2015 WHO 2018 NICE 2017 NICE 2019 FIGO 2012 APPG 2017

	dilatation. **Fetal assessment** -Asses fetal heart rate (FHR) using continous auscultation or cardiotocography if available. **Initial Management** -Explain the situation to the woman and companion. -Empty bladder if suspected full bladder. -Provide adequate pain relief. -Ensure adequate hydration with IV fluids. Avoid oral fluids and food. -Encourage upright position and mobility. -Provide continuous companionship support.		
3.	Non-reassuring fetal heart rate ? OR thick meconium?	The fetal heart rate abnormalities algorithms explain this in detail.	
4.	Suspected fetal distress	The fetal heart rate abnormalities algorithms explain this in detail.	
5.	- Medical review for individualized plan of care and decision on mode of birth. - Prepare for neonatal resuscitation.		
6.	Identify probable cause		
7.	Vertex or face presentation (mento anterior position)?	Cephalic presentation: Fetus in a longitudinal lie with the head closest to the cervix. -Non- Cephalic presentation: Longitudinal, transversal or oblique lie. -Vertex position: “Vertex” diagnostic point is the occiput. -Non-Vertex position: Cephalic presentation other than vertex. -Brow: “Brow” diagnostic point is the fetal nose. -Face: “Face” diagnostic point is the chin.	Williams Obstetrics 24e.
8.	Are there signs of cephalopelvic disproportion/obstructed labour?	Cephalopelvic disproportion is defined as secondary arrest of cervical dilatation and descent of presenting part in presence of good	NICE 2017

		contractions. Obstructed labour is defined as secondary arrest of cervical dilatation and descent of presenting part with large caput, third degree moulding, cervix poorly applied to presenting part, oedematous cervix, ballooning of lower uterine segment, formation of retraction band, or maternal and fetal distress.	
9.	Cephalopelvic disproportion / Obstructed labour	Cephalopelvic disproportion is defined as secondary arrest of cervical dilatation and descent of presenting part in presence of good contractions. Obstructed labour is defined as secondary arrest of cervical dilatation and descent of presenting part with large caput, third degree moulding, cervix poorly applied to presenting part, oedematous cervix, ballooning of lower uterine segment, formation of retraction band, or maternal and fetal distress.	NICE 2017
10.	Malpresentation	Cephalic presentation: Fetus in a longitudinal lie with the head closest to the cervix. -Non- Cephalic presentation: Longitudinal, transversal or oblique lie. -Vertex position: “Vertex” diagnostic point is the occiput. -Non-Vertex position: Cephalic presentation other than vertex. -Brow: “Brow” diagnostic point is the fetal nose. -Face: “Face” diagnostic point is the chin.	Williams Obstetrics 24e.
11.	Medical review: consider assisted vaginal birth if suitable (presenting part below the spines, trained personnel available).		
12.	Suitable for vaginal birth for breech?	Evidence suggest that women who have an uncomplicated singleton breech pregnancy at term (over 36 weeks) and who has any contraindication or does not agree with or had an unsuccessful external cephalic version; health care providers should offer caesarean section. It is possible to consider to attempt vaginal birth for a breech presentation if the women rejects caesarean section and the skilled birth attendant is adequately trained to deliver a vaginal breech birth.	NICE 2019

13.	Vaginal birth		
14.	Suitable for assisted vaginal birth?		
15.	Assisted vaginal birth	Local anesthesia should be used for perineal infiltration prior to cutting an episiotomy, and the practice of cutting an incision without anesthesia is to be deprecated. For instrumental delivery, a pudendal block may be indicated, especially for forceps delivery.	Abenhaim H, et al
16.	-Medical review to consider caesarean section. -Prepare for neonatal resuscitation.		