reasons why low cavity traction forceps may be preferred to a vacuum-assisted delivery (i.e. as it is generally accepted that they are associated with lower rates of fetal trauma than vacuum-assisted delivery). In women with a viral load <50 HIV RNA copies/mL it is unlikely that the type of instrument used will affect transmission risk and thus the one the operator feels is most appropriate should be used as in the non-HIV population (and following national guidance [31]).

The importance of the use of ART in the prevention of vertical transmission of HIV is clear and undisputed. High-quality studies to determine the remaining contribution of obstetric events and interventions to prevent transmission in the setting of a fully suppressed HIV viral load have not been performed and are unlikely to be performed in the near future.

HIV DNA [32] and HIV RNA [33] in cervicovaginal lavage have been identified as independent transmission risk factors. Large cohort studies from the UK and Ireland as well as from France have concluded that there is no significant difference in vertical transmission in women with an undetectable HIV viral load when comparing those who have a planned vaginal delivery and those who have a CS. These studies provide some reassurance with regard to concerns raised about possible discordance between plasma and genital tract viral load that have been reported in patients with an undetectable viral load on cART [34-37]. The clinical significance of this phenomenon is not clear and further research is warranted.

Furthermore, there are reassuring results from the limited studies that have examined the effect on vertical transmission of amniocentesis and length of time of rupture of membranes in women on cART and in those with a viral load <50 HIV RNA copies/mL. An association between vertical transmission and the use of instrumental delivery, amniotomy and episiotomy is not supported by data from the pre-cART era and there is a lack of data from the cART era. Therefore, while acknowledging the potential for discordance between the plasma and genital tract viral load, the writing group considers that there is no compelling evidence to support the continued avoidance of these procedures as well as induction of labour in women on cART for whom a vaginal delivery had been recommended on the basis of viral load.

The data regarding fetal blood sampling and the use of scalp electrodes also originate from the pre-cART era and have yielded conflicting results. The writing group acknowledges a lack of data from the cART era, but concludes that it is unlikely that the use of fetal scalp electrodes or fetal blood sampling confers increased risk of transmission in a woman with an undetectable viral load although this cannot be proven from the current evidence. Electronic fetal monitoring should be performed according to national guidelines [31]. HIV infection *per se* is not an indication for continuous fetal monitoring as there is no increased risk of intrapartum hypoxia or sepsis. If the woman has no other risk factors, she can be managed by midwives either in a midwifery-led unit or at home. She will need to continue with cART through labour and adequate provision needs to be made for examination and testing of the newborn and dispensing of medication to the newborn in a timely fashion (see section 9).

8.2.5	Vaginal birth after CS (VBAC) can be offered to women with a viral load <50 HIV RNA copies/mL.	1D

In the absence of randomised trial data for women with HIV infection who undertake VBAC, evidence to support a benefit of VBAC and vaginal birth over CS is limited to expert judgement that is subject to inherent biases.

The probability of a successful vaginal delivery remains dependent on current and past obstetric factors. In general, provided that the woman is being cared for in a consultant-led maternity unit and the labour properly monitored with rapid recourse to CS in the face of any difficulty, the outcome of trial of labour for both the woman and neonate is good, even if scar dehiscence occurs [38]. In the general maternity population, 70% of women who attempt VBAC manage a vaginal delivery with a uterine rupture rate of around 0.3%. Therefore, where a vaginal birth has been recommended on the basis of cART and viral load, maternal management of the delivery, including a decision regarding VBAC, should be as for a woman without HIV.

8.2.6	Where the indication for CS is the prevention of vertical transmission, CS should be undertaken at between 38 and 39 weeks' gestation.	1C

	Where PLCS is undertaken only for obstetric indications and plasma viral load is <50 HIV RNA copies/mL, the usual obstetric considerations apply and the CS will usually be performed after 39 weeks' gestation.	1C

The timing of CS is a balance between the risks of transient tachypnoea of the newborn (TTN) and the likelihood of labour supervening before the scheduled CS [39]. Where the indication for CS is prevention of vertical transmission, the earlier timing reflects the importance of avoiding the onset of labour. In these cases, the risk of transmission associated with labour and SROM is considered to outweigh the risk of TTN. Where CS is undertaken only for obstetric indications, the optimal timing of PLCS is after 39 weeks of gestation [38]. The risk of TTN at this gestation is approximately 1 in 300 and this risk doubles for every week earlier that delivery occurs. The administration of steroids to the woman to reduce the risk of TTN should be considered prior to 38 completed weeks. The NICE guidelines committee on preterm labour and birth found no reliable evidence of benefit of antenatal corticosteroids in terms of fetal or neonatal death, intraventricular haemorrhage, chronic lung disease or reducing requirement for ventilation or pressure support after 36 weeks' gestation [40]. However, a subsequent meta-analysis showed that maternal corticosteroids reduced the risk of respiratory distress syndrome in infants born at ≥37 weeks' gestation (RR 0.40; 95% CI 0.27–0.59) [41]. Therefore, maternal corticosteroid administration should be considered where PLCS is carried out before 39 weeks.

8.3 Management of SROM

8.3.1	In all cases of term pre-labour SROM, delivery within 24 hours should be the aim.	1C
8.3.2	If maternal HIV viral load is <50 HIV RNA copies/mL, immediate induction or augmentation of labour is recommended in women who have pre-labour SROM, with a low threshold for treatment of intrapartum pyrexia. For all women with viral load <50 HIV RNA copies/mL, obstetric management should aim for delivery within 24 hours of SROM.	1C
8.3.3	For women with SROM and a last measured plasma viral load of 50–399 HIV RNA copies/mL, immediate CS is recommended, but should take into account the actual viral load, the trajectory of the viral load, length of time on treatment, adherence issues, obstetric factors and the woman's views.	1C
8.3.4	For women with SROM and maternal HIV viral load ≥400 HIV RNA copies/mL, immediate CS is recommended.	1C

In the pre-cART era, several studies [30,42,43] suggested that prolonged duration of ruptured membranes, usually defined as more than 4 hours, in women who were either untreated or if treated were largely receiving zidovudine monotherapy, resulted in a significantly increased risk of vertical transmission. A widely quoted meta-analysis (not reporting viral load data) subsequently showed a 2% increase in relative risk of transmission per hour of membrane rupture (adjusted OR 1.02; 95% CI, 1.01–1.04; for each 1-h increment). Transmission increased from 12% with <1 hour of membrane rupture to 19% with >12 hours of membrane rupture [44].

There are few published studies on SROM from the cART era. A study from Spain of 500 women living with HIV examined the effect of various obstetric risk factors on vertical transmission rates in women on no treatment, monotherapy or dual therapy, and in those on cART. Ruptured membranes >6 hours compared to <6 hours was only significantly associated with transmission in the group of women receiving no treatment (26.6% *vs* 11.9%; *P*<0.01). Corresponding transmission rates were 14.3% versus 7.1% (*P*=NS) for the monotherapy or dual therapy group and 0.8% versus 0.0% (*P*=NS) for the women on cART [45].

The NSHPC has reported data on 1464 women with undetectable viral load with duration of SROM for births at term between 2007 and 2012. In these 1464 women delivering with a viral load <50 HIV RNA copies/mL,

the vertical transmission rate was 0.12% (1/809) in women with SROM <4 hours and 0.15% (1/655) in women with SROM ≥4 hours and <24 hours (OR 1.14; 95% CI 0.07–18.27). There were no transmissions in the 55 women with viral load <50 RNA copies/mL and duration of SROM >24 hours, but this represents very few cases [46]. Data from North America in 2012 showed similar results. In over 700 women with HIV (89% received cART, 10% monotherapy and 1% no treatment), the perinatal transmission rate was 1% in those with SROM <4 hours and 1.9% in those with SROM for >4 hours. In those with a viral load <1000 HIV RNA copies/mL there were no cases of perinatal transmission (493 cases with SROM up to 25 hours). Only viral load >10,000 HIV RNA copies/mL was shown to be an independent risk factor [47]. Therefore, for women on cART with SROM at term with a viral load <50 HIV RNA copies/mL and who do not have an obstetric contraindication to vaginal delivery, a CS is not recommended for the prevention of vertical transmission. When planning the birth, it should be discussed that women are recommended to contact their maternity unit for in-person assessment as soon as any SROM is suspected. Women with HIV with a history of SROM should be prioritised for induction/augmentation when they present. Obstetricians should be aware that although there is no evidence of increased transmission risk in women with undetectable viral load with SROM <4 hours and 4 to <24 hours, there are few data for transmission risk beyond this time, and therefore they should aim for delivery within 24 hours, weighing up the risks of intervention as appropriate.

As both acute and chronic chorioamnionitis have been associated with perinatal transmission [43,48-50], albeit from studies largely performed in the pre-cART era, it is recommended that labour should be expedited for all women with SROM at term. Hence women with SROM at term with a viral load <50 HIV RNA copies/mL should have immediate induction with a low threshold for the treatment of intrapartum pyrexia. The NICE induction of labour guidelines [51] and the NICE intrapartum guidelines [31] should be followed with regard to use of antibiotics and mode of induction.

NSHPC data for the effect of SROM more than or less than 4 hours for women with a viral load >50 HIV RNA copies/mL are more difficult to interpret as the numbers are currently small. In the published analysis, there was no significant difference in vertical transmission rates between SROM <4 hours and SROM 4 to <24 hours in women at all viral load levels (vertical transmission rates were 0.34% and 0.64% respectively; OR 1.90; 95% CI 0.45–7.97). However, transmission rates were 0.13% in women with viral load <50 HIV RNA copies/mL (2/1519), 2.05% in women with viral load of 50–999 HIV RNA copies/mL (3/146) and 23.08% in women with viral load >10,000 HIV RNA copies/mL (3/13). There were too few women for a subgroup analysis comparing vertical transmission rates with SROM <4 hours and >4 hours in women with viral load >50 HIV RNA copies/mL.

A single-centre study from Miami of 707 women on ART showed that SROM >4 hours was associated with an increased risk of vertical transmission if the viral load was >1000 HIV RNA copies/mL. There was no association at <1000 HIV RNA copies/mL, but it is not possible to determine the number of women with a viral load greater than 50 and less than 1000 HIV RNA copies/mL in this group.

It is the recommendation of the writing group that CS should be considered for women with a viral load of 50–399 HIV RNA copies/mL at term. Again, if CS is not carried out, delivery should be expedited to occur within 24 hours, as above.

Until further data are available, an urgent (category 2) CS is recommended where the viral load is >400 HIV RNA copies/mL regardless of treatment [52].

In women who have a detectable viral load it may be possible to optimise their cART regimen to reduce the risk of vertical transmission (see recommendation 6.3.3).

8.3.5	The management of preterm SROM at ≥34 weeks is the same as that of term SROM, except that women at 34–37 weeks' gestation will require group B streptococcus prophylaxis in line with national guidelines.	1C

8.3.6	When preterm SROM occurs at <34 weeks: • Intramuscular steroids should be administered in accordance with national guidelines; • Where HIV viral load is not controlled, this should be optimised; • There should be multidisciplinary discussion about the timing and mode of delivery.	1C

There are no data to inform the optimum management of preterm labour in women living with HIV. Decisions regarding the optimum management of early preterm SROM require the assessment of a number of factors including the exact gestation, the facilities available, maternal viral load and the presence of other comorbidities such as infection and pre-eclampsia. Corticosteroids to improve fetal lung maturation and oral erythromycin should be given as per the NICE guidelines on preterm labour [40]. Decisions regarding timing of delivery should be made in consultation with the full MDT including the neonatal unit. Induction is recommended from 34 weeks' gestation in women with SROM who are not in labour to minimise the risk of developing chorioamnionitis.

If maternal HIV viral load is not fully suppressed, consideration should be given to the options available to optimise therapy. An additional concern is that the early preterm infant may be unable to tolerate oral therapy and therefore loading the infant through the transplacental route with maternal ART is recommended (see section 6 for further information on cART in pregnancy). There is most experience with maternal oral nevirapine 200 mg stat >2 hours prior to delivery, but double-dose tenofovir DF and standard-dose raltegravir 400 mg bd should also be considered.

8.4 Use of intrapartum intravenous infusion of zidovudine

8.4.1	Intrapartum intravenous zidovudine infusion is recommended in the following circumstances:	
	For women with a viral load >1000 HIV RNA copies/mL plasma who present in labour or with SROM or who are admitted for PLCS.	1C
	For untreated women presenting in labour or with SROM in whom the current viral load is not known.	1C
	The use of intrapartum intravenous zidovudine infusion can be considered in women on cART with a plasma HIV viral load <1000 HIV RNA copies/mL.	1C

The use of intravenous zidovudine for women on cART with a viral load between 50 and 1000 HIV RNA copies/mL can be considered regardless of mode of delivery. However, continued oral dosing of their current regimen is a reasonable alternative.

Intravenous zidovudine (as part of an intervention package; see section 6.4) has also been recommended for women who present in labour having not received ART.

From the updated French data, there is no evidence that intrapartum intravenous zidovudine further reduces the risk of vertical transmission in women on cART unless maternal HIV viral load is >1000 HIV RNA copies/mL and this benefit is no longer seen if intensive neonatal therapy is given [53]. However, individual circumstances vary, and intravenous zidovudine may be considered as one of a number of maternal intrapartum antiretroviral options for women with viral load >50 HIV RNA copies/mL who present in labour or with SROM or who are admitted for CS provided this does not delay other interventions.

8.5 Multiple pregnancies

There are no published studies comparing multiple versus singleton pregnancies in HIV. Based on the available evidence, comprising expert opinion, there is no increased risk of vertical transmission in multiple pregnancies.

Multiple pregnancies are more common in older pregnant women with HIV than in the HIV-negative population [54]. The number of pregnant women with HIV over 40 years of age has increased from 2% of all pregnant women over 40 in 2000–2004, to 9% in 2010–2014 [54], therefore further data are likely to emerge. Multiple pregnancies should be managed according to obstetric need of the woman and as per HIV-negative protocols.