

ANZCOR Guideline 13.7 – Medication or Fluids for the Resuscitation of the Newborn Infant

Guideline

Medications and fluids are rarely indicated for resuscitation of newborn infants.¹⁻³

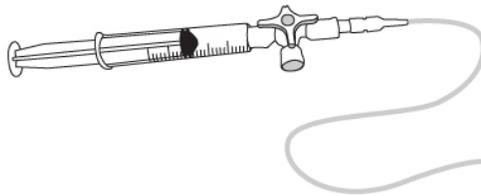
Bradycardia is usually caused by hypoxia and inadequate ventilation. Apnoea is due to insufficient oxygenation of the brainstem. Therefore establishing adequate ventilation is the most important step to improve the heart rate. However, if the heart rate remains less than 60/min despite adequate ventilation (chest is seen to move with inflations) and chest compressions, adrenaline (epinephrine) may be needed. As adrenaline (epinephrine) exerts part of its effect by action on the heart it is important to give it as close to the heart as possible, ideally as a rapid bolus through an umbilical venous catheter.

Ventilation and chest compressions must be delivered continuously during preparation to administer IV medication or fluids.

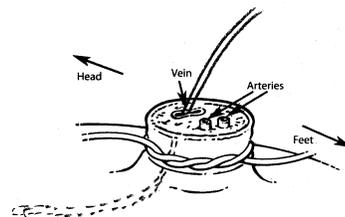
1. Routes of Administration

1.1. Umbilical vein

An umbilical vein catheter (UVC) is the most rapidly accessible intravascular route for adrenaline (epinephrine) and it can also be used for fluid administration. It can also be used for continued vascular access until an alternative route is established after admission to a neonatal unit. Blood gases obtained from the UVC during resuscitation are sometimes useful in guiding treatment decisions.



UVC, 3-way stopcock & syringe prepared for use



Umbilical venous catheter in situ

1.2. Endotracheal tube

Vascular access for adrenaline (epinephrine) is a high priority in any infant receiving chest compressions. There is little research to support the use of endotracheal adrenaline (epinephrine) and there are concerns that even in higher doses, it may still result in lower levels of adrenaline (epinephrine) than the intravenous route.^{4,5} If vascular access cannot be obtained then endotracheal adrenaline (epinephrine) may be considered. If the endotracheal dose fails to increase heart rate > 60 then an intravascular dose should be given as soon as feasible.

1.3. Peripheral vein

Inserting a peripheral venous cannula can be very difficult in a shocked neonate and can take too long.

1.4. Intraosseous lines

Intraosseous lines are not commonly used in neonates because of the more readily accessible umbilical vein, the fragility of small bones and the small intraosseous space, particularly in a premature infant. However, depending on operator training and experience, this route can be used as an alternative, especially if umbilical or direct venous access is not available [Class B, LOE IV^{6,7}].

1.5 Umbilical artery

The umbilical artery is not recommended for administration of resuscitation drugs. There are serious concerns that complications may result if hypertonic or vasoactive drugs (e.g. adrenaline (epinephrine)) are given into an artery.

2. Types and Doses of Medications

2.1. Adrenaline (epinephrine)

Indications

ANZCOR recommends that if adequate ventilation has failed to increase the heart rate to > 60 beats per minute and chest compressions have been commenced, then adrenaline (epinephrine) should be given *intravenously* as soon as possible [Class A, expert consensus opinion^{1,2,8}]

In making this recommendation we have placed higher value on animal research that indicates that chest compressions without adrenaline (epinephrine) are insufficient to increase cerebral blood flow. Furthermore there is the potential for long delays (up to several minutes) in establishing access and administering adrenaline (epinephrine). We have put lower value on the absence of human infant studies demonstrating benefit of early adrenaline (epinephrine) administration.

Dosage

The recommended intravenous dose is 10-30 microgram/kg (0.1-0.3 mL/kg of a 1:10,000 solution) by a quick push [Class A, expert consensus opinion]. (1 mL contains 0.1mg of adrenaline (epinephrine), so 0.1 mL = 10 microgram of adrenaline (epinephrine)). It should be followed by a small saline flush. This dose can be repeated every few minutes if the heart rate remains <60 beats

per minute despite effective ventilation and cardiac compressions.

The studies in newborn infants are inadequate to recommend routine use of higher doses of adrenaline (epinephrine). Based on studies in children and young animals, higher doses may increase risk of post-resuscitation mortality and risk of intracranial haemorrhage and are not recommended [Class A, expert consensus opinion⁹⁻¹¹].

There is insufficient evidence for the use of endotracheal adrenaline (epinephrine), but it is likely that a higher dose will be required to achieve similar blood levels and effect. If the tracheal route is used, doses of 50-100 microgram /kg (0.5-1 mL/kg of a 1:10,000 solution) should be used [Class B, extrapolated evidence^{12,13}]. The efficacy and safety of these doses have not been studied.⁸

2.2 Volume Expanding Fluids

Indications

Intravascular fluids should be considered when there is suspected blood loss, the infant appears to be in shock (pale, poor perfusion, weak pulse) and has not responded adequately to other resuscitative measures [Class A, expert consensus opinion]. Isotonic crystalloid (e.g. 0.9% sodium chloride or Hartmann's solution) should be used in the first instance, but may need to be followed with red cells and other blood products suitable for emergency transfusion, in the setting of critical blood loss.⁸ Use of a specific protocol is suggested whenever critical blood loss is suspected.

Since blood loss may be occult, in the absence of history of blood loss, a trial of volume administration may be considered in babies who are not responding to resuscitation [Class B, expert consensus opinion⁸]. However, in the absence of history of blood loss, there is limited evidence of benefit from administration of volume during resuscitation unresponsive to chest compressions and adrenaline (epinephrine) [LOE IV¹⁴], and some suggestion of harm from animal studies [extrapolated evidence^{15,16}].

Dosage

The initial dose is 10 mL/kg given by IV push (over several minutes) [Class B, expert consensus opinion]. This dose may be repeated after observation of the response.

References

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