Naloxone hydrochloride for acute, life threating opioid events

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As part of public health initiatives, a number of countries now provide naloxone kits for use by first responders in an effort to tackle drug related deaths within communities (Speakman et al., 2023). For those who are opioid dependent 'take home naloxone' may be administered in the event of an accidental overdose, and prior to hospital admission (McAuley et al., 2023).

Naloxone hydrochloride is an opioid receptor antagonist which blocks or rapidly reverses the effects of drugs such as morphine, heroin, methadone or fentanyl. An overdose of an opioid can suppress the central nervous system resulting in respiratory depression, bradycardia and loss of consciousness. Rapid administration of naloxone is indicated as first line medication to reverse these symptoms which can be fatal if not treated promptly (Table 1).

Frequent monitoring of the patient's respiratory rate and level of consciousness post naloxone administration should be undertaken as naloxone has a shorter duration of action than many opioids and repeated doses may be required (NICE 2023a). The prescriber must also be aware that naloxone treatment is only effective against opioids and has no impact on reversing symptoms resulting from exposure to stimulants, cocaine or benzodiazepines. Post-recovery there is also the potential side-effect of the individual experiencing severe withdrawal symptoms (NICE 2023b). Ongoing management should include pharmacological support of non-opioid medications to provide relief from withdrawal symptoms (Kosten et al., 2019).

Acute opioid overdose high-dose regimen to reverse potentially life-threatening effects			
	Initial dose	Secondary doses if no initial response	Post response deterioration
Neonate up to 28 days	Initially 100 micrograms/kg.	Repeat at 1-minute intervals to a total maximum of 2 mg.	Further doses may be required via intravenous route for more rapid effect.
Child 1 month–11 years	Initially 100 micrograms/kg. Maximum dose of 2 mg.	Repeat at 1-minute intervals to a total maximum of 2 mg.	Further doses may be required.
Child 12–17 years	Initially 400 micrograms dose.	-Increase dose to 800 micrograms and repeat at 1-minute intervals for up to 2 doses. -Increase to 2 mg for 1 dose.	Further doses may be required. 4 mg dose may be required in seriously poisoned patients.
Adult	Initially 400 micrograms dose.	-Increase dose to 800 micrograms and repeat at 1-minute intervals for up to 2 doses. -Increase to 2 mg for 1 dose.	Further doses may be required. 4 mg dose may be required in seriously poisoned patients.

Table 1: Naloxone hydrochloride for acute opioid overdose (NICE, 2023c)

Calculations skills

Question 1:

A 3-day old preterm neonate is given morphine as post operative pain relief. They become bradycardia and apnoeic. They weigh 700 grams. What dose of naloxone would you prescribe.

Question 2:

A 10-month-old child weighing 8.7 kg was administered Fentanyl. They become unresponsive with respiratory depression. What dose of naloxone would you prescribe.

Question 3:

A 11-year-old presents with reduced consciousness, respiratory depression and bradycardia following ingestion of heroin. Their weight is estimated to be 20kg. What dose of naloxone would you prescribe.

Question 4:

Adult with known opioid dependency has taken an accidental overdose of methadone. They had been given intranasal naloxone in the community but presents with ongoing respiratory depression. They weigh 60kg.

References

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Answers

Question 1

A 3-day old preterm neonate is given morphine as post operative pain relief. They become bradycardia and apnoeic. They weigh 700 grams. What dose of naloxone would you prescribe.

Dosage is 100 micrograms /kg. 700 grams converts to 0.7 kg.

100 micrograms x 0.7kg = **70micrograms**

Question 2

A 9-month-old child weighing 8.7 kg was administered Fentanyl. They become unresponsive with respiratory depression. What dose of naloxone would you prescribe.

Dosage is 100 micrograms /kg.

100micrograms x 8.7 kg = **870micrograms**

Question 3

A 10-year-old presents with reduced consciousness, respiratory depression and bradycardia following ingestion of heroin. Their weight is estimated to be 21kg. What dose of naloxone would you prescribe.

Dosage is 100 micrograms /kg.

100 x 21 = 2100micrograms or 2.1mg. The maximum recommended dose is **2mg per dose**

Question 4

Adult with known opioid dependency has taken an accidental overdose of methadone. They had been given intranasal naloxone in the community but present with ongoing respiratory depression. They weigh 60kg.

Weight is irrespective of dose which is based on titrated regime.
Initial dose of **400micrograms** increasing to 800micrograms for up to 2 doses, and final 2mg for 1 dose.
May give 4 mg dose in seriously poisoned patients.
Consideration of route of administration to intravenous to increase bioavailability and rapid response.