Neostigmine Newborn use only

Alert	Atropine or glycopyrrolate should be given before or with neostigmine to counteract any severe
Indication	1 Poversal of residual neuromuscular blockade by nen depalarizing neuromuscular blocking agents
malcation	(e.g. rocuronium vecuronium) *
	2 Myasthenia gravis
	* Sugammadex and Neostigmine are currently regarded as clinically equivalent for reversal of
	neuromuscular blockade, except in situations where rapid reversal of blockade is required (under 5
	minutes), in which case Sugammadex is the preferred agent (Refer to practice points)
Action	Neostigmine is a reversible cholinesterase inhibitor. It increases acetylcholine at the neuromuscular
	iunction by inhibiting its breakdown by cholinesterase.
Drug Type	Neuromuscular blocking agent, cholinergic agent
Trade Name	Juno. Hameln (section 19A)
Presentation	Neostigmine methylsulfate 2.5mg (2500microgram) in 1mL ampoule
Dose	Reversal of non-depolarising neuromuscular blockade
	IV - 40 microgram/kg (0.04 mg/kg) – to be given only after witnessing signs of recovery from
	Neuromuscular blockade (NMB). NOT to GIVE TOO EARLY.
	NOTE: Administer atropine (20 microgram/kg) before, or with neostigmine to prevent muscarinic
	effects (e.g. bradycardia, hypotension). ²
	Myasthenia Gravis (MG) ^{3,4}
	Note: Pyridostigmine is the preferred drug. Neostigmine is rarely used for diagnosis and treatment of
	neonatal MG. May be considered in rare situations with suspected neonatal MG where enteral treatment
	is not feasible. Some genetic causes of neonatal MG can be worsened by neostigmine. To be discussed
	with paediatric neurologist.
	Neostigmine is to be given with atropine (20 microgram/kg) to prevent muscarinic effects (e.g.
	bradycardia, hypotension)
	Dose: IM/IV (IM preferable) – 50 microgram/kg (0.05 mg/kg) every 3-4 hours, preferably 30 minutes
	before feeding to assist with dysphagia.
	Treatment is not usually required beyond 8 weeks of age.
D	Condition is usually self-limiting, so daily dosage should gradually be weaned off
Dose adjustment	Inerapeutic hypothermia - No information.
	ECMO – No Information.
	Renar impairment – Prolonged action in severe renar impairment.
Maximum Doco	
Pouto	W bolus over 1 minute
Route	IN - Anterolateral thigh
Prenaration	Draw up 1 ml (2500 microgram peostigmine) and add 9 ml sodium chloride 0.9% to make a final volume
rieparation	of 10 mL with a concentration of 250 microgram/mL
Administration	For Neuromuscular reversal: IV holus over 1 minute
Administration	For Myasthenia Gravis: IM injection preferred. The maximum volume for intramuscular administration is
	0.5mL per site, the dose should be administered 30 minutes before feed.
Monitoring	Cardiorespiratory monitoring
5 5 5	Respiratory function (Breathing sufficiency, SaO2) for any residual neuromuscular blockade.
	Train of four monitoring where available.
	Recurrence of neuromuscular blockade
Contraindications	Mechanical obstruction of intestinal or urinary tract.
	Known hypersensitivity to neostigmine.
	Neostigmine should not be given in conjunction with suxamethonium as neostigmine potentiates the
	depolarising myoneural blocking effects of suxamethonium.
Precautions	Use with extreme caution in neonates who have undergone recent intestinal or bladder surgery.
	Use in patients with intestinal anastomosis may produce rupture or leakage of the anastomosis due to
	the sudden return of abdominal muscle tone.
	Neostigmine can induce significant bronchoconstriction.

Neostigmine Newborn use only

	Use with caution in patients with cardiovascular disorders including arrhythmias and hypotension.
	Use with caution in patients with epilepsy, renal impairment, Addison's disease or hyperthyroidism.
Drug Interactions	Corticosteroids: Corticosteroids may decrease the anticholinesterase effects of neostigmine.
	Depolarising muscle relaxants: Neostigmine may prolong the effect of depolarising muscle relaxants such
	as suxamethonium.
	Atropine or glycopyrrolate: Atropine or glycopyrrolate reverses neostigmine's muscarinic effects
	(bradycardia, hypotension, bronchoconstriction, increased gut motility and salivation, bladder
	contraction)
	Aminoglycosides: Neostigmine can be effective in reversing neuromuscular block induced by
	aminoglycoside antibiotics.
Adverse	Inadequate reversal of neuromuscular blockade.
Reactions	Bradycardia (prevented by simultaneous administration of atropine or glycopyrrolate), hypotension,
	syncope, arrhythmias (bradycardia, tachycardia, AV block, abnormal ECG, Prolonged QTc interval/cardiac
	arrest ⁵⁻⁷
	Diaphoresis, Miosis, tearing,
	Increased bronchial secretions, respiratory depression, bronchoconstriction, Pulmonary oedema ⁸ (8)
	Muscle spasms, twitching and weakness
	Anaphylaxis ⁹
	Gastrointestinal (nausea, vomiting, salivation, flatulence, diarrhea, stomach cramps)
Overdose	AUSTRALIA
	Contact the Poisons Information Centre on 13 11 26 for information on the management of overdose
	Contact the National Poisons Centre on U800 764 766 for information on the management of overdose.
Compatibility	Fluids ^{11,10} Sodium chioride 0.9%.
	PN at Y-Site: No Information.
	Y-site: Palonosetron hydrochloride, Plasma-Lyte 148**.
Incompatibility	Fluids: No information.
	PN at Y-site: No Information.
Chability	f site: No information.
Stability	Stability varies between brands. Check product information.
Storage	Store below 25°C. Protect from light. Discard unused potion.
Excipients	Socium chloride, water for injections.
Special	The maximum volume for intramuscular administration is 0.5mL per site, the dose should be
Comments	administered 30 minutes before feed.
	In patients with bradycardia, after administration of atropine the pulse rate should increase to 80
	bests/min before administering neostigmine.
Evidence	Background
	Neuromuscular blocking agents (NMBAs) are commonly used during paediatric anaesthesia and neonatal
	intensive care to facilitate intubation and muscle relaxation. Spontaneous recovery from neuromuscular
	blockade (NMB) can be slow and variable. Residual NMB refers to symptoms and signs of inadequate
	recovery from blockade, such as muscle weakness, apnoea and hypoxia. Residual NMB, which can be
	defined as the train-of-four (TOF) ratio <0.9, is a problem in the immediate (0-2hrs) post-operative
	period. The incidence of residual NMB in the post-operative period has been reported as high as 37%–
	82%. ¹¹ Some anaesthesiologists use neostigmine to reverse NMB of non-depolarising muscle relaxants
	for paediatric surgical patients. ^{12,13} As an anticholinesterase, neostigmine mainly inhibits the breakdown
	of acetylcholine, increases acetylcholine in the neuromuscular junction, and enhances the availability of
	acetylcholine to compete with NMBAs. ¹¹
	Neostigmine has a broad-spectrum reversal of the effect of all nondepolarizing NMBAs. ¹¹ However, it has
	a maximum effective dosage, and administering additional neostigmine will not produce further reversal.
	The maximum effective dose is in the range of 60-80 microgram/kg, and the recommended dose for
	biockade reversal in paediatric patients is 20-60 microgram/kg when combined with 20 microgram/kg
	atropine

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Eversal of MMD A 2014 Cochrane review found no RCTs on the routine use of neostigmine to reverse NMB in paediatric patients. ¹⁴ However, neostigmine usage for reversal of NMB goes back many decades and it's unsurprising no RCT was found. One of the drawback of neostigmine is its inability to reverse profound and deep blockade, because its effect reaches a plateau (i.e. celling effect) when acetylcholinesterase inhibition is near 100%, and the maximal concentration of acetylcholine is achieved. ¹⁴ Transient Neonatal Myasthenia Gravis (TMMG) Transient Neonatal Myasthenia Gravis (TMMG) is caused by pathogenic maternal autoantibodies that cross the placenta. TNMG affects 10–20% of children born to mothers with MG. The severity of symptoms ranges from minor feeding difficulties to life-threatening respiratory weakness. Acetylcholine-esterase inhibitors (e.g. neostigmine) and antibody-clearing therapise such as immunoghobulins can be used to treat TMMG, but most children do well with observation only. TNMG is self-limiting within weeks as circulating antibodies are naturally cleared from the blood. Symptomatic treatment with acetylcholine-esterase inhibitors can be used for TMMG. Neostigmine and pyridostigmine are usually upreferred for parenteral use, while the slower-acting pyridostigmine is preferred for enteral use (S0-150 microgram/kg IV/IM/SC) is usually preferred for parenteral use, while the slower-acting signification site of disculation prior to feedings for maximal beneft. Muscarinic side effects, Neostigmine is excreted in urine as unchanged drug (S0%) and metabolites. Following IV administration 1% onset of clinical action is within 5-10 minutes and the elimination half-life ranges from 47 to 60 minutes and after IM administration S0 to 91 minutes. ³ Renal impairment: The duration of effect may be prolonged in patients with renal impairment since neostigmi		
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Authors Contribution of the current version	
Current version authors	Srinivas Bolisetty, Mohammad Irfan Azeem
Evidence Review	Srinivas Bolisetty
Expert review	A/Prof Justin Skowno (Paediatric anaesthetist, Sydney Children's Hospital Network)
	Dr Richard Webster, Paediatric Neurologist, Sydney Children's Hospital Network.
Nursing Review	Bryony Malloy
Pharmacy Review	Mohammad Irfan Azeem, Michelle Jenkins
ANMF Group	Bhavesh Mehta, Nilkant Phad, Amber Seigel, Rebecca Barzegar, Rebecca O'Grady, Thao Tran,
contributors	Cindy Chen, Kerrie Knox, Jutta van den Boom, Susannah Brew, Renae Gengaroli, Samantha
	Hassall, Celia Cunha Brites, Tiffany Kwan
Final editing	Srinivas Bolisetty
Electronic version	Cindy Chen, Ian Callander
Facilitator	Srinivas Bolisetty

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