

NCCU CLINICAL GUIDELINES
SECTION: 10

METABOLIC MANAGEMENT

Section: 10 Metabolic management
Cortisol estimation and ACTH stimulation testing
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CORTISOL ESTIMATION AND ACTH STIMULATION TESTING

Adrenal insufficiency in neonates can be divided into 2 categories:

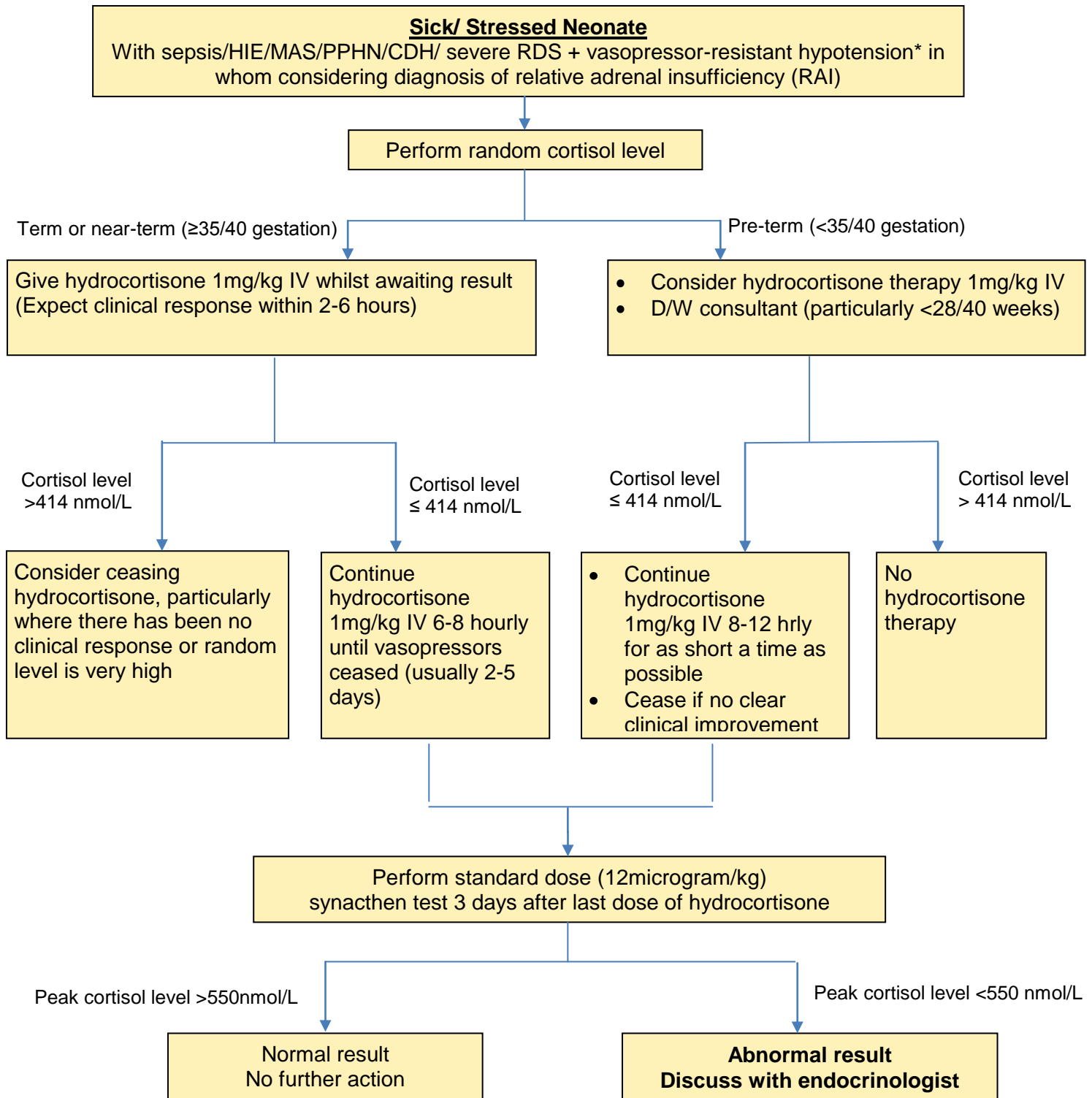
1) RELATIVE ADRENAL INSUFFICIENCY (RAI):

- A temporary condition in critically ill neonates which occurs when the cortisol response is inadequate for the patient's degree of stress and has a reported incidence of 37-86%.
- It is defined as a random or baseline cortisol level <414nmol/L or an ACTH stimulated (short synacthen test, 1mcg IV) Δ -cortisol (peak – baseline) of <250nmol/L or a peak <550nmol/L.
- It should be considered in any critically ill neonate with conditions such as severe sepsis, HIE, MAS, PPHN, CDH and severe RDS, particularly in those with vasopressor-resistant hypotension (BP mean <gestational age despite fluid bolus and inotropic support).
- Diagnosis of RAI and treatment with hydrocortisone are controversial and presently there is a lack of good evidence in the literature. However, it is known that:
 - Severe prolonged hypotension is associated with increased mortality and central nervous system morbidity.
 - Inotropic support may lead to decreased organ perfusion causing decreased cerebral perfusion, renal and cardiac failure and fluid boluses are associated with pulmonary oedema and PDA.
 - It has been shown that:
 - Hydrocortisone therapy results in haemodynamic stability and reduced use of vasopressors and fluid boluses.
 - Treatment with hydrocortisone should be weighed up with the potential risks particularly in preterm neonates where there has been shown to be increased rates of GI perforation (in those treated alongside indomethacin therapy). However, it seems that there may not be the detrimental effects on growth and neurodevelopmental outcome seen with dexamethasone treatment.

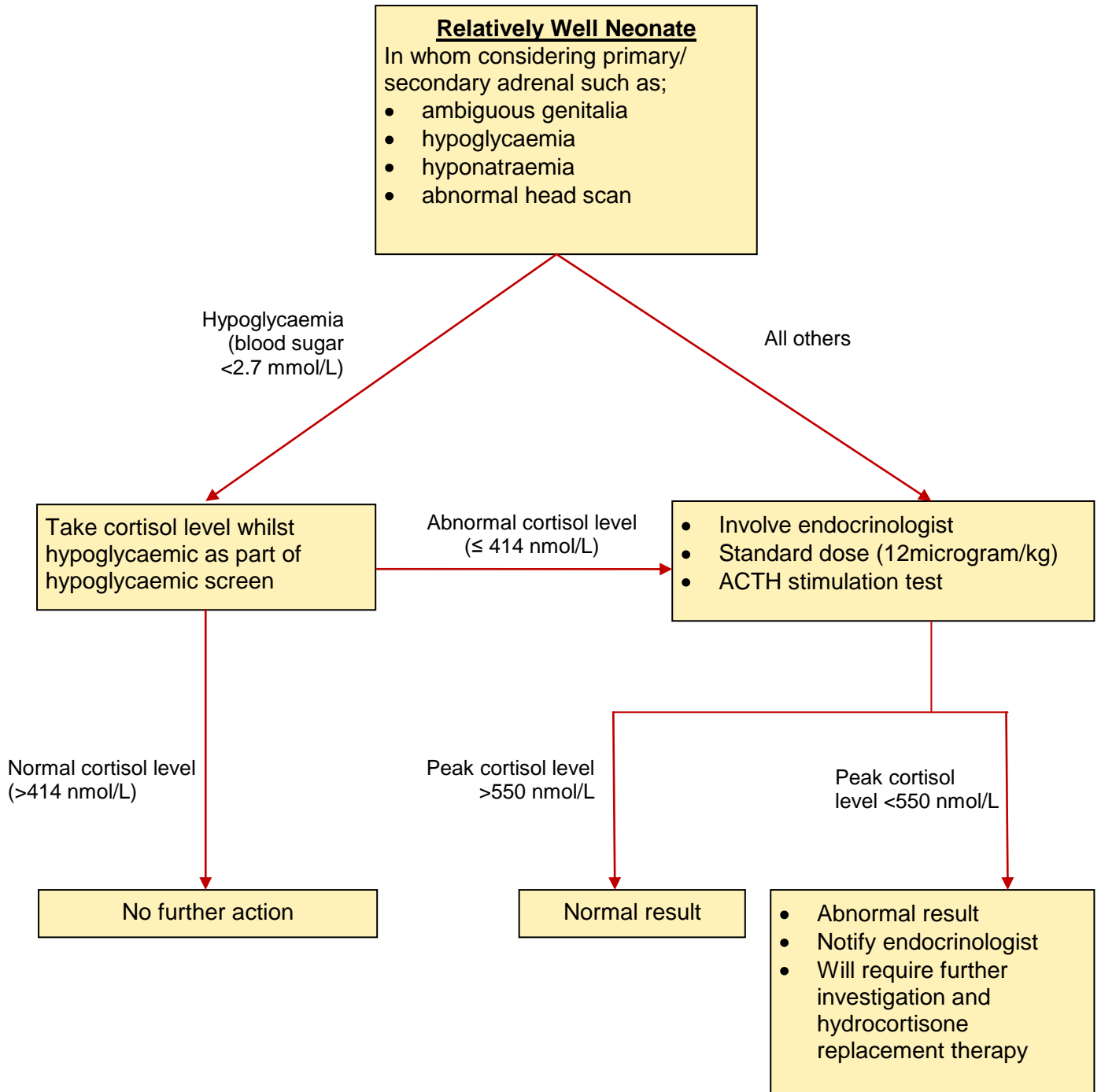
2) PRIMARY/ SECONDARY ADRENAL INSUFFICIENCY:

- Conditions are primary adrenal such as CAH or congenital hypoplasia or secondary adrenal/central such as hypopituitarism.
- Suspected in patients with ambiguous genitalia, hyponatraemia, hypoglycaemia, and an abnormal headscan (absent pituitary/ malplaced pituitary/ septo-optic dysplasia/ midline defects).

- a) **Flowchart for adrenal investigation in the sick/stressed neonate with vasopressor-resistant hypotension in whom a diagnosis of relative adrenal insufficiency (RAI) is being considered:***
 Vasopressor-resistant hypotension defined as mean BP < gestational age despite >20mL/kg fluid bolus and on ≥ 10 microgram/kg/min dopamine and/or ≥ 10 microgram/kg/min dobutamine or multiple other inotropes



B) Flowchart for Adrenal Investigation in the Relatively Well Neonate in Whom a Diagnosis of Primary or Secondary Adrenal Insufficiency is being considered:



ACTH STIMULATION TESTING (SHORT SYNACTHEN TEST):

Which dose of synacthen to use for the short synacthen test remains controversial. The traditional, standard dose (250microgram/1.73m² ≈ 10-12microgram/kg in neonates) is a supra-physiological dose, which may stimulate an adequate response even in those with inadequate adrenal reserve. A more physiological low dose of 1mcg has been proposed.

Studies have shown that the low-dose is more discriminatory in sick/ stressed neonates. However, there is a lack of evidence to use the low dose over the standard dose for other indications. Therefore, if used in the acutely unwell neonate, when looking for a diagnosis of relative adrenal insufficiency (RAI), the 'low dose' test should be used.

The standard dose ACTH stimulation test should be used in all other situations including:

- The stable neonate, when looking for primary or secondary causes of adrenal insufficiency
- When checking adrenal function in RAI having recovered from the acute illness and off hydrocortisone therapy

LOW DOSE TEST:

- 1microgram/kg tetracosactrin intravenously (IV).

STANDARD DOSE TEST:

- 12microgram/kg tetracosactrin intramuscularly (IMI) or intravenously (IV) if available.

See protocol for "tetracosactrin" in NCCU drug manual.

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