**8. Management of acute illness in children on Hydrocortisone Replacement therapy (e.g. Addison’s disease, Panhypopituitarism, Congenital Adrenal Hyperplasia)**

**1 Mild illness**

If the child has an intercurrent illness but is well, feeding and playing normally, then no change in dosage is required.

**2 Moderate illness**

If the child is unwell, with fever, reduced activity, etc. then **the total daily oral dose should be doubled (or increased 3-fold if more unwell) and given in three equally divided doses throughout the day**

**3 Unwell child or not tolerating oral Hydrocortisone**

These children need to be seen immediately and the following steps should be followed: CHECK AND FOLLOW THE INSTRUCTIONS ON THE PATIENT’S STEROID CARD

Instructions for admitting doctor:

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* Insert IV cannula
* Take blood for U+E’s, blood glucose and where necessary perform any other appropriate tests such as blood cultures.
* Check BM stix or Dextrostix.
* Give hydrocortisone IV as a bolus (dose above) (unnecessary if child has already been given IM hydrocortisone within the previous 4 hours).
* If blood glucose <2.5mmol/l, give bolus of 2ml/kg 10% dextrose.
* If patient drowsy, hypotensive and peripherally shut down, give 20ml/kg normal saline.
* Commence IV infusion of 0.45% saline and 5% dextrose at maintenance rate (extra if dehydrated). Add potassium depending on electrolyte result.
* Hydrocortisone must continue either orally or IV if vomiting continues. If IV therapy is required, calculate normal total daily dose and triple it. Then give this calculated dose as four equal divided doses, e.g. patient normally on 10mg/day, triple dose = 30mg, give as 7.5mg qds. Consider giving this increased daily dose as a continuous IV hydrocortisone infusion (50 mg hydrocortisone in 50ml normal saline) in severely ill patients (e.g. Total daily dose = 30mg, then give infusion of 1.25mls/hour).
* If child also on DDAVP, **stop it**. Measure plasma and urine sodium and osmolality as well as monitoring fluid input and output. Then see below or D/W Dr Pryce for guidelines for managing fluids and re-starting DDAVP.
* Once the child is better, the hydrocortisone dose should be reduced back to normal maintenance over 2-3 days.
* Children with congenital adrenal hyperplasia will also be on fludrocortisone(salt losers only). If vomiting and unable tolerate orally, electrolytes will need to be monitored twice daily and appropriate sodium replacement made IV.
* The dose of fludrocortisone remains the same during intercurrent illnesses.
1. **Thyroxine:**

L-thyroxine should be continued orally during an acute admission. However, it has a long half-life of several days and therefore if the child is vomiting and misses a dose for 24 hours this should not cause any harm. If vomiting persists beyond 24 hours and child unable to take medication orally, check urgent thyroid function test including TSH, total and free T4. Consider IV Tri-iodothyronine if oral route not possible for several days but discuss with endocrinologist.

1. **Growth Hormone:**

Growth hormone is administered by subcutaneous injection and therefore can be continued during prolonged admissions. Ask parents to bring in their own supply, as the pharmacy will not stock it. For acute admissions, missing a few days of growth hormone will not usually be of any consequence, except in children experiencing hypoglycaemia associated with GH deficiency.

1. **DDAVP:**

Please see note above about children on hydrocortisone and DDAVP. In children on DDAVP, fluid balance will need to be watched carefully during an acute admission. Check U+E and osmolality at least daily. It is easy to overload a child and therefore, children requiring IV fluids should have their DDAVP temporarily stopped until discussion with endocrinologist. Fluid balance can usually be maintained by providing hourly replacement as previous hours urine output + 0.5 ml/kg. This may require urinary catheterisation. Return to oral fluids as soon as possible.

1. **Sex steroid replacement (oestrogen/testosterone):**

Oestrogen therapy may be continued via the oral route if possible. If oral route not possible then temporarily discontinue. This may induce a withdrawal menstrual bleed in girls on higher doses. Testosterone is usually given by monthly injection and therefore should not be relevant during acute admissions.

**9. STEROID COVER FOR SURGICAL PROCEDURES**

**(Patients with ACTH deficiency, Addison’s, CAH)**

Pre-op Height, weight, blood pressure, surface area, U & E

 Inform Paediatric Endocrine SpR/Dr Pryce or Carol Fraser

 Inform Surgeon and Anaesthetist

**Minor Surgery:** (e.g. cystoscopy/endoscopy)

At Induction - Hydrocortisone IV 25mg if <10 kg

 50mg if 10-30 kg

 100mg if >30 kg

If salt loser - may need IV fluids (0.45% saline/5% dextrose) if not drinking immediately after surgery.

Post-op routine medication if tolerating orally, otherwise as below

**Major Surgery**: (any surgery where not expected to eat/drink immediately)

At Induction - Hydrocortisone IV 25mg if <10 kg

 50mg if 10-30 kg

 100mg if >30 kg

Post-op Hydrocortisone iv/oral

Double the normal maintenance dose and give in 3 divided doses for the first 24-48 hours.

Then, tail off over 24 hours to maintenance dose if child clinically better.

If child unwell postoperatively, consider a continuous IV infusion of hydrocortisone (dose triple normal daily maintenance and divide by 24 to give hourly rate).

Fluids

* **A: Salt-losing** (CAH/ Addison’s)
	+ 0.9% saline and 5% dextrose at maintenance rate.
	+ Daily U & E.
	+ When tolerating oral fluids, return to normal NaCl supplements

And re-start Fludrocortisone.

* **B: Non salt-losing** (ACTH/ isolated Cortisol deficiency)
	+ Normal maintenance fluid as 4% Dextrose/ 0.18% NaCl

**NB This protocol does not apply for patients with Diabetes Insipidus**

Reviewed Dr R Pryce, Dr D Hawkes 2014