



## LRI Children's Hospital

### Adrenal Crisis

Staff relevant to:	Clinical staff working within the UHL Children's Hospital.
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Written by: Reviewed by:	Dr V Tziaferi, Dr S Shenoy, Dr Greening Dr S Shenoy
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### 1. Introduction & Scope

This guideline is intended for the use of clinicians working within the UHL Children's Hospital caring for children presenting with -

- Central Adrenal Insufficiency: Hypopituitarism (multiple pituitary hormone deficiencies)
- Primary Adrenal Insufficiency such as: Congenital Adrenal Hyperplasia (CAH), Addison's disease, adrenal hypoplasia congenita, previous history of adrenalectomy and other rare conditions (for example Smith-Lemli –Opitz on hydrocortisone replacement)

#### **Consider using these guidelines for:**

- *Children who are at high risk for adrenal crisis such*
  - as patient on long term systemic steroids (e.g. prednisolone)
  - weaning regime of prednisolone or dexamethasone
  - high doses of inhaled steroids (beclomethasone >800 micrograms/day or Fluticasone >400 micrograms/day)
  - who present with features suggestive of adrenal crisis; **please discuss this with the paediatric endocrine consultant on call via switchboard.**

-Any child with suspected adrenal crisis without previous history of Adrenal Insufficiency; **please discuss this with the paediatric endocrine consultant on call.** It is important in these children that Hydrocortisone is not started before at least one sample is taken for cortisol.

Ideally in suspected new cases before administration of hydrocortisone samples should be taken for:

- cortisol (white serum)
- ACTH (2 mls EDTA on ice)-send to the lab within 30 mins
- Renin (1ml EDTA) – send to the lab within 30 mins
- Aldosterone (1ml EDTA)- send to the lab within 30 mins

In babies with suspected CAH a spot urine sample should be send for Urine steroid profile.

## **2. Adrenal Crisis**

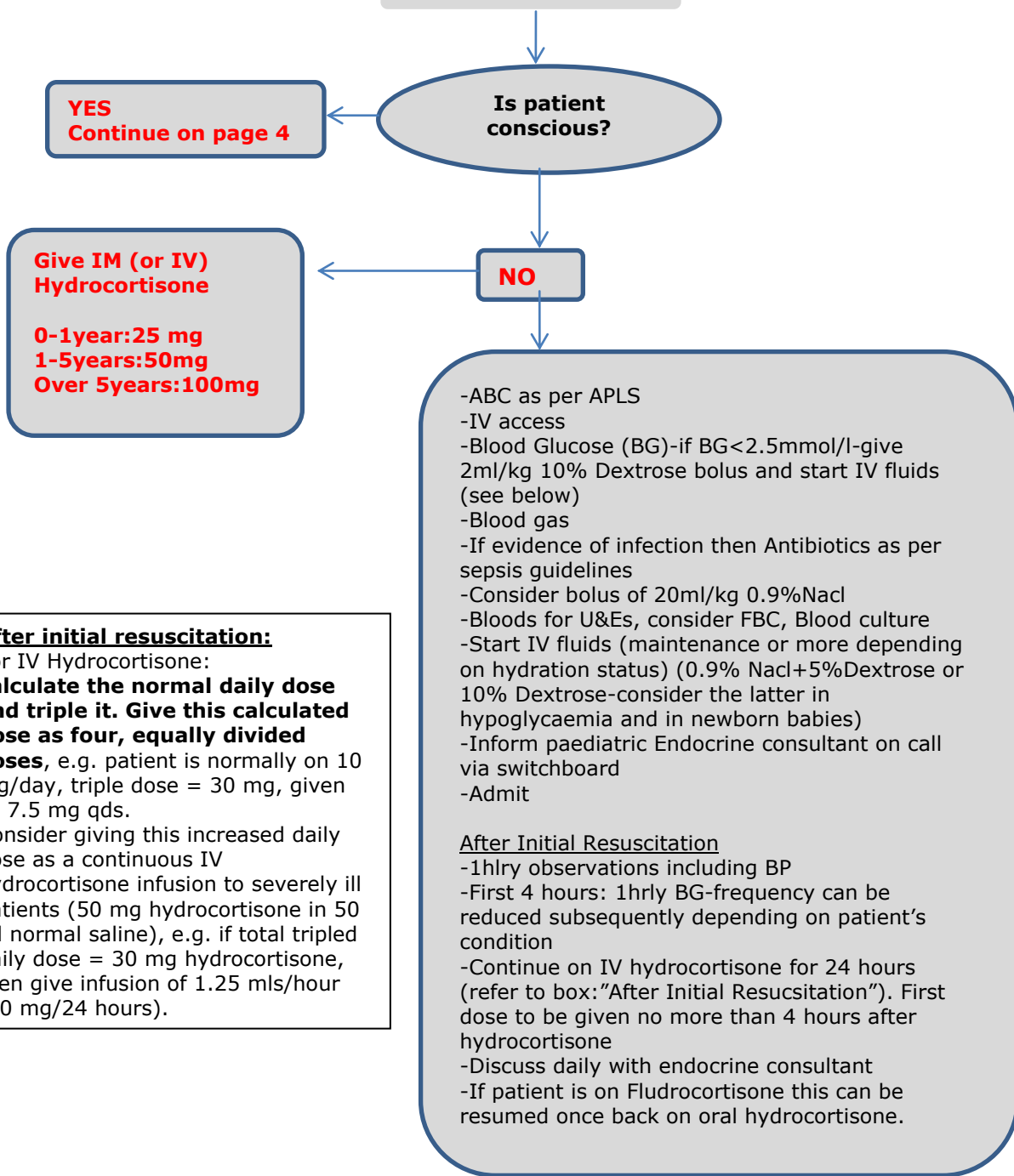
Manifestations:

-weakness, dizziness, floppiness, lethargy, failure to respond, nausea and vomiting, pallor and clammy sweating, cold hands and feet, numbness, pins and needles, low BP, hyponatraemia, hyperkalaemia, hypoglycaemia.

**Adrenal crisis can lead to death.** For further details on the pathophysiology please refer to:

<http://www.cahisus.co.uk/pdf/ADRENAL%20CRISIS%20PATHWAY%20OF%20EVENTS%20CAH.pdf>

**Patient with Adrenal Crisis**



**YES**  
Continue on page 4

**Is patient conscious?**

**Give IM (or IV) Hydrocortisone**  
**0-1 year: 25 mg**  
**1-5 years: 50 mg**  
**Over 5 years: 100 mg**

**NO**

- ABC as per APLS
- IV access
- Blood Glucose (BG)-if BG<2.5mmol/l-give 2ml/kg 10% Dextrose bolus and start IV fluids (see below)
- Blood gas
- If evidence of infection then Antibiotics as per sepsis guidelines
- Consider bolus of 20ml/kg 0.9%NaCl
- Bloods for U&Es, consider FBC, Blood culture
- Start IV fluids (maintenance or more depending on hydration status) (0.9% NaCl+5%Dextrose or 10% Dextrose-consider the latter in hypoglycaemia and in newborn babies)
- Inform paediatric Endocrine consultant on call via switchboard
- Admit

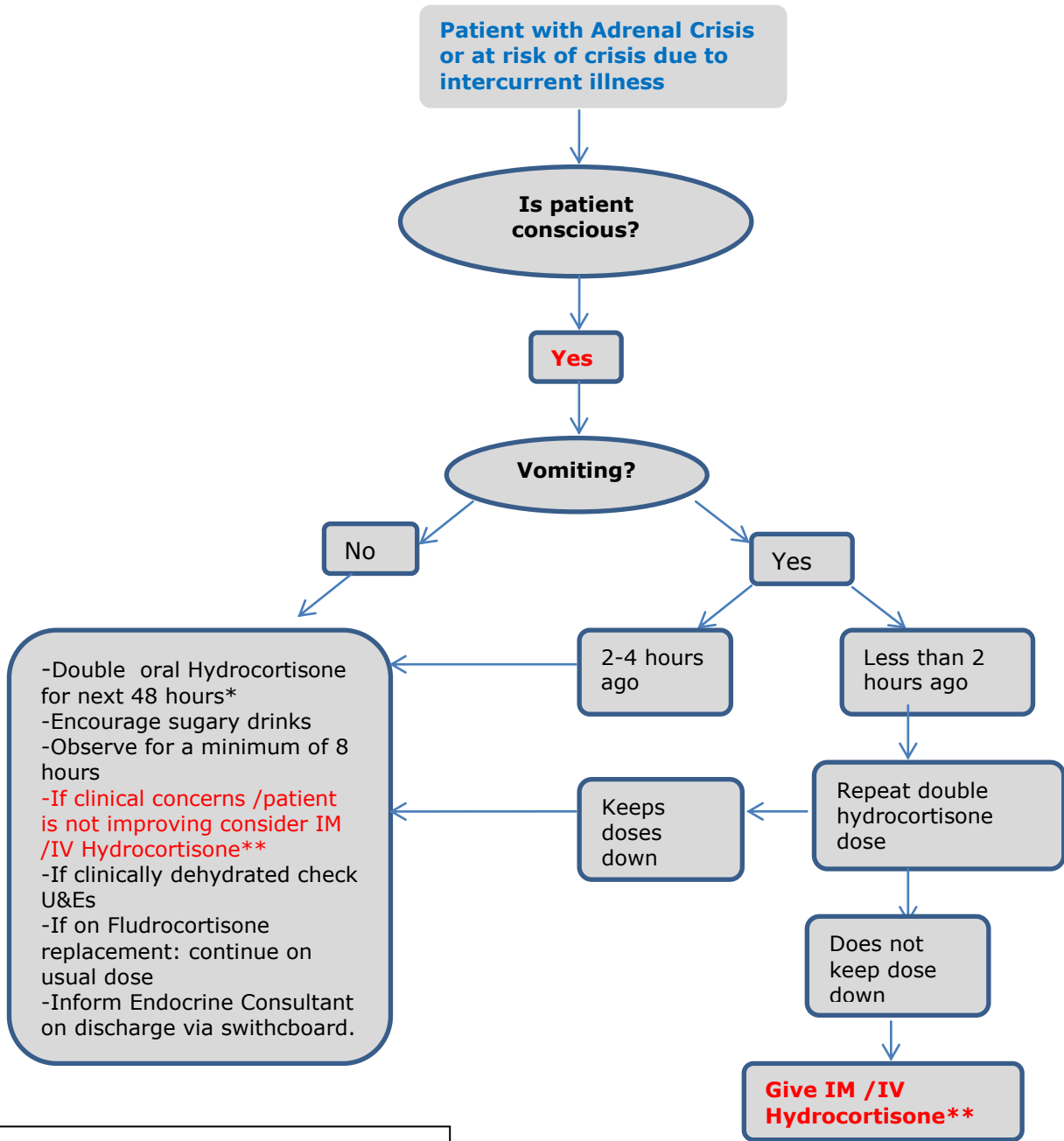
**After initial resuscitation:**

For IV Hydrocortisone:  
**calculate the normal daily dose and triple it. Give this calculated dose as four, equally divided doses**, e.g. patient is normally on 10 mg/day, triple dose = 30 mg, given as 7.5 mg qds.  
Consider giving this increased daily dose as a continuous IV hydrocortisone infusion to severely ill patients (50 mg hydrocortisone in 50 ml normal saline), e.g. if total tripled daily dose = 30 mg hydrocortisone, then give infusion of 1.25 mls/hour (30 mg/24 hours).

**After Initial Resuscitation**

- 1hrly observations including BP
- First 4 hours: 1hrly BG-frequency can be reduced subsequently depending on patient's condition
- Continue on IV hydrocortisone for 24 hours (refer to box: "After Initial Resuscitation"). First dose to be given no more than 4 hours after hydrocortisone
- Discuss daily with endocrine consultant
- If patient is on Fludrocortisone this can be resumed once back on oral hydrocortisone.

*In patients with Hypopituitarism who are on Desmopressin please do not prescribe their regular desmopressin without discussing with the paediatric endocrine consultant on call.*



*\*If there is uncertainty on the usual maintenance dose please prescribe: 30mg/m<sup>2</sup>/day and divide in 3 doses – see appendix for surface area calculation*

*\*\*STAT doses of Hydrocortisone as stated in page 3 can be given IM or IV*

*In patients with Hypopituitarism who are on Desmopressin please do not prescribe their regular desmopressin without discussing with the paediatric endocrine consultant on call.*

-IV access  
 -Check U&Es  
 -Consider IV fluids  
 -If unable to tolerate oral after 2 hours start IV Hydrocortisone (refer to dose in page 2: "After initial resuscitation")  
 -If able to tolerate oral fluids after 2 hours then restart oral Hydrocortisone at double maintenance dose  
 -Children less than 1 year old should be observed for a minimum of 24 hours; older children: 12 hours

Algorithm modified from <http://www.cahisus.co.uk/pdf/QUICK%20GUIDE%20TO%20IL%20LNESS%20PROTOCOL.pdf> Prof PC Hindmarsh

## **Prior to discharge**

- 1) If child going home on double the oral dose, advise the parents to continue normal dose of Fludrocortisone (if child on Fludrocortisone) and revert to normal dose of Hydrocortisone as soon as the symptoms (fever/ vomiting/ diarrhoea) resolves
- 2) If the parents have used their emergency Hydrocortisone injection prior to admission, please provide a prescription for Hydrocortisone injection 100 mg/ml vial for use in emergency (doses as stated above).
- 3) Complete the steroid card (see Appendix) and provide to those families who do not have one already
- 4) Ensure parents feel confident to administer injection – if parents need retraining, please notify the endocrine specialist nurse Pauline Jones (email/extension 5326 – works part-time) and child's Consultant ( by email/phone next working day) so this can be arranged at a suitable time (before discharge if feasible/after discharge).
- 5) Notify the Consultant under whose care the child is of the admission and discharge by email/phone next working day

## **Helpful Contact numbers:**

- Endocrine Secretary : 01162587737 (tel)  
01162587637 (fax)
- Pauline Jones, Paediatric Endocrine Specialist Nurse : 01162585326  
(works part-time – please do not leave urgent messages out-of-hours)
- East Midlands Paediatric Endocrine Consultant oncall: via Switchboard

### **3. Education and Training**

No new training is required to implement this guideline.

### **4. Monitoring Compliance**

<b>What will be measured to monitor compliance</b>	<b>How will compliance be monitored</b>	<b>Monitoring Lead</b>	<b>Frequency</b>	<b>Reporting arrangements</b>
<ul style="list-style-type: none"><li>• Compliance with hydrocortisone doses (IM/IV or oral)</li><li>• Time to discharge</li><li>• Discussion with endocrine consultant prior to discharge</li></ul>	Clinical notes review	Shenoy/Greening	Every 5 years	Audit meetings

### **5. Supporting References**

i) <http://www.cahisus.co.uk/>

ii) <https://www.bsped.org.uk/clinical/docs/SteroidCardForWebs.pdf>

### **6. Key Words**

Adrenal Crisis, Adrenal Insufficiency, Congenital Adrenal Hyperplasia, Hypopituitarism

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**The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.**

**As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.**

<b>CONTACT AND REVIEW DETAILS</b>	
<b>Guideline Lead</b> Dr Savitha Shenoy (Consultant Paediatric Endocrinology)	<b>Executive Lead</b> Chief medical officer
<b>Details of Changes made during review:</b> No changes	

## BODY SURFACE AREA IN CHILDREN

### Body-weight under 40kg

Body-weight (kg)	Surface area (m <sup>2</sup> )
1	0.10
1.5	0.13
2	0.16
2.5	0.19
3	0.21
3.5	0.24
4	0.26
4.5	0.28
5	0.30
5.5	0.32
6	0.34
6.5	0.36
7	0.38
7.5	0.40
8	0.42
8.5	0.44
9	0.46
9.5	0.47
10	0.49
11	0.53
12	0.56
13	0.59
14	0.62
15	0.65
16	0.68

Body-weight (kg)	Surface area (m <sup>2</sup> )
17	0.71
18	0.74
19	0.77
20	0.79
21	0.82
22	0.85
23	0.87
24	0.90
25	0.92
26	0.95
27	0.97
28	1.0
29	1.0
30	1.1
31	1.1
32	1.1
33	1.1
34	1.1
35	1.2
36	1.2
37	1.2
38	1.2
39	1.3
40	1.3

## BODY SURFACE AREA IN CHILDREN

### Body-weight over 40kg

Body-weight (kg)	Surface area (m <sup>2</sup> )
41	1.3
42	1.3
43	1.3
44	1.4
45	1.4
46	1.4
47	1.4
48	1.4
49	1.5
50	1.5
51	1.5
52	1.5
53	1.5
54	1.6
55	1.6
56	1.6
57	1.6
58	1.6
59	1.7
60	1.7
61	1.7
62	1.7
63	1.7
64	1.7
65	1.8

Body-weight (kg)	Surface area (m <sup>2</sup> )
66	1.8
67	1.8
68	1.8
69	1.8
70	1.9
71	1.9
72	1.9
73	1.9
74	1.9
75	1.9
76	2.0
77	2.0
78	2.0
79	2.0
80	2.0
81	2.0
82	2.1
83	2.1
84	2.1
85	2.1
86	2.1
87	2.1
88	2.2
89	2.2
90	2.2

Values are calculated using the Boyd equation

**Note** Height is not required to estimate body surface area using these tables