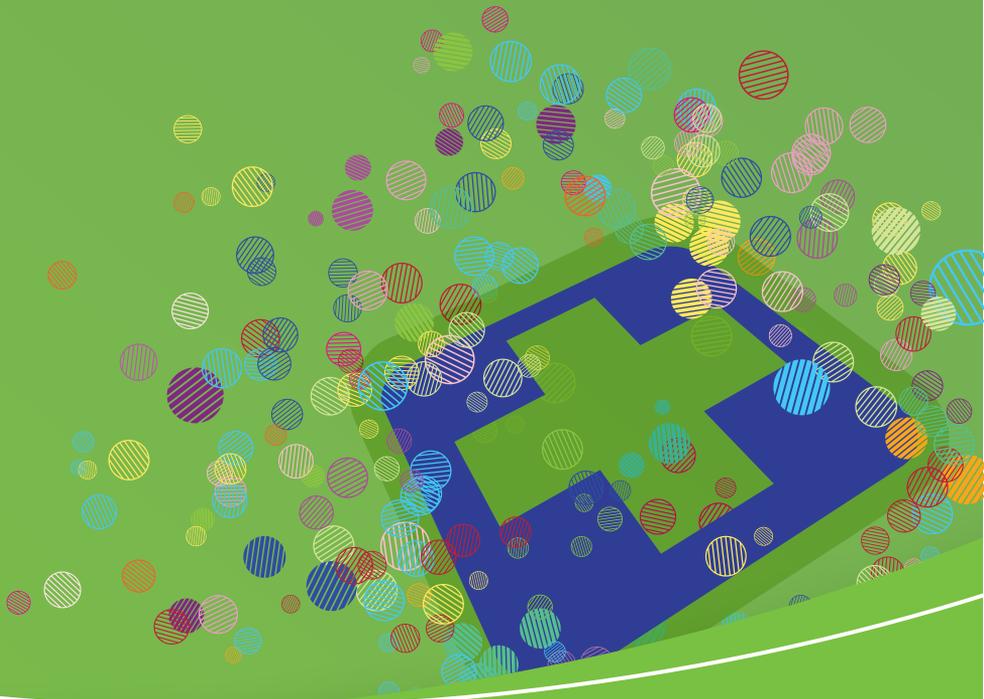


Hormones and Me
Management of Emergency or 'Stress'
Situations Where Hypoglycaemia or
Cortisol Deficiency Occur



Hormones and Me

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

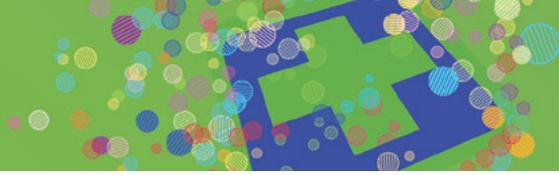


Table of Contents

About this Book	2
Introduction	4
A Brief Explanation	7
Management of 'Stress' Conditions	10
Section 1	12
Section 2	22
Administration of Injections	27
Illness at School or Away from Parents	28
Questions and Answers	31
Glossary	34
Support Organisations and Further Reading	39
References for Text	40
School Information	41
Medical Details	43
Hormones and Me booklet series	44

About this book

This booklet, *Management of Emergency or 'Stress' Situations where Hypoglycaemia or Cortisol Deficiency Occur*, is intended to provide basic guidelines for the management of problems or difficulties which may arise as a consequence of conditions associated with hypoglycaemia and/or cortisol deficiency in childhood. It is hoped that the information provided will enable you to understand your child's treatment better and give a basis for discussion with your specialist when necessary.

We encourage you to discuss any additional questions or areas of concern with your doctor after reading this booklet.

Merck Australia is pleased to bring you this booklet from the *Hormones and Me* educational series. We hope that you find it a valuable and helpful resource.

This booklet was revised in 2011 with the help of Dr Ann Maguire and Dr Maria Craig (The Children's Hospital at Westmead, NSW, Australia), and A/Prof Christine Rodda (Monash Medical Centre, VIC, Australia). All three reviewers are Paediatric Endocrinologists specialising in childhood endocrine disorders and members of the Australasian Paediatric Endocrinology Group (APEG).



Paediatric endocrinologists, A/Prof Margaret Zacharin (Royal Children's Hospital, VIC, Australia) and Dr Ann Maguire (The Children's Hospital at Westmead, NSW Australia) have reviewed the *Hormones and Me* series on behalf of the Australasian Paediatric Endocrine Group (APEG).

This booklet was first updated and reproduced for Australian and New Zealand readers in 2000 with the help of A/Prof Christine Rodda. Special thanks to the original authors and editors, Dr Richard Stanhope (Great Ormond Street Hospital for Children and the Middlesex Hospital, UK), Rosemary Cordell and Mrs Vreli Fry (Child Growth Foundation, UK), and the British Society of Paediatric Endocrinology (BSPE).

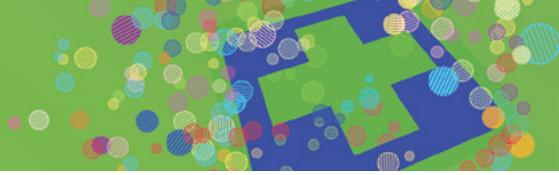
Introduction

This booklet has been produced for the family and friends of children who may require treatment during 'stress' because they have an underlying condition where the body cannot respond in a normal way to stress. The term 'stress' in this context does not refer to psychological stress where a child is briefly emotionally distressed and otherwise well, but rather to conditions such as hypoglycaemia, major injury, surgical procedures or severe illness. This booklet is intended to provide help to parents, school teachers and other carers. Information is provided to help understand the child's treatment better, and to complement discussions with the child's specialist.

“The term 'stress' in this context does not refer to psychological stress where a child is briefly emotionally distressed and otherwise well, but rather to conditions such as hypoglycaemia, major injury, surgical procedures or severe illness.”

There are a number of different medical conditions which cause a child to fail to respond to 'stress' in a normal way. These are often associated with a loss or a lack of appropriate production of 'stress hormones' in the body. Hormone replacement therapy cannot be as efficient as natural hormone production where the body increases supplies of specific hormones when they are needed. Occasions arise, particularly when the body is under stress, when the child requires extra hormone medication.

If possible, these 'at risk' situations should be promptly identified and PREVENTATIVE MEASURES then be commenced immediately.



Practical instructions for management of hypoglycaemia are outlined in this booklet.

This information booklet has been produced for any child who is at risk of developing hypoglycaemia (low blood sugars) and/or cortisol deficiency and has been prepared in two sections.

THE PAEDIATRIC ENDOCRINOLOGIST WILL ADVISE WHICH SECTION IS RELEVANT FOR THE CHILD.

It is important to emphasise that the child can and should be viewed as healthy and resilient in all normal situations but under stress conditions (prolonged starvation, accidents, surgery and severe illness) special precautions will probably be necessary. Such precautions if taken promptly and appropriately should PREVENT hypoglycaemia occurring at all.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Section 1

This section is for children with adrenal insufficiency either because of an adrenal disorder such as congenital adrenal hyperplasia (CAH), adrenal hypoplasia congenita or Addison's Disease, or due to a pituitary abnormality which has resulted in deficiency of adrenocorticotrophic hormone (ACTH) or multiple pituitary hormone deficiency (MPHD). This section also applies to children who are at risk of hypoglycaemia and have inadequate liver glycogen stores in connection with intrauterine growth retardation (IUGR)/Russell Silver Syndrome.

For these children hypoglycaemia occurring during stress conditions such as prolonged fasting, accidents or severe illness usually relates to cortisol deficiency, and is best managed with administration of extra hydrocortisone.

Section 2

This section is for children who are at risk from hypoglycaemia as a result of hyperinsulinism, or growth hormone deficiency (GHD). Both these groups of children need special treatment for their condition on a daily basis.

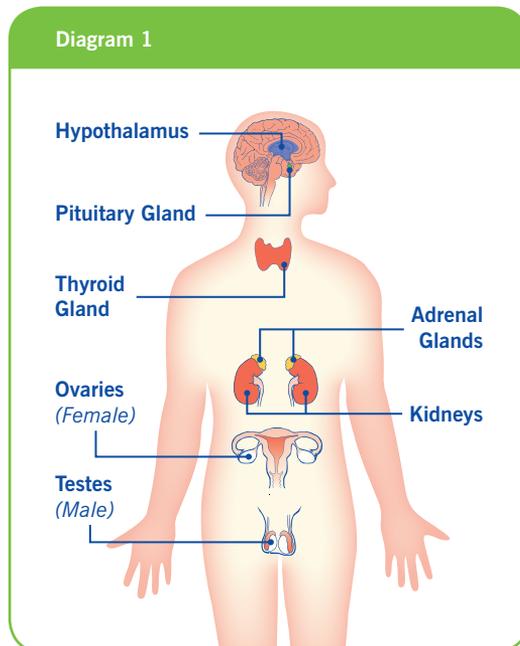
If hypoglycaemia occurs in these children during stress conditions such as prolonged fasting, accidents or severe illness, it is best managed with administration of glucagon.

A Brief Explanation of Hormones

Hormones are chemicals which carry messages from one cell to another via the bloodstream. This booklet will discuss abnormalities in the production of two hormones: corticosteroids and growth hormone. These hormones are produced in the adrenal and pituitary glands respectively.

The pituitary gland is a small pea-sized gland at the base of the brain, which produces a number of hormones (see *Diagrams 1 and 2*). The hormones produced by the anterior (front) part of the pituitary gland include those responsible for growth (growth hormone), sexual

development (gonadotrophins) and special hormones which stimulate the thyroid gland (thyroid stimulating hormone (TSH)) and the adrenal glands (adrenocorticotrophic hormone (ACTH)). The posterior (back) part of the pituitary gland also produces a hormone (antidiuretic hormone (ADH)), which regulates the amount of water passing through the kidneys. A deficiency of pituitary hormones may



Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

occur due to failure of development of the pituitary gland before birth or due to trauma or a tumour occurring at a later date.

The adrenal glands are two small glands situated in the abdomen above the kidneys (see *Diagram 1*). Under the regulation of ACTH from the pituitary gland, the adrenal glands make cortisol. This hormone helps to maintain blood pressure and blood sugar levels. Not enough cortisol occurs either because the pituitary gland fails to send enough message (ACTH) to the adrenal glands, or if the adrenal glands themselves are abnormal, damaged or absent.

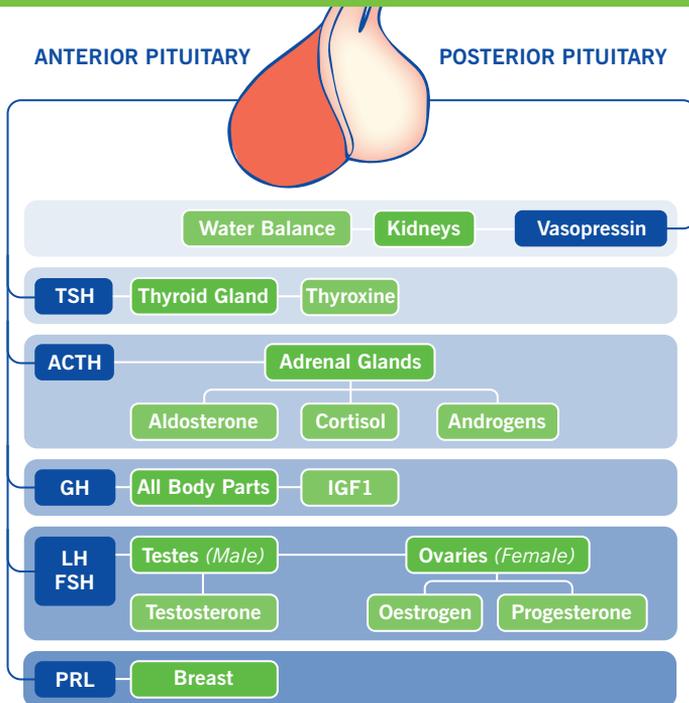
“Fortunately, all of the hormones lacking in the hormone deficient child can be replaced by daily medication in the form of tablets and/or injections.”

Where there is an abnormality in either the pituitary or adrenal gland, hormone replacement treatment is necessary. Fortunately, all of the hormones lacking in the hormone deficient child can be replaced by daily medication in the form of tablets and/or injections.

Most hormone deficient children are otherwise normal children, able to participate in all school activities. It is important that they are not overprotected or treated differently from other children. Careful monitoring of daily hormone replacement doses can in most cases, effectively restore the normal growth and health of the child, who can lead an active and full life.

The major hormones which act to increase blood sugar in times of stress are corticosteroids (cortisol), growth hormone, glucagon and catecholamines. Corticosteroids and glucagon can be given to treat children at risk of hypoglycaemia.

Diagram 2



TSH Thyroid Stimulating Hormone
ACTH Adrenocorticotrophic Hormone
GH Growth Hormone
IGF1 Insulin Growth Factor 1

LH Luteinising Hormone
FSH Follicle Stimulating Hormone
PRL Prolactin

Management of 'Stress' Conditions

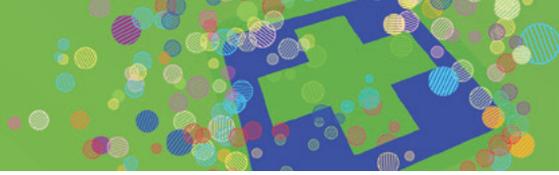
What is Hypoglycaemia?

When sudden illness or severe stress occurs, the body requires extra growth hormone and cortisol, to maintain a normal level of blood glucose (sugar). If growth hormone or cortisol levels are inadequate (low), blood sugar levels may become low (hypoglycaemia) and the child will feel very unwell. This is a very serious condition because the brain requires glucose (sugar) for normal function. If blood glucose levels are low, prompt treatment must be given to restore the child to normal and to prevent the possible onset of confusion, loss of consciousness or fits.

“This is a very serious condition because the brain requires glucose (sugar) for normal function.”

Most children who have isolated growth hormone deficiency with no other hormone deficiencies will not have major problems with low blood sugar levels. However, many children with deficiencies of both growth hormone and cortisol (multiple pituitary hormone deficiency (MPHD)) can have serious problems with blood glucose levels when they are stressed.

The paediatric endocrinologist will instruct the family of these children on how to recognise symptoms of hypoglycaemia and show how to measure blood glucose levels at home.



Causes of Hypoglycaemia

Some of the common stress factors which can cause hypoglycaemia are:

- infective illness, especially with a high temperature
- vomiting (especially if hydrocortisone tablets are vomited)
- accident resulting in physical injury
- any general anaesthetic
- missed meals
- severe emotional stress
- unusually prolonged or extremely energetic activity

Symptoms of Hypoglycaemia

Mild Hypoglycaemia

Children with slightly low blood sugar may feel dizzy, faint or hot but usually look pale. They may tingle, tremble, sweat, have a headache or palpitations.

Moderate Hypoglycaemia

Children with more serious hypoglycaemia also look pale and sometimes appear drunk, 'glassy-eyed', confused, unusually sleepy or very aggressive.

Severe Hypoglycaemia

Loss of consciousness (coma) and/or convulsions (fits) indicate that the problem is very severe.

Section 1

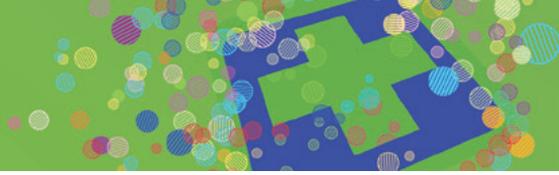
This section relates to children who have cortisol deficiency due to disorders of the hypothalamus, pituitary gland or adrenal glands (e.g. Congenital Adrenal Hyperplasia (CAH)) and/or have conditions which affect glycogen storage.

When stressed by acute illness as minor as a cold or more severe such as vomiting and/or diarrhoea, influenza, gastroenteritis, any major fracture, any surgery or any general anaesthetic for any reason (e.g. MRI Scan), these children (or adults) will require additional hydrocortisone (see page 15).

When a child or adult with this condition is stressed and/or ill, he or she also runs the possible risk of hypoglycaemia. It is important to read the section on hypoglycaemia carefully and to give extra glucose containing fluids or food at the time of illness, to prevent hypoglycaemia.

The child should always wear an identity necklace or bracelet indicating 'adrenal insufficiency, needs hydrocortisone' or 'multiple pituitary hormone deficiency, needs hydrocortisone', to ensure appropriate management in the case of an unforeseen accident.

Please note, the medical backup considered necessary by the child's specialist may include medications/injections that are not included in this booklet.



The conditions discussed in Section 1 can be broken down into the following groups:

Group 1

Primary Adrenal Insufficiency

This group includes children with Congenital Adrenal Hyperplasia (CAH), Adrenal Hypoplasia Congenita or Addison's Disease, where the adrenal glands are very poorly functioning and are unable to respond to 'stress', by increasing cortisol production.

Group 2

Panhypopituitarism (Multiple Pituitary Hormone Deficiency (MPHD))

In this group of children the problem is usually due to cortisol deficiency because there is insufficient pituitary hormone 'ACTH' to stimulate the adrenal glands to produce increased corticosteroids in times of 'stress'.

Group 3

Adrenal Suppression from Steroid Treatment

This group includes children who have received treatment for conditions such as asthma, eczema or rheumatoid arthritis with high doses of corticosteroids, such as hydrocortisone, prednisolone or dexamethasone for more than 2–3 weeks. This steroid treatment may cause the previously normal adrenal glands to become much smaller and unable to respond to 'stress' by increasing cortisol secretion.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Hydrocortisone (cortisol)

This hormone is vital in helping the body to overcome stress as it helps to keep the blood sugar and blood pressure at a safe level.

It is available in both tablet and injection forms and the child's specialist will advise which is most suitable. Hydrocortisone is normally given as tablets. However, if the child is unwell, vomiting or unconscious, treatment is given by intramuscular injection.

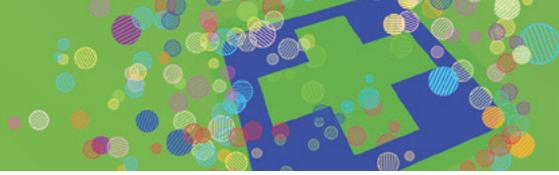
Additional hydrocortisone during stress for patients in Group 1:

Primary Adrenal Insufficiency

If the child has a minor illness such as a mild cold but is otherwise well, no increase in hydrocortisone dose is required.

If the child has an illness such as a fever, chest infection or tummy upset, severe enough to prevent normal activities or miss a few days of school, it is advisable to give three times the daily dose of hydrocortisone. This should be done in consultation with your child's local doctor, using the doses advised by your child's specialist and continued until the child is well and the stress situation has ceased.

In severe illness, especially when associated with diarrhoea and vomiting, the child will need hydrocortisone urgently given by injection. Children with primary adrenal insufficiency can become seriously unwell very quickly. An unnecessary dose of hydrocortisone is not dangerous but delaying the dose in a sick child can be disastrous. Always contact the doctor in this situation for advice.



In an emergency where the child is shocked (pale, clammy, drowsy or unconscious) a hydrocortisone injection should be given immediately and an ambulance called. The recommended doses of hydrocortisone for injection are shown in *Table 1* below.

Table 1: Recommended doses of hydrocortisone for injection for patients in Group 1
Primary Adrenal Insufficiency

Age and Weight (kg)	Dose of hydrocortisone
≤6 months (≤7 kg)	25 mg
6 months–2 years (8–12 kg)	50 mg
3–10 years (13–30 kg)	75–100 mg
>10 years (>30 kg)	100–200 mg

*The doses in this table are based on a recommended stress dose of hydrocortisone (60–100mg/m²) assuming average weight, height and body surface area for the stated age ranges. As the age and weight ranges in each category are wide, this generic advice is to be used in emergency situations only. More accurate individualised advice can be provided by your specialist during routine clinic visits depending upon your child's height and weight.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Additional hydrocortisone during stress for patients in Groups 2 & 3:

Panhypopituitarism (Multiple Pituitary Hormone Deficiency (MPHD)) & Adrenal Suppression from Steroid Treatment

If the child has a minor illness such as a mild cold but is otherwise well, no increase in hydrocortisone dose is required.

If the child has an illness such as a fever, chest infection or tummy upset, severe enough to prevent normal activities or miss a few days of school, give oral hydrocortisone three times daily as described below in *Table 2*. This should be done in consultation with your child's local doctor, using the doses advised by your child's specialist and continued until the child is well and the stress situation has ceased.

In severe illness, especially when associated with diarrhoea and vomiting, the child will need hydrocortisone urgently given by injection (see *Table 2*). An unnecessary dose of hydrocortisone is not dangerous but delaying the dose in a sick child can be disastrous. Always contact the doctor in this situation for advice.

In an emergency where the child is shocked (pale, clammy, drowsy or unconscious) a hydrocortisone injection should be given immediately and an ambulance called. The recommended doses of hydrocortisone are shown in *Table 2* opposite.

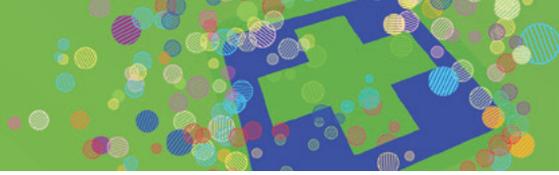


Table 2: Recommended doses of hydrocortisone during stress situations for patients in Groups 2 & 3

Age and Weight (kg)	Dose of oral hydrocortisone*	Dose of hydrocortisone for injection*
≤6 months (≤7 kg)	8mg three times daily	25mg
6 months–2 years (8–12 kg)	16mg three times daily	50mg
3–10 years (13–30 kg)	24mg three times daily	75–100mg
>10 years (>30 kg)	40mg three times daily	100–200mg

*The doses in this table are based on a recommended stress dose of hydrocortisone (60–100mg/m²) assuming average weight, height and body surface area for the stated age ranges. As the age and weight ranges in each category are wide, this generic advice is to be used in emergency situations only. More accurate individualised advice can be provided by your specialist during routine clinic visits depending upon your child's height and weight.

Additional information regarding stress and hydrocortisone doses relevant to all children in Groups 1, 2 or 3:

If a hydrocortisone injection is required, the child should be taken to hospital so they can be given fluids containing glucose and salt by an intravenous drip. Blood glucose should be monitored. The dose of hydrocortisone should be repeated if there is a poor response after the initial treatment with hydrocortisone and intravenous fluids.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

If in any doubt, the hydrocortisone injection should be administered. If an injection was unnecessary, no harm would have been done by administering it.

Minor procedures with general anaesthetic:

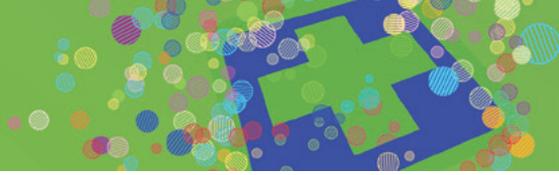
Any surgical procedures requiring general anaesthetic are likely to require additional hydrocortisone therapy. Consult your specialist for advice. The doctor should administer a single injection of hydrocortisone at the time of anaesthesia.

Minor procedures without general anaesthetic:

Dental extractions and other minor procedures under local anaesthetic do not usually necessitate special treatment but the dentist/doctor should be advised of the child's condition.

Continued Vomiting / Hypoglycaemia / Major Illness / Major Surgery

- ALWAYS requires attention from a doctor
- administer emergency injection of hydrocortisone if possible
- take the child to the nearest Accident & Emergency Department and continue administering hydrocortisone every 4–6 hours until the child improves
- then give triple the dose of hydrocortisone for 2–3 days until the child returns to normal health.



Medical Alert Bracelet:

Children with adrenal insufficiency should wear a medical alert bracelet stating 'adrenal insufficiency, needs hydrocortisone' or 'multiple pituitary hormone deficiency, needs hydrocortisone' so that appropriate treatment can be given in an emergency. It is also wise to carry a letter from the specialist when travelling overseas explaining the condition and any medications required.

Blood Glucose Level (BGL) monitoring:

Your doctor can arrange for you to be taught to check the child's blood glucose level (BGL) on a fingerprick blood sample using glucose sticks and a small portable measuring device (a glucometer). There are several brands of glucometers available.

IMPORTANT

Hydrocortisone, prednisone and dexamethasone all come in different strengths.

30mg hydrocortisone = 7.5mg prednisone = 1.2mg dexamethasone (These are standard adult doses)

Currently these preparations are available in different tablet strengths and they are not colour coded so can be easy to mix up.

Check the chemist has dispensed the correct preparation and always read the label on the bottle.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Instructions for Injections

Hydrocortisone

THIS SUBSTANCE SHOULD BE INJECTED INTRAMUSCULARLY

Instructions for intramuscular injection:

Inject hydrocortisone into the thigh as shown on page 21. The dose will depend on the patients age and weight, see table below.

Age and Weight (kg)	Dose of hydrocortisone for injection
≤6 months (≤7 kg)	25 mg
6 months–2 years (8–12 kg)	50 mg
3–10 years (13–30 kg)	75–100 mg
>10 years (>30 kg)	100–200 mg

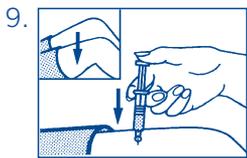
Preparation of substance

It is advisable to seek professional instruction from the specialist or a nurse educator. The following instructions will help remind you of the methods.

Directions for using the hydrocortisone two-compartment ACT-O-VIAL

1. Tap to ensure that powder is at base of vial and away from the central stopper.
2. Place the Act-O-Vial on a flat, stable surface and hold with one hand.
3. Press down firmly on the yellow top with the palm of the other hand to force the liquid into the lower compartment.

4. Gently mix the solution by turning the vial upside down a number of times. DO NOT SHAKE THE VIAL.
5. Remove plastic tab covering the centre of stopper.
6. Sterilise top of the stopper with a suitable alcohol swab.
7. Whilst the vial is on a flat surface, insert the drawing up needle squarely through centre of stopper until the tip is just visible. Turn the vial upside down to withdraw the dose. REMEMBER: Make sure the needle tip always stays below the fluid level.
8. Change to a finer needle to inject the solution.



9. **Intramuscular Injection:** Divide the front part of the thigh into three parts between the hip bone and the knee. Use the middle third on the front when the child is lying on his or her back. Stretch skin tight using thumb and forefinger. Hold syringe like a pencil, (you must hold the syringe straight to make sure you inject into the muscle), and push needle into the skin with a quick firm action at right angles (straight in) to the skin. Each year, organise an injection “refresher session” with your nurse or doctor and always check the vial expiry date.

NOTE: Please discard used vial, needle and syringe into a suitable ‘sharps’ container and dispose of this as advised by your local council.

Section 2

This section is for children who have **hyperinsulinism or growth hormone deficiency**, where the risk of hypoglycaemia during 'stress' is high.

“This section is for children who have hyperinsulinaemia or growth hormone deficiency, where the risk of hypoglycaemia during 'stress' is high.”

These children are potentially 'stressed' by illness, accidents, surgery or any general anaesthetic. The blood sugar level can drop to low levels very quickly. In this situation, an injection of **glucagon** should be given.

The child should always wear an identity necklace or bracelet indicating 'hyperinsulinism' or 'growth hormone deficiency' to ensure appropriate management in case of an unforeseen accident.

Please note, the medical backup considered necessary by the child's specialist may include medications/injections that are not included in this booklet.



Glucagon

This hormone rapidly increases blood sugar levels by making the body release sugar stores from the liver.

“This hormone rapidly increases blood sugar levels by releasing sugar stores from the liver.”

If the child is hypoglycaemic, it is important to inject glucagon first, then give hydrocortisone afterwards.

The following are recommended doses only and are given as a guide for emergency situations. The specialist will advise the correct dose for each individual child.

Children 0–8 years (or <25kg)	0.5mg glucagon by subcutaneous injection
Children 8+ years (or \geq 25kg)	1.0mg glucagon by subcutaneous injection

Treatment of Hypoglycaemia

Mild Hypoglycaemia

At this stage hypoglycaemia should be treated with 6 to 7 jelly beans, or with the energy drink Lucozade (other sweet drinks are also suitable alternatives). Immediately following this, the child needs to have a substantial snack such as a sandwich and then be kept under observation by a responsible adult until return of their normal behaviour.

If symptoms deteriorate, treat as Moderate Hypoglycaemia.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Moderate Hypoglycaemia

Any symptom which indicates a drift towards unconsciousness (such as appearing drunk, glassy eyed, confused, unusually sleepy) must be assumed to be due to moderate hypoglycaemia. If the glucagon and/or hydrocortisone injection is available, then it/they should be administered without delay. Remember to administer glucagon before hydrocortisone. If injections are not available, a teaspoon or so of honey can be given to the child and the honey may be rubbed into the lining of the mouth if he or she does not co-operate with swallowing. If the responsible adult is confident that the child is recovering within 10–20 minutes, a substantial snack such as a sandwich should be given. **However, if recovery is not complete or if the child vomits back the honey or other source of glucose, a doctor or ambulance must be called.** Try to arrange admission directly to the nearest Accident & Emergency Department as any delay may be serious. Once the immediate problem has been sorted out, and if it is thought appropriate, transfer to the child's specialist unit could be arranged later.

Severe Hypoglycaemia

If available, appropriate staff and the parents must be called immediately to administer a glucagon and/or hydrocortisone injection before transport to hospital. An ambulance must be called as hospitalisation is a matter of **EXTREME URGENCY.**

Blood Glucose Level (BGL) monitoring:

Your doctor can arrange for you to be taught to check the child's blood glucose level (BGL) on a fingerprick blood sample using glucose sticks and a small portable measuring device (a glucometer). There are several brands of glucometers available.

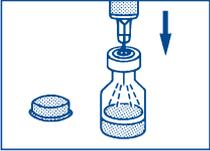
Instructions for Injections

Glucagon

THIS SUBSTANCE SHOULD BE INJECTED INTRAMUSCULARLY

Preparation of substance

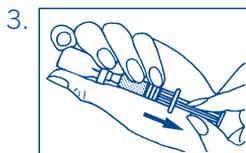
It is advisable to seek professional instruction from the specialist or a nurse educator. The following instructions will help remind you of the methods.

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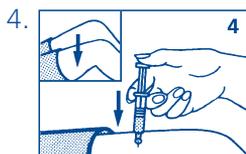
1. Open the Glucagon Hypokit (in orange box). FIRMLY break the top of the ampoule of water. Remove the plastic cap from the vial. Pull the needle cover off the syringe and try to keep the needle sterile by avoiding contact between the needle and your hands or the table. Insert the needle through the rubber stopper (within the marked circle) of the vial containing glucagon and inject all the liquid from the syringe into the vial.
- 

2. Without taking the needle out of the vial, gently shake the vial until the glucagon has completely dissolved and the solution is clear.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

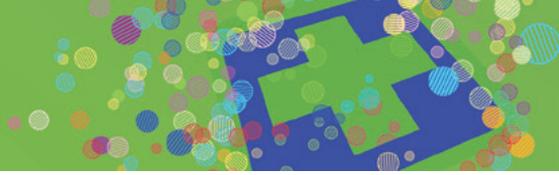


Make sure the plunger is completely down. While keeping the needle in the liquid, slowly withdraw all the solution back into the syringe. Do not pull the plunger out of the syringe. It is important to remove any air bubbles from the syringe: With the needle pointing upwards, tap the syringe with your finger. Push the plunger slightly to release any air that has collected at the top of the syringe. Continue to push the plunger until you have the correct dose for the injection (<25kg child = 0.5mg glucagon, >25kg child = 1mg glucagon). A small amount of liquid will be pushed out when you do this.



Intramuscular Injection: Divide the front part of the thigh into three parts between the hip bone and the knee. Use the middle third on the side or front when the child is lying on his or her back. Stretch skin tight using thumb and forefinger. Hold syringe like a pencil, (you must hold the syringe straight to make sure you inject into the muscle), and push needle into the skin with a quick firm action at right angles (straight in) to the skin.

NOTE: Please discard used vial, needle and syringe into a suitable 'sharps' container and dispose of this as advised by your local council.



Administration of Injections

It is important that parents should learn how to confidently administer an intramuscular injection if possible, in case of an emergency where a doctor cannot be reached in time.

The nurse educator at the Endocrinology Department where the child's specialist is located will be able to teach parents how to administer emergency injections.

Illness at School or Away from Parents

It is extremely important that a teacher or any person looking after a child who has one of the conditions described in this booklet, is informed of his/her condition and is advised on how to recognise and treat symptoms of hypoglycaemia. Please refer to Section 1, how to prevent/treat hypoglycaemia.

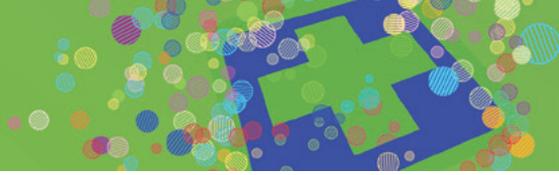
School Excursions or Camps

It is very important that children at risk of hypoglycaemia are not excluded from activities their peers are participating in. However it is important to ensure that at least two adults who will be attending the activity are fully informed of the child's condition and how to manage any crisis situation.

When the child participates in any outside school activity, please ensure that all relevant medication is taken along.

Children at risk of hypoglycaemia should always wear an identity necklace or bracelet or carry a medical card as it is impossible for a stranger to identify an adrenal crisis and/or hypoglycaemia without some prior knowledge or understanding. The wearing or carrying of some medical identification is especially important when the child is on a school outing.

“When the child participates in any outside school activity, please ensure that all relevant medication is taken along.”



General School Issues

When this booklet is taken to the child's school, it is NOT sufficient to give it to a teacher and/or the principal in the hope that it will be read and understood. These issues are very complicated and often make lay people who are not familiar with these problems exceedingly anxious. They may not 'take in' the information, not want to hear and not want to get into the situation being responsible for difficult/dangerous management. The teacher and other staff member will usually feel much happier and more confident if time is taken to explain the situation and they are reassured that they will be able to manage.

This situation can be remedied if an appointment is made with the teacher to ensure enough time is available.

1. Sit down and carefully go through all the information
2. Describe the symptoms that you know mean problems for the child
3. Reassure the teacher that it is very easy to be of great assistance in almost all situations
4. Leave a contact number (e.g. a mobile) so you can be contacted at any time and the staff know that they can reach you quickly.

“The teacher and other staff members will usually feel much happier and more confident if time is taken to explain the situation and they are reassured that they will be able to manage.”

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Holidays

It is important to take extra supplies of all tablets and medicines, including the emergency injections on all holidays and even weekend trips. Take a medical card and/or letter from the child's specialist, to show doctors on holiday to explain about the child's treatment. When travelling overseas and through customs, it is important to carry a medical card or a letter from the specialist listing all medication and equipment that will be necessary for management of the child. Do not forget to keep all medication, needles and syringes in the hand luggage where they are readily accessible in the case of an emergency. When travelling long distances (e.g. international trips) it is preferable to keep two separate supplies of all medication and injection devices – one in the hand luggage and one in the main luggage.

“Do not forget to keep all medication, needles and syringes in the hand luggage where they will be readily accessible in the case of an emergency.”



Questions and Answers

How can 'hypos' be prevented?

Firstly, 'hypos' is a colloquial and shortened form of the word hypoglycaemia (low blood sugar levels) that many people use. To help prevent 'hypos', the following actions can be taken:

1. Ensure that the child ALWAYS has access to a small bag of jelly beans, containing 12–15 jelly beans, including in the classroom, at swimming and sports sessions and outings.
2. Make sure that the child eats regularly and COMPLETES his/her meals. If the child refuses to have a regular snack or lunch, an alternative e.g. sugary drink, sweets, glucose tablets must be given regularly every 15–20 minutes until the child is willing to eat a substantial snack, such as a sandwich. If food refusal persists at school or otherwise outside parental care, parents must be notified to collect their child.
3. School teachers must not keep the child late at school without informing the parents and ensuring that a snack is available.

What should be done if a child who is 'at risk of having hypos' is unwell at school?

NEVER send these children to the secretary or medical room unaccompanied. If the child is sent home ill, it is essential that he/she is accompanied home and that a responsible adult is there to receive the child.

If the child is behaving abnormally, is seriously unwell or if frequent vomiting occurs, additional hormone injections or tablets may be required and he/she should be taken to the nearest hospital Accident and Emergency Department if parents are not immediately available.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

If in any doubt as to the condition or medical needs of the child and medical help is not 'at hand', do not hesitate to call on the emergency services. They would rather be called unnecessarily than not be called when treatment is essential.

If emergency admission is required, it should be to the NEAREST hospital Accident and Emergency Department/Paediatric Unit, as a long ambulance journey with a very sick child can be very dangerous. Telephone advice can also be obtained from the specialist centre and, if considered necessary, a transfer to the child's specialist centre can be arranged when the child's medical condition is more stable.

Does drinking alcohol affect hypoglycaemia?

Adolescents with MPHD, adrenal insufficiency or other conditions which increase risk of hypoglycaemia may develop hypoglycaemia with alcohol consumption, especially if vomiting occurs following excess alcohol consumption. Special counselling on the dangers of excessive alcohol consumption should be given to these children and adolescents.

If any problems are going to occur, it is more likely to happen in either the early hours of the morning or on the day after the alcohol 'binge'. It may be necessary to give hydrocortisone and/or glucagon injections as well as plenty of glucose drinks. This can be an extremely dangerous situation and should be treated as such. Some parents may believe that a drinker must suffer the consequences of his/her behaviour. For young people with one of the conditions described in this booklet, this is not a safe attitude, the consequences are very serious and must be addressed immediately.

Glossary

Addison's disease

A rare disorder in which the adrenal glands cannot produce enough steroid hormones (e.g. cortisol).

Adrenal gland

Glands which are situated on top of the kidneys and produce steroids (e.g. cortisol) and catecholamines (e.g. adrenaline).

Adrenal insufficiency

A condition in which the adrenal glands do not produce enough steroid hormones (e.g. cortisol).

Adrenocorticotrophic hormone (ACTH)

A hormone produced by the pituitary gland which controls the adrenal glands ability to produce steroid hormones.

Asthma

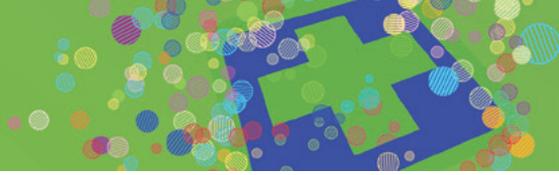
A reversible condition in which the airways of the lungs become either narrowed or blocked, making breathing difficult and often causing a wheezing sound.

Catecholamines

Hormones released by the adrenal gland during stress, for example adrenaline is a catecholamine.

Congenital

A feature or condition that is present from birth, but not necessarily hereditary.



Congenital Adrenal Hyperplasia

A condition where the adrenal glands are enlarged and unable to produce the correct amount of adrenal steroids.

Corticosteroids

Steroid hormones produced by either the adrenal gland (e.g. cortisol) or produced synthetically (e.g. hydrocortisone, prednisolone, dexamethasone).

Cortisol

A steroid hormone produced the by the adrenal gland. There are a number of hormones made by the adrenal gland and they are called corticosteroids (*see above*).

Endocrine Gland

A gland that makes hormones and releases them into the blood. The pituitary, thyroid, adrenal, testes (testicles) and ovaries are all endocrine glands. All of the glands together make up what is termed the endocrine system.

Endocrinologist

A doctor who specialises in the disorders of the endocrine glands or hormonal disorders.

Glucagon

A hormone which the body produces when the blood glucose (sugar) level is low. Glucagon causes the liver to convert stored glycogen into glucose and release it into the bloodstream.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Glycogen

A substance which is stored in the liver. It is an energy store which can be broken down to produce glucose during times of stress.

Growth Hormone

A hormone released by the pituitary gland, which promotes growth.

Hormones

A chemical substance that is made by an endocrine gland and carries messages from one cell to another via the bloodstream. Hormones are chemicals that stimulate growth and sexual development and help to regulate the body's metabolism. There are a large number of hormones that have widespread effects on the body, such as cortisol, thyroid hormone and growth hormone. Normally the body carefully controls the release of hormones. Too much or too little may disrupt the body's delicate balance.

Hormone Replacement Therapy

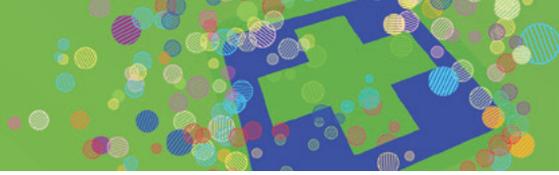
Hormone medicines which are used for the treatment of diseases when the body cannot make enough hormones by itself.

Hydrocortisone

A synthetic form of corticosteroid used in the medical treatment of adrenal insufficiency.

Hyperinsulinism

Higher than normal level of insulin in the blood which can result in low blood glucose levels.



Hypoglycaemia

A low level of glucose (sugar) in the blood.

Hypothalamus

Part of the base of the brain that controls the release of hormones from the pituitary gland.

Intramuscular Injection

An injection delivered into a muscle.

IUGR: (intrauterine growth restriction)

A condition when an unborn baby does not grow properly in the womb, resulting in a small baby at birth.

MPHD (multiple pituitary hormone deficiency)

A condition where more than one pituitary hormone is deficient.

Magnetic Resonance Imaging (MRI Scan)

A technique for obtaining pictures/scans of the brain and other parts of the body. There is no exposure to radiation/X-rays and MRI scans can therefore be repeated in the same person many times if required.

Paediatric Endocrinologist

A doctor who specialises in the disorders of endocrine glands/hormones in children.

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Pituitary gland

A pea-sized gland at the base of the brain, which releases a number of important hormones. Some of these have a direct action on the body, such as growth hormone, whilst others stimulate hormone production from other glands in the body, such as the thyroid gland, adrenal glands and ovaries or testes (see *Diagram 1*).

Russell Silver Syndrome

A growth disorder causing poor growth which is present from birth.

Subcutaneous Injection

An injection given beneath the skin.

Syndrome

A syndrome is a collection of characteristics that occur together and characterise a particular condition.

Thyroid Gland

A butterfly-shaped gland in the front of the neck below the larynx, which makes the hormone thyroxine.



Support Organisations and Further Reading

Australian Pituitary Foundation Ltd

www.pituitary.asn.au

Australasian Paediatric Endocrine Group (APEG)

www.apeg.org.au

The Endocrine Society

www.endocrine.org

The Hormone Foundation

www.hormone.org

The Magic Foundation

www.magicfoundation.org

Pituitary Foundation UK

www.pituitary.org.uk

Pituitary Network Association (USA)

www.pituitary.org

UK Child Growth Foundation

www.childgrowthfoundation.org

UK Society for Endocrinology

www.endocrinology.org

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School Information

Symptoms of Hypoglycaemia

Mild Hypoglycaemia

Children with slightly low blood sugar may feel dizzy, faint or hot but usually look pale. They may tingle, tremble, sweat and/or have a headache or palpitations.

Moderate Hypoglycaemia

Children with more serious hypoglycaemia also look pale and sometimes appear drunk, 'glassy-eyed', confused, unusually sleepy or very aggressive.

Severe Hypoglycaemia

Loss of consciousness (coma) and/or convulsions (fits) indicate that the problem is very severe.

To Prevent / Treat Hypoglycaemia

When the child is under stress from illness follow the guidelines below:

No Vomiting & Not Feeling Unwell

- ensure regular food intake

Feeling Unwell With or Without Fever

- triple the dose of hydrocortisone
- administer 3 times per day

Vomiting

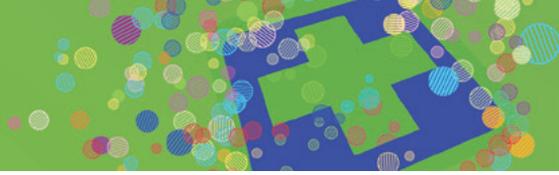
- administer emergency injection of hydrocortisone if possible
- take the child to the nearest Accident & Emergency Department

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Continued Vomiting / Hypoglycaemia / Major Illness / Major Accident

- ALWAYS requires attention from a doctor
- administer emergency injection of hydrocortisone if possible take the child to the nearest Accident & Emergency Department and continue administering hydrocortisone every 6 hours until the child improves.

If the situation is judged serious enough to give the emergency injection of hydrocortisone, the child should always be taken to hospital.



Medical Details

Name:
Date of Birth:
Address:
Parents Contact Phone Numbers:
Diagnosis:
Usual Medications:
Other Medical Problems:
General Practitioner Contact Details:
Usual Hospital Record No.:
Paediatrician Contact Details:

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

Merck is proud to bring you this booklet from the *Hormones and Me* educational series. We aim to provide readers with a better understanding of the issues relating to endocrine disorders particularly in children. We hope that you find it a valuable and helpful resource.

Please ask your doctor or nurse for further information on the resources available to you.

The *Hormones and Me* series includes:

1. Growth Problems in Children
2. Turner Syndrome
3. Craniopharyngioma
4. Diabetes Insipidus
5. Puberty and its Problems
6. Delayed Puberty
7. Multiple Pituitary Hormone Deficiency (MPHD)
8. Congenital Adrenal Hyperplasia (CAH)
9. Growth Hormone Deficiency in Adults
10. Management of Emergency or 'Stress' Situations where Hypoglycaemia or Cortisol Deficiency Occur
11. Intrauterine Growth Retardation (IUGR)
12. Congenital Hypothyroidism
13. Klinefelter Syndrome
14. Disorders of the Thyroid Gland in Children and Adolescents

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Speak to an appropriate healthcare professional

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Merck Serono Australia Pty Ltd | ABN 72 006 900 830
Unit 3–4, 25 Frenchs Forest Road East, Frenchs Forest NSW 2086 Australia.
Phone (02) 8977 4100 | Fax (02) 9975 1516

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Hormones and Me

Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur

This booklet is valuable reading for anyone dealing with the Management of Emergency or 'Stress' Situations Where Hypoglycaemia or Cortisol Deficiency Occur.

It is also recommended reading for their family and friends.

