# What steroid supplementation is required for a patient with primary adrenal insufficiency undergoing a dental procedure?

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Date prepared: October 2019

**This document is for guidance only. Patients with primary adrenal insufficiency should be assessed individually as steroid requirements will vary.**

## Background

Primary adrenal insufficiency (e.g. Addison’s disease) is a rare disorder of the adrenal glands [1]. It affects production of two steroid hormones, cortisol and aldosterone, by the outer layer (the cortex) of the adrenals [2,3]. Cortisol regulates blood pressure, blood sugar and muscle strength [1]. Aldosterone regulates sodium and fluid balance, which affect blood volume and blood pressure [1,3]. Production of cortisol normally increases when the body experiences physical or psychological stress, for example, during surgery, trauma or serious infection [3,4,5].

Patients with primary adrenal insufficiency must take life-long corticosteroid replacement therapy usually prescribed as a combination of hydrocortisone (a glucocorticoid) and fludrocortisone (a mineralocorticoid) [1,2]. A daily dose of 20 to 30mg of hydrocortisone is normally required and given in two or three doses. A larger dose is taken in the morning on waking and a smaller dose at lunchtime and or/in the early evening in order to mimic normal diurnal rhythm of cortisol secretion [2,6]. A 50 to 300microgram dose of fludrocortisone is given once daily [7]. Prednisolone and dexamethasone, which are longer acting glucocorticoids, may sometimes be used as an alternative to hydrocortisone [6]. The glucocorticoid activity of a 5mg dose of prednisolone is roughly equivalent to hydrocortisone 20mg [8].

Patients with primary adrenal insufficiency usually require their usual glucocorticoid dose to be increased or supplemented at times of stress as they are unable to adapt physiologically to stress by producing more endogenous corticosteroid. Without additional steroid cover the patient may suffer shock known as Addisonian, or adrenal, crisis. Symptoms of adrenal crisis include extreme weakness, a significant drop in blood pressure, drowsiness or mental confusion [9]. A crisis is usually preceded by symptoms of adrenal insufficiency, including headache, dizziness, confusion, severe nausea, chills or fever [1].

This Medicines Q&A gives guidance on dental procedures for which steroid supplementation may be required in patients with primary adrenal insufficiency and gives advice on doses and timing of supplementation. It does not address management of patients with secondary adrenal insufficiency, e.g. caused by long-term use of high doses of steroids.

## Answer

The risk of adrenal crisis associated with dental procedures, and hence the dose of steroid supplementation required, is dependent on the type of dental procedure [10]. Additional steroid supplementation is given as additional or increased doses of hydrocortisone (or other glucocorticoid); supplemental fludrocortisone is not required. Suggestions for doses for steroid supplementation and timing of these doses given below are for guidance only. Patients with primary adrenal insufficiency are invariably very well informed about their medical condition and will probably be aware of their steroid requirements prior to a dental procedure. Discussion with the patient in advance of the procedure is vital for planning additional steroid needs, discuss timing of the dental appointment and to arrange for the patient to bring their emergency hydrocortisone kit. It may be useful to provide written advice on any supplementation and top-up doses of hydrocortisone required. Details of the discussion and advice provided should be recorded in the clinical records.

### Which dental procedures require additional steroid cover and what cover should be given?

The Addison’s Disease Self Help Group (ADSHG) surgical guidelines make recommendations for additional glucocorticoid cover prior to dental procedures. The recommended level of cover is intended to ensure the patient is not at risk of Addisonian crisis as a result of the procedure [10]. These recommendations are described below.

Some patients may feel that the additional steroid doses described are unnecessary based on previous experience. Where a primary care dental practitioner is confident that a dental extraction or similar procedure will be entirely straightforward, they may wish to discuss and agree a reduced level of steroid cover with the patient [11]. Full details of the options (and risks and benefits) discussed, the patient’s responses and a note of the patient’s autonomous decision should be documented in the clinical record.

**1**. ***Minor dental procedure* e.g. scale and polish, replacement of a filling.**

The patient should be advised to take their usual morning dose of steroid on the day of the procedure. An additional oral dose of the next dose due should be taken one hour prior to their appointment. They should then continue taking their usual daily dose(s) after the procedure [10]. Some patients may need to take an additional top-up dose of hydrocortisone (or equivalent glucocorticoid), if symptoms of adrenal insufficiency occur after the procedure [10].

**Example 1.1**

The patient normally takes 10mg hydrocortisone twice daily (at 7.30am and 5pm) and the dental appointment is at 10am:

* take 10mg at 7.30am,
* take 10mg at 9am (one hour before procedure),
* take 10mg at 5pm (or 20mg if symptoms of adrenal insufficiency occur),
* resume normal dosing at 7.30am the morning after the procedure (i.e. take 10mg as usual).

**Example 1.2**

The patient normally takes 20mg hydrocortisone at 7am, 5mg at 1pm and 5mg at 6pm and the dental appointment is at 11am:

* take 20mg at 7am,
* take 5mg at 10am (one hour before procedure),
* take 5mg at 1pm (or 10mg if symptoms of adrenal insufficiency occur),
* resume normal dosing at 6pm (i.e. take 5mg as usual).

***2. Minor oral surgery* e.g. root canal work under local anaesthetic.**

In addition to the morning dose of hydrocortisone, the patient should be advised to take a double dose of the next dose due one hour prior to surgery, up to a maximum dose of hydrocortisone 20mg (or equivalent glucocorticoid). The patient should be advised to continue taking a double dose for a full 24 hours after the procedure, before returning to the usual dose [10].

On the day of the procedure:

* Take the usual morning dose.
* One hour before the procedure, take a double dose of the next dose due, to a maximum of 20mg hydrocortisone (or equivalent).
* Double all the other doses due that day to a maximum of 20mg hydrocortisone (or equivalent) per dose.

The day after the procedure:

* Double the morning dose, to a maximum of 20mg hydrocortisone (or equivalent). Continue to double dose until 24 hours after the procedure.

The following are examples of additional dosing requirements for patients undergoing minor oral surgery. These are for guidance only and requirements may differ between patients.

**Example 2.1**

The patient normally takes 10mg hydrocortisone twice daily (at 7.30am and 5pm) and the dental appointment is at 10am:

* take 10mg at 7.30am,
* take 20mg at 9am (one hour before procedure),
* take 20mg at 5pm,
* take 20mg at 7.30am the morning after the procedure,
* resume normal dosing at 5pm (i.e. take 10mg as usual).

**Example 2.2**

The patient takes 15mg hydrocortisone at 8am and 5mg at 6pm and the dental appointment is at 2.30pm (patient is being seen as an emergency):

* take 15mg at 8am,
* take 10mg at 1.30pm (one hour before procedure),
* take 10mg at 6pm,
* take 20mg at 8am the morning after the procedure,
* resume normal dosing at 6pm (i.e. take 5mg as usual).

**Example 2.3**

The patient takes 20mg hydrocortisone at 7am, 5mg at 1pm and 5mg at 6pm and the dental appointment is at 12 noon:

* take 20mg at 7am,
* take 10mg at 11am (one hour before procedure),
* take 10mg at 1pm,
* take 10mg at 6pm,
* take 20mg at 7am the morning after the procedure,
* resume normal dosing at 1pm (i.e. take 5mg as usual).

***3. Major dental surgical procedure e.g. single or multiple tooth extraction with local or general anaesthetic***

Patients with primary adrenal insufficiency needing a major dental surgical procedure will be managed in secondary care. They will be given intramuscular or intravenous hydrocortisone immediately before anaesthesia. After surgery, the usual oral dose of steroid should be doubled for the next 24 hours.

### What can dentists do to prevent adrenal crisis?

* Discuss the procedure and steroid cover with the patient in advance. Most patients will be knowledgeable about their steroid requirements.
* Provide written advice on any supplementation and top-up doses of hydrocortisone required. Ensure the patient knows what to do if symptoms of adrenal insufficiency occur after the procedure.
* Plan the procedure for the morning when steroid levels will be higher [12].
* Ensure the patient has taken the correct dose of steroid prior to the procedure.
* Ensure an emergency hydrocortisone injection kit is available. Most patients will have their own emergency kit which they should be advised to bring to **all** of their dental appointments.
* If a patient registered with the practice is known to have primary adrenal insufficiency, consideration should be given to stocking hydrocortisone 100mg for intramuscular injection in the emergency drugs kit.
* Keep the patient relaxed and make the procedure as pain and stress free as possible.
* If in doubt, discuss treatment with the patient’s endocrinology team (consultant endocrinologist or endocrinology specialist nurse) prior to the procedure.

### What about patients who are seen as an emergency?

* Patients with primary adrenal insufficiency presenting as an emergency with pain and dental swelling will require immediate treatment to establish drainage. Delaying treatment prolongs stress, which may precipitate an acute adrenal crisis.
* Establish the patient’s usual corticosteroid replacement dose regimen.
* Establish when the last dose was taken and what this dose was. The patient may have already increased their dose to cover the stress of the dental pain/swelling.
* If treatment is required, additional supplementation will be needed (see above). The patient should take a double dose of the next dose of hydrocortisone due (to a maximum of 20mg), ideally one hour before the procedure as it takes approximately one hour for peak blood concentrations of hydrocortisone to be reached [13]. Ensure an emergency hydrocortisone injection kit is available.

## Summary

* Patients with primary adrenal insufficiency (e.g. Addison’s disease) lack endogenous steroid hormones cortisol and aldosterone and require daily steroid therapy (usually hydrocortisone and fludrocortisone) to replace them. These patients are unable to physiologically adapt to stress and usually need supplemental steroid therapy when having dental procedures, to prevent adrenal crisis.
* Patients having minor dental procedures (e.g. scale and polish, filling replacement) should be advised to take an additional oral dose of glucocorticoid one hour prior to their appointment.
* Patients having minor oral surgery e.g. root canal work under localanaesthetic, require steroid supplementation prior to the procedure, and for a full 24 hours afterwards.
* Those requiring dental extractions should be referred to secondary care.
* Patients with primary adrenal insufficiency are invariably well informed about their medical condition and additional steroid requirements. Discussion with the patient in advance of the dental procedure is vital for planning required steroid therapy in relation to the type and timing of the procedure. They should be advised to bring their emergency hydrocortisone injection kit to **all** appointments.

Limitations

* This Q&A does not address steroid replacement requirements in patients with secondary adrenal insufficiency e.g. caused by long-term use of high doses of steroids or other disease.
* This Q&A does not cover steroid replacement requirements for individuals with primary adrenal insufficiency who have an elevated temperature and signs of systemic infection.

### References

Addison's Disease Self-Help Group Clinical Advisory Panel. Managing your Addison’s [Internet]. January 2019 [cited 22/10/19]. Available from: [www.addisonsdisease.org.uk/managing-your-addisons](http://www.addisonsdisease.org.uk/managing-your-addisons)

1. Corticosteroids, replacement therapy. Baxter K (ed). Joint Formulary Committee. British National Formulary [online]. London: British Medical Association and Royal Pharmaceutical Society of Great Britain [cited 7/10/19]. Available from: [www.medicinescomplete.com](http://www.medicinescomplete.com)
2. Society for Endocrinology. Adrenal Insufficiency information leaflet [Internet]. April 2016. [cited 22/10/19]. Available from: [www.endocrinology.org/media/1767/16-04\_adrenal-insufficiency.pdf](http://www.endocrinology.org/media/1767/16-04_adrenal-insufficiency.pdf)
3. Choudhury S, Tan T, Khoo B. Redefining the cortisol stress response. Endocrinologist. Issue 130. Winter 2018. [cited 04/11/2019]. Available from: [www.endocrinology.org/endocrinologist/130-winter18/features/redefining-the-cortisol-stress-response/](http://www.endocrinology.org/endocrinologist/130-winter18/features/redefining-the-cortisol-stress-response/)
4. White K G. Stress and the adrenal patient: safety first, please! Endocrinologist. Issue 130. Winter 2018. [cited 04/11/2019]. Available from: [www.endocrinology.org/endocrinologist/130-winter18/features/stress-and-the-adrenal-patient-safety-first-please/](http://www.endocrinology.org/endocrinologist/130-winter18/features/stress-and-the-adrenal-patient-safety-first-please/)
5. Treatment review: Adrenocortical insufficiency. Last updated 16/04/19. Martindale [online]. Buckingham R (ed). London: Pharmaceutical Press [cited 07/10/19]. Available from: [www.medicinescomplete.com](http://www.medicinescomplete.com)
6. Fludrocortisone acetate. Baxter K (ed). Joint Formulary Committee. British National Formulary [online]. London: British Medical Association and Royal Pharmaceutical Society of Great Britain [cited 08/10/19]. Available from: [www.medicinescomplete.com](http://www.medicinescomplete.com)
7. Treatment summary: Glucocorticoid therapy. Baxter K (ed). Joint Formulary Committee. British National Formulary [online]. London: British Medical Association and Royal Pharmaceutical Society of Great Britain [cited 22/10/19]. Available from: [www.medicinescomplete.com](http://www.medicinescomplete.com)
8. Addison's Disease Self-Help Group Clinical Advisory Panel. Adrenal crisis can kill [Internet]. Available from: [www.addisonsdisease.org.uk/emergency](http://www.addisonsdisease.org.uk/emergency) [cited 7/10/19].
9. Addison's Disease Self-Help Group Clinical Advisory Panel. Surgical guidelines for Addison’s disease and other form of adrenal insufficiency [Internet]. 2017. [cited 22/10/19]. Available from: [www.addisonsdisease.org.uk/surgery](http://www.addisonsdisease.org.uk/surgery)
10. Personal communication. Katherine White. Chair, on behalf of the Addison’s Disease Self-Help Group. 20/12/2017.
11. Miller CS, Little JW, Falace DA. Supplemental corticosteroids for dental patients with adrenal insufficiency: reconsiderations of the problem. J Am Dent Assoc 2001; 132: 1570-1579.
12. Hydrocortisone. Last updated 13/07/19. Martindale [online]. Buckingham R (ed). London: Pharmaceutical Press [cited 22/10/19]. Available from: [www.medicinescomplete.com](http://www.medicinescomplete.com)

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### Date Prepared

November 2019

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### Date of check

November 2019

### Search strategy

Search updated 22/10/2019

* Embase 1996 to date:

[ADDISON DISEASE or ADRENAL INSUFFICIENCY] and [DENTAL SURGERY or MINOR SURGERY or ORAL SURGERY]

* Medline 1996 to date:

[ADDISON DISEASE] and [ORAL SURGICAL PROCEDURES OR TOOTH EXTRACTION OR DENTISTRY OR SURGERY, ORAL OR DENTISTRY, OPERATIVE OR SURGICAL PROCEDURES, MINOR]

* In-house dental specialist book/resources.
* Search of British Dental Journal website (accessed via [www.nature.com/bdj/index.html](http://www.nature.com/bdj/index.html)). Used search terms ‘“Addison’s disease”, “Steroid cover”, “Addison’s disease and steroid cover”.
* Addison’s disease self help group [www.addisonsdisease.org.uk](http://www.addisonsdisease.org.uk)

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The Addison's Disease Self-Help Group Clinical Advisory Panel were approached for comment 6/11/19.