



Adrenal Crisis & Stress Steroids

Treat on suspicion · Hydrocortisone and saline before any confirmatory test

NEVER DELAY STEROID
for a cortisol result

SUSPECT IT *non-specific until it is catastrophic*

THE PRESENTATION

Hypotension or shock unresponsive to fluids and vasopressors — the single most useful clue. Plus vomiting, abdominal pain (can mimic an acute abdomen), fever, confusion, profound weakness, and collapse.

THE BIOCHEMISTRY

Hyponatremia (most consistent) · **hyperkalemia** in primary disease · **hypoglycemia**, especially in children and secondary insufficiency · mild hypercalcemia · eosinophilia and a normocytic anemia.

PRIMARY vs SECONDARY

Primary (adrenal): both cortisol **and** aldosterone fail → **hyperkalemia, salt wasting, and hyperpigmentation**.
Secondary (pituitary or steroid withdrawal): aldosterone is preserved, so **potassium is usually normal** and there is no pigmentation.

TREAT IMMEDIATELY *this is one of the true "treat first, investigate later" emergencies*

- 1 **Hydrocortisone 100 mg IV immediately**, then **200 mg over 24 hours** by infusion, or **50 mg IV every 6 hours**. At these doses hydrocortisone provides sufficient mineralocorticoid activity, so **fludrocortisone is not needed acutely**.
- 2 **Aggressive fluid resuscitation** with 0.9% sodium chloride — often 1 L in the first hour, then guided by response. These patients are profoundly volume-depleted.
- 3 **Treat hypoglycemia** with dextrose, and recheck. Correct the sodium **slowly** — steroid replacement switches off ADH and the sodium can rise fast, risking osmotic demyelination.
- 4 **Take the cortisol (and ACTH) before the first dose if you can do it in seconds** — otherwise give the steroid. **Dexamethasone** is an alternative first dose, since it does not interfere with a subsequent cortisol assay, but **never let sampling delay treatment**.
- 5 **Find and treat the precipitant** — infection is the commonest, then surgery, trauma, myocardial infarction, and **abrupt withdrawal of long-term steroids**. Look also for bilateral adrenal hemorrhage in the anticoagulated or septic patient.

WHO IS AT RISK *most crises happen in people already known to be at risk*

Group	Detail
Known adrenal insufficiency	Addison disease, adrenalectomy, congenital adrenal hyperplasia, adrenal metastases or hemorrhage.
Exogenous steroid exposure by far the largest group	Suppression should be assumed with roughly prednisone 5 mg daily or equivalent for 4 weeks or more . Recovery of the axis can take months after stopping. Inhaled, topical, and intra-articular steroids also suppress at sufficient dose.
Pituitary disease	Tumor, surgery, radiotherapy, apoplexy, Sheehan syndrome. Look for other deficient axes — and always replace steroid before thyroxine .
Drugs	Etomidate (even a single dose), ketoconazole, and immune checkpoint inhibitors causing hypophysitis. Also enzyme inducers such as rifampin and phenytoin, which accelerate steroid clearance.

STRESS DOSING & SICK-DAY RULES *prevention is the whole game*

SURGERY & ILLNESS

Minor procedure or moderate illness: double the usual oral dose for the duration, or hydrocortisone 25–50 mg IV. **Major surgery, trauma, or critical illness: hydrocortisone 100 mg IV, then 200 mg per 24 hours**, tapering as the patient recovers. **Vomiting or unable to take oral steroid:** this is an emergency requiring the **parenteral** route.

WHAT EVERY PATIENT NEEDS

A **steroid emergency card** and medical-alert identification · an **intramuscular hydrocortisone kit with training** for them and their family · written **sick-day rules** · and clear instruction **never to stop long-term steroid abruptly**. Check this at every clinic visit — most crises are preventable failures of this education.

CONFIRM THE DIAGNOSIS AFTERWARDS *once the patient is stable, not before*

Test	Interpretation
Morning cortisol	Measured at 08:00–09:00 . A clearly low value supports the diagnosis; a comfortably high value largely excludes it. Intermediate values need dynamic testing.
Short Synacthen test	The confirmatory test . Measure cortisol before and after synthetic ACTH; a failure to rise adequately confirms adrenal insufficiency. Can be falsely normal early in secondary insufficiency, before the adrenals have atrophied.
ACTH level	High ACTH = primary adrenal failure. Low or inappropriately normal ACTH = secondary , which then requires assessment of the rest of the pituitary axis and pituitary imaging.
Further workup	Adrenal autoantibodies (21-hydroxylase) for autoimmune Addison disease · CT adrenals for hemorrhage, infiltration, metastases or tuberculosis · very long-chain fatty acids in young men to exclude adrenoleukodystrophy · screen for other autoimmune disease, especially thyroid and celiac.

LONG-TERM REPLACEMENT *getting this right prevents the next crisis*

THE REGIMEN

Hydrocortisone in divided doses, weighted to the morning to mimic the physiological rhythm, typically two or three times daily. **Fludrocortisone is required in primary insufficiency only** — titrate against blood pressure, postural drop, potassium, and renin. **Do not over-replace:** excess glucocorticoid causes osteoporosis, weight gain, and metabolic harm.

DRUG INTERACTIONS TO CHECK

Enzyme inducers — rifampin, phenytoin, carbamazepine, and some antiretrovirals — accelerate cortisol clearance and **require a higher replacement dose**. **Levothyroxine started in an undiagnosed patient can precipitate a crisis**, so always assess the adrenal axis first. Pregnancy typically needs a dose increase in the third trimester.

PEARLS & PITFALLS

- **Shock that will not respond to fluids and pressors should prompt hydrocortisone**, empirically, while you look for other causes.
- **Never delay steroid for a cortisol level**. If you need a clean assay, give dexamethasone and do the test later.
- **Normal potassium does not exclude it** — secondary adrenal insufficiency preserves aldosterone, so only the sodium is low.
- **At stress doses, hydrocortisone covers the mineralocorticoid requirement**, so fludrocortisone is not needed acutely.
- **Correct the sodium slowly**. Steroid replacement turns off ADH and can cause an abrupt overcorrection.
- **Steroid before thyroxine** in combined pituitary failure — the reverse order can precipitate a crisis.

