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Clinical Decision Tool Reviews

Updated Steroid Conversion Calculator

Michelle D. Lundholm, M.D.[1]

[1] Endocrinology and Metabolism Institute, Cleveland Clinic

Keywords: steroid, glucocorticoid, adrenal insufficiency, prednisone, decadron, solumedrol, convert, hydrocortisone, cortef, betamethasone, cortisone, doxamethasone, methylprednisolone, prednisolone, triamcinolone

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Abstract

The steroid conversion calculator is a clinical tool designed to standardize the process of converting between different systemic glucocorticoids by applying established dose equivalency ratios. These calculators are grounded in pharmacokinetic and pharmacodynamic data to ensure safe and effective transitions between agents.

I. HOW TO USE

When to Use

This steroid conversion calculator should be applied in clinical scenarios where patients require a change from one systemic glucocorticoid to another. Results indicate an equivalent dose in the desired steroid. Common indications may include: transitioning between formulations (e.g., changes to oral (PO) or intravenous (IV) access), adjusting therapy due to drug availability, side effect profile, or patient-specific factors (e.g., comorbidities or pregnancy), converting between short-acting and long-acting steroids for chronic disease management or adrenal axis assessment, or transitioning between care locations (e.g., hospital admission, discharge, or transfer).

This calculator can be used in adult and pediatric patient populations, and for oral or intravenous doses. This calculator is not appropriate for topical, inhaled, intra-articular, and intramuscular steroids as these routes have different rates of absorption and potency. This calculator is used to find equivalent dosing; for patients on chronic steroids with an acute illness or undergoing a procedure, consider increased stress dosing.

PEARLS / PITFALLS

Mineralocorticoid Activity

Steroid potency refers to its glucocorticoid anti-inflammatory effect, and does not account for differences in mineralocorticoid activity. Mineralocorticoid effect may be clinically relevant in patients with primary adrenal insufficiency or fluid sensitivity. Steroids with negligible mineralocorticoid effect are betamethasone, dexamethasone, triamcinolone, and methylprednisolone. Steroids with modest mineralocorticoid effect are hydrocortisone, cortisone, prednisolone, and prednisone. Fludrocortisone is omitted from the calculator because it is a mineralocorticoid with negligible glucocorticoid effect.

Duration of Action

Additionally, steroids differ in their duration of action. Long-acting (36-72 hours: betamethasone, dexamethasone) and medium-acting (12-36 hours: methylprednisolone, prednisolone, prednisone, triamcinolone) steroids are typically administered once per day. Short-acting steroids (8-12 hours: cortisone, hydrocortisone) are given in two to three divided doses per day. When converting between a short-acting steroid and a long- or medium-duration steroid, it is best to convert using the cumulative 24-hour dose.

Other Factors

Only use the calculator for converting between the listed steroids and formulations. For topical, inhaled, intramuscular, or intra-articular formulations, or for steroid medications that are not listed (e.g., budesonide, beclomethasone), please contact a pharmacist for instructions.

Consider the impact of drug-drug interactions, such as Cytochrome P450 (CYP) inducers and inhibitors, which can alter steroid metabolism. Additionally, pharmacokinetics of steroids may vary with some disease states such as severe kidney or liver disease or hyperthyroidism.

WHY USE

A steroid conversion calculator addresses the clinical challenge of safely and accurately transitioning between different glucocorticoid agents, each with unique potencies and durations of action. Inadequate conversions can lead to under- or over-treatment with steroids, resulting in adrenal insufficiency or glucocorticoid toxicity, respectively. This calculator standardizes conversions to reduce errors to improve patient outcomes with steroid transition.

II. NEXT STEPS

Advice

For steroids that are listed as having both IV and PO formulations, their dose is equivalent by either route.

Given differences in steroid duration of action, it is simplest to use the cumulative 24-hour steroid dose when making conversions.

For those on chronic supraphysiologic doses, consider need for steroid tapering and patient education regarding adrenal suppression or stress-dosing. Adult physiologic glucocorticoid replacement is approximately 15-25 mg/day of hydrocortisone (or equivalent).

For patients with primary adrenal insufficiency, ensure adequate mineralocorticoid coverage if switching to a steroid with low mineralocorticoid activity. Glucocorticoid doses which provide a mineralocorticoid effect that is approximately equivalent to 0.1 mg of fludrocortisone are: hydrocortisone 20 mg, cortisone 25 mg, and prednisone or prednisolone 50 mg.

Management

Based on conversion results, prescribe the new steroid at the calculated equivalent dose (if converting to a short-acting steroid, e.g., cortisone and hydrocortisone, then give in two to three divided doses per day). Then, continue to monitor for signs of glucocorticoid excess or for adrenal insufficiency.

Critical Actions

As always, apply clinical context. In acutely ill patients, stress-dose steroids may be appropriate (e.g., 2-3 times the usual steroid doses, or high-dose hydrocortisone 50 mg every 6-8 hours). Always consider the need for dose tapering, especially after prolonged (>2-3 weeks) steroid therapy. Abrupt steroid discontinuation after chronic use can precipitate an adrenal crisis and should be avoided.

III. EVIDENCE

Evidence Appraisal

Early studies investigated steroid equivalence by giving doses of steroid medication followed by morning steroid level measurement to determine relative response and steroid half-life.[1] Further studies on pharmacodynamic response times for T helper cells, suppressor cells, neutrophils, and adrenal suppression showed that dosing tables have reasonable dose equivalency relationships.[2,3] Further consideration incorporating metabolism, intracellular handling, and receptor activation are ongoing.[4]

Today, standardized glucocorticoid conversion ratio tables have emerged.[5,6] Use of these ratios are supported by Endocrine Society Guidelines.[7]

Formula

Corticosteroid Conversions:

Compound	Route	Equivalent Dose (mg)	Duration of Action
Betamethasone	IV	0.6	Long (36-72 Hours)
Cortisone	PO	25	Short (8-12 Hours)
Dexamethasone (Decadron)	IV or PO	0.75	Long (36-72 Hours)
Hydrocortisone	IV or PO	20	Short (8-12 Hours)
MethylPrednisoLONE	IV or PO	4	Medium (12-36 Hours)
PrednisoLONE	PO	5	Medium (12-36 Hours)
PredniSONE	PO	5	Medium (12-36 Hours)
Triamcinolone	IV	4	Medium (12-36 Hours)

Fludrocortisone is not used for its glucocorticoid effects.

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