These guidelines have been withdrawn

MOH clinical practice guidelines are considered withdrawn five years after publication unless otherwise specified in individual guidelines. Users should keep in mind that evidence-based guidelines are only as current as the evidence that supports them and new evidence can supersede recommendations made in the guidelines.
Use of Corticosteroids in General Practice
## Levels of evidence and grades of recommendation

### Levels of Evidence

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<th>Type of Evidence</th>
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<td>1++</td>
<td>High quality meta analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
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<tr>
<td>1+</td>
<td>Well conducted meta analyses, systematic reviews of RCTs, or RCTs with a low risk of bias</td>
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<tr>
<td>1-</td>
<td>Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias</td>
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<tr>
<td>2++</td>
<td>High quality systematic reviews of case-control or cohort studies</td>
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<td></td>
<td>High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal</td>
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<td>Well conducted case control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal</td>
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### Grades of recommendation

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<td>B (evidence levels 2++, 1++, 1+)</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
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<td>C (evidence levels 2++, 2+)</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++</td>
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<td>D (evidence levels 2+, 3, 4)</td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
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<td>GPP (good practice points)</td>
<td>Recommended best practice based on the clinical experience of the guideline development group</td>
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Use of Corticosteroids in General Practice
Statement of Intent

These guidelines are not intended to serve as a standard of medical care. Standards of medical care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge advances and patterns of care evolve.

The contents of this publication are guidelines to clinical practice, based on the best available evidence at the time of development. Adherence to these guidelines may not ensure a successful outcome in every case. These guidelines should neither be construed as including all proper methods of care, nor exclude other acceptable methods of care. Each physician is ultimately responsible for the management of his/her unique patient, in the light of the clinical data presented by the patient and the diagnostic and treatment options available.
Foreword

Corticosteroids are very potent drugs that are known for their anti-inflammatory, anti-proliferative and immunosuppressive effects. Corticosteroids, often just called “steroids”, greatly improve symptoms and provoke impressive results in number of conditions. However, there are also side effects associated with their use. It is therefore important that these drugs are used for evidence-based indications.

The MOH Clinical Practice Guidelines on Use of Corticosteroids in General Practice incorporates the best available evidence from the scientific literature, appraised by experts from many disciplines in an attempt to cover as wide as possible indications on use of steroids in daily clinical practice. These guidelines will highlight how these powerful drugs could have valuable effect if administered within proper guidelines.

I hope this set of guidelines will assist all doctors, particularly primary care physicians, in appropriate use of corticosteroids in their practice.

PROFESSOR K SATKU
DIRECTOR OF MEDICAL SERVICES
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Executive summary of recommendations

Details of recommendations can be found in the main text at the pages indicated.

**Corticosteroid therapy in clinical practice**

**D** The baseline information on blood pressure, weight, growth curve (in children), ophthalmic examination, tuberculosis screening, and levels of fasting glucose, triglycerides and potassium levels, is required in patients in whom steroids have to be started. Repeat ophthalmologic examinations should be done every 6 monthly. The levels of triglycerides, fasting glucose and potassium should be checked after one month of steroid therapy and thereafter, every 3-4 monthly. Blood pressure and weight should be measured at every visit. A history of adverse effects would be ideal at every visit (pg 21).

Grade D, Level 4

**GPP** Hepatitis B status should be checked in all patients in whom steroids have to be started on long term basis (pg 21).

**GPP**

**B** In patients at risk of ischemic heart disease, myocardial infarction, angina, coronary revascularization, heart failure, transient ischaemic attack or stroke, it is best to avoid corticosteroids. However, if definitely indicated, dose should be less than or equal to 7.5 mg prednisolone daily, and should be reduced over time as deemed safe and efficacious (pg 23).

Grade B, Level 2++

**D** Use of corticosteroids should be carefully considered and preferably restricted in obese patients as studies have linked corticosteroids with elevated ratio of intra-abdominal to subcutaneous fat mass (pg 24).

Grade D, Level 3

**B** Blood sugar should be monitored before and after commencement of corticosteroids as there is an increased risk of developing hyperglycaemia when corticosteroids exceed the dose equivalent to 10 mg prednisolone per day (pg 24).

Grade B, Level 2++

**C** Corticosteroids should be used in the lowest possible dose to avert long-term fracture risk. Even low doses of steroids equivalent to 2.5 mg prednisolone per day could compromise bone integrity, and doses of 5 mg and above are associated with increased long-term fracture risk (pg 24).

Grade C, Level 2+
Calcium and vitamin D should be prescribed for patients receiving an average of near-physiologic level of 5-7 mg prednisolone per day to avert reduction in bone loss (pg 25).

Grade B, Level 1+

The combination of bisphosphonates combined with vitamin D is the most effective and is highly recommended for the treatment of glucocorticoid-induced osteoporosis (pg 25).

Grade A, Level 1+

Tests of bone mineral density, particularly of the spine, should be done in women who are above 50 years of age, and have received 6 months of corticosteroids. (pg 25).

Grade D, Level 4

In situations of wound repair, steroids should be avoided but if unavoidable, should be used sparingly (pg 26).

Grade D, Level 4

Changes in mental state, cognitive function and emotional responses in patients on corticosteroids could be due to corticosteroids. As this is eminently treatable, due care should be taken to monitor those with a predisposition to mental disturbances, e.g. those with a family history of mental disturbances, a past history of depression or alcoholism when prescribing corticosteroids to these patients (pg 26).

Grade D, Level 3

If corticosteroids are indicated for growing children, the regime should be alternate-day, preferably topical, and used sparingly (pg 27).

Grade A, Level 1+

In the elderly, dosage of steroids should be limited to 10 mg prednisolone per day, not exceeding a year, as the elderly are more likely to be disabled by complications of glaucoma and subcapsular cataract (pg 27).

Grade D, Level 3

To decrease the risk of myopathy, particularly in the elderly, fluorinated corticosteroid preparations like dexamethasone and triamcinolone should be avoided and dose of prednisolone should not exceed 10 mg per day (pg 27).

Grade D, Level 3
GPP It is best to avoid the usage of high dose corticosteroids over a prolonged duration (pg 28).

Corticosteroids should be withdrawn by tapering the dose gradually. The decision on tapering regime should be made on individually tailored basis (page 29).

Grade A, Level 1+

Prompt withdrawal with rapid tapering is required in the following instances (pg 29):
- Steroid psychosis
- Herpes-induced corneal ulceration
- Uncontrolled hypertension
- Serious lumbar spine osteoporosis
- When therapeutic targets have been achieved or when the regime with steroids proves inefficacious.

Grade D, Level 4

It is unlikely that a tapering regime would be required in the following patients (pg 29):
- those receiving any dose of corticosteroids for less than 3 weeks duration
- those on alternate-day therapy
- those given less than 10 mg prednisolone per day (day dose) for more than a few weeks or at physiologic doses taken for less than 1 month.

Grade D, Level 3 & 4

Withdrawal plans should be commenced by reducing the corticosteroids from supraphysiologic to physiologic doses, which is equivalent to 5-7 mg of prednisolone per day (or hydrocortisone at 15-20 mg per day). Subsequent reduction has been suggested with conversion to hydrocortisone (because of shorter half life) or alternate day prednisolone. During periods of stress or injury, additional doses may be required to avert adrenal crises. The whole process of withdrawal may last from 9 to 12 months (pg 30).

Grade A, Level 1+

Intranasal corticosteroid use in clinical practice

Intranasal steroids are indicated in both adults and children with allergic rhinitis, with no significant growth effects in children. However, there is no definite recommendation for use in pregnancy (pg 32).

Grade A, Level 1++
Intranasal steroids should not be given to children with upper respiratory infections as intranasal steroids use neither provides symptomatic relief nor decreases episodes of acute otitis media (pg 32).

Grade A, Level 1+

Both oral and topical intranasal steroids may be used alone or in combination with an antibiotic as steroid use along with antibiotic, leads to a quicker resolution of otitis media with effusion in the short-term. However, there is no definite recommendation for a long-term benefit with their use (pg 32).

Grade A, Level 1+ and 1++

Use of corticosteroid ear drops in clinical practice

Either combination of steroid and acetic acid ear drops or steroids and antibiotic ear drops may be used in the treatment of acute otitis externa (pg 33).

Grade A, Level 1++

Steroid ear drops may be used in the treatment of eczematous otitis externa as steroid use leads to improvement of otological symptoms, particularly erythema, swelling and discharge (pg 33).

Grade A, Level 1+

Corticosteroids and gastrointestinal conditions

Oral systemic and intravenous steroids are useful in inducing remission and may be used in active ulcerative colitis (pg 34).

Grade A, Level 1++

Budesonide, an oral topically acting steroid, is also useful and may be used in active ulcerative colitis (pg 34).

Grade A, Level 1+

Steroid enemas are useful in inducing remission in patients with distal colitis and a useful adjunct in patients with left-sided colitis (pg 35).

Grade A, Level 1+

Steroids should not be used in maintaining remission in ulcerative colitis (pg 35).

Grade A, Level 1++
Both systemic steroids and oral topically acting steroids (budesonide), either alone or in combination, may be used in active Crohn’s disease (pg 35).

Grade A, Level 1++

Steroids should not be used in maintaining remission in Crohn’s disease (pg 35).

Grade A, Level 1++

Steroids are very useful and may be used in inducing remission and preventing relapse in autoimmune hepatitis (pg 36).

Grade A, Level 1++

Steroids may be used in the treatment of severe alcoholic hepatitis (pg 36).

Grade A, Level 1+

Patients who are on steroids should have prophylaxis if they are also on non-steroidal anti-inflammatory drugs or are elderly with a history of peptic ulcer disease (pg 37).

GPP

Patients who are known to be hepatitis B virus carriers and are receiving chemotherapy with corticosteroids should also receive prophylaxis (pg 37).

Grade A, Level 1+

Patients who are known to be hepatitis B virus carriers should be considered for prophylactic medication if they are to receive systemic steroids for a duration of more than a week (pg 38).

GPP

It is advisable to test all patients for hepatitis B if systemic long-term steroids are being considered (pg 38).

GPP

Based on present evidence, there is no need to specifically look for the presence of hepatitis C before starting corticosteroid treatment in any medical condition (pg 38).

Grade A, Level 1+
Use of corticosteroids in children

D Although children receiving long-term systemic corticosteroid therapy should be screened for cataracts, this is unnecessary in children on inhaled corticosteroids alone (pg 40).

Grade D, Level 3

A Systemic corticosteroids are NOT recommended in children with acute bronchiolitis (pg 41).

Grade A, Level 1++

A Inhaled corticosteroids are NOT recommended in children with acute respiratory syncytial viral bronchiolitis (pg 41).

Grade A, Level 1+

A Corticosteroids are recommended for the treatment of acute laryngotracheobronchitis (pg 41).

Grade A, Level 1++

A Nebulized budesonide, oral and parenteral dexamethasone have the same effectiveness and may be used for treatment of laryngotracheobronchitis (pg 41).

Grade A, Level 1+

GPP For children with mild croup, a single dose of oral dexamethasone is an effective treatment. Choice between oral and parenteral dexamethasone is up to the individual clinical setting (pg 42).

GPP

A Systemic corticosteroids are recommended for children with acute asthma exacerbation (pg 42).

Grade A, Level 1++

A Inhaled corticosteroids are recommended for the treatment of children with persistent asthma (pg 42).

Grade A, Level 1++

A Topical corticosteroids are recommended for children with moderate to severe eczema. Topical corticosteroids results in improvement in disease severity and reduces the risk of relapse (pg 43).

Grade A, Level 1+
It is recommended that systemic corticosteroids in children (except short courses or “bursts” which are not likely to cause side effects) should be used in consultation with physicians with experience in its use and in monitoring for side effects (pg 43).

Corticosteroid injections in joints and soft tissues

A Corticosteroid injections may have short-term benefits but may not be sustained. The subacromial route is recommended for rotator cuff tendonitis and intra-articular injection for adhesive capsulitis. Oral non-steroidal anti-inflammatory drug therapy may be considered prior to injection therapy (pg 44).

Grade A, Level 1+

A Corticosteroid injections can provide short-term relief, and can be useful in early treatment of lateral epicondylitis (Tennis Elbow) and medial epicondylitis (Golfer’s elbow) (pg 44).

Grade A, Level 1+

D Corticosteroid injections can provide short-term relief, is useful and may be used in early treatment of De Quervain’s Tenosynovitis (pg 45).

Grade D, Level 3

A Corticosteroid injections can provide short-term relief and may be used for carpal tunnel syndrome (pg 45).

Grade A, Level 1++

D Recommended safe injection technique for carpal tunnel syndrome (pg 45):
- 25G needle at 30 degree angle insertion, approach skin ulnar to palmaris longus tendon.
- Withdraw needle if paresthesia experienced by patient.
- Bulge in palm distal to transverse carpal ligament is indication of correct placement of needle.

Grade D, Level 4

D Corticosteroid injections are highly effective and may be used as first line therapy for long-term treatment of trigger finger and thumb (pg 45).

Grade D, Level 3

A Intra-articular corticosteroid injections provides short-term benefit and may be used in relieving pain. Judicious use is advocated in acute exacerbation of
osteoarthritis. It may be combined with knee aspiration if effusion is present (pg 46).

**Grade A, Level 1**

**GPP** Regular use of intra-articular steroids is not recommended for osteoarthritis of the knees in the general practice setting (pg 46).

**A** No benefit has been shown for the use of injection corticosteroid in Archilles tendonitis and it is not recommended for this condition (pg 46).

**Grade A, Level 1**

**A** Corticosteroid injections can provide short-term relief of symptoms to a small degree and may be used in plantar fasciitis. Orthosis should be prescribed for those patients who stand for long periods (pg 46).

**Grade A, Level 1**

**GPP** There should be at least 6 weeks of interval between corticostoeoid injections, and up to a maximum of 3 doses are recommended in shoulder conditions, lateral epicondylitis and trigger finger (pg 47).

**GPP** A single dose of corticostoeoids is recommended in De Quervain Tenosynovitis and carpal tunnel syndrome (pg 47).

**Corticosteroids in rheumatological conditions**

**GPP** There is no evidence for the use of systemic corticosteroids in osteoarthritis. It should not be prescribed for the treatment of osteoarthritis (pg 48).

**GPP**

**D** In patients with acute gout affecting one or two joints, intra-articular injection of a long-acting corticosteroid preparation, such as methylprednisolone, triamcinolone acetonide or triamcinolone hexatonide, will control symptoms within 1 to 2 days. It should be given only when the diagnosis is confirmed and infection has been excluded. Patients with polyarticular gout who have a suboptimal or delayed response to oral non-steroidal anti-inflammatory drugs often benefit from adjunctive corticosteroid injections into those joints with persistent synovitis (pg 49).

**Grade D, Level 3**
Both intramuscular injection of corticosteroid (triamcinolone acetonide 40 mg - 60 mg once) and oral corticosteroid are effective and may be used in acute attacks particularly in the patient with polyarticular gout. Prednisolone can be started at a dose of 20 to 40 mg/day and tapered over 7 to 10 days. If tapered too rapidly, a rebound flare-up of gout may occur (pg 49).

Grade D, Level 3

Well conducted studies on the use of intra-articular or systemic corticosteroids in acute attacks of pseudogout are lacking. However, clinical experience suggests that a similar approach to that for the management of acute gout may be effective in acute attacks of pseudogout (pg 49).

Grade D, Level 4

Rheumatoid synovitis may be suppressed for three months or longer using relatively insoluble microcrystalline corticosteroid preparations. Intra-articular corticosteroid should be considered ancillary to rest, physical therapy, non-steroidal anti-inflammatory agents, and disease modifying anti-rheumatic drugs. No convincing evidence exists, that joint erosive changes are retarded (pg 49).

Grade A, Level 1+

Systemic corticosteroids may thus be used in the management of rheumatoid arthritis in two ways (pg 50):

(1) Short-term, low dose bridge therapy, aimed at controlling symptoms during periods of active disease while awaiting the effects of newly started single or combination disease modifying anti-rheumatic drugs (DMARDs).

(2) Moderate to longer-term low dose prednisolone (usually 10 mg or less) given in addition to single or combination DMARDs if this treatment has failed to control disease activity sufficiently.

Grade A, Level 1+

Periodic intra-articular injection of corticosteroid can be of particular value in the management of patients with oligoarticular disease or those with controlled polyarticular disease but one or two persistently active inflamed joints despite disease modifying anti-rheumatic drugs (pg 51).

Grade D, Level 4

In general, systemic corticosteroids should be used judiciously in psoriatic arthritis because of the risk of provoking a pustular flare in the skin on withdrawal (pg 51).

Grade D, Level 3
A Intra- or peri-articular corticosteroid injections have been shown in small randomized controlled trials to be effective and may be used for the pain of sacroiliitis (pg 51).

Grade A, Level 1+

D There are no clinical studies evaluating the efficacy of intra-articular corticosteroid on peripheral arthritis nor on the use of local corticosteroid injections for the enthesitis of ankylosing spondylitis. Clinical experience suggests that corticosteroid injections can be helpful in selected cases (pg 51).

Grade D, Level 4

D The use of systemic corticosteroids for axial disease is not supported by evidence. These patients already have significant loss of bone density, which can be exacerbated by steroid therapy (pg 52).

Grade D, Level 4

**Respiratory diseases**

A Inhaled steroids are the preferred treatment for patients with persistent asthma symptoms at all levels of severity (pg 53).

Grade A, Level 1++

A Add-on therapy with another class of controller medication (e.g. long-acting β₂-agonist) is preferred to increasing the dose of inhaled corticosteroids (pg 53).

Grade A, Level 1++

B The risks of poorly controlled asthma should be weighed against the limited risk of long-term inhaled corticosteroids (pg 53).

Grade B, Level 2++

D Inhaled corticosteroids should be started at a dose appropriate to the control of Asthma (pg 54).

Grade D, Level 4

A Inhaled steroids should be given twice daily (pg 54).

Grade A, Level 1+

B The dose of inhaled steroids should be titrated slowly to the lowest dose that can achieve effective asthma control. After adequate control has been achieved, the inhaled corticosteroid dose should be gradually reduced by 25% every 3 months and titrated according to asthma control. Once the dose of
corticosteroids is less than 500 μg of beclomethasone dipropionate or its equivalent, then withdrawal of add-on therapy can be considered (pg 54).

Grade B, Level 1+

C Inhaled steroid regimen should not be changed in pregnancy (pg 54).

Grade C, Level 2++

A Systemic steroids should be given at least 5 days in acute exacerbations of asthma that do not have rapid and sustained response to short-acting β2-agonist therapy. Oral dosing is preferred over intravenous therapy. Intravenous administration should only be considered in the critically ill or if the patient is unable to tolerate oral medication. There is no need for tapering dose at the end of a short course of oral prednisolone (up to 10 days) (pg 55).

Grade A, Level 1++

A The role of conventional doses of inhaled corticosteroids as adjunctive therapy to systemic steroids in an acute exacerbation of asthma is limited (pg 55).

Grade A, Level 1++

A Combined inhaled corticosteroids with long-acting bronchodilators should be considered in severe COPD patients with recurrent exacerbations or symptoms (pg 56).

Grade A, Level 1++

A Long-term treatment with oral corticosteroids is not recommended in COPD (pg 56).

Grade A, Level 1++

A Oral corticosteroids should be considered if patients experience a significant increase in breathlessness that interferes with daily activities especially if the baseline FEV₁ is less than 50% of predicted. A dose of prednisolone of 30-40 mg/day for 7 to 14 days is recommended for acute exacerbations of COPD (pg 57).

Grade A, Level 1++

D Corticosteroids should not be used in the management of acute bronchitis (pg 57).

Grade D, Level 4
Corticosteroids should not be used in the treatment of lower respiratory tract infections (pg 57).

**Grade D, Level 4**

The routine use of corticosteroids should be avoided in the management of pulmonary tuberculosis (pg 58).

**Grade A, Level 1++**

The following respiratory disorders may require corticosteroid therapy and patients with these conditions should be referred to a specialist respiratory service (pg 58):
- Allergic bronchopulmonary aspergillosis
- Churg Strauss syndrome
- Eosinophilic pneumonia
- Sarcoidosis
- Pulmonary vasculitis
- Alveolar haemorrhage syndromes
- Pneumocystis carinii pneumonia with respiratory failure
- Interstitial lung disease
- Post-radiation pneumonitis

**GPP**

**Corticosteroids in dermatologic conditions**

There is reasonable evidence from randomised controlled trials to support the use of topical corticosteroids as the mainstay of treatment of atopic eczema (pg 59).

**Grade A, Level 1+**

Topical corticosteroids in treatment of psoriasis are best reserved for localised sites such as hands, feet, flexures, genitalia, face and scalp (pg 59).

**GPP**

Topical corticosteroids should not be used more than twice a day (pg 60).

**Grade A, Level 1+**

It is not recommended to dilute and mix other types of creams with topical corticosteroids in your practice (pg 61).

**GPP**
In the presence of infected eczema, use of oral antibiotics is considered as good practice (pg 61).

To prevent side effects, the amount of topical corticosteroids used per week and duration of use must be monitored and controlled. Adjunctive therapy must be emphasized (pg 62).

Grade D, Level 3

It is recommended that not more than 25 g of clobetasal propionate per week be used in adults. All patients on clobetasol propionate should be monitored closely for potential side effects (pg 62).

For areas of the face and flexures it is best to confine use of topical steroids to mild topical corticosteroids and less commonly to moderate to potent topical corticosteroids for short periods of time (pg 62).

When patient requests for repeat prescription of moderately potent and super potent topical corticosteroids, clinical review must be done before repeating the dose. Patient should be educated regarding the need to come for clinical review before extending the duration by explaining the risk and benefits of continuing steroids on long term basis (pg 62).

Grade D, Level 4

Use of flourinated topical corticosteroids should be avoided on the face as there is a high risk for complications like perioral dermatitis, rosacea-like dermatitis, acneform lesions and facial hypotrichosis. Where indicated it should be used for short period, under frequent and close review of patient's condition. Longer usage should be in consultation with a specialist dermatologist (pg 62).

It is presently unknown whether topical corticosteroids are excreted in breast milk. The general advice is to use topical corticosteroids with caution in breastfeeding mothers and they are not to be used on the breast just prior to breastfeeding (pg 63).

In elderly patients, topical corticosteroids should be used for short periods, intermittently and under close supervision (pg 63).
Guidelines as for use in infants and young children should apply to the elderly (pg 63).

In general practice (or primary care), it is best to confine use of systemic corticosteroids to dermatoses that are ‘short-lived’ or rapidly responsive (pg 64).

‘Short-lived dermatoses’ include acute allergic contact dermatitis (allergen withdrawn - like hair dye allergy), certain cutaneous adverse drug exanthem and acute urticaria.

Long-term systemic corticosteroids used in autoimmune bullous dermatoses (like pemphigus vulgaris) or other autoimmune cutaneous disorder (systemic lupus erythematosus, dermatomyositis) are best left to the purview of the specialist (pg 64).

**Use of corticosteroids in ophthalmology**

The role of steroid eye drops in the primary care setting is mainly in the management of acute red eyes. Vision-threatening causes of red eyes – acute glaucoma, iritis, keratitis and scleritis – should first be excluded with careful history, visual acuity testing and examination for corneal clarity and pupillary response (pg 66).

Patients with vernal conjunctivitis (active papillae and/or follicles) could benefit from topical corticosteroid during the acute phase to reduce the acute inflammation and itch. Topical steroid should be stopped once the symptoms have been relieved. The mainstay of treatment, however, is sodium cromoglycate (mast cell stabilizer) eye drops (pg 66).

Patients with vernal conjunctivitis (active papillae and/or follicles) could benefit from topical corticosteroid during the acute phase to reduce the acute inflammation and itch. Topical steroid should be stopped once the symptoms have been relieved. The mainstay of treatment, however, is sodium cromoglycate (mast cell stabilizer) eye drops (pg 66).

The use of topical steroid for the management of viral conjunctivitis in the primary care setting is more controversial. While it certainly alleviates ocular inflammation, it should be used when the presentation is typical and diagnosis certain. Some conditions that mimic viral conjunctivitis (such as herpetic epithelial keratitis and microbial keratitis) may be aggravated by the use of steroid eye drops (pg 66).
Symptoms of acute allergic conjunctivitis (characterized by conjunctival chemosis) usually subside within 24 hours without treatment. Similarly, episcleritis often subsides without treatment. The use of topical steroid may not be necessary in these cases. Alternatives such as Antazoline eye drops may be considered instead (pg 66).

Infective keratitis (corneal ulcer) and herpetic keratitis can mimic viral conjunctivitis. Topical steroids can worsen these conditions while masking the symptoms and are contraindicated in these conditions (pg 67).

Topical steroids are contraindicated in the presence of a history of contact lens use or ocular trauma as microbial keratitis could be present and aggravated by steroid use (pg 67).

Prolonged application of steroidal eye drops can cause elevation of the intraocular pressure. This effect has also been demonstrated in children. The frequency, severity and time-course of the response may be higher in children. Thus special care must be taken when prescribing steroid eye drops for children (pg 67).

Being asymptomatic, steroid-induced ocular hypertension may go undetected for months, resulting in steroid induced glaucoma. Intraocular pressure should be monitored regularly if steroid eye drops are being used for long duration (pg 67).

Without intraocular pressure monitoring, steroidal eye drops should not be used beyond 1 week (pg 67).

Patients should be counseled prior to the start of long-term systemic steroid regarding cataract formation. These are easily diagnosed as fairly dense central opacities of the pupillary red reflex. Decision to continue or cease systemic steroid therapy is largely dependant on the primary disease status for which the steroid was started – cataract can be dealt with surgically with very high success rates. Routine eye screening for presence of cataract is important especially for patients in the amblyogenic age group (10 years old or younger), or when the patient develops visual symptoms (pg 68).
C Prolonged high-dose steroid is known to be associated with central serous chorio-retinopathy, a condition characterised by single or multiple subretinal fluid blebs. The patient presents with micropsia (diminished image size) and/or metamorphopsia (distortion of image). If confirmed by an ophthalmologist, systemic steroid should be reduced, replaced and discontinued wherever possible (pg 68).

Grade C, Level 2+

D Patients who require periocular steroid treatment for longer than 4 weeks would require monitoring of intraocular pressure (pg 68).

Grade D, Level 3

Corticosteroids in other conditions

D Adrenaline is the treatment of choice in anaphylaxis. Corticosteroids are not helpful acutely but potentially might prevent recurrent or protracted anaphylaxis (pg 70).

Grade D, Level 4

A Corticosteroids are not recommended for the treatment of Bell's palsy (pg 70).

Grade A, Level 1+
1 Introduction

1.1 Background information

These clinical practice guidelines on the use of corticosteroids (also referred to as steroids in these guidelines) are the result of a series of dialogue and feedback sessions between the Ministry of Health and the College of Family Physicians, Singapore. The prescription and dispensing of steroids in all forms, whether topical or systemic administration, form a major part of the daily clinical practice of all doctors in the country.

While steroids are useful in conferring a positive therapeutic response to many medical conditions in the short-term, long-term usage and administration of steroids pose many potential hazards to patients and can lead to medium to adverse effects, some of which can be life-threatening.

1.2 Development of guidelines

Due to the vast diversity of medical conditions that may be helped by steroid treatment, our committee was formed with specialists from many disciplines, such as respiratory medicine, dermatology, ophthalmology, otorhinolaryngology, rheumatology, gastroenterology, endocrinology, orthopaedics, paediatrics and family medicine. Our committee attempted to cover as wide as possible a spectrum of possible indications and use of steroids in daily clinical practice. The list of medical conditions covered is by no means exhaustive. The medical conditions are grouped by medical and surgical disciplines authored by the respective expert specialists in our panel.

As steroids have been in existence and widely used for a very long time, much of the evidence to support our recommendations is gleaned from good clinical practice principles. Where possible, our expert committee has based its recommendations on supporting evidence from the scientific literature.

1.3 Objectives

This book is not intended to be a list of dos and don’ts. We are fully mindful and cognizant of the professionalism of our fellow medical
colleagues and would defer to their final assessment and clinical judgment of their patients’ conditions and the necessary treatments for the best clinical outcomes. It is our earnest desire and hope that our fellow colleagues will find this book a useful clinical tool in aiding them to make better informed and safer clinical decisions when prescribing steroids to their patients, especially those requiring long-term therapy.

1.4 Review of guidelines

Evidence-based clinical practice guidelines are only as current as the evidence that supports them. Users must keep in mind that new evidence could supersede recommendations in these guidelines. The workgroup advises that these guidelines be scheduled for review 3 years after publication, or when new evidence appears that requires updating of the recommendations.

1.5 Economic benefits

Steroids have been in existence for a very long time and have the benefit of being very low cost to most patients, especially in the case of oral prednisolone. The value of inhaled steroids in reducing the frequency of recurrent asthmatic attacks, in lengthening the remission periods, and in reducing the frequency of hospitalizations is well documented. Our committee feels that as a class of drugs, steroids represent a low cost therapy to patients who have clinical indications requiring its use. Due to the vast diversity of preparations involved, it is beyond the scope and scale of this committee to ascertain which of the brand or type of steroid is most cost effective and cost beneficial to the patient. The physician is thus advised to use the most appropriate and economical preparation available to manage his or her patient.
2 Corticosteroid Therapy in Clinical Practice

2.1 General introduction

The use of corticosteroids started some 50 years ago. Being very powerful anti-inflammatory agents, they were described as impressive drugs as they not only improved certain clinical conditions, but also conferred a subjective sense of well-being. These drugs were widely used but sometimes without strong indications. Most of the uses of corticosteroids have been in the fields of rheumatology, orthopaedics, dermatology, oncology, respiratory medicine, otorhinolaryngology (ENT) and ophthalmology. Endocrinology utilizes corticosteroids for hypoadrenalism and tapering regimes in hypothalamic-pituitary-adrenal axis suppression.

While powerful as anti-inflammatory agents, these medications have a host of systemic effects which are deleterious to the patient. Hence, care should be exercised in the indications, route of administration and duration of treatment. Drug interactions as well as disease states per se are modifiers in the response and could result in the enhancement of side effects.

The latest development towards greater safety of corticosteroids usage with preservation of full efficacy is channeled at the glucocorticoid receptor so that reduced potency in side effects is possible. These new insights may pave the way for novel, safer therapies that retain the efficacy of currently prescribed steroids.¹

Until then we will have to prescribe sensibly and rationalize the indications, dose, duration and preparation of the right steroid to the right purpose.

2.2 Corticosteroid potencies and preparations:

Steroids can be prescribed as:

- Topical steroids
- Intranasal steroids
- Steroid ear and eye drops
- Intra-articular steroid injections
- Oral steroids
## Relative potencies of corticosteroids²,³

<table>
<thead>
<tr>
<th>Corticosteroids</th>
<th>Anti-inflammatory</th>
<th>Pharmacological Potency</th>
<th>Half-life (min)</th>
<th>Salt retention</th>
<th>Hypothalamic-pituitary-adrenal axis suppression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortisone</td>
<td>0.8</td>
<td>25</td>
<td>30</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>1</td>
<td>20</td>
<td>90</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Prednisone</td>
<td>3.5</td>
<td>5</td>
<td>60</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>4</td>
<td>5</td>
<td>20</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>5</td>
<td>4</td>
<td>300</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>5</td>
<td>4</td>
<td>180</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Betamethasone</td>
<td>25</td>
<td>0.6</td>
<td>100-300</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>30</td>
<td>0.75</td>
<td>100-300</td>
<td>0</td>
<td>17+</td>
</tr>
</tbody>
</table>

## Factors in successful corticosteroid therapy⁴,⁵

### Monitoring
- Glucose concentration (serum and urine)
- Electrolytes (serum and urine),
- Ophthalmologic examination
- Stool tests for occult blood
- Growth and development (children and adolescents)

### Counseling
- Take food with medication
- Never discontinue medication on your own
- Gradual reduction is usually necessary
- Carry or wear MEDIK AWAS
- Dosage increases may be necessary at times of increased stress (surgery or emergency)
- Be aware of potential side effects (visual effects, bruising, delayed wound healing)
- What to do if a dose is missed:
  - If dose is every other day, take in the morning if remembered that morning, if not skip that day. Take the next morning, and then skip the following day.
  - If dose is daily: take as soon as possible. But skip if almost time for next dose. Never double doses.

### Recognising complications
- Early in therapy and essentially unavoidable are insomnia, enhanced appetite, weight gain
- Delayed and insidious: cataracts, atherosclerosis
- Rare and unpredictable: psychosis, glaucoma, pancreatitis
- Complications are common in patients with underlying risk factors: hypertension, diabetes mellitus, peptic ulcer disease
- Long-term intense treatment leads to Cushingoid habitus, hypothalamic-pituitary-adrenal suppression, impaired wound healing
2.3 Principles of corticosteroid therapy

Guidelines for pharmacologic administration of corticosteroids

1. Initiate only if there is published evidence of objective therapeutic benefit
2. Use only after other specific therapies fail
3. Identify a specific therapeutic objective
4. Use objective criteria of response
5. Administer sufficient steroid for a sufficient time to achieve the desired response
6. Administer steroids for no longer than is necessary to achieve the desired response
7. Terminate if objective therapeutic benefit is not observed when expected, if complications arise or if maximum benefit has been achieved.

2.4 Adverse effects of corticosteroids in various formulations for systemic and local use

As adverse effects of steroids are related to its dose and duration, it is essential to have a strong indication before commencing on steroids. Besides the older, nonetheless relevant studies of rheumatoid arthritis patients exhibiting adverse events, notably increased mortality, a recent study has also demonstrated that patients with steroids by prescription had a significant increase in subsequent cardiovascular events.

The baseline information on blood pressure, weight, growth curve (in children), ophthalmic examination, tuberculosis screening, and levels of fasting glucose, triglycerides and potassium levels, is required in patients in whom steroids have to be started. Repeat ophthalmologic examinations should be done every 6 monthly. The levels of triglycerides, fasting glucose and potassium should be checked after one month of steroid therapy and thereafter, every 3-4 monthly. Blood pressure and weight should be measured at every visit. A history of adverse effects would be ideal at every visit.

Grade D, Level 4

Hepatitis B status should be checked in all patients in whom steroids have to be started on long term basis.

GPP
The following side effects are correlated with duration, potency and dosage of steroids used. As the more vulnerable are at extremes of life, the young and elderly merit special attention.

A) Iatrogenic or factitious Cushing’s syndrome

Iatrogenic Cushing’s syndrome is caused by the administration of excessive amounts of a synthetic glucocorticoid (which includes prednisolone, prednisone, dexamethasone), and rarely by ACTH. It is the commonest cause of Cushing’s syndrome and is also referred to as ACTH-independent. It can be occasionally caused by megestrol acetate which has intrinsic glucocorticoid activity.

Features of iatrogenic Cushing’s syndrome as opposed to natural Cushing’s syndrome are as follows:

More common in iatrogenic Cushing’s syndrome
- Traditional stigmata of central obesity
- Supraclavicular fat pads
- Moon facies
- Plethora
- Easy bruising
- Thin skin
- Striae
- Myopathy
- Muscle weakness (proximal)
- Poor wound healing
- Depression
- Psychosis
- Osteoporosis
- Increased incidence of infection

Less common in iatrogenic Cushing’s syndrome
- Hypertension
- Hypokalemia
- Hirsutism or virilism

Virtually unique to iatrogenic Cushing’s syndrome
- Benign intracranial hypertension
- Glaucoma
- Posterior subcapsular cataract
- Pancreatitis
- Aseptic necrosis of bone
- Panniculitis

The most striking laboratory result to distinguish iatrogenic Cushing’s syndrome from ACTH-dependent Cushing’s syndrome is a low plasma cortisol coupled with low ACTH levels after cessation of steroids in Iatrogenic Cushing’s syndrome.

To avert the onset or to minimise the effects of iatrogenic Cushing’s syndrome, glucocorticoids with little or no mineralocorticoid activity (i.e. hydrocortisone, prednisone, prednisolone, methylprednisolone, triamcinolone, betamethasone, and dexamethasone) could be used as opposed to mineralocorticoids like fludrocortisone. The only naturally-occurring glucocorticoids are cortisol and cortisone. The mode of administration could play a significant role in the onset and evolution of adverse effects.

**B) Corticosteroids and macrovascular disease**

Exogenous corticosteroids in excess can contribute to the development of hypertension, insulin resistance, hyperglycaemia, weight gain, hyperhomocysteinemia and atherosclerosis.

Increased rates of all cardiovascular events were found in those who were prescribed 7.5 mg prednisolone or more per day compared to those with non-steroid prescription, the adjusted risk ratio being 2.56. For individual outcomes of congestive heart failure, acute myocardial infarction, stroke and transient ischaemic attacks and all-cause mortality, it was noted that those who were prescribed high dose corticosteroids had significantly increased risk (relative risk: 3.72, 3.26, 1.73, and 7.41 respectively).
Current usage of corticosteroids was associated with increased risk of heart failure (relative risk 2.66) and mild increase in transient ischaemic attacks (odds ratio 1.2) but not stroke.\textsuperscript{15}

There was an increased risk of arteriosclerosis in patients with rheumatoid arthritis receiving long-term corticosteroids therapy, shown by a 3-fold increase in the incidence of lower limb calcifications.\textsuperscript{16}

D Use of corticosteroids should be carefully considered and preferably restricted in obese patients as studies have linked corticosteroids with elevated ratio of intra-abdominal to subcutaneous fat mass.\textsuperscript{17,18}

\textit{Grade D, Level 3}

C\textsuperscript{)\textit{) Corticosteroids and hyperglycemia}}

B Blood sugar should be monitored before and after commencement of corticosteroids as there is an increased risk of developing hyperglycaemia when steroids exceed the dose equivalent to 10 mg prednisolone per day.

\textit{Grade B, Level 2++}

There is 1.8-fold risk of developing diabetes de novo even at doses lower than 10 mg prednisolone per day.\textsuperscript{19} Patients with a family history of diabetes mellitus or who have the metabolic syndrome, must be carefully assessed for the need for oral hypoglycaemic drug therapy as reversibility with reduced dosing of steroids is a possibility.\textsuperscript{19-22}

D\textsuperscript{)\textit{) Corticosteroids and bone mineral density}}

C Corticosteroids should be used in the lowest possible dose to avert long-term fracture risk. Even low doses of steroids equivalent to 2.5 mg prednisolone per day could compromise bone integrity, and doses of 5 mg and above are associated with increased long-term fracture risk.\textsuperscript{23-25}

\textit{Grade C, Level 2+}

If steroids are required for prolonged periods, the dose should be limited to 15-20 mg prednisolone per day to avert osteonecrosis (of
heads of femur and humerus). The risk of osteonecrosis is greater with 
higher doses of corticosteroids. Osteonecrosis can also occur with 
lower doses given for long duration and after intra-articular 
corticosteroids.27

It has been suggested that corticosteroid-induced myopathy 
contributes to the high fracture rate in these patients.

Fractures may occur in 30-50% of patients on chronic corticosteroid 
therapy. Bone loss is fastest in the first 6 months of therapy and 
persists at a lower rate thereafter.28

A retrospective cohort study showed significantly increased risk of 
non-vertebral, hip, forearm and vertebral fractures (relative risk: 1.33, 
1.61, 1.09, and 2.60 respectively) in patients treated with 
corticosteroids as compared to controls. Fracture risk may decrease 
rapidly after cessation of steroids.23

A meta-analysis of seven prospective cohort studies found that prior 
use or current use of corticosteroids was associated with increased 
fracture risk.25

Calcium and vitamin D should be prescribed for patients receiving 
an average of near-physiologic level of 5-7 mg prednisolone per day 
to avert reduction in bone loss.29

Grade B, Level 1+

There is a fracture risk of 34-58% in patients receiving prolonged 
prednisolone at 6.5 mg to 8.6 mg per day. In a study of those receiving 
an average dose of 5.6 mg per day, reduction in bone mineral density 
of 2% and 0.9% of the lumber spine and trochanter respectively was 
preventable with vitamin D supplementation.30

The combination of bisphosphonates combined with vitamin D is 
the most effective and is highly recommended for the treatment of 
glucocorticoid-induced osteoporosis.30

Grade A, Level 1+

Tests of bone mineral density, particularly of the spine, should be 
done in women who are above 50 years of age, and have received 6 
months of corticosteroid.31,32

Grade D, Level 4
E) Corticosteroids and wound healing

In situations of wound repair, steroids should be avoided but if unavoidable, should be used sparingly.

Corticosteroids delay healing of wounds by inhibiting inflammation, collagen synthesis and cross-linking of collagen fibres, hence affecting the structural integrity of wounds. The problem is likely to be compounded if there is hyperglycaemia.\textsuperscript{33,34}

F) Corticosteroids and central nervous system effects

Changes in mental state, cognitive function and emotional responses in patients on corticosteroids could be due to corticosteroids. As this is eminently treatable, due care should be taken to monitor those with a predisposition to mental disturbances, e.g. those with a family history of mental disturbances, a past history of depression or alcoholism when prescribed corticosteroids to these patients.\textsuperscript{35-43}

It is commonly reported that 50% of patients with either natural or iatrogenic Cushing’s syndrome have psychiatric illness, depression being the most common.

At a daily dose of prednisone of 15 mg per day, mood disorders have been observed in rheumatoid arthritis patients.

High dose of corticosteroids taken for ocular symptoms produced hypomanic symptoms in 30% and depressive symptoms in 10% of patients within a one-week period.\textsuperscript{36}

A study of corticosteroid treated multiple sclerosis patients revealed increased risk of hypomanic and manic symptoms in those with a family history of depression or alcoholism.\textsuperscript{40}

Partial memory loss was observed in patients receiving steroid doses between 5 mg and 40 mg prednisolone per day for 1 year or more. In some patients, effects were evident after three months of therapy.\textsuperscript{41}
Chronic exposure to excess corticosteroids can lead to cerebral atrophy. There had been only partial reversal following decrease or cessation of steroids use, hence it is best to keep steroids to low doses, if they are definitely required.44

G) Special considerations

Adverse effects in children

A If corticosteroids are indicated for growing children, the regime should be alternate-day, preferably topical, and used sparingly.

Grade A, Level 1+

Inhaled corticosteroids (supposedly short-lived) have been associated with significant side effects, like growth retardation in children and reduction of bone markers in adolescents.45,46

Intranasal corticosteroids have been linked to Cushing’s syndrome.47 Intra-articular and intradermal steroids were reported to have caused Cushing’s syndrome in 3 children.48

Adverse effects in elderly patients

D In the elderly, dosage of steroids should be limited to 10 mg prednisolone per day, not exceeding a year, as the elderly are more likely to be disabled by complications of glaucoma and subcapsular cataract.49

Grade D, Level 3

Cushingoid facies occur exclusively at doses equal to or exceeding 7.5 mg prednisolone daily.

D To decrease the risk of myopathy, particularly in the elderly, fluorinated corticosteroid preparations like dexamethasone and triamcinolone should be avoided and dose of prednisolone should not exceed 10 mg per day.50

Grade D, Level 3

Myopathy is a dose-dependent effect that could develop within one month, particularly with fluorinated preparations. It is a potentially reversible condition with reduction or cessation of dose.
Elderly patients who are vulnerable to memory decline may experience aggravated and accelerated memory decline due to corticosteroids.\textsuperscript{51-53} Loss of brain volume may be reversed following eucortisolism.\textsuperscript{54}

2.5 Endocrine effects and withdrawal after discontinuation of corticosteroids

\textbf{GPP} It is best to avoid the usage of high dose corticosteroids over a prolonged duration.

This is due to hypothalamic-pituitary-adrenal axis suppression and the adverse effects of corticosteroids, coupled with the difficulty in tailing off these medications for the following reasons\textsuperscript{55-58}:

1. The illness may relapse.
2. Hypothalamic-pituitary-adrenal axis suppression may last for more than 6 months.
3. Non-specific withdrawal may develop even when doses are at physiological replacement level.
4. Psychological dependence occurs resulting in anxiety and panic with activation of sympathoadrenal system.\textsuperscript{59}
5. The weaning off process even when hypothalamic-pituitary-adrenal axis is normal (using criteria of stimulated cortisol with insulin tolerance test or co-syntropin) or when dose of corticosteroids are at physiological levels, could be associated with symptoms of anorexia, weight loss, nausea, emesis, fatigue, myalgias, arthralgias, headaches, abdominal pain, postural hypotension, fever and skin desquamation. This appears to be indicative of “physical dependence on supraphysiological levels of glucocorticoids”. This is also described as the corticosteroid withdrawal syndrome. Its underlying basis is postulated to be the hyposecretion of corticotrophin-releasing factor due to hypoactivity of central corticotrophin releasing hormone neurons, with possible disturbance of vasopressin and oxytocin neurons.
Withdrawal of corticosteroids

A Corticosteroids should be withdrawn by tapering the dose gradually. The decision on tapering regime should be made on individually tailored basis.\textsuperscript{60}

\textbf{Grade A, Level 1+}

There is insufficient evidence to support any particular regimen at this point of time.\textsuperscript{60}

Inter-individual differences for drug absorption and clearance contribute to the difficulty in advocating any particular regime. Even non-oral forms i.e. topical, intra-articular, intranasal, have been demonstrated to cause hypothalamic-pituitary-adrenal axis suppression if used in supraphysiological doses. Withdrawal plans are based on the dual goal of avoiding adverse effects of prolonged steroid therapy while avoiding the potential consequences of adrenal insufficiency.

D Prompt withdrawal with rapid tapering is required in the following instances\textsuperscript{61}:

- Steroid psychosis
- Herpes-induced corneal ulceration
- Uncontrolled hypertension
- Serious lumbar spine osteoporosis
- When therapeutic targets have been achieved or when the regime with steroids proves inefficacious.

\textbf{Grade D, Level 4}

D It is unlikely that a tapering regime would be required in the following patients\textsuperscript{56,57}:

- those receiving any dose of corticosteroids for less than 3 weeks duration\textsuperscript{62,63}
- those on alternate-day therapy\textsuperscript{52}
- those given less than 10 mg prednisolone per day (day dose) for more than a few weeks\textsuperscript{63} or at physiologic doses taken for less than 1 month.\textsuperscript{58}

\textbf{Grade D, Level 3 & 4}

Studies revealed that there is no correlation of hypothalamic-pituitary-adrenal axis suppression with duration, dose or level of early cortisol.\textsuperscript{64,65}
Withdrawal plans should be commenced by reducing the corticosteroids from supraphysiologic to physiologic doses, which is equivalent to 5-7 mg of prednisolone per day (or hydrocortisone at 15-20 mg per day). Subsequent reduction has been suggested with conversion to hydrocortisone (because of shorter half life) or alternate day prednisolone. During periods of stress or injury, additional doses may be required to avert adrenal crises. The whole process of withdrawal may last from 9 to 12 months.

Grade A, Level 1+

Testing the hypothalamic-pituitary-adrenal axis integrity would involve plasma cortisol at 0800 hour, low dose or high dose Cosyntropin testing, and/or the gold standard insulin tolerance test in a hospital setting. Issues of sensitivity and specificity relate to such tests. In lieu of further testing, an alternative approach would be to continue a gradual taper from the level of physiologic replacement.
Randomised controlled trials showed significant improvement in nasal obstruction, nasal discharge, nasal itch, post-nasal drip and total nasal symptoms in patients on intranasal corticosteroids compared to patients on oral H1 receptor antagonists. There was no difference in eye symptoms between the 2 groups.\textsuperscript{68}

Randomised controlled trials showed no difference in the comparative efficacy of the various intranasal steroids.\textsuperscript{69}

There is a multitude of studies comparing the use of intranasal steroids. Meta-analysis suggests that the efficacy of intranasal steroids is better compared with that of oral antihistamine.

Administration of budesonide aqueous nasal spray for 6 weeks had no measurable suppressive effects on hypothalamic-pituitary-adrenal axis function in children aged 2 to 5 years old.\textsuperscript{70}

Fluticasone propionate aqueous nasal spray administered for one year had no effects on growth velocity in children aged 3.5 to 9 years old with allergic rhinitis.\textsuperscript{71}

Mometasone furoate aqueous nasal spray administered for one year in children aged 3 to 9 years old with perennial allergic rhinitis had no effect on growth velocity, with no evidence of hypothalamic-pituitary-adrenal axis suppression at any time point.\textsuperscript{72}

The data suggest that intranasal steroids are relatively safe in children. In a study of long-term use of up to one year, a multicentre, placebo-controlled, double blinded study did not show any effect on growth or the hypothalamic-pituitary-adrenal axis. Table 1 (page 32) shows the ages and safety doses.\textsuperscript{72}

An 8-week course of fluticasone propionate aqueous nasal spray did not affect maternal cortisol levels, foetal growth or pregnancy outcomes.\textsuperscript{73}

There is not much data on the use of steroids in pregnancy. Triamcinolone has been found to be teratogenic and thus is to be avoided in pregnancy. Recently a study of one nasal steroid did not show an impact on pregnancy as referenced above.\textsuperscript{73}
A randomised controlled trial showed symptomatic relief of nasal symptoms after 12 weeks of treatment with fluticasone propionate nasal drops but no objective change in polyp size in bilateral nasal polyposis in adults.\textsuperscript{74}

There is data to show that nasal polyps can be reduced by intranasal steroids as a single modality of treatment. The above study showed symptomatic relief but no objective reduction of polyp size. There is also no conclusive data that nasal steroids are helpful in the presence of sinusitis.

Intranasal steroids are indicated in both adults and children with allergic rhinitis, with no significant growth effects in children. However, there is no definite recommendation for use in pregnancy.

**Table 1. Commonly used intranasal steroids**

<table>
<thead>
<tr>
<th>Intranasal steroids</th>
<th>Adult dosage* (μg/day)</th>
<th>Maximum number of sprays per day</th>
<th>Child's age above which use of steroids is approved (years)</th>
<th>Child dosage (μg/day)</th>
<th>Maximum number of sprays per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluticasone propionate</td>
<td>200</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>Mometasone furoate</td>
<td>200</td>
<td>4</td>
<td>2</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>Beclomethasone dipropionate</td>
<td>200</td>
<td>10</td>
<td>6</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Triamcinolone acetonide</td>
<td>220</td>
<td>4</td>
<td>4</td>
<td>110</td>
<td>2</td>
</tr>
</tbody>
</table>

* adult dosage is for those who are >12 years of age.
(Source: Prescription drug information from package inserts)

Intranasal steroids should not be given to children with upper respiratory infections as intranasal steroids use neither provides symptomatic relief nor decreases episodes of acute otitis media.\textsuperscript{75}

Both oral and topical intranasal steroids may be used alone or in combination with an antibiotic as steroid use along with antibiotic, leads to a quicker resolution of otitis media with effusion in the short-term. However, there is no definite recommendation for a long-term benefit with their use.\textsuperscript{76,77}

Grade A, Level 1+ and 1++
4 Use of Corticosteroid Ear Drops in Clinical Practice

A randomized controlled trial showed that ear drops containing corticosteroids were more effective than acetic ear drops in the treatment of acute otitis externa (cure at day 14). Steroid and acetic or steroid and antibiotic ear drops are equally effective.78

There is a paucity of data with randomized control studies to compare the efficacy of steroids in acute ear infections. In the above study, the ear preparations containing corticosteroids were more effective than acetic acid ear drops in the treatment of acute otitis externa. It is noteworthy that steroid and acetic acid or steroid and antibiotic ear drops are equally effective.

Either combination of steroid and acetic acid ear drops or steroids and antibiotic ear drops may be used in the treatment of acute otitis externa.

Grade A, Level 1++

Steroid ear drops may be used in the treatment of eczematous otitis externa as steroid use leads to improvement of otological symptoms, particularly erythema, swelling and discharge.79

Grade A, Level 1+

A randomized controlled trial showed that five-day treatment with antihistamine or corticosteroid, in addition to antibiotic, did not improve acute otitis media outcomes. Antihistamine use during an acute episode of otitis media should be avoided.80
5 Corticosteroids and Gastrointestinal Conditions

5.1 Introduction

Corticosteroids are useful in very few specific gastrointestinal and hepatic conditions. These include inflammatory bowel diseases (ulcerative colitis, Crohn’s disease), autoimmune hepatitis, severe alcoholic hepatitis, and certain other rare conditions like collagenous sprue/eosinophilic gastroenteritis, which will not be further discussed here. In other conditions like vasculitis, or other drug-induced problems, the decision to use steroids is on a case-to-case basis.

Corticosteroids are “double-edged swords” and while useful, have potential dangers especially with prolonged use. Other than the well known systemic side effects of corticosteroids, specific effects in the gastrointestinal tract include an increased incidence of complications of peptic ulcer disease and reactivation of hepatitis B.

5.2 Beneficial effects of corticosteroids

5.2.1 Corticosteroids and inflammatory bowel disease

A Oral systemic and intravenous steroids are useful in inducing remission and may be used in active ulcerative colitis.\(^{81-83}\)

Grade A, Level 1++

In severe ulcerative colitis, intravenous steroids should be used initially. In mild to moderate cases, patients can be started on oral doses. The doses should be kept at maximum therapeutic levels for at least 2 weeks or until clinical remission occurs before tapering.

A Budesonide, an oral topically acting steroid, is also useful and may be used in active ulcerative colitis.\(^{84,85}\)

Grade A, Level 1+

Budesonide is an oral non-systemic corticosteroid with only 10% systemic bioavailability. It is effective in patients with extensive ulcerative colitis as compared to patients with only left-sided colitis. It is, however, less effective than systemic corticosteroids.
Steroid enemas are useful in inducing remission in patients with distal colitis and a useful adjunct in patients with left-sided colitis.\textsuperscript{86}  

\textbf{Grade A, Level 1}\textsuperscript{*}

Enemas are useful in inducing remission in patients with distal colitis/proctitis. They are also useful adjuncts in inducing remission with more extensive colitis. They have less systemic side effects compared to systemic steroids. However, steroid enemas have been found to be less efficacious than topical aminosalicylates.

Steroids should not be used in maintaining remission in ulcerative colitis.\textsuperscript{81,87,88}  

\textbf{Grade A, Level 1}\textsuperscript{++}

While steroids are useful in inducing remissions, large scale studies have found no evidence that these drugs can prolong remission. Patients in remission should be taken off steroids. Patients who are steroid dependent and cannot be tailed off should be given an alternative drug.

\subsection*{5.2.2 Corticosteroids in Crohn’s disease}

Both systemic steroids and oral topically acting steroids (budesonide), either alone or in combination, may be used in active Crohn’s disease.\textsuperscript{89-93}  

\textbf{Grade A, Level 1}\textsuperscript{++}

In active Crohn’s disease, steroids are useful in bringing the disease into remission. Most patients attain remission in 10 to 12 weeks. Budesonide is more effective for patients with disease involving the terminal ileum and ascending colon. While budesonide is not as effective as systemic steroids, it has considerably less side effects.

Steroids should not be used in maintaining remission in Crohn’s disease.\textsuperscript{89,90,94-96}  

\textbf{Grade A, Level 1}\textsuperscript{++}

Steroids have not been found to be useful in maintaining remission in Crohn’s disease. Patients continued on steroids do not have a lower incidence of relapse as compared to patients without steroids. Patients
who do not respond to steroids or relapse soon after should be started on alternative treatments.

### 5.2.3 Corticosteroids and liver disease

#### Autoimmune hepatitis

Steroids are very useful and may be used in inducing remission and preventing relapse in autoimmune hepatitis.  

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
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<tbody>
<tr>
<td>A</td>
<td>1++</td>
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</table>

This is a condition more common in females and characterized by the presence of hepatitis in the presence of hypergammaglobulinemia and autoantibodies. Prednisolone induces remission in the majority of patients but 80% relapse after cessation of treatment. These patients will benefit from continuous low dose prednisolone.

#### Alcoholic liver disease

Steroids may be used in the treatment of severe alcoholic hepatitis.  

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
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<tbody>
<tr>
<td>A</td>
<td>1+</td>
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</table>

Severe alcoholic hepatitis is a serious condition with a mortality of 60% in the first 4 weeks after diagnosis. Steroids are used to suppress the activated immune response. While controversial, recent meta-analyses have found an improvement in the short-term mortality in patients with severe alcoholic hepatitis. However, they should be used in the absence of renal failure, active infections and gastrointestinal bleeding - complications commonly associated with this condition.

### 5.3 Problems with steroids

#### 5.3.1 Corticosteroids and peptic ulcer disease

Corticosteroids do not increase the incidence of gastric and duodenal ulcer.  

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
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<tbody>
<tr>
<td>A</td>
<td>1++</td>
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</table>

Steroids with the use of non-steroidal anti-inflammatory drugs (NSAIDs) increase the incidence of peptic ulcer disease.
Patients on steroids complain of dyspepsia more often than those without. However, large scale studies while showing a trend towards a higher incidence of peptic ulcer disease, have not shown any statistical significance between those with and those without steroids. This indicates that it is unnecessary to practice preventive anti-ulcer treatment to all patients receiving steroids. There is, however, a higher incidence of peptic ulceration in patients who use both steroids and NSAIDs.

Steroids do not increase the incidence of peptic ulcer complications—bleeding and perforation.\textsuperscript{104}

There is some evidence that steroid usage results in a higher incidence of peptic ulcer perforation in the elderly.\textsuperscript{108,109}

Steroids when used together with NSAIDs, result in a higher incidence of peptic ulcer complications.\textsuperscript{108,109}

While there is a trend showing a higher incidence of complications for the usage of steroids alone, it is not statistically significant. However, the usage of NSAIDs and steroids together more than doubles the risks of complications. Patients on such combination should receive preventive anti-ulcer medication.

\textbf{GPP} Patients who are on steroids should have prophylaxis if they are also on non-steroidal anti-inflammatory drugs or are elderly with a history of peptic ulcer disease.

\textbf{5.3.2 Corticosteroids and Hepatitis B and C (HBV and HCV)}

The usage of corticosteroids can lead to reactivation of quiescent hepatitis B infection or recurrent flares. This can result in fulminant hepatitis.\textsuperscript{110-113}

\textbf{A} Patients who are known to be hepatitis B virus carriers and are receiving chemotherapy with corticosteroids should also receive prophylaxis.\textsuperscript{114-116}

\textbf{Grade A, Level 1*}
Patient who are known to be hepatitis B virus carriers should be considered for prophylactic medication if they are to receive systemic steroids for a duration of more than a week.

It is advisable to test all patients for hepatitis B if systemic long-term steroids are being considered.

Initial studies had demonstrated the effectiveness of steroids for treating chronic active hepatitis in non-hepatitis B patients. Subsequent studies on patients who are hepatitis B virus carriers have either shown no added effects or worse outcome in those treated with long-term steroids. There is an increase in hepatitis B virus DNA levels with the use of steroids and its subsequent cessation can lead to a flare of the condition. It is therefore not advisable to start patients with hepatitis B virus on long-term systemic steroids. Studies have also shown that the hepatitis B virus DNA levels especially in e-antigen positive individuals rise exponentially in 2 weeks. It is therefore advisable to consider prophylaxis in patients who are to take systemic steroids for more than a week.

More recent studies have shown that when used in combination with other chemotherapeutic drugs for malignancy, hepatitis-related flares are common. This usually occurs when the doses are being tailed down. Patients on such therapy should also receive prophylactic antivirals.

The usage of corticosteroids has neither beneficial nor deleterious effects in patients with hepatitis C.\textsuperscript{117-119}

Hepatitis C is sometimes associated with autoimmune phenomena which might require the use of steroids. Moreover, there is an overlap in the diagnosis of hepatitis C and autoimmune hepatitis. This might necessitate the use of corticosteroids. Unlike hepatitis B, reviews have not found sufficient evidence of any beneficial or deleterious effects with the use of corticosteroids in this condition.

Based on present evidence, there is no need to specifically look for the presence of hepatitis C before starting corticosteroid treatment in any medical condition.

\textsuperscript{Grade A, Level 1+}
6 Use of Corticosteroids in Children

6.1 Introduction

6.1.1 Special considerations in the paediatric patient

The side effects of systemic corticosteroids in adults and children are well known, whereas topical corticosteroids are generally thought to be safe. However, physicians should remember that this safety profile has been demonstrated when corticosteroids are used at recommended doses. Topical corticosteroids may not be as innocuous if used at higher than recommended doses in children. Issues with inhaled corticosteroids will be discussed here.

6.1.2 Growth

The paediatric age is the time of growth. Growth retardation is a side effect of treatment with systemic corticosteroids.\textsuperscript{120,121} The longer the treatment, the more severe the impairment. The data for inhaled steroids is not as clear-cut. However, it should be remembered that substantial symptomatic improvement occurs in asthmatic children treated with inhaled corticosteroids.

Normal final adult height is achieved with low dose inhaled corticosteroids.\textsuperscript{122,123}

There may be some reduction in growth velocity in the first year of therapy but this tends not to be sustained during subsequent years.

Moderate doses of beclomethasone and fluticasone in children with mild to moderate asthma caused a slight decrease in linear growth velocity (1.51 cm/year and 0.43 cm/year, respectively) when followed up for 54 weeks.\textsuperscript{124}

The effect of moderate and high doses of inhaled corticosteroids when given for >54 weeks on final adult height remains unknown.

6.1.3 Cataracts

There is no evidence that inhaled corticosteroid therapy causes posterior subcapsular cataract formation, even if treatment is for as long as 3 to 6 years.\textsuperscript{125,126}
Although children receiving long-term systemic corticosteroid therapy should be screened for cataracts, this is unnecessary in children on inhaled corticosteroids alone.

Grade D, Level 3

6.1.4 Effect on bone metabolism

At recommended doses, inhaled corticosteroids have no adverse effects on bone density in children.\textsuperscript{127}

Children aged 6 to 14 years treated with fluticasone propionate had normal increases in lumbar spine and femoral neck bone mineral densities.

6.1.5 Suppression of adrenal function

Low to moderate dose inhaled corticosteroids do not cause adrenal suppression.\textsuperscript{128}

Low dose budesonide aqueous spray in children aged 2 to 5 years also does not result in adverse effect on the hypothalamic-pitutary-adrenal axis.\textsuperscript{70}

However, acute adrenal insufficiency has been reported in children receiving high doses (>500 ug/day) of fluticasone propionate.\textsuperscript{129}

6.1.6 Neuropsychological disturbances

Low doses of inhaled corticosteroids do not cause neuropsychological and behavioural changes in children.\textsuperscript{123,130}

However, small case series have shown that moderate doses of budesonide can cause aggressiveness, hyperanxiety, mood changes and excitability in children.\textsuperscript{131}

Oral prednisolone at a dose of 2 mg/kg/day for 5 days in children with asthma exacerbations was more likely to cause changes in behaviour (aggression and anxiety) than a dose of 1 mg/kg/day.\textsuperscript{132}
6.2 Use of corticosteroids in the paediatric patient

Corticosteroids are used for many medical indications in children. These include diseases of the respiratory tract, skin and autoimmune conditions. There is overlap with the use in adults, but there are medical conditions unique to the paediatric age group. These will be discussed here.

6.2.1 Acute bronchiolitis

Acute bronchiolitis occurs in children less than 2 years of age. It is characterized by upper respiratory tract symptoms progressing on to tachypnoea, crepitations and wheezing.

A Systemic corticosteroids are NOT recommended in children with acute bronchiolitis.\textsuperscript{133} 

\textbf{Grade A, Level 1++}

A Inhaled corticosteroids are NOT recommended in children with acute respiratory syncytial viral bronchiolitis.\textsuperscript{134} 

\textbf{Grade A, Level 1+}

No benefits were found in either length of stay in hospitalized patients or in clinical score in patients seen at the emergency department.

6.2.2 Acute laryngotracheobronchitis

Acute laryngotracheobronchitis (ALTB or croup) occurs in children less than 6 years old, typically between the ages of 1 to 2 years. They have symptoms of an upper respiratory tract infection with the gradual onset of stridor. The commonest aetiological agent is parainfluenza virus.

A Corticosteroids are recommended for the treatment of acute laryngotracheobronchitis.\textsuperscript{135} 

\textbf{Grade A, Level 1++}

A Nebulized budesonide, oral and parenteral dexamethasone have the same effectiveness and may be used for treatment of laryngotracheobronchitis.\textsuperscript{136} 

\textbf{Grade A, Level 1+}
Treatment with oral dexamethasone or nebulised budesonide resulted in relieving symptoms, fewer return visits, fewer readmissions and shorter length of stay for hospitalized patients.

**GPP** For children with mild croup, a single dose of oral dexamethasone is an effective treatment. Choice between oral and parenteral dexamethasone is up to the individual clinical setting. **GPP**

### 6.2.3 Asthma

Corticosteroids are used in acute asthma exacerbations (systemic) as well as for maintenance therapy (inhaled) in patients with persistent asthma.

**A** Systemic corticosteroids are recommended for children with acute asthma exacerbation.\(^{137}\)  
**Grade A, Level 1++**

Both oral prednisolone and intravenous steroids have been shown to be effective in acute asthma, resulting in earlier discharge, shorter length of stay and less chance of relapse. There is insufficient evidence to support the use of early inhaled corticosteroids in the treatment of acute asthma exacerbations.\(^{138}\)

**A** Inhaled corticosteroids are recommended for the treatment of children with persistent asthma.\(^{139,140}\)  
**Grade A, Level 1++**

Inhaled corticosteroids resulted in improvements in FEV\(_1\) (forced expiratory volume in the first second), morning peak flow values, reduction in rescue β\(_2\)-agonist use and reduction in need for rescue prednisolone. Physicians should refer to the global initiative for asthma (GINA) guidelines (www.ginasthma.org) for more information.

### 6.2.4 Eczema

Eczema is a chronic inflammatory skin disease which affects about 15 to 20% of children in Singapore. It causes not only medical complications but can also adversely affect the quality of life of child
and parent. Eczema commonly begins at a young age (usually infancy) and runs a course of exacerbations and remissions.

**A** Topical corticosteroids are recommended for children with moderate to severe eczema. Topical corticosteroids results in improvement in disease severity and reduces the risk of relapse.$^{141,142}$

*Grade A, Level 1*+

In two studies looking at children 2 to 14 years old, treatment was well tolerated with no visible signs of skin atrophy. Treatment should be in conjunction with adjunctive therapy such as emollients and anti-histamines as necessary.

### 6.2.5 Systemic corticosteroids

**GPP** It is recommended that systemic corticosteroids in children (except short courses or “bursts” which are not likely to cause side effects) should be used in consultation with physicians with experience in its use and in monitoring for side effects.

*GPP*
Corticosteroid Injections in Joints and Soft Tissues

Corticosteroids are used for injection into
1. joints
2. bursae
3. soft tissues

Aseptic technique is important. The presence of infection must be excluded before corticosteroid injections.

7.1 Upper limb conditions

7.1.1 Shoulder conditions including rotator cuff tendonitis and adhesive capsulitis

A Corticosteroid injections may have short-term benefits but may not be sustained. The subacromial route is recommended for rotator cuff tendonitis and intra-articular injection for adhesive capsulitis. Oral non-steroidal anti-inflammatory drug (NSAID) therapy may be considered prior to injection therapy.\textsuperscript{143-145}

Grade A, Level 1+

7.1.2 Lateral epicondylitis (Tennis Elbow) and medial epicondylitis (Golfer’s elbow)

A Corticosteroid injections can provide short-term relief, and can be useful in early treatment of lateral epicondylitis (Tennis Elbow) and medial epicondylitis (Golfer’s elbow).\textsuperscript{146-148}

Grade A, Level 1+

Possible adverse effects include subcutaneous necrosis with local skin atrophy, and post-injection pain.\textsuperscript{4,5}
7.1.3 De Quervain’s Tenosynovitis

D Corticosteroid injections can provide short-term relief, is useful and may be used in early treatment of De Quervain’s Tenosynovitis.

Grade D, Level 3

It is most effective in patients that present early with a short history. Injections may be coupled with splinting.149,150

Possible adverse effects include local discomfort, local flare, bruising, superficial radial nerve neuropraxia, and local subcutaneous fat atrophy.149,150

7.1.4 Carpal tunnel syndrome

A Corticosteroid injections can provide short-term relief and may be used for carpal tunnel syndrome.

Grade A, Level 1++

It is most effective in early presentation with short history and minimal neurological deficit. One study found this modality not superior to oral NSAIDs with splinting.151

One possible complication is intra-neural injection of the median nerve.

D Recommended safe injection technique for carpal tunnel syndrome:152
- 25G needle at 30 degree angle insertion, approach skin ulnar to palmaris longus tendon.
- Withdraw needle if paresthesia experienced by patient.
- Bulge in palm distal to transverse carpal ligament is indication of correct placement of needle.

Grade D, Level 4

7.1.5 Trigger finger

D Corticosteroid injections are highly effective and may be used as first line therapy for long-term treatment of trigger finger and thumb.153,154

Grade D, Level 3
True intra-sheath injection confers no advantage compared to subcutaneous injection over the annular pulley.\textsuperscript{155}

7.2 Lower limb conditions

7.2.1 Osteoarthritis of the knee

A Intra-articular corticosteroid injections provides short-term benefit and may be used in relieving pain.\textsuperscript{156,157} Judicious use is advocated in acute exacerbation of osteoarthritis. It may be combined with knee aspiration if effusion is present.

\textbf{Grade A, Level 1+}

The incidence of septic arthritis resulting from intra-articular injection corticosteroids has ranged from 1:14,000 to 1:50,000.\textsuperscript{158-160}

We suggest the use of this modality in the community setting with caution.

\textbf{GPP} Regular use of intra-articular steroids is not recommended for osteoarthritis of the knees in the general practice setting.

7.2.2 Achilles tendinitis

A No benefit has been shown for the use of injection corticosteroid in Achilles tendonitis and it is not recommended for this condition.\textsuperscript{161}

\textbf{Grade A, Level 1+}

There have been many animal studies showing the deleterious effects of steroids on tendon healing, as well as case reports\textsuperscript{162-169} of Achilles tendon rupture after injection corticosteroid. As there is no benefit shown in the use of this modality in Achilles tendinitis, coupled with the attendant risks, we strongly advise against any use of injection corticosteroid therapy in this condition.

7.2.3 Plantar fasciitis

A Corticosteroid injections can provide short-term relief of symptoms to a small degree and may be used in plantar fasciitis.
Orthosis should be prescribed for those patients who stand for long periods.\textsuperscript{170}

**Table 2** Table of dosages of steroid medication that have been used and are provided for information

<table>
<thead>
<tr>
<th>Condition*</th>
<th>Shoulder Condition*</th>
<th>Lateral Epicondylitis*</th>
<th>De Quervain’s Tenosynovitis\textsuperscript{1}</th>
<th>Carpal Tunnel syndrome\textsuperscript{†}</th>
<th>Trigger Finger*</th>
<th>Osteoarthritis of the Knee</th>
<th>Planter Fasciitis\textsuperscript{273}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone</td>
<td>25-50 mg\textsuperscript{143}</td>
<td>25 mg\textsuperscript{140,144}</td>
<td>25-50 mg\textsuperscript{150}</td>
<td>25-50 mg\textsuperscript{176,177}</td>
<td>-</td>
<td>50 mg\textsuperscript{158,161}</td>
<td>-</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>10-40 mg\textsuperscript{143,145}</td>
<td>10-20 mg\textsuperscript{146,147,174}</td>
<td>30 mg\textsuperscript{173}</td>
<td>30 mg\textsuperscript{176,178}</td>
<td>10-20 mg\textsuperscript{154}</td>
<td>20-40 mg\textsuperscript{158,179,180}</td>
<td>5-10 mg\textsuperscript{162}</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>2-3 mg\textsuperscript{143}</td>
<td>1.5-3 mg\textsuperscript{146,147}</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>40-80 mg\textsuperscript{143}</td>
<td>20 mg\textsuperscript{148,149,173}</td>
<td>15-40 mg\textsuperscript{149}</td>
<td>15-40 mg\textsuperscript{151}</td>
<td>-</td>
<td>40-80 mg\textsuperscript{158,180}</td>
<td>40 mg\textsuperscript{183}</td>
</tr>
<tr>
<td>Lignocaine 1%</td>
<td>Up to 10 mls\textsuperscript{172}</td>
<td>0.5-2 ml\textsuperscript{146,147,173}</td>
<td>0.5-2 ml\textsuperscript{140,130,175}</td>
<td>1-2 ml\textsuperscript{151,176-178}</td>
<td>0.5 ml\textsuperscript{155}</td>
<td>-</td>
<td>1-2 mls\textsuperscript{182,183}</td>
</tr>
</tbody>
</table>

* \textbf{GPP} There should be at least 6 weeks of interval between corticosteoid injections, and up to a maximum of 3 doses are recommended in shoulder conditions, lateral epicondylitis and trigger finger.

† \textbf{GPP} A single dose of corticostoeoids is recommended in De Quervain’s Tenosynovitis and carpal tunnel syndrome.

### 7.3 Trigger point injections

Although steroid injections are done frequently for trigger points, effectiveness is not supported by studies.
8 Corticosteroids in Rheumatological Conditions

8.1 Osteoarthritis

8.1.1 Intra-articular corticosteroids

Knee

Intra-articular corticosteroids in osteoarthritis of knees was discussed in Chapter 7.

Carpometacarpal joint of the thumb

One small double-blind randomized controlled trial showed no clinical benefit was gained from intra-articular injection of triamcinolone hexacetonide to the carpometacarpal joint of the thumb in moderate to severe osteoarthritis compared with placebo injection.\(^{184}\)

Hip

There is no robust evidence to support the efficacy of steroid injection for hip osteoarthritis.\(^{185,186}\)

8.1.2 Systemic corticosteroids

GPP There is no evidence for the use of systemic corticosteroids in osteoarthritis. It should not be prescribed for the treatment of osteoarthritis.

GPP

8.2 Gout

In the management of acute attacks of gout, corticosteroids may be used in patients with renal insufficiency or who for other reasons cannot tolerate non-steroidal anti-inflammatory drugs (NSAIDs) or colchicine.
8.2.1 Intra-articular corticosteroid

D In patients with acute gout affecting one or two joints, intra-articular injection of a long-acting corticosteroid preparation, such as methylprednisolone, triamcinolone acetonide or triamcinolone hexatonide, will control symptoms within 1 to 2 days.\textsuperscript{160,187-189} It should be given only when the diagnosis is confirmed and infection has been excluded. Patients with polyarticular gout who have a suboptimal or delayed response to oral non-steroidal anti-inflammatory drugs often benefit from adjunctive corticosteroid injections into those joints with persistent synovitis.\textsuperscript{189} 

Grade D, Level 3

8.2.2 Systemic corticosteroid

D Both intramuscular injection of corticosteroid (triamcinolone acetonide 40 mg - 60 mg once) and oral corticosteroid are effective and may be used in acute attacks particularly in the patient with polyarticular gout.\textsuperscript{189-191} Prednisolone can be started at a dose of 20 to 40 mg/day and tapered over 7 to 10 days. If tapered too rapidly, a rebound flare-up of gout may occur. 

Grade D, Level 3

8.3 Pseudogout

D Well conducted studies on the use of intra-articular or systemic corticosteroids in acute attacks of pseudogout are lacking.\textsuperscript{160,192} However, clinical experience suggests that a similar approach to that for the management of acute gout may be effective in acute attacks of pseudogout.\textsuperscript{193} 

Grade D, Level 4

8.4 Rheumatoid arthritis

8.4.1 Intra-articular corticosteroids

A Rheumatoid synovitis may be suppressed for three months or longer using relatively insoluble microcrystalline corticosteroid preparations.\textsuperscript{194-197} Intra-articular corticosteroid should be considered ancillary to rest, physical therapy, non-steroidal anti-inflammatory agents, and disease modifying anti-rheumatic drugs. No convincing evidence exists, that joint erosive changes are retarded. 

Grade A, Level 1+
8.4.2 Systemic corticosteroids

Prednisolone in low doses (not exceeding 15 mg daily) may be used intermittently in patients with rheumatoid arthritis, particularly if the disease cannot be controlled by other means.\textsuperscript{198}

Based on the limited data available, moderate-term low dose prednisolone (not exceeding 15 mg per day) treatment of rheumatoid arthritis appears to be superior to placebo and comparable to treatment with aspirin or chloroquine in improving several common rheumatoid arthritis disease activity measures.\textsuperscript{199}

Studies conducted more recently have corroborated findings from older trials that corticosteroids decrease the progression of rheumatoid arthritis as detected radiographically.\textsuperscript{200-202}

A Systemic corticosteroids may thus be used in the management of rheumatoid arthritis in two ways\textsuperscript{198,199}:

1. Short-term, low dose bridge therapy, aimed at controlling symptoms during periods of active disease while awaiting the effects of newly started single or combination disease modifying anti-rheumatic drugs (DMARDs).

2. Moderate to longer-term low dose prednisolone (usually 10 mg or less) given in addition to single or combination DMARDs if this treatment has failed to control disease activity sufficiently.

\textbf{Grade A, Level 1+}

The benefits of low dose systemic corticosteroids, however, should always be weighed against their adverse effects. For long-term disease control, the corticosteroid dosage should be kept to a minimum. For the majority of patients with rheumatoid arthritis, this means less than 10 mg of prednisolone per day.\textsuperscript{203}
8.5 Psoriatic arthritis

8.5.1 Intra-articular corticosteroids

D Periodic intra-articular injection of corticosteroid can be of particular value in the management of patients with oligoarticular disease or those with controlled polyarticular disease but one or two persistently active inflamed joints despite disease modifying anti-rheumatic drugs. \(^{204}\)

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<tr>
<th>Grade</th>
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<tr>
<td>D</td>
<td>4</td>
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</table>

8.5.2 Systemic corticosteroids

D In general, systemic corticosteroids should be used judiciously in psoriatic arthritis because of the risk of provoking a pustular flare in the skin on withdrawal. \(^{205}\)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
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<tbody>
<tr>
<td>D</td>
<td>3</td>
</tr>
</tbody>
</table>

8.6 Ankylosing spondylitis

8.6.1 Intra-articular corticosteroids

Sacro-iliac joint

A Intra- or peri-articular corticosteroid injections have been shown in small randomized controlled trials to be effective and may be used for the pain of sacroiliitis. \(^{206-208}\)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
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<tbody>
<tr>
<td>A</td>
<td>1+</td>
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</table>

Peripheral joints and entheses

D There are no clinical studies evaluating the efficacy of intra-articular corticosteroid on peripheral arthritis nor on the use of local corticosteroid injections for the enthesitis of ankylosing spondylitis. Clinical experience suggests that corticosteroid injections can be helpful in selected cases. \(^{209}\)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
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</thead>
<tbody>
<tr>
<td>D</td>
<td>4</td>
</tr>
</tbody>
</table>
8.6.2 Systemic corticosteroids

D The use of systemic corticosteroids for axial disease is not supported by evidence.\textsuperscript{209} These patients already have significant loss of bone density, which can be exacerbated by steroid therapy.

Grade D, Level 4

8.7 Connective tissue diseases

Corticosteroid therapy is widely used in the management of connective tissue diseases such as systemic lupus erythematosus, polymyositis/dermatomyositis and systemic vasculitis. Corticosteroids can be used as intravenous pulses to obtain rapid control of disease activity in ill patients. More often varying dosages of oral prednisolone are used depending on the disease condition, its manifestations and disease activity. Based on pathophysiologic and pharmacokinetic data, standardization of the terms such as "low" or "high" dose has been recently proposed to minimize problems in interpretation of these generally used terms.\textsuperscript{210} As there are specific indications for corticosteroids in these multi-systemic disorders, they are best managed in, or co-managed with, a specialist practice.
9 Respiratory Diseases

9.1 Asthma

9.1.1 Long-term asthma management

Corticosteroids are the most effective anti-inflammatory treatment for asthma. They reduce airway inflammation and hyper-responsiveness. This results in improved lung function and quality of life as well as reduced symptoms and exacerbations.\textsuperscript{211-213} The therapeutic index and safety profile of even high dose inhaled steroids is clearly better than oral steroids.\textsuperscript{214} Common side effects with inhaled preparations are oral candidiiasis and dysphonia. The range of inhaled steroids available differs in delivery devices, potency and bioavailability.

A Inhaled steroids are the preferred treatment for patients with persistent asthma symptoms at all levels of severity.\textsuperscript{215,216}  
\textit{Grade A, Level 1++}

The dose response curve of inhaled steroids is relatively flat in mild to moderate asthma. This has been proven for outcome measures such as symptoms, lung function and airway responsiveness.\textsuperscript{215,217,218} Therefore, escalating to high dose inhaled corticosteroids provides limited further benefit in terms of asthma control but increases risk of side effects.

A Add-on therapy with another class of controller medication (e.g. long-acting $\beta_2$-agonist) is preferred to increasing the dose of inhaled corticosteroids.\textsuperscript{219}  
\textit{Grade A, Level 1++}

Long-term treatment with high doses of inhaled corticosteroids may be associated with skin thinning, easy bruising and adrenal suppression.\textsuperscript{220,221} There is no evidence of conventional doses of inhaled corticosteroids affecting bone mineral density or vertebral fracture risk.\textsuperscript{222}

B The risks of poorly controlled asthma should be weighed against the limited risk of long-term inhaled corticosteroids.\textsuperscript{220-222}  
\textit{Grade B, Level 2++}
**9.1.2 Asthma management in pregnancy**

The clinical course of asthma can change in pregnancy and needs to be carefully monitored. Poorly-controlled asthma has an adverse effect on the fetus and can result in maternal complications like pre-eclampsia and hyperemesis. The overall perinatal prognosis in well-managed asthma in pregnancy is comparable to that of children born to women without asthma.\(^\text{227}\) However, there may be an increased risk of oral clefts in exposure to steroids in the first trimester.\(^\text{228}\) Using steroids in pregnancy is justified even if their safety is not unequivocally proven when the benefits outweigh the risks. Therefore, well-controlled asthmatics should remain on their current treatment regimen of inhaled corticosteroids during pregnancy if control is acceptable.\(^\text{229}\)

**C** Inhaled steroid regimen should not be changed in pregnancy.

Grade C, Level 2++

**9.1.3 Management of acute exacerbations of asthma**

Systemic corticosteroids speed up resolution of acute exacerbations of asthma if there is no lasting response to initial short acting \(\beta_2\)-agonist therapy. Early use of oral corticosteroids is associated with a decrease in hospital admission, relapse rate and \(\beta_2\)-agonist use.\(^\text{230,231}\) Doses
higher than 0.5 to 1 mg/kg/day of prednisolone or 400 mg/day of hydrocortisone offer no therapeutic advantage. Oral steroids are as effective as intravenous steroids and are both less invasive and less expensive.

Systemic steroids should be given at least 5 days in acute exacerbations of asthma that do not have rapid and sustained response to short-acting β2-agonist therapy. Oral dosing is preferred over intravenous therapy. Intravenous administration should only be considered in the critically ill or if the patient is unable to tolerate oral medication. There is no need for tapering dose at the end of a short course of oral prednisolone (up to 10 days).

The optimal increase in maintenance inhaled corticosteroids in an acute exacerbation is not well defined. Increase of inhaled steroids early in an acute attack (e.g. as part of an asthma action plan) reduces hospital admission. High dose inhaled corticosteroids and β2-agonists provide greater bronchodilation than β2-agonist alone. However, there is insufficient evidence that inhaled corticosteroids provide additional benefit when used in combination with systemic steroids in acute exacerbations of asthma. Inhaled corticosteroids should be continued or started as part of the chronic asthma management plan.

The role of conventional doses of inhaled corticosteroids as adjunctive therapy to systemic steroids in an acute exacerbation of asthma is limited.

9.2 Chronic obstructive pulmonary disease (COPD)

9.2.1 Management of stable COPD

The therapeutic effects of both oral and inhaled corticosteroids in COPD are less clear than in asthma and prescription should be limited to specific indications. Patients who have a significant bronchodilator response on spirometry (200 ml and 12% increase in FEV1) may be more likely to respond to long-term inhaled corticosteroids. Reversibility tests with a trial of oral corticosteroids do not predict response to inhaled corticosteroids and should not be
used to identify who will benefit from inhaled corticosteroids. Inhaled corticosteroids do not have a clinically significant effect on the long-term decline of FEV₁ in COPD. However, long-term inhaled corticosteroid therapy reduces the rate of acute exacerbations and improves quality of life. Therefore, inhaled corticosteroids are appropriate for symptomatic patients with FEV₁ less than 50% of predicted and repeated exacerbations requiring antibiotics or oral corticosteroids (e.g. three episodes in the preceding 3 years). Furthermore, in patients with moderate to severe COPD, discontinuation of inhaled corticosteroids may lead to an increase in exacerbations and deterioration in quality of life. Combination therapy of long-acting β₂-agonists and inhaled corticosteroids have been shown to reduce reliever use and severe exacerbations compared to placebo in severe COPD.

**Combined inhaled corticosteroids with long-acting bronchodilators should be considered in severe COPD patients with recurrent exacerbations or symptoms.**

*Grade A, Level 1++*

There is a lack of substantial benefit in the long-term use of oral corticosteroids in COPD. This should be weighed against considerable side effects including steroid myopathy, which can worsen the patient’s functional status and worsen respiratory failure.

**Long-term treatment with oral corticosteroids is not recommended in COPD.**

*Grade A, Level 1++*

### 9.2.2 Management of exacerbations of COPD

Systemic corticosteroids increase the rate of lung function improvement over the first 72 hours of an acute COPD exacerbation. It also shortens recovery time and reduces treatment failure. Therapy beyond 14 days has not been shown to result in greater efficacy and increases the risk of side effects.
A Oral corticosteroids should be considered if patients experience a significant increase in breathlessness that interferes with daily activities especially if the baseline FEV$_1$ is less than 50% of predicted. A dose of prednisolone of 30-40 mg/day for 7 to 14 days is recommended for acute exacerbations of COPD.

Grade A, Level 1++

9.3 Respiratory infections

9.3.1 Acute bronchitis

Acute bronchitis is defined as a syndrome of cough lasting less than 2-3 weeks that may be associated with sputum production as well as other respiratory or constitutional symptoms. There is no data for the use of inhaled or oral corticosteroids in the treatment of bronchial hyper-responsiveness caused by acute bronchitis. Symptomatic treatment with short-acting inhaled bronchodilators and anti-tussives may be more appropriate for patients with persistent and troublesome cough.248,249

D Corticosteroids should not be used in the management of acute bronchitis.249

Grade D, Level 4

9.3.2 Lower respiratory tract infections

There is no data for the outpatient management of lower respiratory tract infections like bronchiolitis or pneumonia with adjunctive corticosteroid therapy. Appropriate anti-microbial therapy should be administered expeditiously.250

D Corticosteroids should not be used in the treatment of lower respiratory tract infections.

Grade D, Level 4

9.3.3 Pulmonary tuberculosis

Adjunctive therapy with corticosteroids in pulmonary tuberculosis may hasten radiological resolution of lung infiltrates.251 However, there is no appreciable effect on the rate of sputum conversion.251 There is also no benefit of corticosteroid use in tuberculous pleurisy in both clinical and radiological outcomes.252 There is a role for
corticosteroids in the management of paradoxical reactions to tuberculosis anti-microbial therapy as well as in the treatment of extra-pulmonary tuberculosis with pericarditis or meningitis. These conditions should be managed under specialist care.

A The routine use of corticosteroids should be avoided in the management of pulmonary tuberculosis.

Grade A, Level 1++

9.4. Other respiratory diseases

GPP The following respiratory disorders may require corticosteroid therapy and patients with these conditions should be referred to a specialist respiratory service:
- Allergic bronchopulmonary aspergillosis
- Churg Strauss syndrome
- Eosinophilic pneumonia
- Sarcoidosis
- Pulmonary vasculitis
- Pulmonary haemorrhage syndromes
- Pneumocystis carinii pneumonia with respiratory failure
- Interstitial lung disease
- Post-radiation pneumonitis

GPP
10 Corticosteroids in Dermatologic Conditions

10.1 General principles

- Accurate diagnosis, understanding and recognition of the steroid-responsive dermatoses is an important skill all practitioners need to acquire before using topical corticosteroids.
- Indications, risk, benefits, alternatives and associated adjunct therapies of topical corticosteroids are essential before prescribing.
- Topical corticosteroids are effective and safe if used with discretion.
- Understanding of the relative and absolute contraindications for topical corticosteroids like skin infections are critical for safe use of topical corticosteroids.
- The principle of reviewing the patient before repeating the prescription is good clinical practice for safe and effective use of topical corticosteroids.

10.2 Indications

Topical corticosteroids are potent and effective local anti-inflammatory and anti-proliferative medications available for the treatment of inflammatory skin and mucosal disorders.

Topical corticosteroids are useful in the treatment of steroid-responsive dermatoses, namely eczema/dermatitis, psoriasis, lichen planus, pityriasis rosea, drug eruptions, and lupus erythematoses.

A There is reasonable evidence from randomised controlled trials to support the use of topical corticosteroids as the mainstay of treatment of atopic eczema.\textsuperscript{254}

\textbf{Grade A, Level 1+}

GPP Topical corticosteroids in treatment of psoriasis are best reserved for localised sites such as hands, feet, flexures, genitalia, face and scalp.

GPP
Intralesional corticosteroids are used in the therapy of prurigo, lichenified eczema, alopecia areata, granuloma annulare and keloids.

Topical corticosteroids are contraindicated in the presence of skin infection (viral, bacterial, fungal, parasitic) ulceration and known hypersensitivity to the steroid or its vehicle.

**10.3 Uses**

Topical corticosteroids are available in many strengths and their potencies have been ranked in the Stoughton-Cornell Classification (USA system) which is originally based on an assay of each corticosteroid’s ability to cause vasoconstriction. The steroid potencies range from Class 1 super potent steroids like clobetasal propionate to Class 7 mildest 1% hydrocortisone.

In the British National Formulary, the potencies range from Class 1 super potent to Class 4 (see Table 4 page 65).

Topical steroids are available in creams, ointments, lotions, solutions, foams and gel.

The potency of topical corticosteroids is directly related to the beneficial effects and side effects.

The finger-tip unit (the amount of ointment/cream expressed from a tube from distal skin crease to tip of index finger) is a readily understandable measure for patients and doctors.²⁵⁵

Fluticasone propionate, mometasone furoate, prednicarbate and hydrocortisone aceponate are associated with few side effects despite their potencies. However, improved benefit/risk ratio remains to be proven.²⁵⁶

Topical corticosteroids are often used in twice daily application. There is no data supporting that more frequent application leads to a better or faster resolution of lesions.¹⁴²

Topical corticosteroids should not be used more than twice a day.²⁵⁴,²⁵⁷,²⁵⁸

*Grade A, Level 1*
There is evidence in some situations that once a day application of topical corticosteroids gives as effective result as twice daily application.\textsuperscript{254}

There is some evidence to suggest the benefit of using intermittent (twice weekly) topical corticosteroids to prevent relapses of atopic eczema. There is no evidence of skin thinning after 4 months of intermittent use of a potent topical corticosteroids.\textsuperscript{142}

There is no randomised controlled trials evidence to support the notion that diluting topical corticosteroids reduces adverse effects while maintaining efficacy in patients with atopic eczema.\textsuperscript{254}

\textbf{GPP} It is not recommended to dilute and mix other types of creams with topical corticosteroids in your practice. \textit{GPP}

There is no randomised controlled trial evidence of improved efficiency with the use of topical corticosteroids plus antibiotics (fusidic acid or gentamicin) as compared to plain topical corticosteroids in patients with infected atopic eczema.\textsuperscript{254}

\textbf{GPP} In the presence of infected eczema, use of oral antibiotics is considered as good practice. \textit{GPP}

### 10.4 Safety and side effects

Hypothalamic-pituitary-adrenal (HPA) axis suppression has been demonstrated in some patients with super potent topical corticosteroids.

There are rare cases of iatrogenic Cushing’s syndrome in patients treated (including self treatment) with super potent topical corticosteroids. However, clinically significant effects seldom result from minor degrees of adrenal suppression that occur with the use of super potent topical corticosteroids.\textsuperscript{256}

The increased skin surface to body mass ratio in infants and small children makes them more susceptible to hypothalamic-pituitary-adrenal axis suppression.\textsuperscript{256}
Local cutaneous side effects of epidermal atrophy, skin fragility, dermal atrophy, striae, purpura, telangiectasia and dryness do occur when topical corticosteroids are used in excessive amount or prolonged duration.\textsuperscript{256}

D To prevent side effects, the amount of topical corticosteroids used per week and duration of use must be monitored and controlled. Adjunctive therapy must be emphasized.\textsuperscript{259}

\textbf{Grade D, Level 3}

Adults applying a potent steroid in excess of 50 to 100 g weekly and 10-20 g in small children run the risk of hypothalamic-pituitary-adrenal axis suppression.

\textbf{GPP} It is recommended that not more than 25 g of clobetasal propionate per week be used in adults. All patients on clobetasol propionate should be monitored closely for potential side effects.

\textbf{GPP} Applying potent topical corticosteroids under occlusion increases absorption, efficacy and risk to hypothalamic-pituitary-adrenal axis suppression.

\textbf{GPP} For areas of the face and flexures it is best to confine use of topical steroids to mild topical corticosteroids and less commonly to moderate to potent topical corticosteroids for short periods of time.

\textbf{GPP} When patient requests for repeat prescription of moderately potent and super potent topical corticosteroids, clinical review must be done before repeating the dose. Patient should be educated regarding the need to come for clinical review before extending the duration by explaining the risk and benefits of continuing steroids on long term basis.

\textbf{D} Use of flourinated topical corticosteroids should be avoided on the face as there is a high risk for complications like perioral dermatitis, rosacea-like dermatitis, acneform lesions and facial hypotrichosis. Where indicated it should be used for short period, under frequent
and close review of patient's condition. Longer usage should be in consultation with a specialist dermatologist.\textsuperscript{260,261}

\textit{Grade D, Level 4}

Generic topical corticosteroids are not necessarily equal in efficacy to branded products due mainly to differences in vehicle.\textsuperscript{262}

10.5 \textbf{Topical corticosteroids in pregnancy and lactation}

Appropriate human studies using topical corticosteroids in pregnancy have never been performed.

Most topical corticosteroids are rated by the US Food and Drug Administration as Category C drugs which indicates that caution must be exercised while using them and these should be used only if the benefits outweigh any risk to the foetus.

Numerous studies of pregnant patients taking systemic corticosteroids throughout pregnancy show no increase in the incidence of foetal abnormalities.

\textbf{GPP} It is presently unknown whether topical corticosteroids are excreted in breast milk. The general advice is to use topical corticosteroids with caution in breastfeeding mothers and they are not to be used on the breast just prior to breastfeeding.

10.6 \textbf{Topical corticosteroids in geriatric use}

Elderly patients have thinner skin (both epidermal and dermal atrophy) and are at greater risk to the adverse effects of topical corticosteroids.

\textbf{GPP} In elderly patients, topical corticosteroids should be used for short periods, intermittently and under close supervision.

\textbf{GPP} Guidelines as for use in infants and young children should apply to the elderly.
10.7 Systemic corticosteroid use in general practice

Systemic corticosteroids are potent and effective anti-inflammatory agents in acute, severe inflammatory dermatoses.

**GPP** In general practice (or primary care), it is best to confine use of systemic corticosteroids to dermatoses that are ‘short-lived’ or rapidly responsive.

‘Short-lived dermatoses’ include acute allergic contact dermatitis (allergen withdrawn - like hair dye allergy), certain cutaneous adverse drug exanthem and acute urticaria.

**GPP** Long-term systemic corticosteroids used in autoimmune bullous dermatoses (like pemphigus vulgaris) or other autoimmune cutaneous disorder (systemic lupus erythematosus, dermatomyositis) are best left to the purview of the specialist.

There is no evidence to support the benefit of long-term oral corticosteroids in conditions like atopic eczema, hand eczema, discoid eczema or chronic urticaria.

Systemic corticosteroids are of limited or no benefit but risk destabilisation of the condition in the management of psoriasis. Withdrawal of systemic steroids is a well recognised cause of erythrodermic and generalized pustular psoriasis.
### Table 4  Topical corticosteroid preparation potencies

<table>
<thead>
<tr>
<th>Class 1</th>
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<tbody>
<tr>
<td>Very potent (up to 600 times as hydrocortisone)</td>
</tr>
<tr>
<td>• Clobetasol propionate</td>
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<tr>
<td>• Betamethasone dipropionate</td>
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<table>
<thead>
<tr>
<th>Class 2</th>
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<tbody>
<tr>
<td>Potent (150 to 100 times as potent as hydrocortisone)</td>
</tr>
<tr>
<td>• Betamethasone valerate</td>
</tr>
<tr>
<td>• Betamethasone dipropionate</td>
</tr>
<tr>
<td>• Diflucortolone valerate</td>
</tr>
<tr>
<td>• Fluticasone valerate</td>
</tr>
<tr>
<td>• Hydrocortisone 17-butyrate</td>
</tr>
<tr>
<td>• Mometasone furoate</td>
</tr>
<tr>
<td>• Methylprednisolone aceponate</td>
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<tr>
<th>Class 3</th>
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<tbody>
<tr>
<td>Moderate (2 to 25 times as potent as hydrocortisone)</td>
</tr>
<tr>
<td>• Aclometasone dipropionate</td>
</tr>
<tr>
<td>• Clobetasone butyrate</td>
</tr>
<tr>
<td>• Fluocinolone acetonide</td>
</tr>
<tr>
<td>• Triamcinolone acetonide</td>
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<table>
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<tr>
<th>Class 4</th>
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</thead>
<tbody>
<tr>
<td>• Mild</td>
</tr>
<tr>
<td>• Hydrocortisone 0.5 - 2.5%</td>
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(Source: British National Formulary)
11 Use of Corticosteroids in Ophthalmology

11.1 Steroid eye drops in the primary care setting

11.1.1 Indications

**GPP** The role of steroid eye drops in the primary care setting is mainly in the management of acute red eyes. Vision-threatening causes of red eyes – acute glaucoma, iritis, keratitis and scleritis – should first be excluded with careful history, visual acuity testing and examination for corneal clarity and pupillary response.

**A** Patients with vernal conjunctivitis (active papillae and/or follicles) could benefit from topical corticosteroid during the acute phase to reduce the acute inflammation and itch. Topical steroid should be stopped once the symptoms have been relieved. The mainstay of treatment, however, is sodium cromoglycate (mast cell stabilizer) eye drops.\(^{263}\)

Grade A, Level 1+

**D** The use of topical steroid for the management of viral conjunctivitis in the primary care setting is more controversial. While it certainly alleviates ocular inflammation\(^{264}\), it should be used when the presentation is typical and diagnosis certain. Some conditions that mimic viral conjunctivitis (such as herpetic epithelial keratitis\(^{265}\) and microbial keratitis) may be aggravated by the use of steroid eye drops.

Grade D, Level 3

**GPP** Symptoms of acute allergic conjunctivitis (characterized by conjunctival chemosis) usually subside within 24 hours without treatment. Similarly, episcleritis often subsides without treatment. The use of topical steroid may not be necessary in these cases. Alternatives such as antazoline eye drops may be considered instead.

GPP
11.1.2 Contraindications

**GPP** Infective keratitis (corneal ulcer) and herpetic keratitis can mimic viral conjunctivitis. Topical steroids can worsen these conditions while masking the symptoms and are contraindicated in these conditions.

**GPP** Topical steroids are contraindicated in the presence of a history of contact lens use or ocular trauma as microbial keratitis could be present and aggravated by steroid use.

11.1.3 Side effects of steroid eye drops

**A** Prolonged application of steroidal eye drops can cause elevation of the intraocular pressure.²⁶⁶-²⁷¹ This effect has also been demonstrated in children.²⁷²,²⁷³ The frequency, severity and time-course of the response may be higher in children.²⁷² Thus special care must be taken when prescribing steroid eye drops for children.

*Grade A, Level 1*

**A** Being asymptomatic, steroid-induced ocular hypertension may go undetected for months, resulting in steroid induced glaucoma. Intraocular pressure should be monitored regularly if steroid eye drops are being used for long duration.²⁶⁶-²⁷¹

*Grade A, Level 1*

**D** Without intraocular pressure monitoring, steroidal eye drops should not be used beyond 1 week.²⁶⁶,²⁷⁴

*Grade D, Level 3 & 4*

Long-term use of steroidal eye drops can cause steroid-induced cataracts.²⁷⁵

11.1.4 Types of steroid eye drops

Gutte Betamethasone and Gutte Dexamethasone are the mainstay of steroidal eye drops. Gutte Prednisolone acetate 1% penetrates the eye much better making it the most efficacious steroidal eye drop available. Gutte Fluorometholone does not penetrate the eye well.
Therefore it is least likely to cause steroid-induced glaucoma.\textsuperscript{276} It is a useful and safe ocular surface anti-inflammatory agent, but does not treat intraocular inflammation. Some new steroidal preparations such as Lotemax\textsuperscript{®} and Vexol\textsuperscript{®} may have less effect on the intraocular pressure.

11.2 Ocular side effects of systemic steroid therapy

Long-term systemic steroid is known to cause bilateral posterior subcapsular cataracts.\textsuperscript{270,277}

\textbf{GPP} Patients should be counseled prior to the start of long-term systemic steroid regarding cataract formation. These are easily diagnosed as fairly dense central opacities of the pupillary red reflex. Decision to continue or cease systemic steroid therapy is largely dependant on the primary disease status for which the steroid was started – cataract can be dealt with surgically with very high success rates. Routine eye screening for presence of cataract is important especially for patients in the amblyogenic age group (10 years old or younger), or when the patient develops visual symptoms.

\textbf{C} Prolonged high-dose steroid is known to be associated with central serous chorio-retinopathy,\textsuperscript{278-280} a condition characterised by single or multiple subretinal fluid blebs. The patient presents with micropsia (diminished image size) and/or metamorphopsia (distortion of image). If confirmed by an ophthalmologist, systemic steroid should be reduced, replaced and discontinued wherever possible.

\textit{Grade C, Level 2+}

Glaucome secondary to systemic steroid usage is uncommon.\textsuperscript{281-283}

11.3 Ocular side effects of peri-ocular steroid therapy

Topical steroid application around the eye,\textsuperscript{284-287} intralesional steroid injection\textsuperscript{288} and inhalational steroids\textsuperscript{289,290} are known to cause steroid-induced glaucoma.

\textbf{D} Patients who require periocular steroid treatment for longer than 4 weeks would require monitoring of intraocular pressure.

\textit{Grade D, Level 3}
11.4 Systemic steroids for ophthalmic conditions

Systemic steroids may be required for the following ophthalmic conditions:
1. Uveitis
2. Scleritis
3. Optic neuritis
4. Thyroid eye disease

These conditions are usually diagnosed and managed by the ophthalmologist. Please refer to the earlier chapters for the guidelines on systemic steroid usage for other conditions.
12 Corticosteroids in Other Conditions

12.1 Anaphylaxis

D Adrenaline is the treatment of choice in anaphylaxis. Corticosteroids are not helpful acutely but potentially might prevent recurrent or protracted anaphylaxis.\textsuperscript{291,292}  

Grade D, Level 4

12.2 Bell's palsy (idiopathic facial paralysis)

A Corticosteroids are not recommended for the treatment of Bell's palsy.\textsuperscript{293}  

Grade A, Level 1+

Evidence from randomized controlled trials does not show significant benefit from treating Bell's palsy with corticosteroids.\textsuperscript{293} More randomized controlled trials with a greater number of patients are needed to determine reliably whether there is real benefit (or harm) from the use of corticosteroid therapy in patients with Bell's palsy.
Clinical Quality Improvement

The following clinical quality improvement parameters, based on recommendations in these guidelines, are proposed:

**Asthma**

1. Proportion of patients with persistent asthma symptoms using inhaled corticosteroids. (Page 53, 9.1.1)

2. Proportion of patients with an acute exacerbation given systemic corticosteroids. (Page 55, 9.1.3)

**COPD**

1. Proportion of COPD patients with an FEV$_1$ < 50% predicted with repeated exacerbations who are prescribed inhaled corticosteroids. (Page 56, 9.2.1)

**Allergic Rhinitis**

1. Proportion of children and adults with allergic rhinitis prescribed with intranasal steroids (Page 32)

**Atopic Dermatitis**

1. Avoidance of flourinated steroids on face for more than 2 weeks. (Page 62)
References


103. Madhotra R, Gilmore IT. Recent developments in the treatment of alcoholic hepatitis. QJM 2003;96(6);391-400.


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Self-assessment (MCQs)

After reading the Clinical Practice Guidelines, you can claim one CME point under Category III (Self-Study) of the SMC Online CME System. Before you login to claim the CME point, we encourage you to evaluate whether you have mastered the key points in the Guidelines by completing this set of MCQs. This is an extension of the learning process and is not intended to “judge” your knowledge and is not compulsory. The answers can be found at the end of the questionnaire.

Instruction: Choose the best (one) answer for each question.

1. Which of the following steroids has the largest potency to suppress the hypothalamic-pituitary-adrenal axis?
   - A) Prednisolone
   - B) Dexamethasone
   - C) Hydrocortisone
   - D) Triamcinolone

2. Iatrogenic Cushing’s syndrome can be diagnosed by the following after cessation of steroids for 1 week:
   - A) high plasma cortisol and a high plasma ACTH
   - B) low plasma cortisol and high plasma ACTH
   - C) low plasma cortisol and a low plasma ACTH
   - D) none of the above

3. Regarding effect of glucocorticoids on bone architecture, all are true except
   - A) Bone integrity could be compromised at doses above 7.5 mg
   - B) Osteonecrosis occurs at doses equivalent to 5 mg of prednisolone for period of 3 months
   - C) Fracture risk decreases rapidly after cessation of corticosteroids
   - D) Bisphosphonates and vitamin D are given in steroid-induced osteoporosis
4. Intranasal steroids use in children have been shown not to affect the hypothalamic-pituitary-adrenal axis up to

A) 3 months  
B) 6 months  
C) 9 months  
D) 12 years

5. A 2-year-old develops stridor over 2 days and this is associated with a barking cough. The best treatment option is

A) oral prednisolone at a dose of 2 mg/kg for 3 days.  
B) single dose of oral dexamethasone.  
C) inhaled budesonide 500 μg for 5 days.  
D) prescribe beclomethasone 200 μg bd via MDI for 1 month.  
E) nebulised salbutamol tds for 5 days.

6. A 45-year-old lady presents with numbness of both hands, worse at night and early morning, improving with activity in the day. Clinically, her symptoms and signs are suggestive of carpal tunnel syndrome, with no motor involvement (in particular, thenar wasting). Treatment modalities can include the following:

A) Trial of night splinting  
B) Activity modification  
C) Corticosteroid injection of 25 mg of hydrocortisone with 1 ml of 1% lignocaine into the carpal tunnel  
D) All of the above

7. A 30-year-old female presents with signs and symptoms of De Quervain’s Tenosynovitis. She is currently breastfeeding. She has been given a trial of splinting with little improvement. You, as the treating doctor, decide to give a local injection of corticosteroid/lignocaine admixture. The following are common complications except:

A) Superficial radial nerve neuropraxia  
B) Local fat atrophy  
C) Local flare  
D) Tendon rupture
8. In the primary care setting without intraocular pressure monitoring, steroid eye drops is considered unsafe beyond

   A) 1 day
   B) 1 week
   C) 1 month
   D) 1 year
Answer:

1. B (pg 20)
2. C (pg 23)
3. B (pg 24)
4. D (pg 31)
5. B (pg 42)
6. D (pg 45)
7. D (pg 45)
8. B (pg 67)
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Senior Vice President  
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Use of Corticosteroids in General Practice

MOH Clinical Practice Guidelines 5/2006

Executive summary of recommendations
Details of recommendations can be found in the main text at the pages indicated.

Corticosteroid therapy in clinical practice

D The baseline information on blood pressure, weight, growth curve (in children), ophthalmic examination, tuberculosis screening, and levels of fasting glucose, triglycerides and potassium levels, is required in patients in whom steroids have to be started. Repeat ophthalmologic examinations should be done every 6 monthly. The levels of triglycerides, fasting glucose and potassium should be checked after one month of steroid therapy and thereafter, every 3-4 monthly. Blood pressure and weight should be measured at every visit. A history of adverse effects would be ideal at every visit (pg 21).

Grade D, Level 4

GPP Hepatitis B status should be checked in all patients in whom steroids have to be started on long term basis (pg 21).

Grade P

B In patients at risk of ischemic heart disease, myocardial infarction, angina, coronary revascularization, heart failure, transient ischaemic attack or stroke, it is best to avoid corticosteroids. However, if definitely indicated, dose should be less than or equal to 7.5 mg prednisolone daily, and should be reduced over time as deemed safe and efficacious (pg 23).

Grade B, Level 2**

D Use of corticosteroids should be carefully considered and preferably restricted in obese patients as studies have linked corticosteroids with elevated ratio of intra-abdominal to subcutaneous fat mass (pg 24).

Grade D, Level 3
Blood sugar should be monitored before and after commencement of corticosteroids as there is an increased risk of developing hyperglycaemia when corticosteroids exceed the dose equivalent to 10 mg prednisolone per day (pg 24).

*Grade B, Level 2**

Corticosteroids should be used in the lowest possible dose to avert long-term fracture risk. Even low doses of steroids equivalent to 2.5 mg prednisolone per day could compromise bone integrity, and doses of 5 mg and above are associated with increased long-term fracture risk (pg 24).

*Grade C, Level 2*

Calcium and vitamin D should be prescribed for patients receiving an average of near-physiologic level of 5-7 mg prednisone per day to avert reduction in bone loss (pg 25).

*Grade B, Level 1*

The combination of bisphophonates combined with vitamin D is the most effective and is highly recommended for the treatment of glucocorticoid-induced osteoporosis (pg 25).

*Grade A, Level 1*

Tests of bone mineral density, particularly of the spine, should be done in women who are above 50 years of age, and have received 6 months of corticosteroid (pg 25).

*Grade D, Level 4*

In situations of wound repair, steroids should be avoided but if unavoidable, should be used sparingly (pg 26).

*Grade D, Level 4*

Changes in mental state, cognitive function and emotional responses in patients on corticosteroids could be due to corticosteroids. As this is eminently treatable, due care should be taken to monitor those with a predisposition to mental disturbances, e.g. those with a family history of mental disturbances, a past history of depression or alcoholism when prescribing corticosteroids to these patients (pg 26).

*Grade D, Level 3*

If steroids are indicated for growing children, the regime should be alternate-day, preferably topical, and used sparingly (pg 27).

*Grade A, Level 1*
In the elderly, dosage of steroids should be limited to 10 mg prednisolone per day, not exceeding a year, as the elderly are more likely to be disabled by complications of glaucoma and subcapsular cataract (pg 27).

**Grade D, Level 3**

To decrease the risk of myopathy, particularly in the elderly, fluorinated corticosteroid preparations like dexamethasone and triamcinolone should be avoided and dose of prednisolone should not exceed 10 mg per day (pg 27).

**Grade D, Level 3**

**GPP** It is best to avoid the usage of high dose corticosteroids over a prolonged duration (pg 28).

Corticosteroids should be withdrawn by tapering the dose gradually. The decision on tapering regime should be made on individually tailored basis (page 28).

**Grade A, Level 1**

Prompt withdrawal with rapid tapering is required in the following instances (pg 29):
- Steroid psychosis
- Herpes-induced corneal ulceration
- Uncontrolled hypertension
- Serious lumbar spine osteoporosis
- When therapeutic targets have been achieved or when the regime with steroids proves inefficacious.

**Grade D, Level 4**

It is unlikely that a tapering regime would be required in the following patients (pg 29):
- those receiving any dose of corticosteroids for less than 3 weeks duration
- those on alternate-day therapy
- those given less than 10 mg prednisolone per day (day dose) for more than a few weeks or at physiologic doses taken for less than 1 month.

**Grade D, Level 3 & 4**

Withdrawal plans should be commenced by reducing the corticosteroids from supraphysiologic to physiologic doses, which is equivalent to 5-7 mg of prednisolone per day (or hydrocortisone at 15-20 mg per day). Subsequent reduction has been suggested with conversion to hydrocortisone (because of shorter half life) or alternate day prednisolone. During periods of stress or
injury, additional doses may be required to avert adrenal crises. The whole process of withdrawal may last from 9 to 12 months (pg 30).

**Grade A, Level 1**

**Intranasal corticosteroid use in clinical practice**

**A** Intranasal steroids are indicated in both adults and children with allergic rhinitis, with no significant growth effects in children. However, there is no definite recommendation for use in pregnancy (pg 32).

**Grade A, Level 1**

**A** Intranasal steroids should not be given to children with upper respiratory infections as intranasal steroids use neither provides symptomatic relief nor decreases episodes of acute otitis media (pg 32).

**Grade A, Level 1**

**A** Both oral and topical intranasal steroids may be used alone or in combination with an antibiotic as steroid use along with antibiotic, leads to a quicker resolution of otitis media with effusion in the short-term. However, there is no definite recommendation for a long-term benefit with their use (pg 32).

**Grade A, Level 1 and 2**

**Use of corticosteroid ear drops in clinical practice**

**A** Either combination of steroid and acetic acid ear drops or steroids and antibiotic ear drops may be used in the treatment of acute otitis externa (pg 33).

**Grade A, Level 1**

**A** Steroid ear drops may be used in the treatment of eczematous otitis externa as steroid use leads to improvement of otological symptoms, particularly erythema, swelling and discharge (pg 33).

**Grade A, Level 1**

**Corticosteroids and gastrointestinal conditions**

**A** Oral systemic and intravenous steroids are useful in inducing remission and may be used in active ulcerative colitis (pg 34).

**Grade A, Level 1**

**A** Budesonide, an oral topically acting steroid, is also useful and may be used in active ulcerative colitis (pg 34).

**Grade A, Level 1**
Steroid enemas are useful in inducing remission in patients with distal colitis and a useful adjunct in patients with left-sided colitis (pg 35).

Grade A, Level 1*

Steroids should not be used in maintaining remission in ulcerative colitis (pg 35).

Grade A, Level 1++

Both systemic steroids and oral topically acting steroids (budesonide), either alone or in combination, may be used in active Crohn’s disease (pg 35).

Grade A, Level 1++

Steroids should not be used in maintaining remission in Crohn’s disease (pg 35).

Grade A, Level 1++

Steroids are very useful and may be used in inducing remission and preventing relapse in autoimmune hepatitis (pg 36).

Grade A, Level 1++

Steroids may be used in the treatment of severe alcoholic hepatitis (pg 36).

Grade A, Level 1*

Patients who are on steroids should have prophylaxis if they are also on non-steroidal anti-inflammatory drugs or are elderly with a history of peptic ulcer disease (pg 37).

GPP

Patients who are known to be hepatitis B virus carriers and are receiving chemotherapy with corticosteroids should also receive prophylaxis (pg 37).

Grade A, Level 1*

Patient who are known to be hepatitis B virus carriers should be considered for prophylactic medication if they are to receive systemic steroids for a duration of more than a week (pg 38).

GPP

It is advisable to test all patients for hepatitis B if systemic long-term steroids are being considered (pg 38).

GPP
A Based on present evidence, there is no need to specifically look for the presence of hepatitis C before starting corticosteroid treatment in any medical condition (pg 38).

Grade A, Level 1

Use of corticosteroids in children

D Although children receiving long-term systemic corticosteroid therapy should be screened for cataracts, this is unnecessary in children on inhaled corticosteroids alone (pg 40).

Grade D, Level 3

A Systemic corticosteroids are NOT recommended in children with acute bronchiolitis (pg 41).

Grade A, Level 1++

A Inhaled corticosteroids are NOT recommended in children with acute respiratory syncytial viral bronchiolitis (pg 41).

Grade A, Level 1

A Corticosteroids are recommended for the treatment of acute laryngotracheobronchitis (pg 41).

Grade A, Level 1++

A Nebulized budesonide, oral and parenteral dexamethasone have the same effectiveness and may be used for treatment of laryngotracheobronchitis (pg 42).

Grade A, Level 1

GPP For children with mild croup, a single dose of oral dexamethasone is an effective treatment. Choice between oral and parenteral dexamethasone is up to the individual clinical setting (pg 42).

GPP

A Systemic corticosteroids are recommended for children with acute asthma exacerbation (pg 42).

Grade A, Level 1++

A Inhaled corticosteroids are recommended for the treatment of children with persistent asthma (pg 42).

Grade A, Level 1++
Topical corticosteroids are recommended for children with moderate to severe eczema. Topical corticosteroids results in improvement in disease severity and reduces the risk of relapse (pg 43).

Grade A, Level 1

GPP It is recommended that systemic corticosteroids in children (except short courses or “bursts” which are not likely to cause side effects) should be used in consultation with physicians with experience in its use and in monitoring for side effects (pg 43).

GPP

Corticosteroid injections in joints and soft tissues

Corticosteroid injections may have short-term benefits but may not be sustained. The subacromial route is recommended for rotator cuff tendinitis and intra-articular injection for adhesive capsulitis. Oral non-steroidal anti-inflammatory drug therapy may be considered prior to injection therapy (pg 44).

Grade A, Level 1

Corticosteroid injections can provide short-term relief, and can be useful in early treatment of lateral epicondylitis (Tennis Elbow) and medial epicondylitis (Golfer’s elbow) (pg 44).

Grade A, Level 1

Corticosteroid injections can provide short-term relief, is useful and may be used in early treatment of De Quervain’s Tenosynovitis (pg 45).

Grade D, Level 3

Corticosteroid injections can provide short-term relief and may be used for carpal tunnel syndrome (pg 45).

Grade A, Level 1

Recommended safe injection technique for carpal tunnel syndrome (pg 45):
- 25G needle at 30 degree angle insertion, approach skin ulnar to palmaris longus tendon.
- Withdraw needle if paresthesia experienced by patient.
- Bulge in palm distal to transverse carpal ligament is indication of correct placement of needle.

Grade D, Level 4
Corticosteroid injections are highly effective and may be used as first line therapy for long-term treatment of trigger finger and thumb (pg 45).

Grade D, Level 3

Intra-articular corticosteroid injections provides short-term benefit and may be used in relieving pain. Judicious use is advocated in acute exacerbation of osteoarthritis. It may be combined with knee aspiration if effusion is present (pg 46).

Grade A, Level 1*

Regular use of intra-articular steroids is not recommended for osteoarthritis of the knees in the general practice setting (pg 46).

GPP

No benefit has been shown for the use of injection corticosteroid in Archilles tendonitis and it is not recommended for this condition (pg 46).

Grade A, Level 1*

Corticosteroid injections can provide short-term relief of symptoms to a small degree and may be used in plantar fasciitis. Orthosis should be prescribed for those patients who stand for long periods (pg 47).

Grade A, Level 1*

There should be at least 6 weeks of interval between corticosteoid injections, and up to a maximum of 3 doses are recommended in shoulder conditions, lateral epicondyritis and trigger finger (pg 47).

GPP

A single dose of corticosteoids is recommended in De Quervain Tenosynovitis and carpal tunnel syndrome (pg 47).

GPP

Corticosteroids in rheumatological conditions

There is no evidence for the use of systemic corticosteroids in osteoarthritis. It should not be prescribed for the treatment of osteoarthritis (pg 48).

GPP

In patients with acute gout affecting one or two joints, intra-articular injection of a long-acting corticosteroid preparation, such as methylprednisolone, triamcinolone acetonide or triamcinolone hexatonide, will
control symptoms within 1 to 2 days. It should be given only when the diagnosis is confirmed and infection has been excluded. Patients with polyarticular gout who have a suboptimal or delayed response to oral nonsteroidal anti-inflammatory drugs often benefit from adjunctive corticosteroid injections into those joints with persistent synovitis (pg 49).

**Grade D, Level 3**

D Both intramuscular injection of corticosteroid (triamcinolone acetonide 40 mg - 60 mg once) and oral corticosteroid are effective and may be used in acute attacks particularly in the patient with polyarticular gout. Prednisolone can be started at a dose of 20 to 40 mg/day and tapered over 7 to 10 days. If tapered too rapidly, a rebound flare-up of gout may occur (pg 49).

**Grade D, Level 3**

D Well conducted studies on the use of intra-articular or systemic corticosteroids in acute attacks of pseudogout are lacking. However, clinical experience suggests that a similar approach to that for the management of acute gout may be effective in acute attacks of pseudogout (pg 49).

**Grade D, Level 4**

A Rheumatoid synovitis may be suppressed for three months or longer using relatively insoluble microcrystalline corticosteroid preparations. Intra-articular corticosteroid should be considered ancillary to rest, physical therapy, nonsteroidal anti-inflammatory agents, and disease modifying anti-rheumatic drugs. No convincing evidence exists, that joint erosive changes are retarded (pg 49).

**Grade A, Level 1**

A Systemic corticosteroids may thus be used in the management of rheumatoid arthritis in two ways (pg 50):

1. Short-term, low dose bridge therapy, aimed at controlling symptoms during periods of active disease while awaiting the effects of newly started single or combination disease modifying anti-rheumatic drugs (DMARDs).
2. Moderate to longer-term low dose prednisolone (usually 10 mg or less) given in addition to single or combination DMARDs if this treatment has failed to control disease activity sufficiently.

**Grade A, Level 1**
Periodic intra-articular injection of corticosteroid can be of particular value in the management of patients with oligoarticular disease or those with controlled polyarticular disease but one or two persistently active inflamed joints despite disease modifying anti-rheumatic drugs (pg 51).

Grade D, Level 4

In general, systemic corticosteroids should be used judiciously in psoriatic arthritis because of the risk of provoking a pustular flare in the skin on withdrawal (pg 51).

Grade D, Level 3

Intra- or peri-articular corticosteroid injections have been shown in small randomized controlled trials to be effective and may be used for the pain of sacroiliitis (pg 51).

Grade A, Level 1*

There are no clinical studies evaluating the efficacy of intra-articular corticosteroid on peripheral arthritis nor on the use of local corticosteroid injections for the enthesitis of ankylosing spondylitis. Clinical experience suggests that corticosteroid injections can be helpful in selected cases (pg 51).

Grade D, Level 4

The use of systemic corticosteroids for axial disease is not supported by evidence. These patients already have significant loss of bone density, which can be exacerbated by steroid therapy (pg 52).

Grade D, Level 4

**Respiratory diseases**

Inhaled steroids are the preferred treatment for patients with persistent asthma symptoms at all levels of severity (pg 53).

Grade A, Level 1**

Add-on therapy with another class of controller medication (e.g. long-acting β2-agonist) is preferred to increasing the dose of inhaled corticosteroids (pg 53).

Grade A, Level 1**

The risks of poorly controlled asthma should be weighed against the limited risk of long-term inhaled corticosteroids (pg 53).

Grade B, Level 2***
**D** Inhaled corticosteroids should be started at a dose appropriate to the control of asthma (pg 54).

*Grade D, Level 4*

**A** Inhaled steroids should be given twice daily (pg 54).

*Grade A, Level 1*

**B** The dose of inhaled steroids should be titrated slowly to the lowest dose that can achieve effective asthma control. After adequate control has been achieved, the inhaled corticosteroid dose should be gradually reduced by 25% every 3 months and titrated according to asthma control. Once the dose of corticosteroids is less than 500 μg of beclomethasone dipropionate or its equivalent, then withdrawal of add-on therapy can be considered (pg 54).

*Grade B, Level 1*

**C** Inhaled steroid regimen should not be changed in pregnancy (pg 54).

*Grade C, Level 2***

**A** Systemic steroids should be given at least 5 days in acute exacerbations of asthma that do not have rapid and sustained response to short-acting β₂-agonist therapy. Oral dosing is preferred over intravenous therapy. Intravenous administration should only be considered in the critically ill or if the patient is unable to tolerate oral medication. There is no need for tapering dose at the end of a short course of oral prednisolone (up to 10 days) (pg 55).

*Grade A, Level 1***

**A** The role of conventional doses of inhaled corticosteroids as adjunctive therapy to systemic steroids in an acute exacerbation of asthma is limited (pg 55).

*Grade A, Level 1***

**A** Combined inhaled corticosteroids with long-acting bronchodilators should be considered in severe COPD patients with recurrent exacerbations or symptoms (pg 56).

*Grade A, Level 1***

**A** Long-term treatment with oral corticosteroids is not recommended in COPD (pg 56).

*Grade A, Level 1***
Oral corticosteroids should be considered if patients experience a significant increase in breathlessness that interferes with daily activities especially if the baseline FEV₁ is less than 50% of predicted. A dose of prednisolone of 30-40 mg/day for 7 to 14 days is recommended for acute exacerbations of COPD (pg 57).

**Grade A, Level 1**

Corticosteroids should not be used in the management of acute bronchitis (pg 57).

**Grade D, Level 4**

Corticosteroids should not be used in the treatment of lower respiratory tract infections (pg 57).

**Grade D, Level 4**

The routine use of corticosteroids should be avoided in the management of pulmonary tuberculosis (pg 58).

**Grade A, Level 1**

The following respiratory disorders may require corticosteroid therapy and patients with these conditions should be referred to a specialist respiratory service (pg 58):
- Allergic bronchopulmonary aspergillosis
- Churg Strauss syndrome
- Eosinophilic pneumonia
- Sarcoidosis
- Pulmonary vasculitis
- Alveolar haemorrhage syndromes
- Pneumocystis carinii pneumonia with respiratory failure
- Interstitial lung disease
- Post-radiation pneumonitis

**GPP**

**Corticosteroids in dermatologic conditions**

There is reasonable evidence from randomised controlled trials to support the use of topical corticosteroids as the mainstay of treatment of atopic eczema (pg 59).

**Grade A, Level 1**
**GPP** Topical corticosteroids in treatment of psoriasis are best reserved for localised sites such as hands, feet, flexures, genitalia, face and scalp (pg 59).

**GPP**

**A** Topical corticosteroids should not be used more than twice a day (pg 60).

*Grade A, Level 1*

**GPP** It is not recommended to dilute and mix other types of creams with topical corticosteroids in your practice (pg 61).

**GPP**

In the presence of infected eczema, use of oral antibiotics is considered as good practice (pg 61).

**D** To prevent side effects, the amount of topical corticosteroids used per week and duration of use must be monitored and controlled. Adjunctive therapy must be emphasized (pg 62).

*Grade D, Level 3*

**GPP** It is recommended that not more than 25 g of clobetasal propionate per week be used in adults. All patients on clobetasol propionate should be monitored closely for potential side effects (pg 62).

**GPP**

For areas of the face and flexures it is best to confine use of topical steroids to mild topical corticosteroids and less commonly to moderate to potent topical corticosteroids for short periods of time (pg 62).

**GPP** When patient requests for repeat prescription of moderately potent and super potent topical corticosteroids, clinical review must be done before repeating the dose. Patient should be educated regarding the need to come for clinical review before extending the duration by explaining the risk and benefits of continuing steroids on long term basis (pg 62).

**GPP**

**D** Use of flourinated topical corticosteroids should be avoided on the face as there is a high risk for complications like perioral dermatitis, rosacea-like dermatitis, acneform lesions and facial hypotrichosis. Where indicated it should be used for short period, under frequent and close review of patient's
condition. Longer usage should be in consultation with a specialist dermatologist (pg 62).

Grade D, Level 4

GPP It is presently unknown whether topical corticosteroids are excreted in breast milk. The general advice is to use topical corticosteroids with caution in breastfeeding mothers and they are not to be used on the breast just prior to breastfeeding (pg 63).

GPP In elderly patients, topical corticosteroids should be used for short periods, intermittently and under close supervision (pg 63).

GPP Guidelines as for use in infants and young children should apply to the elderly (pg 63).

GPP In general practice (or primary care), it is best to confine use of systemic corticosteroids to dermatoses that are ‘short-lived’ or rapidly responsive (pg 64).

GPP ‘Short-lived dermatoses’ include acute allergic contact dermatitis (allergen withdrawn -like hair dye allergy), certain cutaneous adverse drug exanthem and acute urticaria.

GPP Long-term systemic corticosteroids used in autoimmune bullous dermatoses (like pemphigus vulgaris) or other autoimmune cutaneous disorder (systemic lupus erythematosus, dermatomyositis) are best left to the purview of the specialist (pg 64).

Use of corticosteroids in ophthalmology

GPP The role of steroid eye drops in the primary care setting is mainly in the management of acute red eyes. Vision-threatening causes of red eyes – acute glaucoma, iritis, keratitis and scleritis – should first be excluded with careful history, visual acuity testing and examination for corneal clarity and pupillary response (pg 66).
Patients with vernal conjunctivitis (active papillae and/or follicles) could benefit from topical corticosteroid during the acute phase to reduce the acute inflammation and itch. Topical steroid should be stopped once the symptoms have been relieved. The mainstay of treatment, however, is sodium cromoglycate (mast cell stabilizer) eye drops (pg 66).

Grade A, Level 1

The use of topical steroid for the management of viral conjunctivitis in the primary care setting is more controversial. While it certainly alleviates ocular inflammation, it should be used when the presentation is typical and diagnosis certain. Some conditions that mimic viral conjunctivitis (such as herpetic epithelial keratitis and microbial keratitis) may be aggravated by the use of steroid eye drops (pg 66).

Grade D, Level 3

Symptoms of acute allergic conjunctivitis (characterized by conjunctival chemosis) usually subside within 24 hours without treatment. Similarly, episcleritis often subsides without treatment. The use of topical steroid may not be necessary in these cases. Alternatives such as Antazoline eye drops may be considered instead (pg 66).

GPP

Infective keratitis (corneal ulcer) and herpetic keratitis can mimic viral conjunctivitis. Topical steroids can worsen these conditions while masking the symptoms and are contraindicated in these conditions (pg 67).

GPP

Topical steroids are contraindicated in the presence of a history of contact lens use or ocular trauma as microbial keratitis could be present and aggravated by steroid use (pg 67).

GPP

Prolonged application of steroidal eye drops can cause elevation of the intraocular pressure. This effect has also been demonstrated in children. The frequency, severity and time-course of the response may be higher in children. Thus special care must be taken when prescribing steroidal eye drops for children (pg 67).

Grade A, Level 1
A Being asymptomatic, steroid-induced ocular hypertension may go undetected for months, resulting in steroid induced glaucoma. Intraocular pressure should be monitored regularly if steroid eye drops are being used for long duration (pg 67).

Grade A, Level 1*

D Without intraocular pressure monitoring, steroidal eye drops should not be used beyond 1 week (pg 67).

Grade D, Level 3 & 4

GPP Patients should be counseled prior to the start of long-term systemic steroid regarding cataract formation. These are easily diagnosed as fairly dense central opacities of the pupillary red reflex. Decision to continue or cease systemic steroid therapy is largely dependant on the primary disease status for which the steroid was started – cataract can be dealt with surgically with very high success rates. Routine eye screening for presence of cataract is important especially for patients in the amblyogenic age group (10 years old or younger), or when the patient develops visual symptoms (pg 68).

GPP

C Prolonged high-dose steroid is known to be associated with central serous chorio-retinopathy, a condition characterised by single or multiple subretinal fluid blebs. The patient presents with micropsia (diminished image size) and/or metamorphopsia (distortion of image). If confirmed by an ophthalmologist, systemic steroid should be reduced, replaced and discontinued wherever possible (pg 68).

Grade C, Level 2*

D Patients who require periocular steroid treatment for longer than 4 weeks would require monitoring of intraocular pressure (pg 68).

Grade D, Level 3

Corticosteroids in other conditions

D Adrenaline is the treatment of choice in anaphylaxis. Corticosteroids are not helpful acutely but potentially might prevent recurrent or protracted anaphylaxis (pg 70).

Grade D, Level 4

A Corticosteroids are not recommended for the treatment of Bell's palsy (pg 70).

Grade A, Level 1*