



**Mercy
Ships®**

Bringing Hope and Healing...

Formulary 2009-2011



**An Essential Medicines Dosing Guide
Based on the WHO Model Formulary**

MUSCULOSKELETAL SYSTEM

WHO MODEL FORMULARY 2008 NOTES:

Pain may be modified by psychological factors and attention to these is essential in pain management. Drug treatment aims to modify the peripheral and central mechanisms involved in the development of pain. *Neuropathic pain* may respond only partially to conventional analgesics; treatment can be difficult and includes the use of **carbamazepine** (100mg 1-2 times daily gradually increased to 200mg 3-4 times daily max 1.6g/DAY) for trigeminal neuralgia and **amitriptyline** (10-25mg at night increased if needed to 75mg daily) for diabetic neuropathy and postherpetic neuralgia.

Non-opioid analgesics (section 5.01) are particularly suitable for musculoskeletal pain whereas the **opioid analgesics** (section 5.02) are more suitable for moderate to severe visceral pain. Non-opioid analgesics which also have anti-inflammatory actions include salicylates and other nonsteroidal anti-inflammatory drugs (NSAIDs); they can reduce both pain and inflammation of chronic inflammatory disorders such as rheumatoid arthritis, but they do not alter or modify the disease process itself. For the management of rheumatoid arthritis disease-modifying antirheumatic drugs (DMARDs) [not on Mercy Ships list] may favourably influence the disease process. The pain and inflammation of an acute gout attack is treated with a NSAID (section 5.03) or **colchicine** [not included on WHO Model List]; **allopurinol** (section 5.03) is used for long-term control of gout.

5.01 NON-OPIOID ANALGESICS: NSAIDS & PARACETAMOL

WHO MODEL FORMULARY 2008 NOTES:

Non-opioid analgesics with anti-inflammatory activity include salicylates such as **acetylsalicylic acid** and other nonsteroidal anti-inflammatory drugs such as **ibuprofen**. Non-opioid analgesics with little or no anti-inflammatory activity include **paracetamol (acetaminophen)**.

The principal effects of **acetylsalicylic acid** are anti-inflammatory, analgesic, antipyretic and antiplatelet. Oral doses are absorbed rapidly from the gastrointestinal tract; rectal absorption is less reliable but suppositories are useful in patients unable to take oral dosage forms. Acetylsalicylic acid is used for the management of mild to moderate pain such as headache, acute migraine attacks (section 4.05), transient musculoskeletal pain and dysmenorrhoea, and for reducing fever. Although it may be used in higher doses in the management of pain and inflammation of rheumatoid arthritis, other NSAIDs are preferred because they are likely to be better tolerated. Acetylsalicylic acid is also used for its antiplatelet properties (section 2.10). Adverse effects with analgesic doses are

generally mild but include a high incidence of GI irritation with slight blood loss, bronchospasm and skin reactions in hypersensitive patients, and increased bleeding time. Anti-inflammatory doses are associated with a much higher incidence of adverse reactions, and they also cause mild chronic salicylism which is characterized by tinnitus and deafness. Acetylsalicylic acid should be avoided in children < 16 yo, unless specifically indicated (e.g. juvenile arthritis), due to an association with Reye syndrome (encephalopathy and liver damage); it should particularly be avoided during fever or viral infection in children and adolescents.

Paracetamol is similar in analgesic and antipyretic efficacy to acetylsalicylic acid. It is used for mild to moderate pain including headache and acute migraine attacks (section 4.05) and for reducing fever, including postimmunization pyrexia. Paracetamol is particularly useful in patients in whom salicylates or other NSAIDs are contraindicated, such as asthmatics and those with a history of peptic ulcer, or for children < 16 yo in whom salicylates should be avoided because of the risk of Reye syndrome. It is generally preferred to acetylsalicylic acid, particularly in the elderly, because it is less irritant to the stomach. Unlike acetylsalicylic acid and other NSAIDs, paracetamol has little anti-inflammatory activity which limits its usefulness for long-term treatment of pain associated with inflammation; however it is useful in the management of osteoarthritis, a condition with only a small inflammatory component. In normal doses adverse effects are rare, but overdosage with a single dose of 10–15 g is particularly dangerous because it may cause hepatocellular necrosis and, less frequently, renal tubular necrosis.

NSAIDs (**ibuprofen**) have analgesic, anti-inflammatory, antipyretic properties. In single doses NSAIDs have analgesic activity comparable to that of paracetamol. In regular full dosage, they have a lasting analgesic and anti-inflammatory effect, which makes them useful for continuous or regular pain due to inflammation. Differences in anti-inflammatory activity between different NSAIDs are small but there is considerable variation in individual patient response and in the incidence and type of adverse effects. Ibuprofen has fewer adverse effects than other NSAIDs but its anti-inflammatory properties are weaker. Ibuprofen is used in the treatment of mild to moderate pain and in the management of pain and inflammation in rheumatoid/juvenile arthritis. It may also be of value in the less well-defined conditions of back pain and soft-tissue disorders. Ibuprofen is also used to reduce pain in children. With all NSAIDs caution should be exercised in the treatment of the elderly, in allergic disorders, during pregnancy and breastfeeding. In patients with renal, cardiac or hepatic impairment, the dose should be kept as low as possible and renal function should be monitored. NSAIDs should not be given to patients with active peptic ulceration and should preferably not be used in those with a history of the disease. The commonest adverse effects are generally gastrointestinal including nausea, vomiting, diarrhoea, and dyspepsia; hypersensitivity reactions including anaphylaxis, bronchospasm, and rash have been reported, as has fluid retention.

GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
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<p>Acetylsalicylic Acid (Aspirin) Tab 100mg, 300mg, 500mg (various formulations)</p>	<p>IDA EML</p>	<p><i>By mouth</i> Adult 300-900mg every 4-6 hours; max 4g/DAY in divided doses, after food (dissolve soluble tablets in a glass of water). [NOT for < 16 yo, Reye's syndrome reported.]</p>
<p>Diclofenac Sodium Tab 25mg & 50mg, 100mg Suppository 25mg, 50mg & 100mg (Voltaren)</p>	<p>MSL</p>	<p><i>Oral/rectal routes</i> Adult 25-50mg up to 3 times daily; Child 6 mths - 18 yo 0.3-1mg/kg/DOSE 3 times daily; or 2-5 yo 25mg, 6-12 yo 50mg, given twice daily. Give oral dose after food. <i>By deep IM inj</i> (undiluted, into the gluteal muscle) Adult 75mg repeated if necessary after 4-6 hours for max 2 days, for acute/post-op pain; <i>By IV infusion</i> (in hospital setting) for prevention of post-op pain, initially after surgery Adult 25-50mg over 15-60 minutes or 75mg over 30-120 minutes, then <i>by cont IV infusion</i> 5mg/hour, for max 2 days. NOTE: Max total daily dose by any route 150-200mg. For IV infusion dilute 75mg with 100-500ml D5/NS.</p>
<p>Ibuprofen Tab 200mg & 400mg, Suspension 100mg/5ml (Brufen)</p>	<p>MSL IDA EML</p>	<p><i>By mouth</i> Adult 200-400mg 4 times daily, preferably taken after food, max 2.4g/DAY; Child >7kg, 20-30mg/kg/DAY in divided doses; or <12kg (<2yo) 5-7.5mg/kg/DOSE, >12kg (2-12yo) 5-10mg/kg/DOSE; or 1-2 yo 50mg, 3-7 yo 100mg, 8-12 yo 200mg, taken 3-4 times daily.</p>
<p>Indometacin Tab 25mg [Indomethacin] (Indocid)</p>	<p>IDA</p>	<p><i>By mouth</i> in divided doses with food. Dysmenorrhoea, up to 75mg/DAY; Rheumatic disease, 50-200mg/DAY; Acute gout, 150-200mg/DAY. <i>May cause dizziness.</i></p>
<p>Ketorolac Tromethamine Inj 30mg/ml (Toradol)</p>		<p>Moderate post-op pain: <i>by deep IM inj</i> (undiluted over 15 seconds), Adult/Child >16yo 10-30mg every 4-6 hours when needed for 2 days, max 90mg/DAY; Elderly/Adult <50kg max 60mg/DAY.</p>

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GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
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<p>Paracetamol Chewable Tab 80mg or Suspension 160mg/5ml (Tylenol US brand) (Acetaminophen) [Do not exceed dose listed.]</p>	<p>D</p>	<p><i>By mouth</i> Child 1-5yo 80-160mg (1-2 chewable tablets or 2.5-5ml); 6-11yo, 160-320mg (2-4 chewable tablets or 5-10ml); dose may be repeated every 4-6 hours. Maximum 4 doses in 24 hours.</p>
<p>Paracetamol Suspension 120mg/5ml (generic/IDA) (Acetaminophen) [Do not exceed dose listed.]</p>	<p>IDA EML</p>	<p><i>By mouth</i> Infant < 3 mth 5-10mg/kg (on doctor's advice only); child 3mth-1 yo 60-120mg, 1-5 yo 120-250mg; 6-12yo 250-500mg; <i>or</i> <12kg (<2yo) 15mg/kg/DOSE, >12kg (2-12yo) 15-20mg/kg/DOSE; all above doses may be repeated every 4-6 hours when needed. Maximum 4 doses in 24 hours.</p>
<p>Paracetamol Tab 500mg & Effervescent Tab 500mg (Panadol/Tylenol) (Acetaminophen) [Do not exceed dose listed.]</p>	<p>MSL IDA EML</p>	<p><i>By mouth</i> Adult, 0.5-1g every 4-6 hours, max 4g daily; child 6-12 yo 250-500mg, given every 4-6 hours. Dissolve effervescent tablets in a glass of water. Maximum 4 doses in 24 hours.</p>
<p>Paracetamol Suppository 125mg, 250mg, 500mg & 1g (Acetaminophen) [Do not exceed dose listed.]</p>	<p>IDA EML</p>	<p><i>Rectally</i>, child 1-5 yo 125-250mg, 6-12 yo 250-500mg, adult/child >12yo 500-1000mg every 4-6 hours. Maximum 4 doses in 24 hours.</p>

COMMENT/CAUTIONS:

- **Adverse effects:** All NSAIDs can produce GI side effects. Antacids should not be added to NSAIDs since they will affect absorption and efficacy, and may also mask the symptoms of NSAID-induced ulceration. H2 antagonists, proton pump inhibitors and misoprostol should only be prescribed with NSAIDs for patients with peptic ulceration history if alternatives are not available (see BNF recommendations). May also cause worsening of asthma.
- **Drug interactions:** Commonly with antihypertensives (antagonism of hypotension, increased risk of renal failure with ACE inhibitors), diuretics (increased risk of nephrotoxicity, NSAIDs antagonise diuretic effect of loop diuretics) and warfarin (increased risk of bleeding).
- **Aspirin:** Due to association with Reye's syndrome, aspirin should not be prescribed for under 16 yo unless specifically indicated e.g. juvenile arthritis.
- **Ketorolac Inj:** Pain relief may not occur for up to 30 minute after injection.

5.02 OPIOID ANALGESICS

WHO MODEL FORMULARY 2008 NOTES:

Morphine is effective in relieving moderate to severe pain, particularly of visceral origin; there is a large variation in patient response. Weaker opioids such as codeine are suitable for mild to moderate pain. **Codeine** is an opioid analgesic much less potent than morphine and much less liable, in normal doses, to produce adverse effects including dependency. It is effective for mild to moderate pain but is too constipating for long-term use. **Morphine** remains the most valuable analgesic for severe pain. In addition to pain relief it confers a state of euphoria and mental detachment; repeated administration may cause dependence and tolerance, but this should not be a deterrent in the control of pain in terminal illness. Regular use may also be appropriate for certain cases of non-malignant pain, but specialist supervision is required. In normal doses common adverse effects include nausea, vomiting, constipation and drowsiness; larger doses produce respiratory depression and hypotension.

GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
Codeine Tab 30mg	N/CD MSL IDA EML	<i>By mouth</i> Adult 30-60mg every 4 hour when needed max 240mg/DAY
Codeine Syrup 25mg/5ml	N/CD	<i>By mouth</i> Child 1-12 yo 3mg/kg/DAY given in divided doses.
Codeine 30mg + Paracetamol 500mg Combination Tablet (Co-Codamol 30/500) [Paracetamol=Acetaminophen]	N/CD	<i>By mouth</i> Adult 1-2 tablets every 4-6 hours, maximum 8 tablets daily.
Fentanyl Inj 100microgram/2ml (as citrate) [Opioids]	N/CD IDA	Premed: <i>By IM inj</i> 50-100 microgram 30-60 minute pre-surgery, or <i>by IV inj or infusion</i> 20-100 microgram/kg, max 150 microgram/kg total dose. Analgesic: <i>IM inj</i> 50-100 microgram. See manufacturer's leaflet for detail. <i>May cause respiratory depression.</i> Inject IM undiluted into a large muscle mass, or IV undiluted over 2-3 minute. For IV infusion, further dilute with D5/NS.
N/CD – Drugs subject to international control under the Single Convention on Narcotic Drugs (1961).		

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GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
Morphine Sustained Release Tab 30mg (SRM-Rhotard) [Opiates]	N/CD IDA	<i>By mouth</i> 30-60mg twice daily for patients stabilised on morphine, dose titrate according to pain control, see Chart below for conversion from morphine oral solution dose.
Morphine Hydrochloride Oral Solution 10mg/5ml [Opiates]	N/CD EML	<i>By mouth</i> 5-20mg every 4 hours, titrate according to pain control. Half dose can be given for breakthrough pain before the next 4 hourly dose. Oral dose is 2-3 times of parenteral dose, convert to sustained release tablet preparation when stabilised.
Morphine Sulphate Inj 10mg/ml [Opiates]	N/CD MSL IDA EML	Acute pain: <i>by SC/IM inj</i> undiluted; Adult 10mg every 4 hours when needed <i>or slow IV</i> in small boluses of 2-10mg over 4-5 minutes, titrate to pain control. Infant <1month, 25-50 microgram/kg with monitoring; 1-12 months 200 microgram/kg/DOSE; 1-5 yo: 2.5-5mg; 6-12 yo 5-10mg; given every 4 hours when needed. (convert to oral doses when tolerated, see chart below). Premed 1 hour before surgery: Adult <i>by SC/IM inj</i> 150-200microgram/kg; Child <i>by IM inj</i> 50-100microgram/kg. Inject IM/SC undiluted; slow IV 10mg dilute in 5-10ml WFI over 5 minutes, IV infusion dilute in 50-100ml of D5/NS infuse at 2mg/minute.
Pholcodine Linctus 5mg/5ml (Pavachol-D)		For unproductive persistent cough: <i>By mouth</i> adult 5-15mg up to 4 times daily; child 6-12 yo 5mg up to 4 times daily; 3-5 yo 5mg up to 3 times daily; 1-2 yo 2.5mg up to 4 times daily.
N/CD – Drugs subject to international control under the Single Convention on Narcotic Drugs (1961).		

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GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
Tramadol Hydrochloride Cap 50mg, Drops 100mg/ml, Inj 100mg/2ml (Tramal) [Partial opioid agonist]	IDA	Adult/Child > 14 yo <i>oral/SC/IM/IV</i> (<i>IM/IV</i> given over 2-3 minutes), 50-100mg every 6 hours; max 400mg in 24 hours. <i>Monitor for respiratory depression.</i>
Tramadol Hydrochloride Tab Slow-Release 100mg & 200mg (Tramal SR) [Partial opioid agonist]	D	Adult/Child > 12 yo: <i>By mouth</i> 100-200mg given 1-2 times daily, max 400mg in 24 hours; <i>or</i> (according to the product leaflet) >1yo 1mg/kg/DOSE every 6 hours, 2-12yo 2mg/kg/DOSE every 4-6 hours, max 8mg/kg/DAY. Swallow whole, do not chew.
N/CD – Drugs subject to international control under the Single Convention on Narcotic Drugs (1961).		

COMMENT/CAUTIONS:

- **N/CD Narcotic/Controlled Drugs.** Recording required in pharmacy/ward/OR.
Morphine for pain relief: The appropriate dose is that which relieves pain but does not give toxic side effects. Morphine is well absorbed by mouth producing peak blood levels in 1.5-2 hours. It should be given at 4 hourly intervals regularly unless sustained release preparations are used which can be given 12 hourly. To initiate: administer 5-10mg morphine oral solution 4 hourly when needed, increasing dose by 50% until pain is controlled. Convert to sustain release (SR) morphine using the chart below. Treat breakthrough pain with morphine oral solution on a 'when needed' basis with 1/6th of the 24-hour total dose requirement, increasing the morphine SR tablet dose if needed.

- **Morphine - Adverse effects:** 20% sedation, 30% nausea/vomiting (usually temporary), 95% constipation.

- **Morphine Conversion Chart:**

Morphine Injection (every 4 hours)	Morphine Oral Solution (every 4 hours)	Morphine SR Tab (every 12 hours)
Dose / 2	Dose	Dose x 3
5mg	10mg	30mg
10mg	20mg	60mg

(...and so forth according to patient tolerance to side effects and pain relief).

5.03 MEDICINES USED IN GOUT

WHO MODEL FORMULARY 2008 NOTES:

ACUTE GOUT. Acute attacks of gout are usually treated with high doses of a **NSAID** such as indometacin (150–200 mg daily in divided doses); ibuprofen has weaker anti-inflammatory properties than other NSAIDs and is therefore less suitable for treatment of gout. Salicylates, including acetylsalicylic acid are also not suitable because they may increase plasma-urate concentrations. **Colchicine** [not on WHO Model List] is an alternative for those patients in whom NSAIDs are contraindicated. Its use is limited by toxicity with high doses. It does not induce fluid retention and can therefore be given to patients with heart failure; it can also be given to patients receiving anticoagulants.

CHRONIC GOUT. For long-term control of gout in patients who have frequent attacks, the presence of tophi, or acute gouty arthritis, the xanthine oxidase inhibitor **allopurinol** may be used to reduce production of uric acid. It should not be used to treat an acute attack since it may prolong it indefinitely. Treatment for chronic gout should not be started until after an acute attack has completely subsided, usually 2–3 weeks. The initiation of allopurinol treatment may precipitate an acute attack therefore colchicine [not on WHO Model List] or a suitable NSAID should be used as a prophylactic and continued for at least one month after the hyperuricaemia has been corrected. If an acute attack develops during treatment for chronic gout, then allopurinol should continue at the same dosage and the acute attack should be treated in its own right. Treatment for chronic gout must be continued indefinitely to prevent further attacks of gout.

GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
Allopurinol Tab 100mg [NOTE: DO NOT START TREATMENT DURING AN ACUTE GOUT ATTACK.]	IDA EML	Gout prophylaxis: <i>By mouth</i> Adult initially 100mg after food with plenty of water; maintenance 100-200mg daily in mild conditions, up to max 900mg/DAY given in divided doses; Child 10-20mg/kg/DAY in divided doses, taken after food with water.

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GENERIC (TRADE) NAME	CAT.	INDICATION/DOSE
Colchicine Tab 500microgram	D	Acute gout attack: <i>By mouth</i> Adult initially 0.5-1mg after food, then 0.5mg (500 micrograms) every 2-3 hours until pain relief or until vomiting or diarrhoea occurs, max total dose 6mg. Do not repeat course within 3 days. Short-term prophylaxis: 0.5mg 2-3 times daily continuing for at least 1 month after hyperuricaemia has been corrected.

COMMENT/CAUTIONS:

- Consider long-term gout prophylaxis only for: 1) persistent hyperuricaemia, 2) > 3 gout attacks/year + hyperuricaemia, 3) gout + hyperuricaemia + renal impairment, 4) chronic tophaceous gout.
- During acute gout attack, an NSAID may relieve inflammation & pain (see Notes above). Use colchicine where NSAIDs are contraindicated.
- Do NOT give **allopurinol** within TWO WEEKS of an acute attack (may precipitate further attacks, see Notes above).
- **Drug Interactions:** Thiazide diuretics may increase risk of allopurinol toxicity.
- DRUG-INDUCED Hyperuricaemia: Salicylates, diuretics, pyrazinamide, nicotinic acid and cytotoxic drugs may precipitate gout attacks.

NOTE: For Non-depolarising/Depolarising Neuromuscular Blocking Agents e.g. atracurium, see Chapter 13 Anaesthetics Section 13.04 Muscle Relaxants Used in Surgery.

NOTE: For Antimuscarinics e.g. atropine, glycopyrrolate and neostigmine, see Chapter 13 Anaesthetics Section 13.05 Antimuscarinics/Anticholinesterases.

NOTE: For Antimigraine Drugs see Chapter 4 Central Nervous System Section 4.05 Antimigraine Drugs.