Table 5
Pharmacologic management of pain.

Non-opioid analgesics		
Acetaminophen/Paracetamol		
• First-line pharmacologic therapy		
• Included in many over-the-counter combination products		
• No anti-inflammatory activity		
• Adverse reactions:		
○ Hepatotoxicity		
Acetaminophen/ Paracetamol	Adults and adolescents: Oral: 325 to 650 mg every 4 to 6 has needed or 1000 mg every 6 h as needed; maximum dose: 4000 mg/day IV: ≥50 kg: 650 mg every 4 h or 1000 mg every 6 h; maximum single dose: 1000 mg/dose; maximum daily dose: 4000 mg/day. <50 kg: 12.5 mg/kg every 4 h or 15 mg/kg every 6 h; maximum single dose: 15 mg/kg/dose (≤750 mg/dose); maximum daily dose: 75 mg/kg/day (≤3750 mg/day). Children: Oral: 10 to 15 mg/kg/dose every 4 to 6 h as needed; do not exceed 5 doses in 24 h; maximum daily dose: 75 mg/kg/day (not to exceed 4000 mg/day). IV: <50 kg: 12.5 mg/kg every 4 h or 15 mg/kg every 6 h as needed; maximum single dose: 15 mg/kg/dose (≤750 mg/dose); maximum daily dose: 75 mg/kg/day (≤3750 mg/day). Infants/children <2 years old: maximum daily dose: 60 mg/kg/day.	Due to risk for hepatotoxicity, some experts recommend a lower maximum dose of 3000 mg/day in adults with normal liver function, particularly when used for longer durations (e.g., >7 days). An even lower total daily dose (e.g., 2000 mg/day) or avoidance may be preferred in patients with certain risk factors for hepatotoxicity, such as heavy alcohol use, malnutrition, fasting, low body weight, advanced age, febrile illness, select liver disease, and concomitant use of interacting drugs.
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)		
• First-line pharmacologic therapy		
• The listed agents are more commonly used NSAIDs; there are other agents available.		
• Around the clock therapy is more effective for anti-inflammatory effect.		
• Adverse reactions:		
○ Toxicity is related to dose and duration of therapy.		
○ Renal toxicity (increased risks when given concurrently with other nephrotoxic medicines e.g. aminoglycosides, vancomycin, diuretics, calcineurin inhibitors).		
○ NSAIDs are generally avoided after transplant due to risk of renal toxicity.		
○ Gastrointestinal toxicity – particularly bleeding (increased risk when given concurrently with antiplatelet and anticoagulant medicines and/or SSRIs/SNRIs). Consider need for gastroprotection.		
○ Risk of cardiovascular events – of agents listed, higher relative risk with meloxicam and indomethacin [118].		
Ibuprofen	Adults: OTC: 200–400 mg every 6–8 h (max 1200 mg/day) Rx: 600–800 mg every 6–8 h (max 3200 mg/day) Children: 4 to 10 mg/kg/dose (maximum dose: 600 mg/dose) every 6 to 8 h; maximum daily dose: 40 mg/kg/day or 2400 mg/day, whichever is less	Available over the counter; appropriate for pediatric use
Naproxen	Adults: OTC: 200 mg every 8–12 h (max 600 mg/day) Rx: 250–500 mg every 12 h (max 1500 mg/day)	Available over the counter as 220 mg naproxen sodium = 200 mg naproxen 500 mg tablets available with prescription
Celecoxib	Adults: 100–200 mg every 12 h (max 400 mg/day)	COX-2 inhibitor; Less GI toxicity
Topical analgesics		
• Available over the counter		
• May be helpful for localized musculoskeletal pain but evidence is inconclusive		
Lidocaine spray/patches/cream		
Capsaicin patches/cream		For neuropathic pain; muscle/joint pain in countries where approved
Menthol spray/cream/gel		
Diclofenac or ibuprofen gel		Availability may vary by country
Multipurpose Adjuvant Analgesics		
• Multipurpose adjuvant analgesics are often managed with the involvement of clinicians with expertise in prescribing*		
Noradrenergic agents		
Titrate gradually; risk for side effects with rapid initiation or discontinuation.		
Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs)	Duloxetine, milnacipran, venlafaxine	
Secondary amine tricyclic antidepressants (TCAs)	Desipramine, nortriptyline	
Tertiary amine TCAs	Amitriptyline	
Cannabinoids		
Cannabinoids	Nabilone, dronabinol, medical cannabis**	Cannabinoid legalization and availability of medical-grade products vary. Lack of consensus on efficacy and dose. Inhalation is not recommended. Long term effects are unknown.
Neuropathic pain agents		
Titrate gradually; risk for side effects with rapid initiation or discontinuation.		
Gabapentinoids	Pregabalin, gabapentin	Sedating; potential for misuse
GABA B agonist	Baclofen	Spasticity and neuropathic pain

(*continued on next page*)