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Drugs in Dentistry

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The following is a summary of the use of analgesics, anti-infectives, anesthetics and medical emergency drugs in dentistry. This information is not intended to present a comprehensive review; the reader is therefore encouraged to seek additional and confirmatory information.

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Analgesics^{1, 2, 3} (Figure 1 - Management of Acute Postoperative Dental Pain in Adults)

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[Figure 1: Management of Acute Postoperative Dental Pain in Adults](#)

[Table 1: Analgesics for Orofacial Pain: Pediatric Doses](#)

[Table 2: Analgesics for Orofacial Pain: Adult Doses](#)

Consider the following points in the use of analgesics:

- Eliminate the source of pain, if possible.
- Individualize regimens.
- Optimize dose and frequency before switching.
- Maximize the nonopioid before adding the opioid.
- Consider a loading dose and/or a preoperative dose for nonsteroidal anti-inflammatory drugs (NSAIDs).
- Avoid chronic use of any analgesic.
- Reduce the dose in older individuals.

Be aware of the contraindications and cautions for NSAIDs, including ASA (see also individual product monographs and CPhA monographs as well as comprehensive drug interaction references):

- Allergic reaction to any NSAID, including ASA
- ASA-induced asthma and nasal polyps
- Gastrointestinal inflammatory or ulcerative disease
- History of bleeding disorder or concurrent use of anticoagulants
- Concurrent use of ACE inhibitors, loop diuretics or beta-blockers, particularly in patients with heart failure (avoid NSAIDs or limit use to ≤ 4 days)
- Concurrent use of antineoplastic doses of methotrexate
- Concurrent use of lithium
- Concurrent use of digoxin in older individuals or those with renal disease
- For ASA: concurrent use of sulfonylurea oral hypoglycemics.

Be aware of the contraindications and cautions for opioids:

- Severe respiratory disease
- Severe inflammatory bowel disease
- Concurrent use of alcohol or other CNS depressants.

[Table 1](#) and [Table 2](#) list common analgesics and corresponding pediatric and adult doses recommended to treat orofacial pain.

Table 1: Analgesics for Orofacial Pain: Pediatric Doses ([Printable Table](#))

Drug	Pediatric Dose	Daily Maximum ^a
Acetaminophen	10–15 mg/kg po Q4–6H	65 mg/kg or 2600 mg
Codeine	0.5–1 mg/kg po Q4–6H	3 mg/kg ^b
Ibuprofen	10 mg/kg po Q6–8H	40 mg/kg or 2400 mg

^a Maximum doses are for acute pain only.

^b Do not exceed 60 mg/dose.

Table 2: Analgesics for Orofacial Pain: Adult Doses ([Printable Table](#))

Drug	Adult Dose	Daily Maximum ^a
Nonopioids		
Simple Analgesics		
Acetaminophen	325–1000 mg po Q4–6H	4000 mg
NSAIDs^b		
ASA	325–1000 mg po Q4–6H	4000 mg
Celecoxib	200 mg po daily to BID	400 mg
Diffunisal	1000 mg po × 1 dose, then 500 mg Q12H	1500 mg
Etodolac	200–400 mg po Q6–8H	1200 mg
Floctafenine	200–400 mg po Q6–8H	1200 mg
Flurbiprofen	50–100 mg po Q4–6H	300 mg
Ibuprofen	400 mg po Q4–6H	2400 mg
Ketoprofen	25–50 mg po Q6–8H	300 mg
Ketorolac	10 mg po Q4–6H	40 mg
Naproxen	500 mg po × 1 dose, then 250 mg Q6–8H	1250 mg
Naproxen sodium	550 mg po × 1 dose, then 275 mg Q6–8H	1375 mg
Opioids^c		
Codeine	30–60 mg po Q4–6H	^d
Oxycodone	5–10 mg po Q4–6H	^d

^a. Maximum doses are for acute pain only.

^b. Use for shortest possible time.

^c. In combination with a nonopioid.

^d. Maximum doses for opioids are not established. Base dosing on individual response and side effects.

Anti-infectives^d

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[Table 3: Antibacterial Dosages for Orofacial Infections](#)

[Table 4: Antifungals for the Treatment of Oral Candidiasis](#)

Consider the following points when using antibiotics:

- Use only when there is an indication.
- Use only when the risk-benefit ratio is favourable.
- They are not a substitute for establishing adequate drainage.
- Choose an effective agent with the narrowest spectrum of activity.
- Prescribe a therapeutic dose.
- Consider a loading dose.
- Prescribe at an appropriate frequency.
- Prescribe for an appropriate duration.
- Choose the drug with the fewest side effects.
- Consider laboratory culture and sensitivity tests to target specific bacteria with antibiotics identified as effective.
- Recognize that antibiotics encourage development of resistance if used for too long and/or at suboptimal doses.
- In superficial infections, consider alternatives to antibiotics such as topical debridement and application of topical antiseptics when appropriate.
- Consider individual patient factors such as age, allergies and drug interactions (especially with erythromycin, clarithromycin, metronidazole, tetracyclines and azole antifungals, e.g., ketoconazole, fluconazole, itraconazole); consult individual product monographs and drug interaction references.
- Consider cost.

[Table 3](#) lists common antibiotics and corresponding adult doses recommended for orofacial infections.

[Table 4](#) lists antifungals and corresponding adult doses recommended for the treatment of oral candidiasis.

Table 3: Antibacterial Dosages for Orofacial Infections² ([Printable Table](#))

Drug	Recommended Adult Dose
Amoxicillin	250–500 mg po TID
Amoxicillin/clavulanate	250–500 mg (amoxicillin) po TID
Cephalexin	250–500 mg po QID
Clarithromycin	250–500 mg po BID
Clindamycin	150–300 mg po QID
Doxycycline	100 mg po once daily or BID
Erythromycin	250–500 mg po QID
Metronidazole	250–500 mg po TID
Penicillin V	300–600 mg po QID

Table 4: Antifungals for the Treatment of Oral Candidiasis⁵ ([Printable Table](#))

Drug	Adult Dose
Immunocompetent Patients	
Nystatin oral suspension	Swish and swallow 400 000–600 000 units QID × 14 days
Immunocompromised Patients	
Nystatin oral suspension	Swish and swallow 500 000–1 000 000 units QID × 14 days
Fluconazole	100 mg po once daily × 1–2 wk
Itraconazole	200 mg po once daily × 1–2 wk
Ketoconazole	200–400 mg po once daily × 1–2 wk

Endocarditis Prophylaxis⁶

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Table 5: Cardiac Conditions Associated with the Highest Risk of Adverse Outcome from Endocarditis for which Prophylaxis with Dental Procedures is Reasonable

Table 6: Dental Procedures for which Endocarditis Prophylaxis is Reasonable for Patients with Cardiac Conditions in Table 5

Table 7: Antibacterial Regimens for Endocarditis Prophylaxis in Dental Procedures

Table 5 lists cardiac conditions associated with the highest risk of adverse outcome from infective endocarditis, in which antibacterial coverage is considered reasonable for patients undergoing certain dental procedures.⁶

Table 5: Cardiac Conditions Associated with the Highest Risk of Adverse Outcome from Endocarditis for which Prophylaxis with Dental Procedures is Reasonable (Printable Table)

Prosthetic cardiac valve, or prosthetic material used for cardiac valve repair
Previous infective endocarditis
Congenital heart disease (CHD) ^a <ul style="list-style-type: none"> • Unrepaired cyanotic CHD, including palliative shunts and conduits • Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure • Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device^b
Cardiac transplantation recipients who develop cardiac valvulopathy

^a Except for conditions listed above, antibacterial prophylaxis is no longer recommended for any other form of CHD.

^b Prophylaxis is reasonable because endothelialization of prosthetic material occurs within 6 months following the procedure.

Antibacterial prophylaxis is reasonable for patients with cardiac conditions listed in Table 5 who are undergoing certain dental procedures (see Table 6).⁶

Table 6: Dental Procedures for which Endocarditis Prophylaxis is Reasonable for Patients with Cardiac Conditions in Table 5 (Printable Table)

Endocarditis prophylaxis is reasonable for all dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa
Endocarditis prophylaxis is not required for the following dental procedures: <ul style="list-style-type: none"> • routine local anesthetic injections (nonintraaligamentary) through noninfected tissue • placement of removable prosthodontic or orthodontic appliances • fluoride treatments • taking of oral radiographs • orthodontic appliance adjustment • placement of orthodontic brackets • shedding of primary teeth • bleeding from trauma to the lips or oral mucosa

The recommended antibacterial regimens for endocarditis prophylaxis in dental procedures⁶ are listed in Table 7.

Table 7: Antibacterial Regimens for Endocarditis Prophylaxis in Dental Procedures⁶ (Printable Table)

Drug	Adult Dose (30–60 minutes before procedure)	Pediatric Dose ^b (30–60 minutes before procedure)
Standard Regimen		
Amoxicillin	2 g po	50 mg/kg po
Unable to Take Oral Medications		
Ampicillin	2 g im ^c or iv	50 mg/kg im ^c or iv
<i>or</i>		
Cefazolin	1 g im ^c or iv	50 mg/kg im ^c or iv
<i>or</i>		
Ceftriaxone	1 g im ^c or iv	50 mg/kg im ^c or iv
Allergic to Penicillins		
Clindamycin	600 mg po	20 mg/kg po
<i>or</i>		
Cephalexin ^{d, e}	2 g po	50 mg/kg po
<i>or</i>		
Clarithromycin	500 mg po	15 mg/kg po
<i>or</i>		
Azithromycin	500 mg po	15 mg/kg po
Allergic to Penicillins and Unable to Take Oral Medications		
Clindamycin	600 mg im ^c or iv	20 mg/kg iv

^a See Table 5 and Table 6.

^b Pediatric dose should not exceed adult dose.

^c Avoid im injections in anticoagulated patients.

^d Or other first- or second-generation oral cephalosporin in equivalent adult or pediatric dosage.

^e Cephalosporins should not be used in individuals with immediate-type hypersensitivity reaction (urticaria, angioedema or anaphylaxis) to penicillins.

Antibacterial Prophylaxis for Dental Patients with Total Joint Replacements

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Table 8: Antibacterial Prophylaxis for Dental Patients with a Total Joint Prosthesis

The Canadian Dental Association continues to support the 2003 statement of the American Dental Association (ADA) and the American Academy of Orthopaedic Surgeons (AAOS) concerning antibiotic prophylaxis for dental patients with total joint replacements.^{4, 5} Antibacterial administration to prevent infection of joint prostheses is not indicated for patients with pins, plates and screws, nor is it routinely indicated for most dental patients with total joint replacements. Prophylaxis may be warranted for a small number of patients with total joint replacements who have the following conditions:

- Inflammatory arthropathies (rheumatoid arthritis, systemic lupus erythematosus)
- Disease-, drug- or radiation-induced immunosuppression
- Type 1 diabetes
- First two years following joint placement
- Previous prosthetic joint infections
- Malnourishment
- Hemophilia
- HIV infection
- Malignancy

Refer to Table 6 for dental procedures requiring antibacterial prophylaxis and to Table 8 for antibacterial regimens that may be used in these cases. Practitioners must use clinical judgment in selecting antibacterial prophylaxis for dental patients with total joint replacements.

Table 8: Antibacterial Prophylaxis for Dental Patients with a Total Joint Prosthesis (Printable Table)

Drug	Adult Dose
Standard Regimen	
Amoxicillin or cephalexin ^a	2 g po to be taken 1 h before procedure
Penicillin Allergy	
Clindamycin	600 mg po to be taken 1 h before procedure
Unable to Take Oral Medications	
Standard Regimen	
Ampicillin	2 g im or iv to be given 1 h before procedure
<i>or</i>	
Cefazolin ^a	1 g im or iv to be given 1 h before procedure
Penicillin Allergy	
Clindamycin	600 mg iv to be given 1 h before procedure

^a Cephalosporins should not be used in individuals with a history of immediate-type hypersensitivity reactions (urticaria, angioedema or anaphylaxis) to penicillins.

Local Anesthetics

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Table 9: Maximum Recommended Doses of Local Anesthetics

Table 10: Expected Duration of Action (minutes) of Local Anesthetics

Potential Interactions with Epinephrine or Levonordefrin:^{9, 10, 11} Adding epinephrine or levonordefrin to the local anesthetic formulation improves the depth and duration of the local anesthetic block. However, exercise caution if a patient has a history of significant cardiovascular disease or is concomitantly taking any of the following drugs:

- **Nonselective beta-blockers** such as nadolol, oxprenolol, pindolol, propranolol, sotalol or timolol (may result in increased blood pressure)
- **Tricyclic antidepressants** (may result in increased blood pressure and cardiac dysrhythmias).

In these cases, use the lowest effective dose of epinephrine and consider a maximum of <40 µg.¹² The administration of levonordefrin is contraindicated in individuals taking tricyclic antidepressants. For those with cardiovascular disease or taking nonselective beta-blockers, use the lowest effective dose of levonordefrin and consider a maximum of <200 µg.

Due to an increased risk of cardiac dysrhythmias, patients undergoing general anesthesia with **halothane** should receive reduced epinephrine doses. The following dosing limits have been suggested: epinephrine 1 µg/kg when halothane is used with thiopental, and epinephrine 2 µg/kg when halothane is used alone.

Avoid epinephrine altogether in patients who have ingested **cocaine** within the previous 24 hours, as there is increased risk of cardiac dysrhythmias and increased blood pressure.

The vasoconstrictor dose per 1.8 mL dental cartridge is as follows:

1 cartridge of 1:200 000 epinephrine = 9 µg

1 cartridge of 1:100 000 epinephrine = 18 µg

1 cartridge of 1:50 000 epinephrine = 36 µg

1 cartridge of 1:20 000 levonordefrin = 90 µg.

The maximum recommended doses of local anesthetics and their expected duration of action are listed in Table 9 and Table 10, respectively.

Table 9: Maximum Recommended Doses of Local Anesthetics^{13, 14, 15, 16} (Printable Table)

Drug	Maximum Dose (mg/kg)	Maximum Number of Cartridges ^a
Articaine 4% with epinephrine 1:100 000 or 1:200 000	7	7
Bupivacaine ^b 0.5% with epinephrine 1:200 000	2	10
Lidocaine 2% with epinephrine 1:50 000 or 1:100 000	7	13
Mepivacaine 2% with levonordefrin 1:20 000	6.6	11
Mepivacaine 3% plain	6.6	7
Prilocaine 4% plain	8	8
Prilocaine 4% with epinephrine 1:200 000	8	8

^a 1.8 mL volume (except articaine which may be 1.7 mL or 1.8 mL depending on the manufacturer).

^b Not recommended for children.

Table 10: Expected Duration of Action (minutes) of Local Anesthetics^{12, 14, 15, 16} (Printable Table)

Drug	Maxillary Infiltration		Inferior Alveolar Block	
	Tooth Pulp	Soft Tissue	Tooth Pulp	Soft Tissue
Articaine 4% with epinephrine 1:100 000 or 1:200 000	60	170	90	220
Bupivacaine 0.5% with epinephrine 1:200 000	40	340	240	440
Lidocaine 2% with epinephrine 1:50 000 or 1:100 000	60	170	85	190
Mepivacaine 2% with levonordefrin 1:20 000	50	130	75	185
Mepivacaine 3% plain	25	90	40	165
Prilocaine 4% plain	20	105	55	190
Prilocaine 4% with epinephrine 1:200 000	40	140	60	220

Medical Emergencies^{17, 18, 19, 20}

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Table 11: Drugs for Medical Emergencies

Treatment of a medical emergency in a dental office begins with assessment and, if necessary, treatment of airway, breathing and circulation (cardiopulmonary resuscitation). Most often, only after these basics are addressed should the drugs listed in Table 11 be considered. They should, however, be readily available for such emergencies. A sugar source such as orange juice or nondiet soft drink should be readily available for use in the management of hypoglycemic reactions. Additional agents may be appropriate depending on the nature of the dental practice.

Table 11: Drugs for Medical Emergencies (Printable Table)

Drug	Indication	Initial Adult Dose	Initial Pediatric Dose ^a
Oxygen	Most medical emergencies	100% inhalation	100% inhalation
Epinephrine ^b	Anaphylaxis	0.3–0.5 mg im or 0.1 mg iv	0.01 mg/kg im or iv
	Asthmatic bronchospasm unresponsive to salbutamol	0.3–0.5 mg im or 0.1 mg iv	0.01 mg/kg im or iv
	Cardiac arrest	1 mg iv	0.01 mg/kg iv
ASA	Suspected MI or unstable angina	160 ^c –325 mg orally; chewing is preferable to just swallowing (single dose). Enteric-coated ASA is not recommended unless it is chewed.	N/A
Diphenhydramine	Allergic reactions	25–50 mg iv or im	1 mg/kg iv or im
Nitroglycerin	Angina pectoris	0.3–0.6 mg sublingually	N/A
Salbutamol	Asthmatic bronchospasm	200 µg (2 puffs) by metered dose inhaler	100 µg (1 puff) by metered dose inhaler

^a The total pediatric dose should not exceed the recommended adult dose.

^b The dose suggested for the im route is also appropriate for intralingual or sublingual injection.

^c For 160 mg dose, 2 × 80 mg children's chewable tablets may be used.

Abbreviations: MI = myocardial infarction; N/A = not applicable.

Suggested Readings

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