

Pharmaceutical Prescribing For Children By Dental Professionals: A Review

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Abstract

Dental treatment is particularly difficult for the practitioner because of the different physical conditions, emotional conditions, and developmental features of the developing child. Children are not just miniature adults, and it is difficult to "fit" the profile and demands of a child with the concepts of adult pharmacotherapeutics. The literature on the application of pharmacologic medicines in paediatric dentistry is sadly very scant. This has mostly been linked to the worries and challenges related to dealing with kids. Children struggle to locate or identify their discomfort, and fear might make it impossible for them to communicate at all. The dentist and the parents are responsible for diagnosing and preventing pain, anxiety, and infection. The dentist can better treat patients and instruct parents on appropriate preventive, treatments, and therapy by having a working knowledge of current developments in pharmaceutical treatment of pain complaints, infection complaints, and anxiety problems. When administered to children by untrained personnel, pharmacotherapeutic drugs have the potential to be devastating. To prevent putting patients at undue danger, healthcare professionals should only provide medications in that they have received adequate training. Carefully observe the manufacturer's recommended dosage; if unsure, consult the child's paediatrician is advised. This article reviews about the pharmaceutical prescribing for children by dental professionals.

Keywords: Amoxicillin, Ibuprofen, Dentist, Prescription.

Introduction

Dental treatment is particularly difficult for the practitioner because of the different physical conditions, emotional conditions, and developmental features of the developing child. Children are not just miniature adults, and it is difficult to "fit" the profile and demands of a child with the concepts of adult pharmacotherapeutics. The literature on the application of pharmacologic medicines in paediatric dentistry is sadly very scant. This has mostly been linked to the worries and challenges related to dealing with kids. Children struggle to locate or identify their discomfort, and fear might make it impossible for them to communicate at all.[1,2] The dentist and the parents are responsible for diagnosing and preventing pain, anxiety, and infection. The dentist can better treat patients and instruct parents on appropriate preventive, treatments, and therapy by having a working knowledge of current developments in pharmaceutical treatment of pain complaints, infection complaints, and anxiety problems. When administered to children by untrained personnel,

pharmacotherapeutic drugs have the potential to be devastating. To prevent putting patients at undue danger, healthcare professionals should only provide medications in that they have received adequate training. Carefully observe the manufacturer's recommended dosage; if unsure, consult the child's paediatrician is advised.[3,4] Children are not just "little adults"; they respond to medications differently from adults. Children's reactions to and metabolites of drugs alter regularly from birth through puberty. When deciding what medications to prescribe for children and adolescents, care and consideration must be taken. Due to variations in selection criteria, research participants, and treatment regimens, it is usually impossible to compare studies and compile information in the literature that is currently available. Despite these challenges, when young patients present with pain problems, anxiety problems, and infection problems, they should rely on the practitioner's skills and understanding to resolve their issues. An overview of paediatric drug prescriptions by dentists is given in this article.[5]

General Principles

Unlicensed and 'OffLabel' Use of Medicines in Children

A drug manufacturer must acquire a product licence before it can advertise a drug. Applications for product licences are supported by data from clinical trials. The specific ailment, dosage range, and age range for which the drug is appropriate are listed in the product permit. The medicine's Summary of Product Characteristics (SmPC) contains these information. Children should always be given only approved medications. Few drugs are tested on kids, so many drugs aren't approved for kids. This does not imply that a drug is ineffective or unsafe for use in youngsters, though.[6] It is acknowledged that the insightful use of unlicensed (medicines without authorization for any purpose) or licenced drugs for unlicensed manifestations (use of a licenced drug but used for a disease condition, dose amount, or maturity level not indicated in the licence) is frequently required in paediatric practise. Many young kids may require medications that are not specifically licenced for paediatric use. Off-label use refers to the use of medications for medical conditions that are not approved. The 1968 Medications Act does not forbid the administration of unlicensed medicines, despite the fact that promotions of medicines are not permitted outside the scope of the licence. Without a permit or outside the scope of the product licence, doctors and dentists may legally administer medications.[7,8]

Consent: In general, it is not essential to go above and beyond the measures taken when prescribing licenced medicines to get the permission of parents, caregivers, and paediatric patients to recommend or dispense unlicensed medications or licenced medications for unlicensed manifestations, according to the RCPCH/NPPG.[10]

Prescription Advice: Children's prescriptions should be written in accordance with the British National Formulary's Prescription Writing Guidelines (BNF). These guidelines are:

Before prescribing: Make sure the child's allergy status is enquired about and noted.
Get a complete medical history.

General advice: Use indelible ink and write in block letters. The prescription should be signed and dated.

Add the following information to the prescription:

A. Information on the patient, including full name and address: Age (it is a legal obligation in the situation of prescription consisting of only drugs if the kid is under twelve years of age, however, it is preferred to specify the age including all prescriptions for paediatric patients) Patient's body weight [11]

Information regarding the drug: When recommending a drug, just use generic name. Names of medications and preparations should be written completely, not abbreviated. It is advisable to get and adhere to the list of medications that the Ministry of Health has approved dentists to prescribe. If a patient on the NHS needs a medication that is not on the list, their dentist can write them a private prescription. Despite being notably suitable for young infants, some liquid treatments do include sugar. When possible, parents should choose sugar-free liquid medications for their children by writing "sugar-free" on the prescription. This is crucial for kids who are academically, physically, or medically disadvantaged and whose oral and dental health poses a serious threat to their lives. Oral syringes are accessible and will be provided by the pharmacist if the dosage required is less than 5 ml. Discuss with the child and/or guardians which preparation would be best as many kids can gulp down capsules or tablets and may choose a solid dose formulation. It is crucial to specify the strength of the preparation when prescribing capsules or tablets. Milligrams, such as 500 mg, should be used to represent amounts less than 1 gramme. Write 1 g, etc., for quantities greater than one gramme. Micrograms, not milligrammes, should be used to express amounts smaller than 1 mg, i.e. 100 micrograms rather than 0.1 mg. Micrograms, nanograms, and units shouldn't be truncated, and it's best to avoid using extraneous decimal points, such as 3 mg rather than 3.0 mg. The term "prn" must be used with the therapeutic purpose, the minimum dose spacing, the dosage, and the administering route specified.[11]

Children's Prescription Costs through the NHS

All children under the age of 16 and full-time students in grades 16, 17, and 18 are free from paying NHS prescription fees.

Children's Dosages: It can be difficult to prescribe medications for kids, particularly for those specialists who don't frequently work with kids. The child's age, weight, developmental stage, and co-morbidities must be considered while prescribing medication doses. The majority of paediatric doses are listed inside the BNF inside each medication entry. If a children's

dosage is not specified, pediatric patients use might not be acceptable, there might not be sufficient information, or there might be unique risks. The SmPC, which is typically available digitally via the Digital Medicines Compendium, contains more in-depth prescribing information. The websites of the manufacturers, Septodont company and Dentsply company, have 4 types of SmPCs for tooth local anaesthetics. The following age ranges or body weight (in kilograms; for predictions of body weight by age) are typically used to determine doses in the BNF.[12]

Dosages in Obese Children: More and more kids are being labelled as obese. Although calculating drug dosages for young kids might be challenging, in most situations they must be determined by their age or the average body weight for that age. Sometimes, this could result in a less-than-ideal reaction. A child's weight-based maximum dose should never be higher than an adult's maximum dose. Please contact your local pharmacist who handles drug information for more detailed instructions on determining doses for children who are obese.

Analgesia and Prescribing for Children in Pain in Dentistry: Children's oral pain brought on by decay should be evaluated and treated correctly. The primary goal is to eliminate the problem as quickly as feasible through clinical intervention. Analgesics should be provided if the course of treatment needs to be postponed or if post-operative pain is anticipated. It is recommended to take ibuprofen drug or paracetamol drug at dosages suitable for the child's age and/or weight. Opioids are rarely recommended for treating dental pain, particularly in children.[13]

Aetiology of dental pain: Children's dental pain is typically brought on by trauma or tooth decay. Treatment of the underlying cause is preferred because it will reduce symptoms. Following therapy, there can be a duration of post-operative pain.

Control of dental pain

When a patient complains of discomfort, the following details are to be obtained:

- Radiation area and the location of the pain.
- Type of pain, such as stabbing, dull, sharp, or throbbing.
- The length of the pain, i.e., how it persists and how long it has been there.
- Whether the discomfort is constant or sporadic.
- The time intervals, if there are breaks in discomfort.
- Whether the pain started on its own.
- Factors that make pain worse or better.

- The things that cause agony.
- Any associated behaviours, like clenching or grinding.
- A disturbance in sleep.
- The use of medication or other treatments to relieve pain (dosage of drug, frequency of drug and duration of drug).

The first step in treating tooth discomfort is to find the source. Analgesics should be provided if the course of treatment needs to be postponed or if post-operative pain is anticipated. The type of analgesic needed depends on how bad the pain is. The analgesic effectiveness of non-opioids, including NSAIDs, aspirin, and paracetamol, is constrained by adverse effects and ceiling effects, meaning that at a certain dose, no more pharmacological impact is observed. The ceiling effect is also present in weak opioids like codeine and dihydrocodeine, whose use is constrained by negative side effects. Strong opioids, such as morphine, do not, however, have a ceiling effect, therefore analgesia increases with dose.[12]

Paracetamol: Many national bodies and international bodies advise using paracetamol as a painkiller and an antipyretic. All stages of children tolerate it nicely. Paracetamol has centrally mediated analgesic effects; it lowers prostaglandin synthesis CNS, which effectively inhibits pain signal transmission to the cortex and raises the threshold for pain. Paracetamol has almost minimal impact on regional prostaglandin synthesis when compared to NSAIDs[12], which likely explains why it has little anti-inflammatory action. Although its efficacy for this application is unproven, paracetamol is frequently used for symptoms related to teething. The antipyretic and analgesia properties of paracetamol could provide relief as teething is frequently accompanied by pyrexia, which may have bacterial origins.[13,14]

Legal standing

For post-immunization pyrexia in infants older than 2 months, as well as as an antipyretic as well as analgesic in infants older than 3 months, paracetamol is approved.

Pediatric paracetamol medications are available from dentists with an NHS prescription.

Suspension of oral acetaminophen for paediatric dental patient. It comes in the following forms: Paracetamol oral suspension 120 mg/5 ml; Paracetamol oral suspension 250 mg/5 ml. BP (= paediatric paracetamol oral suspension = paediatric paracetamol combination) is also available as a liquid. The strength of the paracetamol suspension should be specified before prescribing it. If no dosage is specified, a formulation containing 120 mg/5 ml will be given. If "sugar-free" is noted on the prescription,

which is desired for children, sugar-free goods will be provided. Pediatric paracetamol products are sold at pharmacies and other retail locations. In pharmacies, you can get paracetamol in any of its oral forms. Retailers and other retail establishments sell small packets of tablets and suspensions.[13]

Non-Steroidal Anti-Inflammatory Drugs: NSAIDs have analgesic impacts antipyretic impacts, and anti-inflammatory effects. By inhibiting the cyclooxygenase enzymatic activity at or close to the injury location and inflammation, NSAIDs reduce inflammation. The nervous system's central and peripheral systems' suppression of prostaglandin production is the source of NSAIDs' analgesic effects. Moderate to severe musculoskeletal discomfort, pain from inflammatory soft tissue structures and bones, pain from bone metastases, dental discomfort, and post-operative pain are all treated with NSAIDs. Aspirin, ibuprofen, diclofenac, and naproxen are NSAIDs. Celecoxib drug, etoricoxib drug, valdecoxib drug, and meloxicam drug are COX-2-specific NSAIDs.[14,15]

Aspirin

Aspirin is a suitable option for treating dental pain in adults, but the Council for Safe Operation of Drugs (CSM) has cautioned against using it in kids: Children under the age of 16 shouldn't take aspirin. The CSM has recommended that aspirin-containing formulations must not be administered to children and teenagers under 16 years old, unless expressly indicated, such as for Kawasaki syndrome, due to a link with Reye's syndrome.

Ibuprofen

Ibuprofen is typically used as a backup to paracetamol when managing pyrexia and uncomplicated pain in kids, but it is the medicine of preference when managing dental pain linked to tissue inflammation.

Toxicology, adverse effects, and interactions in children

NSAID side effects are less common in children than in adults, although long-term use raises the risk of stomach irritation and platelet problems. Compared to those other NSAIDs, ibuprofen is less probable to have gastrointestinal adverse effects. The side effects that are most frequently mentioned are dyspepsia condition, nausea condition, diarrhoea condition, and gastrointestinal pain. The least frequently encountered adverse reactions include thrombocytopenia condition, skin rashes condition, and hypersensitivity reactions. Children with a predisposition of peptic ulcer syndrome or those who have NSAID hypersensitivity conditions such as

asthma condition, rhinitis condition, or urticaria should not take ibuprofen. Ibuprofen should be used with caution in children with kidney or liver impairment, asthma, heart failure or coagulation defects.[16,17] Ibuprofen 400 mg/kg consumption in kids may result in significant intoxication. Nausea condition, vomiting condition, epigastric discomfort, and, less frequently, diarrhoea are symptoms when taken normally from the oral route.

Products containing paediatric ibuprofen that dentists can prescribe through the NHS

Ibuprofen oral suspension (100 mg/5.0 ml), sugar-free.

Ibuprofen paediatric formulations are sold at pharmacies and other retail locations.

Oral suspension of ibuprofen can indeed be purchased from pharmacies and other retail locations in tiny packets of single 5 ml dosages.

Opioids

Opioid analgesics affect both the somatic and autonomic neural systems, and both the CNS as well as peripheral nerves are involved in mediating their effects. Many medications in the weaker opioid class, including codeine as well as dihydrocodeine, may be useful when coupled with a non-opioid. It has not been demonstrated that proprietary mixtures like co-dydramol as well as co-codamol, which include insufficient levels of one or both ingredients, provide higher pain relief than a sufficient dose of the non-opioid ingredient given alone. The effectiveness of mild opioids even when administered alone in treating acute post-operative painful symptoms in teeth has not been demonstrated. Strong opioids are essential for treating both adults and children's severe pain. Strong opioids must only be prescribed and provided to children when necessary by professionals skilled in evaluating a child's level of distress. The most common and potent opioid is morphine. Due to its lower potency and shorter duration of effect, pethidine has few advantages over morphine (two hours).[12,16]

Choice of Analgesic in Paediatric Dental Patients

Some discomfort is straightforward to identify and simple to manage. It is crucial to evaluate each component independently when treating other kinds of pain, particularly dental pain, which can have multiple components. Chronic pain demands ongoing analgesia, hence analgesics cannot be administered on an "as needed" basis in this situation. Ibuprofen is regarded as a second-line painkiller but may be a better acceptable first preference for dental pain related to inflammation. Paracetamol is widely

recognised as the analgesic of preference for the alleviation of pain as well as pyrexia in children.[15,16]

Prescription of antibiotics for kids with oral pathogen infections

Practitioners have recently been given instructions with the goal of lowering the usage of antibiotics for curative and preventative purposes. This is because microbes are becoming more resistant to antibiotics globally. There is some agreement among specialists regarding the application of antibiotics in dental practice despite the lack of supporting scientific research.

The following situations show improper antibiotic use:

- Use in clinical conditions where it is not necessary, such as when there is no infection but there is tooth pain.
- Inappropriate dosage, frequency, and timeframe.
- Inappropriate antimicrobial selection.
- Antibiotics being used frequently in dentistry to treat active infectious diseases.
- To stop distant infections like infective endocarditis from spreading.
- Antibiotics are not proven to be effective in treating acute infections that develop in deciduous teeth.

The therapy of odontogenic infections originating from permanent teeth has been outlined in clear, evidence-based recommendations for dentists following a systematic assessment of the literature. The recommendations that follow are based on these principles.

Management of Orofacial Infections with Antibiotics

An infection's initial evaluation is crucial. The clinician should determine whether or not a referral is required or whether treatment can be delivered in practice. If any of the following conditions hold true then a referral should be done:

- Indicators of septicemia.
- Spreading cellulitis; swellings that could impair breathing, close an eye, or make swallowing difficult.
- Dehydration, as well as a treatment-resistant condition.
- A patient who was uncooperative.

Children's orofacial infections: Typically, they have an odontogenic origin, and if the tooth that caused them is removed, they typically go away on their own. Additionally, keep in mind that some may drain on their own. Pediatric patients may quickly develop

systemic illness, making early diagnosis, management, and close monitoring of the clearance of the infection crucial. Local infections may progress if left untreated, which could result in major complications such as airway blockage.[19]

Antibiotic preference

First preference: Children's infections can be successfully treated with penicillin, such as amoxicillin. Dental infections should also be treated with phenoxymethyl penicillin.

Second preference

Metronidazole.

Third option

Erythromycin

It is not advised to use antibiotics to treat localised dental infections in addition to establishing drainage from an abscess. For the treatment of systemic odontogenic infections, there is no scientific basis to choose one antibiotic over another.

Dosage of amoxicillin for kids

Less than a year old: 62.5 mg tds;

Between one and five years old: 125 mg tds.

6 to 12 years of age: 250 mg tds.

Duration of medication

Two to three days, with a five-day maximum.

Presentation of drug

250 mg capsule.

125 mg and 250 mg of oral suspension per 5 ml, respectively.

NB Some products contain sucrose; if at all feasible, avoid these by writing "sugar-free" on the prescription.

250 mg and 125 mg per 5 ml of syrup.

Metronidazole

The properties of metronidazole, a nitroimidazole antimicrobial compound ensure its use as an antibiotic.

Spectrum

Efficient against some protozoa and anaerobic bacteria.

Dosage for kids

From ages 1-3: 50 mg tds;

From ages 3-7: 100 mg bd;

From ages 7-10: 100 mg tds; and

From ages 10 and older: 200 mg tds (adult dose).

Timeframe

3 days

Presentation

200 mg in 5 ml in the form of suspension (as benzoate). NB: Sucrose is included; there is no sugar-free option.

200 mg tablet form.

Erythromycin

The antibiotic macrolide is erythromycin. It contains the following qualities and is helpful for people who are allergic to penicillin. Spectrum It is effective against both Gram-positive microorganisms and Gram-negative micro-organisms throughout a wide range. It prevents bacterial expansion (bacteriostatic).[20]

Dosage for kids

From the age of one month to two years: 125 mg per day.

2 to 12 years old: 250 mg per day.

Duration

Two to three days, up to five days.

Antiviral and Antifungal Treatment

Antifungal drugs in children: Medications for treating oral fungus infections When possible, antifungal medications are used in conjunction with eradication of the underlying cause to treat oral fungal infections.

Antifungal agents can be categorised into four basic categories: category of allylamines (terbinafine), categories of echinocandins (caspofungin), categories of polyenes, and category of azoles. The azoles and polyenes are used to treat oral fungus infections in general dentistry, whereas the remaining two categories of drugs are frequently utilised in hospital settings. The major goal of treating oral illness is to totally remove the fungi in order to prevent recrudescence. The best way to verify the removal of the fungi is to apply microbiological swabs. If there are no available microbiological capabilities, a great stable clinical guideline is to continue treatment for as long as it takes for the symptoms and signs of candidosis to go away.[21]

Antiviral treatment in children: The virus herpes simplex (HSV) is responsible for the most viral infections that dentists commonly see. It is best to consult a doctor for other infections including varicella/zoster and chickenpox.

Herpes Simplex: HSV primary oral infection frequently results in agitation, fever, swelling of the cervical lymph nodes, and acute gingivostomatitis. Young children frequently contract this infection, which may be asymptomatic. Gingivostomatitis is

only present in the mouth and often goes away in ten days. Referral to the patient's primary physician is necessary in the event that the issue cannot be resolved.

Treatment: Although aciclovir is an effective treatment, many patients have advanced diseases when they first arrive.

Treatment should be restricted to using aqueous chlorhexidine (0.2%) mouthwashes, drinking enough fluids, analgesics, and practising proper oral hygiene. About 30% of patients get recurrent infections because the virus continues to be dormant, frequently in the trigeminal ganglia. Cold sores generally appear at the mucocutaneous interface of the lip. Since they are very contagious, personal things used by a person with infectious lesion must be kept in a containment and not shared with other family and friends. Acyclovir as well as penciclovir are the two drugs capable of curing cold sores in kids. Both are advertised as being useful for treating cold sores, but drugs must be used extremely early when the lesion is in prodromal phase. It is exceedingly challenging to recognise this stage in children, and antivirals are typically taken after the lesions have manifested when they frequently have very little impact. Four to five occasions a day, both antiviral medications are topically applied.[22]

Conscious Sedation for Dentistry in Children: To achieve light to moderate sedation, every doctor uses a different mix of medications. Others utilise a variety of medications, while some doctors only use one. Most dentists adhere to a routine that was taught to them during modern dental school. [23] Providers need to be aware of the pharmacodynamic and pharmacokinetic characteristics of the sedatives they use. Antihistamines, sedative-hypnotics, anti-anxiety pharmaceuticals, and opioid analgesics are the four groups of drugs that are widely used in conscious sedation. Certain pharmaceutical classes could fit into different therapeutic groups. For instance, benzodiazepines target the -aminobutyric acid receptor and have a variety of therapeutic effects, including sedative-hypnotic, anxiolytic, anticonvulsant, and muscle relaxant properties. Sedation therapists must be aware of the therapeutic categories of the drugs they choose in order to tailor the sedative regimen to the patient's particular needs. For instance, if painful operations are planned, adding an analgesic to the regimen may be beneficial. Regardless of the medication's intended use, providers must be suitably qualified and licenced before selecting it.[24]

Conclusion

The dentist can better treat patients and instruct parents on appropriate preventive, treatments, and therapy by having a working knowledge of current developments in pharmaceutical management of pain, infection, and anxiety. When administered to children by untrained personnel, pharmacotherapeutic drugs have the potential to be devastating. To avoid putting patients at undue risk, healthcare professionals should only administer medications in which they have received adequate training. Carefully follow the manufacturer's recommended dosage; if unsure, consult the child's paediatrician is advised.

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