

Is Pharmacy Dispensing Information Useful to Identify Problems with Analgesic Prescribing in Children?

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The primary objective of this study was to evaluate pharmacy dispensing patterns of analgesic prescriptions in children. A computerised search of the number of units of paracetamol and ketorolac dispensed by pharmacy during the years 2000 and 2001 was performed. 7, 244 units of paracetamol were dispensed each year (49% to surgical services and 49% to medical services). 1,138 units of ketorolac were dispensed each year (80% to surgical services). Within the surgical services, anaesthesia was responsible for the use of 90% of this drug. Information obtained from pharmacy in relation to the dispensing of drugs can be a valuable tool to identify potential problems with prescribing analgesic drugs in children.

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Introduction

The pharmacological options for analgesia have increased with the advent of new drugs and novel routes of administration. The number of procedures in paediatric clinical practice has also increased¹. However, paediatric patients ranging from neonates to adolescents are not a homogenous population and pain sensitivity varies among them. Evidence suggests an increased sensitivity to pain in neonates compared with older groups². The metabolism and clearance rates of most analgesic agents in preterm neonates are slower than in term neonates, but increase rapidly with age².

The Hospital Infantil de México "Federico Gómez" (HIM) is a tertiary-care public hospital for sick children without medical insurance. The Pharmacy Unit purchases medicines at the lowest

possible price in order to dispense these to patients free of charge. Information from the pharmacy in relation to drugs dispensed has been available electronically from 2000. We have used this data to identify potential problems in relation to analgesic prescription in children. We have focused on paracetamol, a commonly prescribed analgesic-antipyretic drug, and ketorolac, a potent analgesic drug that has not yet been authorised for paediatric patients in many countries but is extensively used in Mexico for this population.

Methods

A computerised search of the number of paracetamol and ketorolac units dispensed during the years 2000 and 2001 was performed. Data was expressed as units of paracetamol dispensed as tablets, liquid (bottles), ampoules and suppositories annually (Table 1). Ketorolac data

Table 1. Types of formulations dispensed by pharmacy
Paracetamol
Tablet 500 mg
Liquid 160 mg/5 mL and 100 mg/mL
Ampoule 1 g
Suppository 100 mg and 300 mg
Ketorolac
Tablet 30 mg
Ampoule 10 mg

was expressed as units of tablets and ampoules. Units of paracetamol and ketorolac provided to each department available at the HIM were also computed. Results were expressed as mean and percentages.

Results

7,244 units of paracetamol were dispensed by the pharmacy each year. The majority of units

Table 2. Units of paracetamol dispensed to the different services		
	Units/year	%
Surgical services	3,563	
General surgery	1,149	32
Orthopaedic	827	23
Cardiovascular surgery	620	17
Neurosurgery	513	14
Anaesthesia	231	7
Urology and gynaecology	113	3
Plastic surgery	109	3
Medical services	3,573	
Nephrology	606	17
Oncology	505	14
Ambulatory care	494	14
Intensive care	431	12
Infectious diseases	407	11
Internal medicine	253	7
Cardiology	240	7
Haematology	227	6
Neurology	174	5
Endocrinology	129	4
Neonatology	71	2
Gastroenterology	33	1
Other services	107	

were dispensed as oral formulations: 4,980 (69%). There were 1,512 ampoules (21%) and 752 suppositories (10%) dispensed each year. Approximately 49% of the units of paracetamol dispensed were to medical services and another 49% to surgical services. Within the surgical services, both general surgery and orthopaedics accounted for 55% of paracetamol dispensed by pharmacy (Table 2).

1,138 units of ketorolac were dispensed each year. The majority of these were ampoules: 972 (85%) with 166 (15%) tablets. The majority of the ketorolac was dispensed to surgical services, 940 units per year (83%). Within surgical services the department of anaesthesia received 90% of all the ketorolac dispensed (Table 3).

Discussion

Paracetamol is an analgesic drug that is well tolerated, lacks many of the side effects of aspirin, is available without prescription and widely used in the management of children with pain or fever³. However, the pharmacodynamics of analgesia produced by paracetamol have not been adequately described in humans and little is known in relation to the influence of covariables such as age or disease process³. Ketorolac is a

Table 3. Units of ketorolac dispensed to the different services		
	Units/year	%
Surgical services	940	
Anaesthesia	846	90
Plastic surgery	26	3
General surgery	20	2
Urology and gynaecology	18	2
Orthopaedic	12	1
Cardiovascular surgery	9	1
Neurosurgery	8	1
Medical services	197	
Internal medicine	55	28
Endocrinology	39	20
Oncology	27	14
Intensive care	26	13
Ambulatory care	19	10
Infectious diseases	11	6
Cardiology	10	5
Nephrology	7	3
Gastroenterology	1	0

potent nonsteroidal anti-inflammatory drug and, as such, may cause a transient reduction of creatinine clearance and sodium and potassium output⁴. Multiple adverse effects and costs associated with ketorolac have limited its use⁵⁻⁸.

Since similar amounts of paracetamol were dispensed to medical and surgical services (Table 2), we were unable to differentiate whether this drug was being administered for either analgesic or antipyretic purposes. 10% of total paracetamol was dispensed as suppositories, the least effective and most variable form of administration of this drug³. The safety of paracetamol is well recognised. Despite suggestions that it may accumulate in paediatric patients after repeated therapeutic doses^{9,10}, the Canadian experience has been that chronic poisoning is rare¹¹.

In relation to ketorolac, the main finding was that the anaesthetic department was responsible for the majority of ketorolac use in the hospital. Several studies have demonstrated that ketorolac has greater analgesic potency than paracetamol^{6,12}. However, differences in cost are important. In Mexico, ketorolac tablets are approximately seven times as expensive as paracetamol. Unfortunately, Mexican anaesthetists do not consider cost when selecting drugs¹³.

In Canada, the United States and the United Kingdom the use of ketorolac in patients under 16 years of age is not licensed and dosing guidelines have not been established^{5-7,14}. However, in Mexico ketorolac can be administered to children older than three years old, according to information provided for Dolac® (SYNTEX, S. A. de C. V., México DF) at an intramuscular dose of 1 mg/kg or an intravenous dose of 0.5–1 mg/kg followed by 0.5 mg/kg every 6 hours¹⁵.

Extensive contact between physicians and pharmaceutical representatives has been related to changes in behaviour of the former^{16,17}. In Mexico, a major contact with the pharmaceutical companies is known to occur at every Congress or Course, where a considerable amount, not only of promotional material but also of drug samples, can be obtained free of charge by all the course's attendees. However, the number of residents in anaesthesia attending the major national course of anaesthesia in Mexico has been limited^{13,18,19}. The promotional pressure to prescribe ketorolac as a first line analgesic drug for postoperative pain appears to be aimed at anaesthetists. The lack of guidelines in relation to the use of analgesia at the HIM is a contributing factor to the widespread use of ketorolac.

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