

Descriptive Study of Opioid-Acetaminophen Prescription Patterns at the Providence VA Medical Center

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ABSTRACT

Background: Prescription opioid-acetaminophen products account for the majority of cases of acetaminophen-related acute liver failure in the United States. We sought to examine the frequency of opioid-acetaminophen overuse at the Providence VA Medical Center and improve the quality and safety of opioid-acetaminophen prescription practices in a system employing electronic health records and e-prescribing.

Results: During fiscal year 2011, the Providence VA pharmacy dispensed a total of 19,841 acetaminophen prescriptions to a total of 4455 different patients. There were only 15 acetaminophen prescriptions dispensed in excess of 4g/day, and there were only 14 patients exposed to a potential maximum daily dose of acetaminophen greater than 4g.

Conclusions: The Providence VAMC appears to have a low rate of prescription acetaminophen misuse, in contrast to rates seen in previous studies. The VHA electronic health record, accessible to all healthcare providers, appears to offer considerable benefit in reducing the overuse of acetaminophen containing opioid products.

lected over other opioids due to the Schedule III status of this medication, which allows for refills. This convenience factor may contribute to a tendency to over-utilize hydrocodone products, contributing to greater risk of acetaminophen toxicity.

Acetaminophen is the most common etiology of acute liver failure (ALF), responsible for more than 40% of cases nationally.⁷ Ingesting more than the FDA-recommended 4g total daily dose of acetaminophen may result in liver injury. In a retrospective cohort of nearly 5 million health beneficiaries, liver dysfunction was diagnosed in 3800 cases, 23% of whom had received an opioid-acetaminophen prescription in the 90 days prior to liver dysfunction.³ Acetaminophen-associated overdoses led to an estimated 56,000 emergency room visits, 26,000 hospitalizations, and 458 deaths per year between 1990-1998.¹ Although there are a myriad of acetaminophen-containing medications, in both OTC and prescription formulations, our present study focuses on opioid-acetaminophen products because overdose from acetaminophen-containing prescription products account for nearly half of all cases of acetaminophen-related ALF in the U.S.^{3,7,8}

The goal of this study is to examine the frequency of opioid-acetaminophen overuse and improve the quality and safety of opioid-acetaminophen prescription practices.

INTRODUCTION

In the United States, acetaminophen is one of the most commonly used drugs for treating pain and fever – 28 billion doses are purchased annually in over-the-counter (OTC) and prescription formulations.¹ Over 20% of the adult United States population uses acetaminophen-containing products in an average week.^{2,3} Opioid combinations with acetaminophen account for 90% of acetaminophen prescriptions among adults.⁴ Between 2001-2005, the use of acetaminophen-containing prescription opioids increased by 38%, representing 11 billion doses and 182 million prescriptions annually. Hydrocodone-acetaminophen combination product (i.e. Vicodin® – Abbott Laboratories) has been the most frequently prescribed drug since 1997; it accounted for 128 million prescriptions in 2009, more than statins, ACE-inhibitors, or generic proton-pump inhibitors.⁵ From 1999-2010, opioid pain reliever sales quadrupled, and enough pills were sold in 2010 to medicate every American adult with a typical 5mg dose of hydrocodone every 4 hours for 1 month.⁶ Hydrocodone-acetaminophen combinations are often se-

METHODS

We conducted a descriptive study of pharmacy records at the Providence VA Medical Center (VAMC). We sought to: 1) examine the frequency of opioid-acetaminophen prescriptions exceeding the proposed acetaminophen dosing recommendations of less than 4g/day; and 2) analyze the proportion of prescription acetaminophen users at risk of consuming over the recommended dosage of 4g/day. This quality-improvement study was considered IRB-exempt as no identifiable patient data was used.

The Providence VAMC serves on average 178,000 patients per year. Approximately 150 board-certified physicians and 1000 other healthcare providers are responsible for over 350,000 outpatient visits per year.¹⁰ Providence VAMC providers prescribe over 600,000 prescriptions per year. The VA hospital system offers several unique advantages with regard to tracking patient health records and pharmacy data.⁹ First, the Providence VAMC, as with most VA hospitals, utilizes a fully computerized electronic record system, the

Computerized Patient Record System (CPRS). Since CPRS was implemented, this system allows access to nearly all inpatient and outpatient clinic notes, procedure notes, laboratory values, and pharmacy records written at VA institutions nationwide. A second advantage is that nearly all prescriptions written at the VA clinic or hospital are filled by a VA pharmacy, allowing physicians and pharmacists to track prescriptions within the VA system.

The electronic pharmacy records for the fiscal year 2011 (FY11, October 1, 2010 – September 30, 2011) were reviewed and sorted by type of acetaminophen prescription, yielding both single-entity acetaminophen and combination opioid-acetaminophen products. The pharmacy database was queried and analyzed for potential maximum daily dose (PMDD) of prescription acetaminophen use during FY11. PMDD was calculated based on days supplied, quantity, and acetaminophen content per dose.

RESULTS

During FY11, the Providence VA pharmacy dispensed a total of 19,841 acetaminophen prescriptions to a total of 4455

different patients (Table 1). Hydrocodone 5mg/acetaminophen 500mg was the most prescribed medication (n = 9786; 49.3% of total acetaminophen prescriptions). More patients used hydrocodone 5mg/acetaminophen 500mg than any other prescription acetaminophen medication (n = 2617 patients; 50.3% of all prescription acetaminophen use). Oxycodone 5mg/acetaminophen 325mg was the second most prescribed drug (n = 3984; 20.1% of total acetaminophen prescriptions). In total, combination opioid-acetaminophen accounted for 83.6% of total acetaminophen prescriptions (n = 16,590) while solo-acetaminophen accounted for the remaining 16.4% (n = 3251). Over three-quarters of patients reviewed in our study received acetaminophen in the form of an opioid-acetaminophen combination product.

There were a total of 15 acetaminophen prescriptions dispensed during FY11 that were greater than 4g/day (Table 2). Of these, hydrocodone 5mg/acetaminophen 500mg accounted for 73.3% (11 of 15). A total of 14 patients received a PMDD of acetaminophen in excess of 4g/day at some point during FY11; hydrocodone 5mg/acetaminophen 500mg accounted for 71.4% (10 of 14) of these patients. There were 510 total acetaminophen prescriptions exactly at the 4g/day

Table 1. Medications dispensed and Providence VA patients receiving each type of actaminophen prescription during fiscal year 2011

Medication	Number of Prescriptions Dispensed	Percentage (%) of Total Acetaminophen Prescriptions Dispensed			Number of Patients		Percentage (%) of Total Rx-Acetaminophen Use Among Patients	
Acetaminophen 325MG TAB	893	4.5%	16.4%	16.4%	398	1181	22.7%	22.7%
Acetaminophen 500MG TAB	2358	11.9%			783			
Codeine 30MG/Acetaminophen 300MG TAB	1043	5.3%	5.3%	83.6%	368	368	7.1%	77.3%
Hydrocodone 10MG/Acetaminophen 325MG TAB	1360	6.9%	56.5%		204	2838	54.5%	
Hydrocodone 10MG/Acetaminophen 500MG TAB	65	0.3%			17			
Hydrocodone 5MG/Acetaminophen 500MG TAB	9786	49.3%			2617			
Oxycodone 10MG/Acetaminophen 325MG TAB	352	1.8%	21.9%		45	816	15.7%	
Oxycodone 5MG/Acetaminophen 325MG TAB	3984	20.1%		771				
Grand Total	19841				5203 ^a			

a. This total includes patients prescribed more than one acetaminophen-containing prescription. There were 4455 unique patients who received any acetaminophen prescription in FY11

Table 2. Potential prescription acetaminophen overuse among Providence VA patients during fiscal year 2011

Medication	Number of prescriptions ^a		Number of patients with Potential Maximum Daily Dose Acetaminophen ^{b,c}	
	> 4g/day	= 4g/day	> 4g/day	= 4g/day
Acetaminophen 500MG TAB	0	37	0	31
Hydrocodone 5MG/Acetaminophen 500MG TAB	11	473	10	108
Oxycodone 5MG/Acetaminophen 325MG TAB	4	0	4	0
Total	15	510	14	139

a. Total number of acetaminophen prescriptions = 19841

b. Number of patients receiving any prescription acetaminophen products = 4455

c. Potential maximum daily dose (PMDD) was calculated based on days supplied, quantity, and acetaminophen content per dose

threshold, and hydrocodone 5mg/acetaminophen 500mg accounted for 92.7% (473 of 510) of these prescriptions at the 4g/day threshold. There were 139 patients who received a PMDD of acetaminophen of 4g/day; hydrocodone 5mg/acetaminophen 500mg was prescribed to 77.7% (108 of 139) of these patients.

Amongst patients who were prescribed hydrocodone 5mg/acetaminophen 500mg, 32.4% (35 of 108) received three or more prescriptions at the 4g/day PMDD threshold during FY11. With regard to repeat acetaminophen prescriptions, 46.5% (2070 of 4455) of prescription acetaminophen users received at least three acetaminophen prescriptions during FY11. Finally, with regard to PMDD of acetaminophen, 3.4% (153 of 4455) of prescription acetaminophen users were exposed to a PMDD of acetaminophen of 4g or greater.

DISCUSSION

Overuse of acetaminophen-containing prescription products account for nearly half of all cases of acetaminophen-related acute liver failure (ALF) in the United States.^{3,7,8} Our study shows that the Providence VAMC had very few acetaminophen prescriptions in excess of the 4g maximum daily dose recommended by the FDA – only 15 prescriptions out of 19,841 exceeded 4g/day. Based exclusively on pharmacy data, only 14 out of 4455 patients who were prescribed acetaminophen products had a PMDD greater than 4g. A relatively small proportion of patients, 3.1%, were exposed to the 4g PMDD threshold (139 of 4455 patients). Hence, prescription acetaminophen misuse appears to be low at the Providence VAMC.

In contrast to our findings, multiple studies have shown that prescription acetaminophen continues to be misused. According to California Medicaid pharmacy data of over 3.2 million patients, 5.9% of all enrollees were potentially exposed to a PMDD of acetaminophen greater than 4g.² Another study of 4.8 million beneficiaries found that 8.1% of opioid-acetaminophen prescriptions exceeded the 4g PMDD, thereby putting about 19% of Rx-acetaminophen users at risk of liver toxicity.³ Finally, in a study of a national commercial insurance database of pharmacy claims of 2.7 million subjects, about 25% of Rx-acetaminophen users had a PMDD of acetaminophen over 4g, and 2-3% even had a PMDD over 10g.⁴

Our data demonstrates that the rate of prescription acetaminophen misuse at the Providence VAMC is low. Electronic health records, such as the VHA Computerized Patient Record System (CPRS), is an effective means to track all VA-based prescriptions, thereby safeguarding against distribution of excessive doses of prescription acetaminophen. The CPRS warns prescribers and pharmacists about medication allergies and duplicate opioid prescriptions. For opioid-acetaminophen doses with 500mg acetaminophen per tablet, there is cautionary alert embedded in each prescription order not to exceed 8 tablets in 24 hours (4g per day maximum

dose of acetaminophen). A Providence VAMC pharmacist would have to disregard these cautions before dispensing a single opioid-acetaminophen prescription in excess of 4g acetaminophen per day. A potential CPRS shortcoming is that there is no pop-up alert warning or hard stop to prevent duplicate acetaminophen prescriptions, hence the need for a pharmacist to review the record. As the United States moves towards an integrated electronic medical record system nationwide, the VAMC system might serve as a good model to curb potential toxic prescription acetaminophen overuse.

CONCLUSION

The Providence VAMC appears to have a low rate of opioid-acetaminophen combination prescribing and dispensing in excess of FDA recommendations, in contrast to rates previously reported in the medical literature.²⁻⁴ This improved pattern of safety may be directly attributable to the VHA electronic health record and e-prescribing system, which offers greater transparency and collaboration between the prescribers and pharmacists. General adoption and improvements in broadly accessible electronic health records offer the potential for improved patient safety.

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Disclosures

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