

Challenges in Quantifying Narcotic Use from Drug Dispensing Records

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Introduction The epidemic of narcotic prescription drug abuse and its associated high cost and mortality have attracted national attention. Much research has been done to explore the distribution and determinants of the narcotic abuse. Narcotics prescriptions are usually ordered on a PRN basis (i.e., “as needed”) with guidelines regarding the appropriate frequency of administration. Most researchers look at narcotic daily dose and days supply to determine a patient’s risk for drug abuse. Currently, no standardized method exists to calculate these metrics from observational data. Inconsistency in narcotic measurement methods might lead to discrepancies in daily dose calculation and affect the stratification of patient risk for drug abuse. In this study, we will describe some of the challenges in quantifying narcotic prescriptions into morphine equivalents, the standard unit used for assessing patient risk and predicting mortality.

Methods Narcotic prescription data were collected from the Emergency Department of Wishard Health Services, from 2008 to 2010. Data elements used for calculating daily dose and supply days are: order_name, sig (free text describing administration instructions), quantity, script_dose (the amount of drug taken each time), frequency (time interval between doses), daily_dose, rx_dose (strength of the prescription per unit dispensed), and dose_unit (defining the dose in milligram or milliliters). The completeness of each data element was summarized as a proportion of the non-missing counts divided by the total prescription orders. “Maximum” rule was applied to dose calculation. For rx_dose PRN, e.g. ‘12.5-25 mL PO’, the maximum volume ‘25ml’ was selected as the dose taken by patient each time; for frequency PRN, e.g. ‘PO Q4-6 hours’, the time period between two doses was standardized as 4 hours; for any specified maximum dose, e.g. ‘1 tab PO Q4-6H prn pain (Do not take any more than 4 tablets per day)’; the maximum amount ‘4 tablets per day’ was selected instead of the dose (6 tablets) calculated from structured data elements. Total morphine equivalents (Meq) for a single prescription was calculated using equation = quantity × rx_dose × dose_unit × conversion factor for Meq. Supply days for each prescription were equal to the quantity divided by daily_dose or by the product of script_dose multiplied by frequency/24hours. Average daily morphine equivalent dose (MED) were determined by total Meq for a single prescription divided by supply days.

Results A total of 46140 patients generated 74266 narcotics prescription orders. The raw completeness of each data elements are: 100% (order_name), ~100% (sig), 100% (quantity), 1.5% (rx_dose), 85.9% (frequency), 22.3% (daily_dose), 22.3% script_dose, and 22.4% (dose_unit), respectively. Overall, about 20% of the prescriptions had sufficient data to calculate the average daily MED using the structured data elements. Around 80% of prescriptions required information from the free text ‘sig’ in order to calculate the daily MED. Only 0.1% of the prescriptions were could not be converted to daily MED due to missing or discrepant data. Some examples of these problematic prescriptions are listed in the table below.

Table. Examples of prescription orders with inadequate data to calculate morphine equivalent dose

Order_Name	Sig	Rx_dose	Quantity	Frequency	Daily_dose	Script_dose	Dose_unit
HYDROcodone & Actmnpn Elixir (7.5mg&500mg/15mL) 31383 M	5 mL PO Q6H PRN pain		1 bottle	Q6H	20	5	ML
HYDROcodone 5/Acetaminophen 500 12983 M	5 mg hydrocodone, 1 tab PO q6h prn pain (Do not take any more than 2 per day)		#15	Q6H			
HYDROcodone 5/Acetaminophen 325 36966 M	5 mg hydrocodone, 1 tab PO q6h prn pain (Do not take any more than 1 per day per day)		#10	Q6H			
OXYcodone 21543 M	not more than 5 tab/day	5mg	#30		5	5	TAB/D
Hydrocodone/Ibuprofen 32803 M	Take one tablet PO every 6 hours no more than 5 tablets per day		#20	Q6H			
HYDROcodone 5/Acetaminophen 500 12983 M	max 8 tabs/day		#20		8	8	TAB/D
Tramadol 22482 M	Take for headaches if necessary		#10				
Tramadol 22482 M	25 mg PO QAM for 3 days duration then 25 mg PO BID for 3 days duration then 25 mg PO TID for 3 days duration then 25 mg PO QID for 3 days duration then 50 mg PO Q6H PRN pain (not more than 400 mg per day)	50 MG	#20	QAM BID TID QID Q 6H	25 50 75 100 200	25 25 25 25 50	MG MG MG MG MG
HYDROcodone 5/Acetaminophen 500 12983 M	5 mg hydrocodone, 1 tab PO once daily before sleep q6h		#10	QDAY,Q6H	9	5,1	MG,TAB

Conclusion A standardized method for measuring the daily dose of narcotics PRN prescriptions is important for secondary use of narcotic prescription data. Such standards will help improve the reliability of research identification from narcotics research.