Reliability of the reported ingested dose of acetaminophen for predicting the risk of toxicity in acetaminophen overdose patients

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ABSTRACT

Purpose The present study examines the relationship between the dose of acetaminophen reported to have been ingested by patients and the occurrence of serum acetaminophen levels above the ‘possible toxicity’ line in patients presenting at the hospital after acetaminophen overdose. The prognostic value of patient-reported dosage cut-offs of 8, 10 and 12g was determined.

Methods This retrospective cohort study included patients admitted to the emergency department or hospital within 24 hours of acetaminophen ingestion. Serum acetaminophen concentrations were considered to be the gold standard, and specificity, sensitivity and positive/negative predictive values were calculated from the reported ingested dose, to predict toxicity using the Rumack–Matthew nomogram (i.e. the ‘possible toxicity’ treatment line) and standard equations.

Results Of 305 patients identified, 291 met the study inclusion criteria, and 121 (41.6%) had serum acetaminophen concentrations above the ‘possible toxicity’ treatment line. The range of patient-reported acetaminophen ingested was 1–75g, with 185 patients (63.6%) reporting ≥8g. One hundred eighteen patients (97.5%) who reported ingesting ≥8g had serum acetaminophen concentrations above the ‘150-line’, compared with only three patients (2.5%) who reported ingesting <8g ($p < 0.001$). The positive predictive value of a patient-reported dose ≥8g for predicting serum acetaminophen concentrations above the ‘possible toxicity’ treatment line was 63.78%, with a negative predictive value of 97.17%. The sensitivity of patient-reported doses ≥8g was high (97.52%) but with low specificity (60.59%). The sensitivity of patient-reported doses ≥10g also was high (89.26%) with low specificity (65.29%), whereas the sensitivity of ≥12g dose was low (61.16%) with high specificity (86.47%).

Conclusions Patient-reported doses of acetaminophen are good risk indicators for acetaminophen overdose patients in Malaysia. Patient-reported ingestion of ≥8g (as a cut-off dose) had a higher sensitivity than ≥10g or ≥12g. The results of this study have important implications for toxicity risk evaluations in areas with poor serum acetaminophen assay availability. Copyright © 2011 John Wiley & Sons, Ltd.

KEY WORDS — acetaminophen; patient-reported dosage; possible toxicity treatment line; sensitivity; specificity

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INTRODUCTION

Acetaminophen (paracetamol) is a very common cause of poisoning, which is widely used in deliberate self-poisoning1,2 and is a leading cause of hospital admissions, delayed hepatoxocity (including fulminant hepatic failure), renal failure and death following overdose in most countries.3–5

Since the early 1970s, N-acetylcysteine (NAC) has been used as an antidote for acetaminophen overdose.6 The risk of toxicity and need for antidote is normally determined by evaluating the extent of acetaminophen exposure, taking the following into consideration: patient-reported quantities of acetaminophen ingested, the elapsed time between ingestion and presentation at the hospital, patient susceptibility to hepatoxocity, and evaluation of serum acetaminophen concentrations on the Rumack–Matthew nomogram.6–8 Accordingly, NAC is normally administered if the patient is suspected to have ingested >12g acetaminophen in the previous 24 hours.8

A drug nomogram developed in 1975, called the Rumack–Matthew nomogram, estimates toxicity risk