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ENDOTRACHEAL INTUBATION AFTER ACUTE DRUG OVERDOSES: INCIDENCE, COMPLICATIONS, AND RISK FACTORS

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☐ **Abstract—Background: Drug overdose is the leading cause of injury-related fatality in the United States, and respiratory failure remains a major source of morbidity and mortality. Objectives: We aimed to identify the incidence and risk factors for endotracheal intubation after acute drug overdose. Methods: This secondary data analysis was performed on a 5-year prospective cohort at two urban tertiary-care hospitals. The present study analyzed adult patients with suspected acute drug overdose to derive independent clinical predictors of endotracheal intubation. Results: We analyzed 2497 patients with acute drug overdose, of whom 87 (3.5%) underwent endotracheal intubation. Independent clinical risk factors for endotracheal intubation were: younger age (odds ratio [OR] 0.97, 95% confidence interval [CI] 0.96–0.98), and history of obstructive lung disease (OR 6.6, 95% CI 3.5–12.3); however, heart failure had no association. Patients with obstructive lung disease had significantly more hypercapnia (mean difference 6.8 mm Hg, 95% CI 2.3–11.3) and a higher degree of acidemia (mean pH difference 0.04, 95% CI 0.01–0.07) than patients without obstructive lung disease. Lack of rapid sequence sedative/paralytic was associated with in-hospital fatality. Early complications of endotracheal intubation itself included desaturation (3.4%) and bradycardia (1%). Conclusions: Endotracheal intubation was infrequently performed on patients with acute drug overdose, and complications were rare when performed. Risk factors associated with endotracheal intubation included younger age and prior obstructive lung disease.** © **2016 Elsevier Inc. All rights reserved.**

☐ **Keywords—overdose; intubation; risk factors**

INTRODUCTION

Drug poisoning accounts for considerable morbidity, mortality, and health care expenditures worldwide. With nearly 100 deaths per day since 2007, the United States is currently experiencing its worst drug overdose epidemic of all time (1). According to the Centers for Disease Control and Prevention, there were approximately 2.5 million drug-related emergency department (ED) visits in 2011 (2). Even more concerning is that drug overdose is now the leading cause of injury-related fatality in the United States, surpassing even motor vehicle collisions (3).

Respiratory failure from various mechanisms may lead to the requirement of mechanical ventilation, which has historically been a major cause of morbidity and mortality in poisoned patients (4). Drugs can affect the respiratory system in a number of ways: direct suppression or stimulation of the respiratory center; alteration in the response of chemoreceptors to changes in PCO_2; impaired mechanics of respiration from muscular weakness; increase in metabolic demands (e.g., agitation, fever) leading to increased total body oxygen consumption; and creation of acid-base disorders (5).

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Despite the clinical significance, neither the incidence nor risk factors for endotracheal intubation (ETI) in ED patients with suspected overdose are well described. The purpose of this study was to identify the incidence as well as potential risk factors for ETI in this patient population. Additionally, we analyzed variables surrounding ETI that may impact adverse outcomes.

METHODS

Study Design and Setting

This study was a secondary analysis of data collected from a prospective cohort of adult ED patients with acute drug overdose at two urban tertiary-care hospitals over a 5-year period (2009–2013) (6). These EDs have a combined annual visit volume in excess of 150,000 and are staffed 24 h per day with board-certified emergency physicians and intensivists. The study protocol was approved by the Institutional Review Board for all participating institutions, with a waiver of informed consent.

Study Population

Patients with suspected acute drug overdose in general were initially screened for inclusion by trained research assistants using one of two mechanisms: 1) normal business hours (9:00 AM–5:00 PM) by rounding in person with ED staff several times daily; or 2) patients were enrolled after hours and on weekends by telephone referral of the case to the regional Poison Control Center that is staffed 24 h/day and 7 days/week by Certified Specialists in Poisoning Information. In New York City, reporting of suspected acute poisoning to the Poison Control Center is mandated by public health law (7).

The screening, inclusion, and exclusion criteria have recently been described elsewhere (6). Briefly, patients were included who met both of the following criteria: 1) acute presentation (within 24 h of exposure); and 2) suspected overdose (i.e., illicit drug dose sufficient to cause symptoms or any prescription drug exposure greater than its therapeutic dose). Exclusion criteria were the following: alternative diagnosis (e.g., trauma or infection), chronic presentation (i.e., not meeting acute criteria above), nondrug overdose (e.g., plant), exposures limited to dermal or inhalational means only (i.e., trivial exposures), prisoners, age < 18 years, anaphylaxis, patients with incomplete data (i.e., left against medical advice, transferred to an outside institution, or otherwise eloped from the hospital), and patients with do-not-resuscitate orders.

Measurements

Data collection from the medical chart occurred in accordance with accepted guidelines for valid medical chart abstraction, including training of abstractors (blinded to study objectives) and 95% agreement of a random sampling of 10 test charts prior to mass data abstraction (8). Whereas Poison Control Center data were used to enhance initial screening/inclusion of subjects, actual medical record data were relied upon for all other data measurements, including study outcomes. ED clinical data included demographics, congestive heart failure, obstructive lung disease (OLD; defined as any one or more of asthma, chronic bronchitis, or emphysema), drug information/screens, and blood gas analysis. Nonrespiratory comorbidities (e.g., psychiatric) were not collected as part of the present study.

Outcomes

The study outcome for the current study was endotracheal intubation (ETI) during the hospital or prehospital course, defined as placement of an endotracheal tube for the purpose of mechanical ventilation. The original (primary) data analysis for this cohort was adverse cardiovascular events, which has previously been reported (6). ETI was counted regardless of rapid sequence induction, and excluded noninvasive ventilation. Chart information was recorded regarding indications for ETI, and details of ETI (location, drugs, and procedural complications). In-hospital mortality was also recorded as exploratory secondary outcome.

Study Protocol

Subjects were prospectively followed to hospital discharge with data that included electronic medical records, paper medical records, consult records, and Poison Control Center records (for initial screening/inclusion only, not for data acquisition or outcome data). Hospital medical record follow-up for all patients was performed by research assistants trained in medical abstraction and recorded using standardized data collection forms. Results (from electronic physician notes, laboratory records, radiology results, and discharge summaries) were prospectively available to the study investigators. Patients discharged from the hospital had no further follow-up.

Data Analysis

Sample size was calculated a priori. Assuming a 4% incidence of ETI (based on preliminary data), we calculated