

# High Resource Utilization of Psychiatric Emergency Services by Methamphetamine Users

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## Abstract

Methamphetamine use has increased throughout the United States in recent years, and is historically prevalent in Hawai'i. This retrospective study aimed to determine the effect of methamphetamine use on emergency department (ED) resources, by examining visits to an emergency department (ED) in an urban hospital in Hawai'i from 2007 – 2011. The rate of patients who tested positive for amphetamine was measured and broken down by year. Primary outcomes included length of ED stay, the administration of medication or physical restraints for safety, and the rate of psychiatric hospitalization. Overall, 15.1% of drug-screened patients (N = 16,018) tested positive for amphetamines over the study period. Amphetamine-positive patients spent more time per visit on average in the ED, and were more likely to require medication and physical restraints, compared to amphetamine-negative patients. Amphetamine positive patients were admitted to inpatient psychiatry less frequently than negative-testing patients. In summary, there is higher resource utilization per psychiatric emergency service visit by amphetamine-positive patients; however if patients can be stabilized in the ED, the increased ED resources utilized may be offset by the reduced burden on inpatient facilities.

## Keywords

amphetamine; methamphetamine; emergency services, psychiatric; substance-related disorders

## Introduction

Illicit methamphetamine use has waxed and waned worldwide since post-World War II years, particularly in the United States (US) beginning in the 1960s.<sup>1</sup> Use in the mainland US was initially concentrated in the West Coast, but a surge in use occurred in Hawai'i in the 1980s, with the availability of d-methamphetamine hydrochloride (“ice”) from Far East sources.<sup>1</sup> Use increased and moved eastward across the US beginning in the late 1990s, began to decrease in 2008, but increased again in subsequent years.<sup>2</sup>

Relatively few studies have examined the impact of methamphetamine use on the utilization of psychiatric emergency services (PES). Studies thus far have shown significant utilization of resources in psychiatric and general emergency departments (EDs) by amphetamine-using patients, who were often found to be more agitated or experiencing psychosis.<sup>3-12</sup> A 1990 study in Hawai'i showed that over 90% of methamphetamine-using patients seen in a PES in Honolulu required psychiatric hospitalization.<sup>13</sup>

In recent years, physicians have anecdotally encountered an increased rate of acutely intoxicated, often psychotic or violent patients in the study institution's PES in Hawai'i. The study team hypothesized that methamphetamine use is related to an increased use of psychiatric emergency resources. This study analyzed the utilization of services by patients seen in an urban PES in Hawai'i from 2007 – 2011, to examine the demand for

resources by amphetamine-using patients compared to other patients. No known previous reports have been identified that studied this topic over such a length of time or included as many amphetamine-related cases.

## Methods

The study team performed a retrospective chart review from a high-volume ED in urban Hawai'i, encompassing a PES. The project received Institutional Review Board approval from the study institution. The charts reviewed, from 2007 – 2011 inclusively, included patients who were triaged directly to the PES and those who were evaluated in the general ED but subsequently required a psychiatric consult (N = 22,124). Only those patients receiving urine toxicology screening (72.4%, n = 16,018) were included in the analyses. Of note, the urine toxicology screen did not distinguish between methamphetamine and other amphetamines, including prescription amphetamines. Outcome measures taken from medical records included the results of the urine toxicology screen, the length of stay in the emergency department in minutes, the use of physical restraints, the use of intramuscular injection of psychotropic medications, and whether the patient was admitted to the psychiatric inpatient unit. T tests were performed to compare amphetamine positive and amphetamine negative groups on age and length of stay. Chi square analyses were conducted to compare amphetamine screen by year, gender, and for the outcomes of use of intramuscular injection, physical restraint, and psychiatric admission. A linear regression was calculated to predict the primary outcome of length of stay based on amphetamine screen, controlling for age and gender. All statistical analyses were performed using SPSS software (IBM SPSS Statistics, version 24, Chicago, IL).

## Results

Of the 16,018 patients receiving a urine toxicology screen during 2007-2011, 2,414 (15.1%) tested positive for amphetamines (amp<sup>+</sup>) (Table 1). Both the percentage and the absolute number of amp<sup>+</sup> patients significantly increased over time ( $\chi^2(4) = 74.986$ ,  $P < .001$ ), with the highest percentage and absolute number of amp<sup>+</sup> patients seen in 2011 (19.1%, or 678 amp<sup>+</sup> patients that year) (Table 1). Amp<sup>+</sup> patients were more likely to be younger on average (amp<sup>+</sup>: 36.9 years old, amp<sup>-</sup>: 38.9 years old,  $t(16016) = 5.71$ ,  $P < .001$ ) than amp<sup>-</sup> patients, and were more likely to be male (15.9% of all males vs 13.9% of all females;  $\chi^2(1) = 13.063$ ,  $P < .001$ ).

The mean length of stay in the ED was longer for amp<sup>+</sup> patients compared to amp<sup>-</sup> patients: 548 minutes (median 465

	2007 (n = 2,927)		2008 (n = 3,037)		2009 (n = 3,152)		2010 (n = 3,351)		2011 (n = 3,551)		Total (N = 16,018)	
	n	%	n	%	n	%	n	%	n	%	N	%
Amphetamine +	385	13.2	366	12.1	475	15.1	510	15.2	678	19.1	2414	15.1
Amphetamine -	2542	86.8	2671	87.9	2677	84.9	2841	84.8	2873	80.9	13604	84.9

$P < .001$  for overall trend.

min) vs 450 minutes (median 369 min), respectively ( $t(16016) = -14.11, P < .001$ ). Compared to amp<sup>-</sup> patients, amp<sup>+</sup> patients received intramuscular (IM) medication more often (17.1% of amp<sup>+</sup> vs 11.4% of amp<sup>-</sup>,  $\chi^2(1) = 62.83, P < .001$ ) and required physical restraints more often (4.6% of amp<sup>+</sup> vs 3.4% of amp<sup>-</sup>,  $\chi^2(1) = 8.47, P < .01$ ). Regarding disposition, amp<sup>+</sup> patients underwent less psychiatric hospitalization (19.0% amp<sup>+</sup> vs 37.0% amp<sup>-</sup>,  $\chi^2(1) = 294.46, P < .001$ ).

Further linear regression analyses controlling for the effects of gender and age revealed the same significant findings: amp<sup>+</sup> patients had longer length of stay (+102 min,  $F(3, 16014) = 144.625, P < .001, R^2$  of .026).

## Discussion

The primary goal of this study was to determine the effect of methamphetamine use on emergency department resources. Due to the limitation in the toxicology screening that was available, amphetamine-positive screens were used as a proxy for methamphetamine use.

The length of stay in the ED averaged over 90 minutes longer for amp<sup>+</sup> patients compared to amp<sup>-</sup> patients. Other studies have similarly found amphetamine users spending more time in the emergency room compared to other patients.<sup>5,7</sup> The length of stay may partially reflect the acuity of the patients, which is also reflected in the higher rate of intramuscular injection and physical restraints utilized in the treatment of the amp<sup>+</sup> patients. Pasic, et al, reported similar findings of a higher rate of medication administration in the PES for methamphetamine patients.<sup>7</sup> However, the length of stay in the ED may also be related to decisions regarding psychiatric hospital admission.

The national rate of hospital admission (all types) for methamphetamine ED presentations in 2011 was 16%.<sup>2</sup> Other recent US studies have found no significant difference in admission rates between users and non-users of methamphetamine.<sup>7,8</sup> Of note, these recent results differ significantly from those of a small 1990 study in Hawai'i in which 93% of patients presenting with methamphetamine-induced organic mental disorders were admitted to the psychiatric ward.<sup>13</sup> Although the current study detects amphetamine exposure in general, the psychiatric admission rate of 19% for amphetamine<sup>+</sup> patients is similar to the national rate for methamphetamine related admission,<sup>2</sup> and certainly lower than the rates found in a similar locale in 1990.<sup>13</sup> While some of the decrease may be related to the likelihood that a portion of the amp<sup>+</sup> patients were not using methamphetamine specifically, or were not acutely intoxicated, amp<sup>+</sup> patients in the current study were hospitalized less frequently than amp<sup>-</sup>

patients. Lower rates of methamphetamine-related admission in Hawai'i and elsewhere may be related to the practice of treating towards symptom resolution in the ED or PES, or to finding other treatment environments. Indeed, alternative treatment to psychiatric hospitalization has been noted in many cases to be effective and to decrease the burden on inpatient resources.<sup>14</sup> Allowing patients to recover in the ED, instead of on an inpatient unit, may also be related to the longer average length of stay observed in this study for amp<sup>+</sup> patients.

National trends of ED visits involving methamphetamine use were stable from 2007 – 2009 and increased in 2010 and 2011.<sup>2</sup> Other studies of urban psychiatric EDs have shown varying data from a similar time period. An observational study of an ED in Portland, Oregon from February 2006 – February 2007 showed that 7.6% of visits to the psychiatric ED were methamphetamine related.<sup>4</sup> However, a retrospective study of an urban California ED from May 2009 – May 2010 counted 14.8% of patients receiving psychiatric evaluations that were amphetamine positive.<sup>8</sup> Based on the current results that suggest a higher resource utilization for amp<sup>+</sup> patients, the national increase in methamphetamine use could place a correspondingly higher burden on ED resources across the country. However, the results also suggest that allowing patients to stabilize in the ED or another 24-hour observational crisis center could be clinically more appropriate than utilizing inpatient resources for many of these patients.

This was a retrospective study, with inherent limitations. Over 25% of the patients presenting to the PES during the study period did not undergo urine drug testing, and therefore were not included in the analyses. This may be due to sampling bias, based on clinicians' opinions of which patients warranted such screening, or to lack of patient cooperation. Another limitation of this study is that the urine drug screen that was utilized did not distinguish between methamphetamine and other types of amphetamines such as prescription stimulants. A false-positive screen may also have resulted from other medications such as over the counter medications (eg, pseudoephedrine), prescription anti-emetics, or anti-depressants. While the study assumes that a significant majority of patients who screened positive for amphetamines had been using methamphetamine, there were likely patients counted in the cohort of amp<sup>+</sup> patients who were not using methamphetamine. Furthermore, a positive drug screen indicates exposure to the drug at some time over the prior 3 days, but not necessarily that the patient was intoxicated at the time of presentation, or that the presentation was related to methamphetamine use. The amp<sup>+</sup> patients in this study likely comprise

a combination of acutely intoxicated patients, patients in withdrawal, patients without residual symptoms, and patients not using methamphetamines. The study team expects that resource utilization is highest among acutely intoxicated patients. Since the amp<sup>+</sup> patient sample was likely diluted with non-intoxicated patients, the actual resource utilization by methamphetamine intoxicated patients was probably greater than the overall amp<sup>+</sup> data suggest. Confirmation of this hypothesis requires further investigation with observational or prospective studies.

In conclusion, methamphetamine use continues to be associated with a significant and increasing percentage of ED presentations nationwide.<sup>2</sup> The current study associates amphetamine use in general with an increased length of stay in the ED and an increased likelihood of requiring the administration of intramuscular medication or physical restraints. A prospective study measuring methamphetamine specifically, and recording the reason for presentation, would likely detect a smaller percentage of patients using methamphetamine than were amp<sup>+</sup> in this study, but also may find a greater impact on ED resources than are reported here, since it would be enriched solely for methamphetamine users. However, it is becoming clearer that inpatient psychiatric hospitalization is not necessary in many amphetamine-related ED presentations. These findings suggest the opportunity to provide other treatment settings that provide a safe environment for recovery from acute intoxication, but would be expected to require less of a burden on resources compared to the ED and inpatient units.

### Conflict of Interest

None of the authors identify any conflict of interest.

### Acknowledgments

This research was supported in part by a grant from the Queen's Medical Center. Mahalo nui loa to Mr. Eldon Yoshida of the QMC Emergency Department, for his assistance. The contents of this article are solely the responsibility of the authors and do not represent the official views of the Queen's Medical Center.

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