

THE 'METH'

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EPIDEMIC:

ACUTE INTOXICATION

Managing psychosis, agitation, and suicide risk

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Methamphetamine-induced psychosis is difficult to differentiate from a primary thought disorder, especially in patients who show signs of both.

Methamphetamine abuse has spread to every region of the United States in the past 10 years (*Table 1, page 48*).¹ Its long-lasting, difficult-to-treat medical effects destroy lives and create psychiatric and physical comorbidities that confound clinicians in emergency rooms and community practice settings.

This first in a series of two articles describes methamphetamine's growing use and offers guidance to identify abusers and manage acute "meth" intoxication. Methamphetamine-abusing patients can appear in any area of acute psychiatric practice—during emergency department (ED) evaluations, medical-surgical consultations, and inpatient psychiatric admissions. Using case examples, we describe key clinical principles to help you assess patients in each of these settings.

SCOURGE OF THE HEARTLAND

A stimulant first synthesized in Japan,² methamphetamine is the primary drug of abuse in Asia³ and the leading drug threat in the United States, according to U.S. law enforcement officials.⁴ Although most methamphetamine used in the



Table 1

10-yr. growth in hospitalization rates for methamphetamine/amphetamine use*

State	Year		State	Year	
	1993	2003		1993	2003
U.S. national rate	13	56			
Northeast			Midwest		
Connecticut	1	4	Illinois	1	19
Maine	2	5	Indiana	3	28
Massachusetts	<1	2	Iowa	13	213
New Hampshire	<1	2	Kansas	15	65
New Jersey	3	2	Michigan	2	7
New York	2	4	Minnesota	8	100
Pennsylvania	3	2	Missouri	7	84
Rhode Island	2	2	Nebraska	8	117
Vermont	5	4	North Dakota	3	44
South			Ohio	3	3
Alabama	1	45	South Dakota	5	90
Arkansas	13	130	Wisconsin	<1	5
Delaware	2	2	West		
District of Columbia	—	2	Alaska	4	13
Florida	2	7	Arizona	—	36
Georgia	3	39	California	66	212
Kentucky	—	20	Colorado	18	86
Louisiana	4	21	Hawaii	52	241
Maryland	1	3	Idaho	20	72
Mississippi	—	23	Montana	30	133
North Carolina	<1	4	Nevada	59	176
Oklahoma	19	117	New Mexico	7	10
South Carolina	1	9	Oregon	98	251
Tennessee	†	6	Utah	16	186
Texas	7	17	Washington	18	143
Virginia	1	4	Wyoming	15	209
West Virginia	<1	—			

* Per 100,000 population aged 12 or older, with methamphetamine/amphetamine use as the primary diagnosis. Percentages in boldface exceed the national rate for that year.

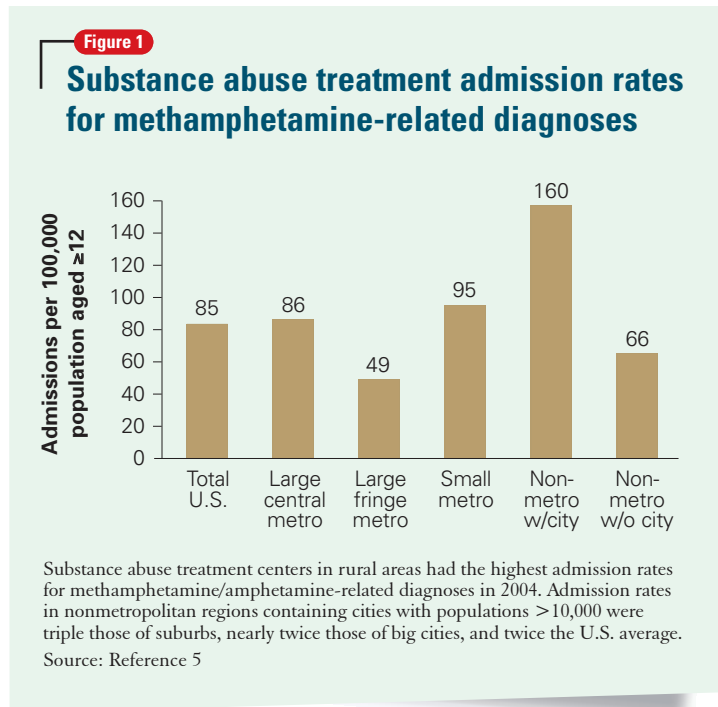
† <0.05%

— No data available

Source: Reference 1

United States is manufactured in “super-labs” along the U.S.-Mexican border,⁴ the drug is also easily made from common ingredients in small-scale home laboratories.

These smaller domestic “meth labs” have devastated rural communities and altered demographic patterns of methamphetamine abuse (*Figure 1*).⁵ Two aspects of rural life—relative isolation and availability of ingredients for production—proved critical in the initial spread of methamphetamine production and use in the United States. As a result, production by smaller labs is being targeted by state and federal law enforcement officers, who have had some success in eradicating this scourge (*Box 1, Figure 2, page 50*).⁶⁻⁹



SYMPTOMS OF 'METH' USE

Physiologic effects. Methamphetamine is taken because it induces euphoria, anorexia, and increased energy, sexual stimulation, and alertness. Initial use evolves into abuse because of the drug’s highly addictive properties. Available in multiple forms and carrying a variety of labels (see *Related resources*), methamphetamine causes CNS release of monoamines—particularly dopamine—and damages dopaminergic neurons in the striatum and serotonergic neurons in the frontal lobes, striatum, and hippocampus.^{10,11}

Through sympathetic nervous system activation, methamphetamine can cause reversible or irreversible damage to organ systems (*Table 2, page 55*).¹²⁻¹⁷

Psychiatric effects. Methamphetamine abusers frequently report depressive symptoms, including irritability, anxiety, social isolation, and suicidal ideation.^{10,18} These patients may show:

- signs of psychosis, including paranoia, hallucinations, and homicidal thoughts

- neurocognitive changes, including poor attention, impaired verbal memory, and decreased executive functioning.¹⁹

Agitation is frequent, and its severity appears to correlate directly with methamphetamine blood levels.²⁰ Violent behavior is common. In 1,016 previous users, 40% of men and 46% of women described difficulty controlling their behavior when under methamphetamine’s influence.¹⁸

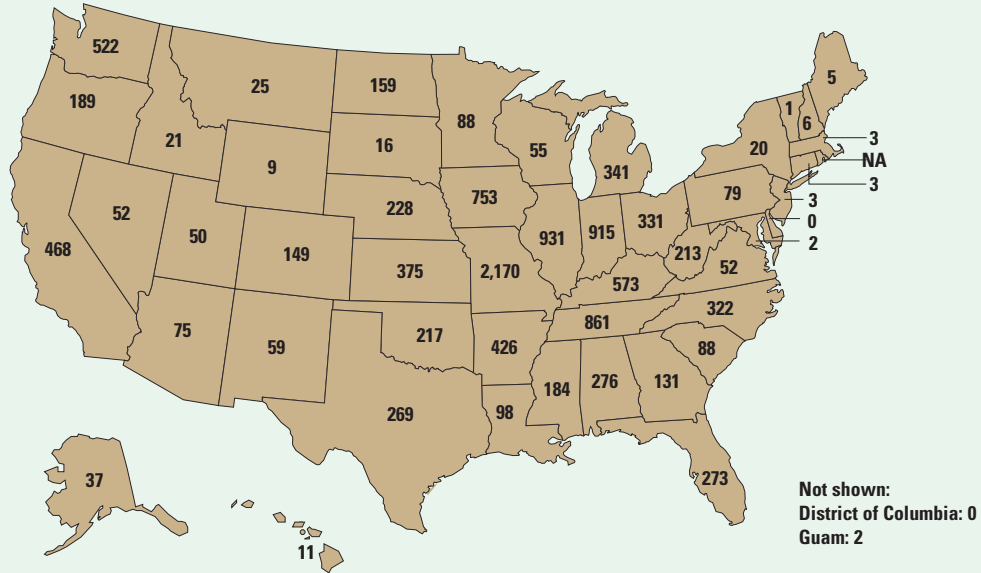
In acute clinical practice, differentiating a primary thought disorder from methamphetamine-induced psychosis is challenging—especially when a patient shows signs of both.²¹ Methamphetamine also can contribute profoundly to depressive and anxiety disorders. Users may experience residual psychotic symptoms years after the original abuse ends, particularly when stressed. Their positive and negative symptoms are strikingly similar to those seen in schizophrenia.²¹

Longitudinal illness course, recent history, collateral information, and laboratory and phys-



Figure 2

Methamphetamine clandestine laboratory incidents,* 2005



Total: 12,139 from Jan. 1 to Dec. 31, 2005

* Incidents include chemicals, contaminated glass, and equipment used in methamphetamine production found by law enforcement agencies at laboratories or dump sites.

Source: Drug Enforcement Administration database, reference 9

Box 1

Meth 'cooking' poisons lives, homes, and communities

Dangerous recipes. The ease with which methamphetamine can be "cooked" in a home kitchen from ingredients available in pharmacies and hardware stores has contributed to the drug's rapid spread. Meth users produce their own "fixes" using recipes readily available on the Internet and passed on by other "cooks."⁶ The combination of inexperienced or intoxicated cooks, homemade equipment, and highly flammable ingredients results in frequent fires and explosions, often with injuries to home occupants and emergency responders.⁷

Meth labs have been estimated to produce 6 pounds of toxic waste for each 1 pound of methamphetamine produced. Composed of acid, lye, and phosphorus, this waste typically is dumped into ditches, rivers, yards, and drains. The fine-particulate methamphetamine residue

generated during home production settles on exposed household surfaces, leading to absorption by children and others who come into contact with it.^{6,8}

Disastrous results. Methamphetamine cooking has caused a social, environmental, and medical disaster—particularly in the Midwest (*Figure 2*), although the situation has improved in the past 2 years. Many states have passed laws restricting and monitoring sales of the methamphetamine ingredients ephedrine and pseudoephedrine. A change in U.S. law prohibiting pseudoephedrine imports in bulk from Canada has decreased domestic "superlab" production.⁹ Although these laws appear to have slowed U.S. manufacturing, the drug is still readily available, predominantly smuggled in from large-scale producers in Mexico.

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ical data may all inform clinical presentations and comorbidity.

EMERGENT EVALUATION

Gathering data. Police bring Mr. J, age 22, to the ED after his parents said he talked about killing himself and the mother of his 4-year-old child. Police report that Mr. J's parents said he and his friends abuse methamphetamine, but no first-hand information is available.

Disheveled and uncooperative, Mr. J threatens to harm ED staff. His speech is pressured, and he appears to be responding to internal stimuli. Vital signs include temperature 37.8° C, pulse rate 105 bpm, blood pressure 140/85 mm Hg, and respiration rate 18 breaths per minute.

Mr. J refuses to provide blood or urine for drug screening or to provide a history to the ED physician. He attempts to walk out and is placed in restraints after he tries to punch the ED security officer.

Options for containing uncooperative and agitated patients such as Mr. J are extremely limited, and the overriding concern with violently intoxicated patients is to minimize damage to self, others, and property. Methamphetamine abusers have a propensity for impulsivity and violence;¹⁸ many are brought to the hospital by police and have criminal histories.¹ In emergent evaluation, begin by searching patients and their belongings for weapons.

Because laboratory results and patient history are not immediately available, methamphetamine abuse often is not included in the initial differential diagnosis—particularly for patients with pre-existing primary affective or psychotic

Table 2

Physiologic signs of methamphetamine abuse

Vital signs	Tachycardia Hypertension Pyrexia
Laboratory abnormalities	Metabolic acidosis Evidence of rhabdomyolysis
Organ damage	Cardiomyopathy Acute coronary syndrome Pulmonary edema
Stigmata of chronic use	Premature aging Cachexia Discolored and fractured teeth Skin lesions from stereotypical scratching related to formication ("meth bugs") and/or compulsive picking

Source: References 12-17

disorders. It is critical to remember that methamphetamine abuse might be complicating a patient's psychiatric presentation.

Managing agitation. When agitation is prominent, secure the patient in a quiet room to reduce stimulation. Have on hand adequate staffing and benzodiazepines, antipsychotics, or both.

In theory, using an antipsychotic to control methamphetamine-induced agitation is problematic because synergy between the two agents might adversely affect cardiac function.¹⁵ On the other hand, acute treatment of agitation often leads to salutary declines in pulse rate, blood pressure, respiration rate, and body temperature.

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continued



Box 2

Which psychotropics for methamphetamine-induced agitation?

Benzodiazepines vs neuroleptics. Evidence for acute treatment of agitation is limited,²² especially when agitation was induced by methamphetamine. A randomized, controlled comparison of lorazepam and droperidol (a neuroleptic not routinely prescribed for psychosis) suggested that droperidol could be used safely to control agitation in ED patients, with methamphetamine toxicity.²³ Droperidol provided more rapid and effective sedation than lorazepam.

Droperidol use has decreased dramatically since 2001, however, when the FDA ordered a black-box warning about potential for cardiac dysrhythmias.²⁴⁻²⁵ After that warning, the American College of Emergency Physicians²⁶ examined the evidence to identify the most effective pharmacologic treatment for agitation of unknown etiology. Its recommendation—felt to represent “moderate” clinical certainty—was monotherapy with either:

- a benzodiazepine (lorazepam or midazolam)
- or a conventional antipsychotic (droperidol or haloperidol).

The level of certainty for combining a benzodiazepine with an antipsychotic was lower. In our experience, psychiatrists tend to favor haloperidol and lorazepam over droperidol and midazolam.

Evidence on treating methamphetamine-induced agitation is limited (Box 2).²²⁻²⁶ Before you prescribe any medication, keep in mind its side effect profile, the patient’s age and physical condition, and the possibility that other substances might be contributing to emergent presentations.

We have repeatedly and effectively treated acutely agitated patients in the ED with haloperidol and lorazepam without observing adverse

effects. Psychiatrists generally favor haloperidol and lorazepam over droperidol and midazolam. When a patient can cooperate with treatment, we recommend an ECG to rule out prolonged QTc interval, an uncommon complication. Telemetry and a cardiology consultation are indicated with a QTc interval >450 msec or >25% over previous ECGs, particularly if you plan to continue haloperidol treatment.²⁷

Physical examination. Because methamphetamine use can cause substantial physical morbidity, we recommend a thorough physical exam aimed at identifying its stigmata (Table 2, page 55). Look especially for injuries resulting from violence, and test for sexually-transmitted diseases. Drug testing in the ED is essential to diagnosis and for planning treatment (Box 3, page 59).^{28,29}

MEDICAL-SURGICAL CONSULTATION

Ensuring safety. Ms. A, age 41, is admitted to the trauma surgery service after a motor vehicle accident in which she was the driver. She has long-standing methamphetamine dependence and is severely agitated. Urine drug testing is positive for methamphetamine, marijuana, and alcohol. Her alcohol serum level of 165 mg/dL exceeds the legal threshold for intoxication.

Tibial and fibular fractures sustained in the car accident require open reduction and internal fixation. On the postsurgical floor 2 days later, Ms. A remains “extremely irritable, dysphoric, and suicidal,” according to the trauma surgery consultation. Staff is concerned about her boyfriend’s behavior: “We think he’s using drugs and might be bringing her drugs.”

Understanding Ms. A’s behavior requires us to consider a broad range of diagnostic contributors, including:

- untreated withdrawal from alcohol or other drugs
- delirium from ongoing effects of the trauma or corrective operation

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- inadequate pain control, particularly given her history of substance dependence
- psychiatric comorbidity.

Management includes:

- monitoring for withdrawal and treating it if symptoms emerge
- identifying and minimizing medical factors contributing to confusion, and medicating agitation with psychotropics
- providing adequate analgesia, mindful that dosing may need to be aggressive—particularly if the abused substances include narcotics
- assessing for pre-existing and methamphetamine-induced psychiatric disorders.

If the patient is cognitively able to cooperate, perform a thorough suicide assessment and provide initial supportive and cognitive-behavioral therapy to target suicidal behavior. Consider one-to-one monitoring, depending on the potential for deliberate self-injury, and guard against impulsive actions occurring in a drug- or treatment-induced delirium that could endanger the patient or staff.

A one-to-one monitor also can watch for smuggled contraband. When hospitalized, patients who are chronic substance abusers are prone to continue using illicit substances smuggled in by associates, such as the boyfriend in this case. Consider further testing for illicit drugs if you suspect smuggling.

ACUTE PSYCHIATRIC INPATIENT

Initial diagnosis and treatment planning. Miss G, age 23 and homeless, is admitted directly to the inpatient psychiatric unit from an urgent care clinic. She reports being “depressed and suicidal.” An intermittent methamphetamine abuser, she says she last used the drug the previous day.

Miss G reveals that she is on probation for forged checks and drug use. She believes she failed a random urinalysis given earlier in the day as a condition of her probation, and she fears being sent

Box 3

Hold your ground: Why drug testing in the ED is critical to treatment

Take the long-term view. Emergency room physicians and psychiatrists often disagree about drug testing in the ED. Emergency medicine physicians argue that the yield is low and results do not affect short-term ED management. However, we believe that drug testing is essential during the initial evaluation and that, at a minimum, urine toxicology screening must be performed to aid diagnosis and subsequent treatment planning.

A positive toxicology screen provides nearly irrefutable evidence with which to confront a resistant patient who is likely to be involved with the criminal justice system. In a study by Perrone et al,²⁸ the patient history combined with drug testing was most likely to identify substance abuse. Overreliance on either the history or testing alone was flawed.

Objective data. In our experience, patients with legal problems often deny drug abuse. A toxicology screen provides objective data on concomitant use of other substances abused by many methamphetamine users to temper methamphetamine-related insomnia, anxiety, and overstimulation. Hair testing, a promising tool being investigated, may allow more substance abuse to be detected and possibly determine the level of use.²⁹

back to jail. Her history includes childhood sexual abuse and emotional abuse in a relationship that ended the previous year.

Physical examination shows multiple erythematous excoriations on her arms from repetitive picking at her skin, poor dentition, and cachexia. She reports multiple recent sexual partners without using condoms. She cannot remember when she last menstruated, and she doesn’t recall ever being tested for sexually transmitted disease.

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As in any medical setting involving methamphetamine abusers, acute management of psychiatric inpatients includes careful attention to methamphetamine-related physical conditions—in Miss G's case possible sexually transmitted diseases, pregnancy, cellulitis, and dental disease.

Mood and anxiety disorders. Methamphetamine users may present with depressive symptoms and suicidality.^{18,30} In a study of Taiwanese methamphetamine abusers who had recently quit the drug, depressive symptoms were common on cessation but often resolved without antidepressants within 2 to 3 weeks.³⁰ Evidence on antidepressant use in the methamphetamine-dependent patient is limited, and the existing studies have yielded conflicting results (as we will detail in part 2 of this article).

For patients previously diagnosed with mood or anxiety disorders, do not restart psychotropics until you have considered how methamphetamine use is contributing to the immediate presentation. We recommend initial observation for several weeks before starting an antidepressant if there is no pre-methamphetamine history of mood or anxiety symptoms.

Psychosocial treatments. Involve social services in assessing the patient's need for community resources. Miss G's ability to benefit from these programs will depend on her cognitive capacity, education level, trauma history, and comorbid psychiatric illness.

For patients who relapse to methamphetamine use, previous successful treatment and abstinence may be a hopeful prognostic sign and

warrant referral to a program for recidivists. The patient's legal status may limit some options in the community but open others in the criminal justice system.

Methamphetamine users often have multiple problems that require attention. For example, compared with other mothers under investigation by child welfare services in California, methamphetamine-abusing mothers were younger and less educated on average, less likely to have had substance-abuse treatment, and more likely to have criminal records.³¹ These findings underscore the challenge of coordinating a response that integrates separate and complex systems—psychiatric/substance abuse treatment, child welfare, and criminal justice.

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COMING IN A FUTURE ISSUE

Part 2 of this article will address chronic methamphetamine use by psychiatric outpatients, including users' behavioral symptoms and risk of violence, problems getting them into treatment, and the most effective approaches to their psychiatric and chronic medical conditions.

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Related resources

- ▶ Methresources. Web site pooling information from multiple agencies for communities, law enforcement, and policy makers. www.methresources.gov.
- ▶ Methamphetamine. National drug threat assessment, with information on methamphetamine production, trafficking, and patterns of use. U.S. Department of Justice. Drug Enforcement Administration. www.dea.gov/concern/18862/meth.htm.
- ▶ Substance Abuse and Mental Health Services Administration. Drug and Alcohol Services Information System. Trends in methamphetamine/amphetamine admissions to treatment: 1993-2003. *The DASIS Report* 2006; Issue 9. Available at: <http://www.oas.samhsa.gov/2k6/methTX/methTX.pdf>.

DRUG BRAND NAMES

Droperidol • Inapsine	Lorazepam • Ativan
Haloperidol • Haldol	Midazolam • Versed

DISCLOSURE

The authors report no financial relationship with any company whose products are mentioned in this article or with manufacturers of competing products.

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Acute methamphetamine intoxication requires immediate psychotropic and/or behavioral intervention to contain agitation. Work up for medical and psychiatric illness, suicide risk, cardiac and sexually transmitted diseases, and withdrawal symptoms. Involve social services to address patients' complex psychological and social problems.

BottomLine