

Cocaine Intoxication: Strategy for Treatment

The vast majority of patients, who are alive when emergency personnel get to them, will survive cocaine poisoning. If someone is going to die, they will usually do so within 2–3 min of first experiencing symptoms of advanced CNS stimulation. Unless this occurs in the controlled medical environment of an emergency room (ER) or a fully equipped ambulance, death is quite likely. Reporting in the *Annals of Emergency Medicine* in October 1982, George (Skip) Gay of the Haight-Ashbury Free Clinic of San Francisco, set down what has become standard in the description of cocaine toxicity [19]. His so-called “Caine”, or “Casey Jones” reaction can be divided into three “phases” or stages of signs:

Caine or Casey Jones Reaction

Early Stimulation Phase

<i>CNS</i>	<i>Circulation</i>	<i>Respiration</i>
Excitement	Brady/Tachycardia	High respiratory rate
Euphoria	PVC's	High tidal volume
Soaring	Blood pressure rise	
Garrulous		
Muscle twitching		
Teeth grinding		
Nausea		
Headache		
Preconvulsive movements		
Body temperature increase		

Advanced Stimulation Phase

<i>CNS</i>	<i>Circulation</i>	<i>Respiration</i>
Tonic-clonic seizure	Hypertonia	Cyanosis
Hyperkinesia	Irregular pulse	Dyspnea
Hyperthermia	High cardiac output	Irregular rate
Status epilepticus		

Depressive Phase

<i>CNS</i>	<i>Circulation</i>	<i>Respiration</i>
Flaccid paralysis	Ventricular fibrillation	Respiratory arrest
Coma	Circulatory failure	Cyanosis
Fixed pupils dilated	Cardiac arrest	Pulmonary edema
Loss of vital function	Death	Death
Death		

Phase of Early Stimulation

The effects in this phase are commonly experienced by users, who have at least some, if not all at one time or another, of these reactions to even small amounts of cocaine. Patients are rarely seen in this stage, as they will usually not feel distressed until crossing into phase II (advanced stimulation), when medical attention may be sought. Note that initially there is a bradycardia associated with cocaine use, but by the time medical personnel are asked to evaluate the patient, this has been long gone.

Phase of Advanced Stimulation

It is in this phase that the user begins to feel that something has gone wrong. This may have been signalled at the end of phase I by preconvulsive movements, heart palpitations, headache, nausea/vomiting etc. Now, they begin to experience seizures, their temperature rises precipitously, cardiovascular effects are much more pronounced, breathing may become impaired, and often there is a sense of impending doom (“I think I’m gonna die”). At this point it is worth noting that the progression through the phases of stimulation can be very rapid, and accelerate at any time from one phase to the next. A patient who seems quite stable 1 min, can progress to severe depression of the CNS in the next.

The Depressive Phase

By this time it’s usually all over except where to send the body. There is a sudden loss of control, the consequences of an “overamped CNS”. In the first two phases, we see overstimulation, and in the third and final phase, there is understimulation. The disruption of the CNS by “relentless stimulation” leads to the depression of its function in maintaining circulatory and respiratory activity. Patients die quickly, due to an electrical-imbalance of the cardiovascular system. The place to intervene then, is before they pass out of phase II.

Basics in Treatment of Cocaine Overdose (OD)

Patients presenting an altered mental status should be treated with:

1. ABCs (Airway, Breathing, Cardiovascular status)
2. Administration of dextrose (in case of potential hypoglycemia)
3. Administration of thiamine (for preventing Kosakoff’s syndrome in potential alcohol intoxication), and
4. Administration of 2 mg of naloxone (Narcane®) for reversal of potential opioid overdose

All this may effectively treat or rule out a number of other potential causes or contributors to the patient's condition, including hypoglycemia and opioid poisoning. It must be remembered that as many as a quarter of patients who present with cocaine intoxication also have opioids on board. Since other drugs may be interfering with the diagnosis at this point, and until toxicological studies are performed, no definitive cause can be established. For this reason, a high index of suspicion for the presence of depressants such as alcohol and opioids must be maintained, with appropriate measures (naloxone etc.) ready to deal with a sudden onset of these effects.

Advanced Treatment of Cocaine OD

The overdose must realistically be treated as a *stimulant* overdose in the most general sense, since until a positive toxicological screen is obtained, one cannot be certain as to the offending agent. Often even the patient is unaware of the actual composition of the substance they ingested (see chapter on adulterants in cocaine). Certain "active" cuts such as amphetamine, PCP, phenylpropanolamine, and/or yohimbine can last longer and be more cardiotoxic than the cocaine alone. Treatment is therefore directed at target symptoms, with pharmacologic therapy designed to stabilize the patient until the effects of the poison have abated. Thereafter intervention continues for cardiac symptomatology, with the goal to quiet the irritable heart. Propranolol was the most frequently mentioned beta-blocker to accomplish this task, but it was by no means the only effective agent [20]. However, due to its alpha-adrenergic action it will result in peripheral vasoconstriction, thus further increasing the elevated blood pressure. Therefore the β -blocker of choice is esmolol (Brevibloc®, Baxter), which is a pure β -blocking agent, with a very short duration of action (ca 7 min). By this last property the dose essentially can be titrated to effect. There has been some discussion of the utility of calcium channel blockers (verapamil and others) but all the recipes are based on clinical judgement rather than controlled studies. So in reality it is rather a trial-and-error therapy. The goal of beta-blocker therapy is to lower the diastolic pressure to about 90 mmHg and stabilize the arrhythmia.

Selective Approach to Cocaine OD

The most serious and life-threatening reactions to cocaine poisoning are seizures. Often the patient seizes soon after a dose of cocaine, usually without warning. This can be followed by an "emergence arrhythmia" which can be manifested as ventricular fibrillation from which there is little chance of recovery unless it occurs in a controlled medical setting such as an ER. Therapy is commonly intravenous diazepam or a short-acting barbiturate. Haloperidol (Halidol®) has been mentioned in the literature, but

it should be kept in mind that this agent can lower the seizure threshold. Before considering pharmacologic therapy, be certain that the patient's temperature is stable. As Skip Gay MD admonishes: *One has to cool these people down as they are cooking their brain cells, your drugs won't do any good if you can't get control of hyperthermia.* An ice-bath is recommended, and to be continued to below 39°C or 102°F until the patient's heart rate is down [19].

Avoiding Procedures in Cocaine OD

One of the commonest mistakes that can be made in treating a patient with possible cocaine overdosage is to resort to "P3" therapy. While there is a great temptation to restrain, drug and pack these people off to the loony bin, this approach can and does contribute to the deaths of patients who might otherwise recover. With the unpredictable nature of cocaine (and other stimulants), a rapid acceleration through the phases of the "Caine reaction" can occur. Unless the patient is kept in a controlled medical (ER) environment, where the goal is to treat target symptoms and avoid further stress to the individual's CNS, the outcome may be fatal.

If confronted with an individual with a toxic delirium, avoid the "P3" therapy, which is

1. **Physical restraint**
2. **Phenothiazines in staggering doses**
3. **Psychiatric ward where the user is being locked up and left on their own**

In contrast, one should use the "The Science of **ART**" named after the Haight-Ashbury Free Clinic. It is based on the theory that a patient with an "overamped" CNS needs calming more than anything else. When dealing with an individual who has taken what has been called by some *the premier ego enhancing drug known to man* and who may have dealt on the *Faustian point* (i.e. sold their souls for cocaine), The first consideration should be

1. **Acceptance of their state.** Acceptance only means a sincere approach to explaining to the patient that they've gone too far in the pursuit of pleasure, and now it's time to come down. The immediate goal is to
2. **Reduce stimuli** (dark area of the ER if practical), and give rest and assurance that help is the only desire of the medical staff. And finally, a good
3. **Talkdown** technique will do more than many drugs to calm the CNS