

This resource provides information that is beyond the basics about fentanyl-induced muscle rigidity (FIMR) or “wooden chest syndrome”. For basic information, check out

FIMR: The Basics

What is fentanyl-induced muscle rigidity?

Fentanyl-induced muscle rigidity (FIMR) is a complication of fentanyl use that causes rapid stiffening or spasm of the muscles used in breathing including the chest, neck, jaw, and upper airway.

What are the signs and symptoms of FIMR?

FIMR can be recognized by rapid onset (within 1-2 minutes of fentanyl use), muscle stiffness of the upper body, or resistance to airway insertion and ventilation from a clenched jaw, neck, or chest wall.

FIMR Signs & Symptoms (1 or more):

Muscle stiffness in the upper body: jaw, neck, chest wall and abdominal muscles

Vocal cord spasm that blocks upper airway (laryngospasm)

Clenched jaw that makes it difficult to insert oral airway

Rapid decrease in consciousness and cessation of breathing

Eyes open with fixed gaze, but unable to sit down or speak

Slumped over, with hyperextended neck

Decorticate posture (a type of abnormal involuntary body position)

- Arms flexed
- Legs extended with plantar flexion (toes pointed)
- Clenched fists

Is FIMR an emergency?

Yes, FIMR requires rapid intervention with naloxone and airway management. FIMR prevents breathing and oxygen intake. Muscle stiffness in the chest wall can prevent spontaneous and assisted ventilation. Jaw clenching and upper airway spasm can make airway insertion and ventilation difficult or impossible. FIMR usually responds quickly to naloxone, however, larger doses are often required to reverse the drug poisoning and resume breathing. .

How common is FIMR?

FIMR is a common overdose complication. The extreme concentrations of fentanyl in the toxic unregulated drug supply may contribute to increased rates of FIMR. However, exact numbers are difficult to determine.

How much fentanyl can cause FIMR?

FIMR can occur with any dose or route of administration, but is more likely to occur when fentanyl is used quickly and at high doses.

Other factors associated with FIMR include:

- Extremes of age (i.e., infants, elderly)
- Severe illness
- Neurologic or metabolic conditions (e.g. essential tremor)
- Combined use of substances that alter dopamine levels (e.g., cocaine, amphetamines, antidepressants, Parkinson's medications)

Considerations for responding to FIMR:

- Establish an airway and ensure adequate oxygenation. If unable to insert an airway or ventilate properly, administer naloxone immediately while troubleshooting ventilation[1].
- Consider giving a higher dose of naloxone (0.4mg-0.8 mg IM) and/or give more frequent doses (every 2 minutes) until an airway is inserted and ventilation and oxygenation is restored (e.g., SpO₂>95%).
- If the person is breathing normally on their own, help them into recovery position and avoid giving additional doses of naloxone, which could induce acute opioid withdrawal.
- When the person becomes alert, provide space, reassurance, and re-orientation to time and place.
- Sometimes vomiting occurs, which increases the risk for aspiration. If available, use suction to clear the airway and put the person in the recovery position.
- Sometimes muscle rigidity can have another cause. If the person does not respond to several doses of naloxone, consider other causes such as: high doses of substances that increase dopamine (e.g., bupropion), norepinephrine (e.g., stimulants) or serotonin (e.g., citalopram, fluoxetine); anticholinergic toxicity (e.g., zopiclone, sertraline); hemorrhagic stroke; and toxicologic, hypoxemic, or hypoglycemic related seizures.

Follow-up care

Monitor the person for 30-90 minutes following FIMR. If monitoring is not possible, discuss drug poisoning prevention safety planning including using with a buddy, use of the [Brave](#) or [Lifeguard](#) app, or calling the [National Overdose Response Hotline](#) 1-888-688-NORS.

How to Respond to an Opioid Poisoning

S

Stimulate

Check responsiveness

- 1 Speak to them or make noise
- 2 Squeeze their fingertips or the muscle between the neck and shoulder

If not responsive:

- 1 Call 9-1-1
- 2 Go to next step

Responsiveness means:

- Awake and alert **OR**
- Responds to questions **OR**
- Easy to wake up **OR**
- Minimal or no sedation

A

Airway

- 1 Check if they are breathing normally
- 2 Check for a pulse (heartbeat)
- 3 Remove anything in their mouth
- 4 Insert airway (if trained and permitted)

If not breathing normally: Go to next step

Breathing normally means:

- Taking 10 or more breaths per minute **AND/OR**
- Oxygen saturation is more than 90% **AND**
- No unusual breathing sounds (e.g. gurgling)

V

Ventilate

- 1 Lift chin and tilt head back
- 2 Give 1 breath every 5 seconds:
Use a CPR face mask **OR** Bag-Valve-Mask with oxygen
- 3 Keep giving breaths until breathing normally

If not breathing normally: Go to next step

If at any time:

There is **NO PULSE**:

Start CPR with rescue breathing and compressions

They start breathing normally:

- Place them on their side
- Monitor breathing and responsiveness
- Repeat SAVE ME if they stop breathing or become unresponsive
- **STOP** giving naloxone when they are breathing normally – even if they are still unresponsive

E

Evaluate

- 1 Check again if they are breathing
- 2 Check responsiveness
- 3 Check for a pulse

If not breathing normally: Go to next step

M

Medicate

Give naloxone:

- Inject **1-2 ampoules** (0.4-0.8 mg) into arm or thigh muscle **OR**
- Give **1 intranasal spray** (4 mg) in one nostril

Repeat step M & E until they are breathing normally

E

Evaluate & Support

- 1 Check breathing and responsiveness
- 2 If they are still not breathing normally 3-5 minutes after giving naloxone, give another dose
- 3 Keep giving breaths until they are breathing normally

The poisoning seems severe or complex:

- Inject 2 ampoules (0.8 mg) of naloxone immediately
- Then give 1 ampoule of naloxone every 2-4 minutes until they are breathing normally

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