CLACKAMAS & WASHINGTON COUNTY EMERGENCY MEDICAL SERVICES				
EMS Clinical Notification				
EFFECTIVE DATE: 29 March 2022	NUMBER: 032922-OPS	TYPE: Clinical Guideline	REPLACES: None	PAGE: 1 OF 2
ENTER NAME/TITLE HERE (signature on line below): **DR. RITU SAHNI, MD, MPH, FAEMS**		TITLE: **"WOODEN CHEST SYNDROME" SECONDARY TO SUSPECTED ILLICIT FENTANYL**		

Hello!

Multnomah County EMS has received two recent reports of patients presenting with respiratory arrest and/or cardiac arrest thought secondary to illicit fentanyl. At this time, MCEMS does believe the two cases are not related.

Case 1

A young male (estimated age between 25 to 30 years old) who presented unconscious, unresponsive with snoring respirations but a strong carotid pulse. Initial vital signs revealed mild tachycardia and oxygen saturation of less than 50%. Naloxone was administered IM within one minute after arriving at patients' side and attempts to ventilate by BVM was initiated. On the initial attempts to ventilate with BVM, providers noted minimal to no chest rise with good BVM efforts and a clenched jaw. Gradual improvement was noted approximately two minutes after initial administration of naloxone. A second dose of naloxone was administered approximately seven minutes after first dose and within two minutes after second dose, patients' respiration markedly improved; patient became more alert with GCS of 14. Patient remained stable throughout the remainder of his transport, but providers noted upper extremity myoclonus bilaterally.

Case 2

A young male (estimated age between 25 to 30 years old) presented to Fire/EMS with cardiac arrest secondary to presumed drug overdose from fentanyl. Witness on scene stated that patient is a known asthmatic and had been smoking fentanyl and self-administered his IN naloxone before becoming unconscious. On EMS arrival, patient noted to be pulseless, apneic, and unresponsive. Pulseless electrical activity was noted on monitor. Resuscitation was initiated which included CPR, advanced airway, and IO medications. After the third epinephrine administration, narrow complex tachycardia with pulses was obtained. At this time, gastric distention with poor chest compliance was noted by the EMS provider in spite of effective BVM. His EtCO2 was also rising during this period.

Discussion

Chest wall rigidity secondary to fentanyl is a rare but well described complication. MCEMS believes that this is the first reported case(s) secondary to illicit fentanyl use in the Portland area. Previous investigations have suggested that this may be an etiology of sudden death in these patients[1,2]. Chest wall rigidity is an uncommon complication of opioid analgesia with fentanyl which was first described in 1953 as "wooden chest syndrome". It is most seen in neonates in the critical care unit. Lipophilic opioids such as fentanyl, remifentanil and sufentanil are implicated. The mechanism is thought to be centrally mediated with involvement of the caudate nucleus and spinal motor neurons, especially the nucleus raphe pontis [3,4]. Onset and strength of rigidity is directly proportional to the dose. Opioid-induced chest wall rigidity is characterized by increase in muscle tone in the thoracic, abdominal and neck muscles and jaw clenching after exposure to fentanyl. Laryngeal spasms occur in 50%–100% of cases of fentanyl-induced muscle rigidity, depending on the dose and injection rate. Decreased chest compliance and inability to open the mouth to insert an oral airway owing to masseter muscle spasm have been reported. Management includes reversal with naloxone and/or a neuromuscular blocking agent. Some case reports describe almost immediate reversal of clinical signs with naloxone administration. The effective naloxone doses given to adults in case reports varied from 0.2 mg to 0.4 mg. Chest wall rigidity in non-ventilated patients often needs emergent intubation. In "healthy

volunteers", rigidity started at approximately 1 to 3 minutes (range 1-4 minutes) and lasted about 11 minutes (range 7-23 minutes). No difference was noted in the concentration of fentanyl between subjects who did not demonstrate rigidity vs. those who did. This study found that fentanyl 15 micrograms/kg administered at a rate of 150 micrograms/min resulted in rigidity in 50% of young volunteers[5].

Recommendations

Suspected Case of Chest Wall Rigidity (aka wooden chest syndrome).
A clinical case is defined as a patient with suspected fentanyl overdose with "wooden chest syndrome" (i.e. rigid chest wall) in the setting of effective attempts of ventilation. Specifically, the scenario should be suspected when effective BVM or advanced airway intervention does not result in chest wall rise or expansion.

Recommended treatment
1. Prompt recognition of syndrome
2. Optimize oxygenation and ventilation
3. Repeat doses of naloxone (IV/IO recommended) up to 8mg if partial response is observed
4. Paralyze the patient if unable to ventilate

Thank you for your continued hard work and dedication.

Ritu Sahni, MD, MPH, FAEMS
EMS Medical Director

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