**Cases 2023.9A: Naloxone: A Safety Net with Holes**

**Situation:** A 24 y/o patient presents for routine dental extractions with moderate sedation. A complete past medical history was negative per oral review with confirmation of a written health history document. Patient was NPO x 8 hours, Mallampati I airway, 5’10” tall, 132# (BMI 19), ASA I. Patient denied snoring. Pre-op vital signs were normal. 4 lpm supplemental O₂ was delivered via nasal cannula. Intravenous access was obtained with a 22g catheter. IV drugs included 3.0 mg midazolam titrated to effect over 1 minute, followed by 50μg fentanyl. After 3 minutes, local anesthesia injections were attempted without success as the patient became restless/combatitive triggered by injection pain. The sedation provider administered another 50μg fentanyl and added 50% N₂O, as the patient continued to be agitated. Another 50μg of fentanyl was given to facilitate the injections. This was followed by loss of responsiveness to painful stimuli, loss of rhythmic breathing, then apnea, then desaturation. The moderate sedation provider became distraught, and quickly administered 0.4mg naloxone IV in hopes of reversing the opioid. The patient did not improve, became cyanotic and SpO₂ plummeted to 60%, at which time the patient suddenly gasped, regained some responsiveness and eventually recovered. The intended procedure was not completed at that time.

**What we learned:** This close-call event highlights the inherent, sometimes hidden danger in premature redosing (stacked dosing) of analgesic/sedative medications. Oversedation resulted in hypoventilation/apnea and probable loss of upper airway tone and patency. Opioid reversal should not be viewed as a reliable rescue plan. A more efficacious intervention would have been a triple airway maneuver followed by positive pressure ventilation with a full-face mask to support ventilation until the narcotic re-distributed, reducing the CNS opioid concentration.

**Naloxone:** Recent information has become available regarding the use of opioid antagonists to reverse respiratory depression during moderate sedation.

1. The speed, magnitude and efficacy of opioid reversal depends on the opioid affinity for the μ receptor, the opioid dose and speed of delivery, time interval between opioid administration and reversal administration, co-ingestion with prescription, non-prescription and/or illicit medications and the dose and route of administration of the reversal agent.
2. Re-narcotization is a very real concern as the half-life of naloxone is typically much less than the opioid which requires reversal. Repeated dosing of fentanyl significantly prolongs its duration of action, possibly requiring much high doses of naloxone for successful reversal.
3. When attempting to reverse ventilatory depression, intravenous doses of 2mg or more should be administered slowly. More than 1 dose might be necessary. Rapid intravenous administration of naloxone can trigger vomiting with attendant aspiration risk in an obtunded patient.
4. Opioid reversal during hypoxemia cannot be relied upon to improve ventilation, as both hypoxia and hypercarbia also depress the central nervous system.
5. Opioid reversal in conditions of decreased cardiac output will delay its circulation to the central nervous system.

The DPSF encourages frequent reporting of unsafe conditions, near misses and adverse events as the only means to close the gap between knowing how to prevent these occurrences and taking the necessary action to do so. Please visit our website.

Additional Reading:

**www.dentalpatientsafety.org**
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