

No One Dies a Preventable Death

The Role of EMS in Addiction Care & the Science of Opioid
Addiction

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Bridging emergency care and community health to create an integrated system that improves health and equity.

We have no disclosures.



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Special thanks to:



Opioid
Response
Network

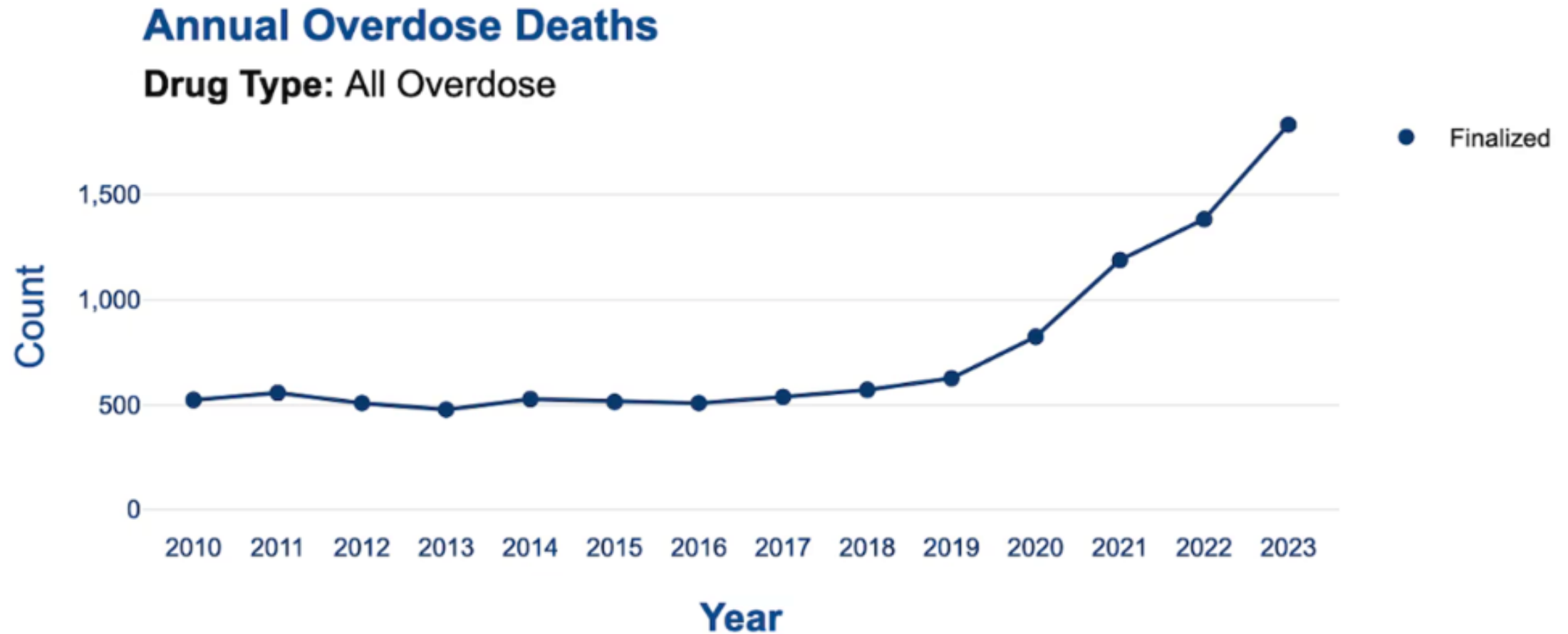




NO ONE DIES A PREVENTABLE DEATH

Oregon overdose deaths grew 33% in 2023, health data shows

Published: Dec. 12, 2024, 4:28 p.m.





Home from boot camp, Army recruit from Oregon dies of fentanyl OD

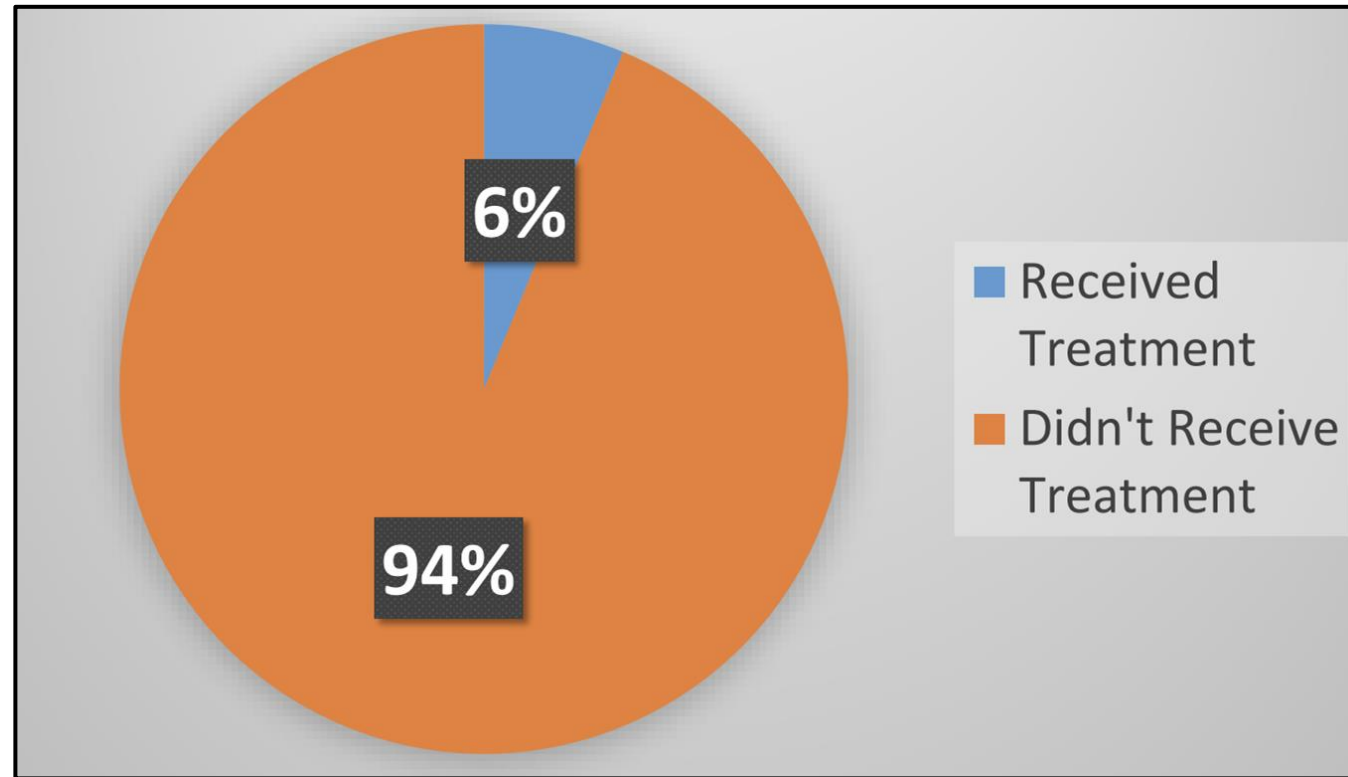
Updated: Jan. 23, 2025, 10:17 p.m. | Published: Jan. 23, 2025, 7:00 a.m.



Inspired by an uncle, Tyson Richardson joined the Army and had dreams of serving as a cavalry scout to specialize in reconnaissance and gathering information about enemy positions, weapons and activity. "He wanted to serve his country, to be part of something greater than himself," said Clifford Richardson, his father. Courtesy of Family

About 46 million Americans, or 15% of the population, have a substance use disorder (SUD).

Receipt of *Any* Substance Use Treatment Among People with a Past Year SUD

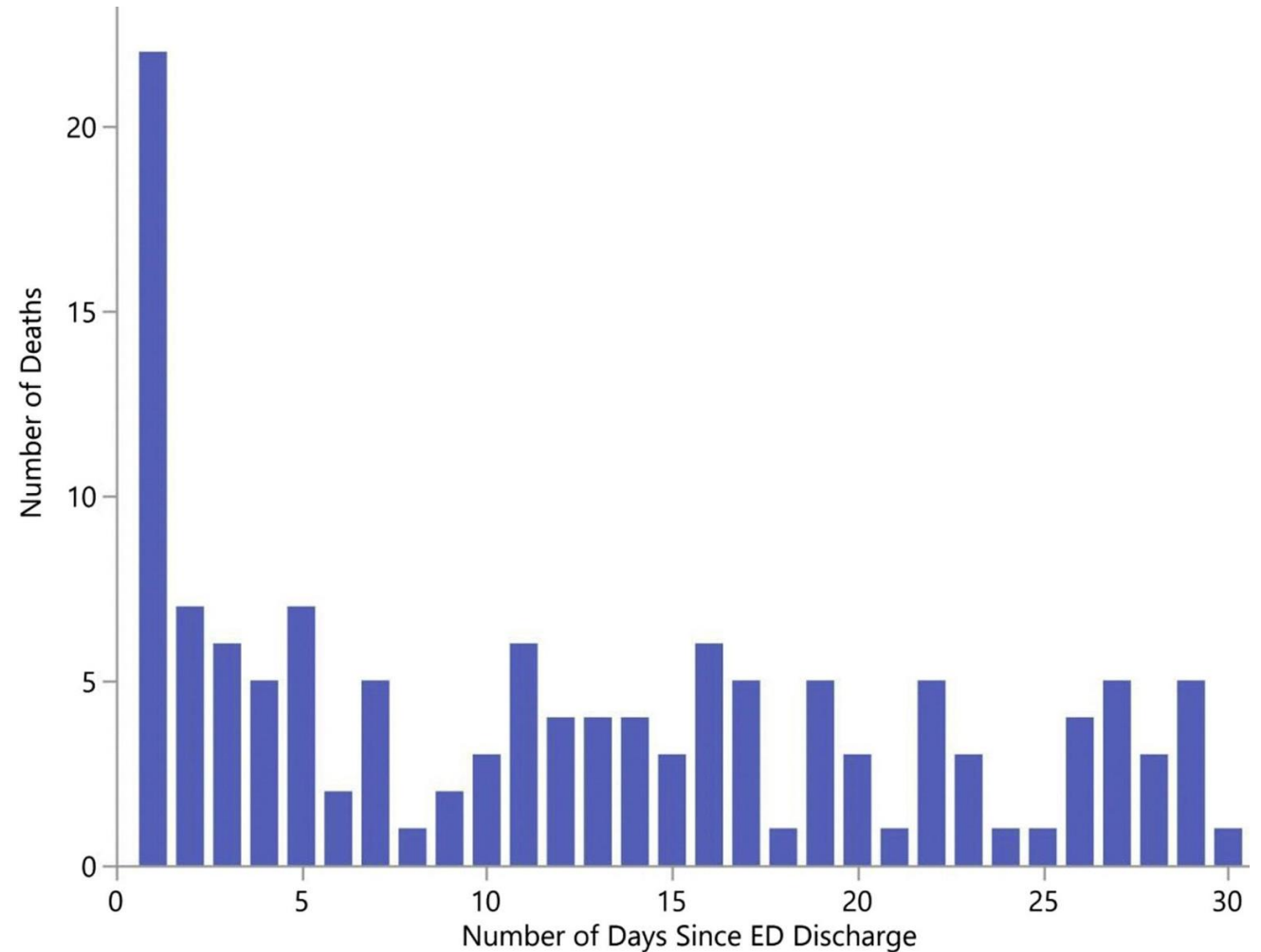


Why is this an EMS problem?

OOD is an Emergency

Significant increased mortality risk post-ED discharge

- 20% of patients who died did so in the first month
- **22% of those who died in the first month died within the first 2 days**



A healthcare worker, likely a nurse or doctor, is shown in a hospital setting. She is wearing green scrubs and has a stethoscope around her neck. She is holding a white telephone receiver to her ear with her right hand and a clipboard with a red pen in her left hand. The background is a busy hospital corridor with other staff members in blue scrubs.

Non transport rates for
overdose survivors have
increased by

44%

30%

of people who die due to
overdose have had at
least 1 interaction with
EMS in the year
preceding their death.

Emergency Medical Services: Buprenorphine (Bup) Field Start Protocol



This treatment protocol can be used for patients experiencing opioid withdrawal symptoms and for patients recently administered naloxone.

Assess opioid withdrawal signs and symptoms.

Opioid Withdrawal Signs & Symptoms: Patient must present with ≥ 2 objective signs to be considered for bup treatment.

Objective Signs	Subjective Symptoms
• Yawning • Rhinorrhea or lacrimation • Dilated pupils • Tachycardia	• Nausea • Stomach/abdominal cramps • Body aches • Achy bones/joints
• Diaphoresis • Restlessness and/or agitation • Vomiting, diarrhea • Piloerection	• Restlessness • Hot and cold • Nasal congestion

Assess for exclusion criteria.

Exclusion Criteria: Patient is not a candidate for buprenorphine treatment if any of the following are present.

- No opioid withdrawal signs or symptoms
- Under 16 years of age
- Any methadone use within last 10 days
- Severe medical illness (sepsis, respiratory distress, etc.)
- Altered mental status and unable to give consent or comprehend potential risks and benefits for any reason

Are any exclusion criteria present?

NO

Check for COWS Score ≥ 8
(Clinical Opioid Withdrawal Scale)



YES

Offer patient bup and counseling on treatment options.

Consider MD Base contact for complex cases/additional support.

PATIENT AGREES TO TREATMENT

Administer Buprenorphine.

1. Administer buprenorphine 16 mg SL.
2. Reassess after 10 minutes.

IF SYMPTOMS WORSEN OR PERSIST

Re-dose with bup 8 mg SL.

Total maximum bup dose not to exceed 24 mg SL.

PATIENT DENIES TREATMENT

Not eligible for bup field start.

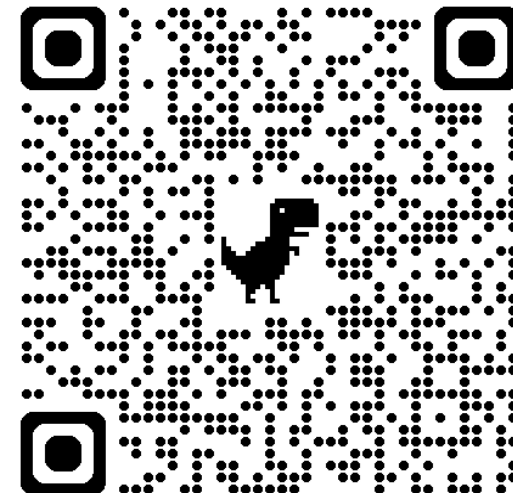
1. Provide medication for addiction treatment (MAT) brochure.
2. Provide naloxone.
3. Offer transport to Bridge hospital.

IF SYMPTOMS IMPROVE

1. Verify patient contact information for hospital follow up, two phone numbers recommended.
2. Provide naloxone and MAT brochure.
3. Repeat and document second COWS.
4. Recommend transport to Bridge hospital.
5. If patient declines transport, inform them that a navigator may initiate contact for further support.

EMS Bridge Field Protocol:

- Follow the arrows, like ACLS
- 1300 paramedics across California use this protocol
- Currently 1/3 of all Californians live in an area where EMS has been trained to provide field bup



Steps 1 & 2

Assess opioid withdrawal signs and symptoms.

Opioid Withdrawal Signs & Symptoms: Patient must present with ≥ 2 objective signs to be considered for bup treatment.

Objective Signs

- Yawning
- Rhinorrhea or lacrimation
- Dilated pupils
- Tachycardia
- Diaphoresis
- Restlessness and/or agitation
- Vomiting, diarrhea
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Subjective Symptoms

- Nausea
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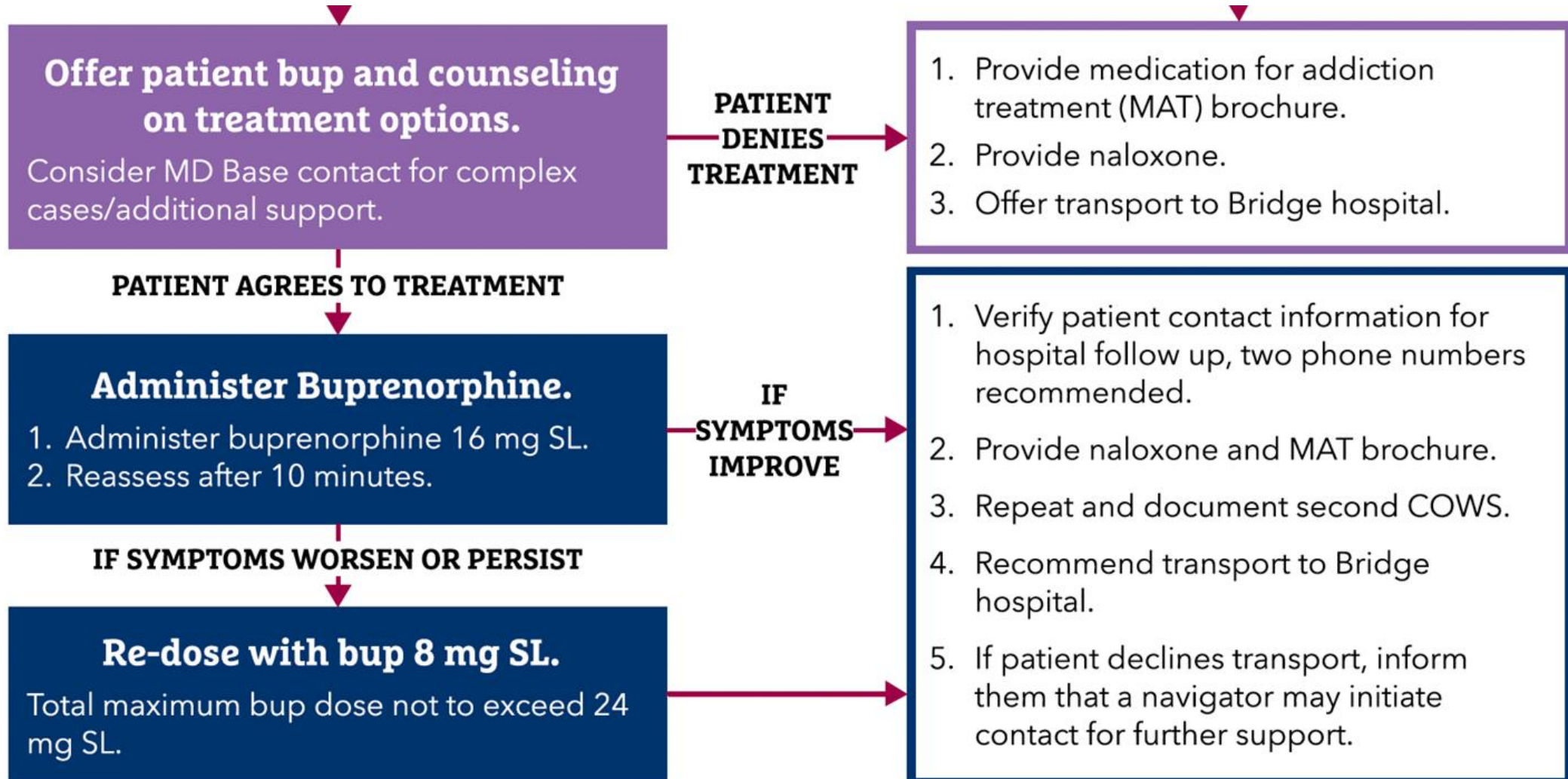


NO

Not eligible for bup field start.

YES

Steps 3 & 4



Successful Implementation in the EMS Setting



Emergency medical services/original research

Impact of Administering Buprenorphine to Overdose Survivors Using Emergency Medical Services

Carroll & Solomon, et al., 2023

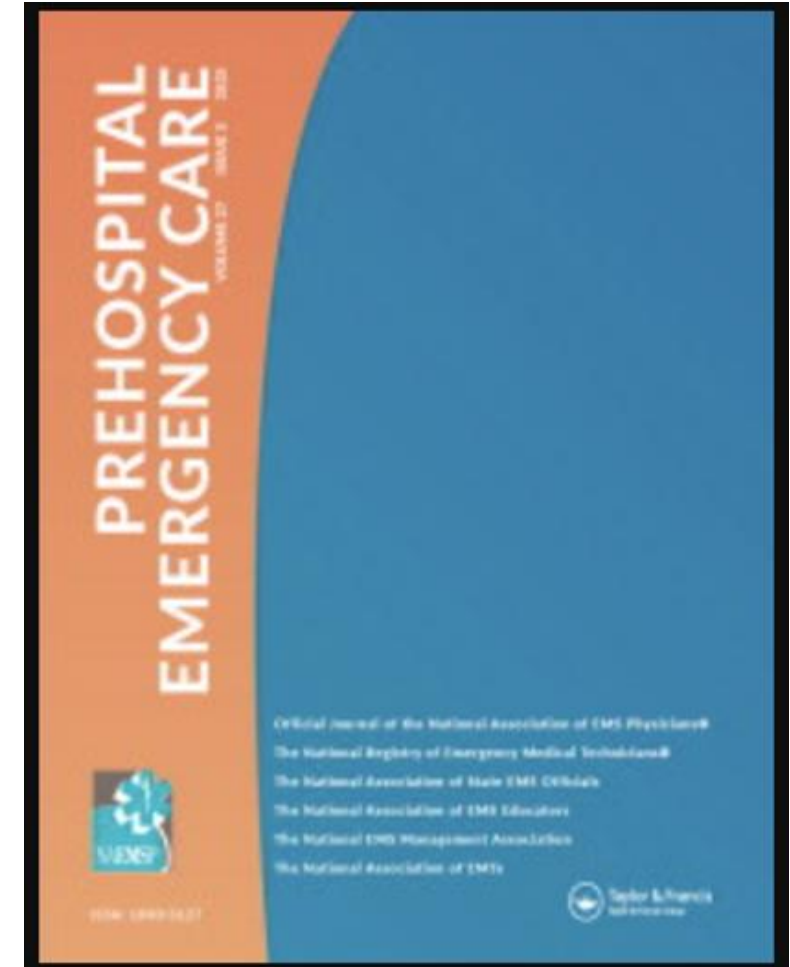
Key Findings:

- “Patients who received buprenorphine had a 12-fold increase in being engaged in treatment at 30 days”
- No precipitated withdrawal
- Decrease in Clinical Opioid Withdrawal Scale (COWS) from 9.3 to 2.2
- Increased scene time of 6 minutes

Contra Costa County, CA

Bridge Buprenorphine Pilot:

- Treated abstinence withdrawal and naloxone precipitated withdrawal
- Precipitated withdrawal rate <1%
- 25% of patients retained in treatment at 30 days
- CA policy change: buprenorphine no longer requires calling medical direction as of 2023



Detoxification Doesn't Last



Chutuape, M et al. One-, three-, and six-month outcomes after brief inpatient opioid detoxification. The American Journal of Drug and Alcohol Abuse. Vol 27:1, 2001.

Medications for Opioid Use Disorder (MOUD)

Methadone

Full mu (opioid) receptor agonist



Oral (often solution)

Buprenorphine ± Naloxone

Partial mu receptor agonist



Sublingual (tab, film),
IV, IM, subcutaneous
injection, transdermal patch

Naltrexone

Mu receptor antagonist (blocker)



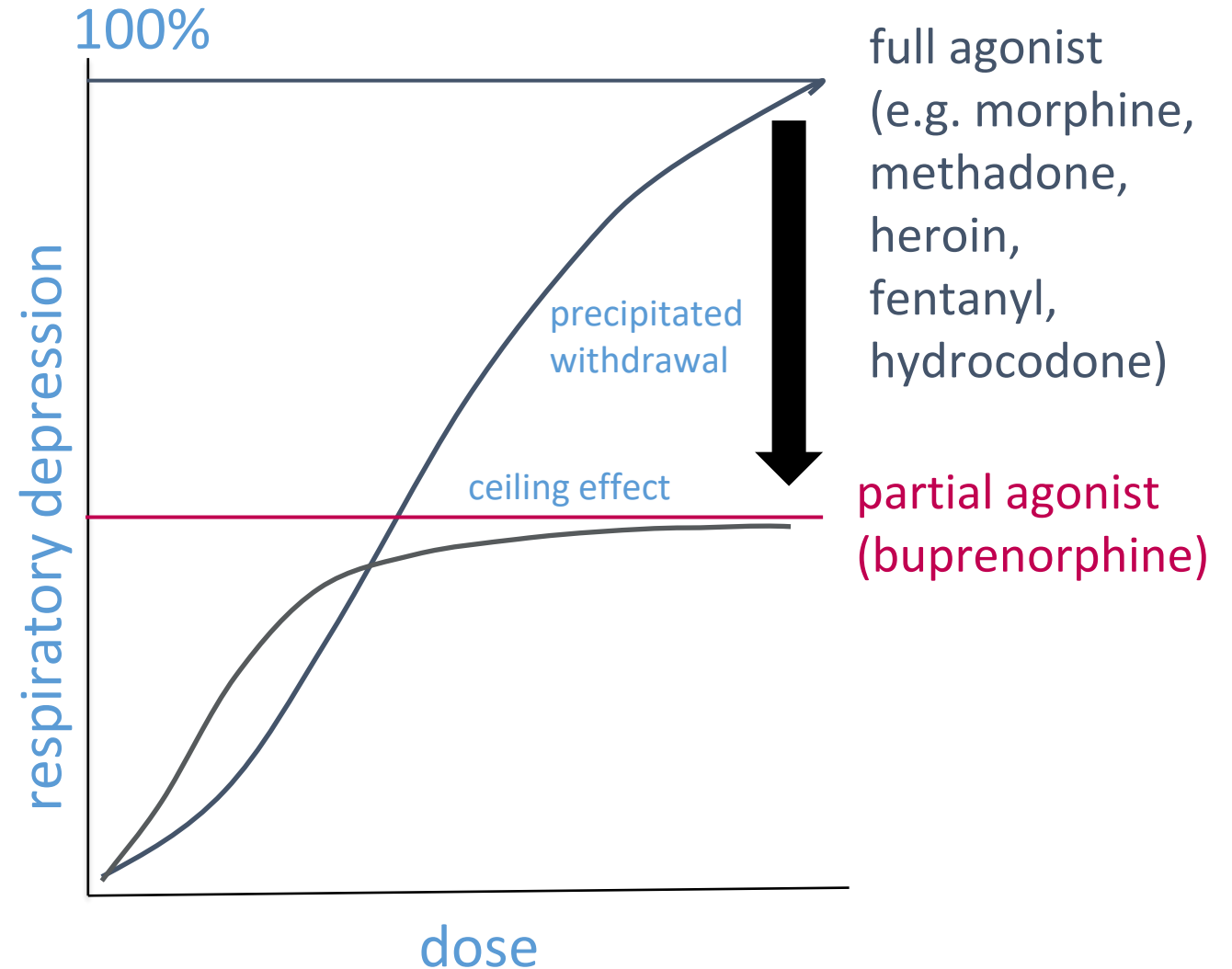
Intramuscular injection (extended
release) or Oral

Ex: “Vivitrol,” “ReVia”

Buprenorphine

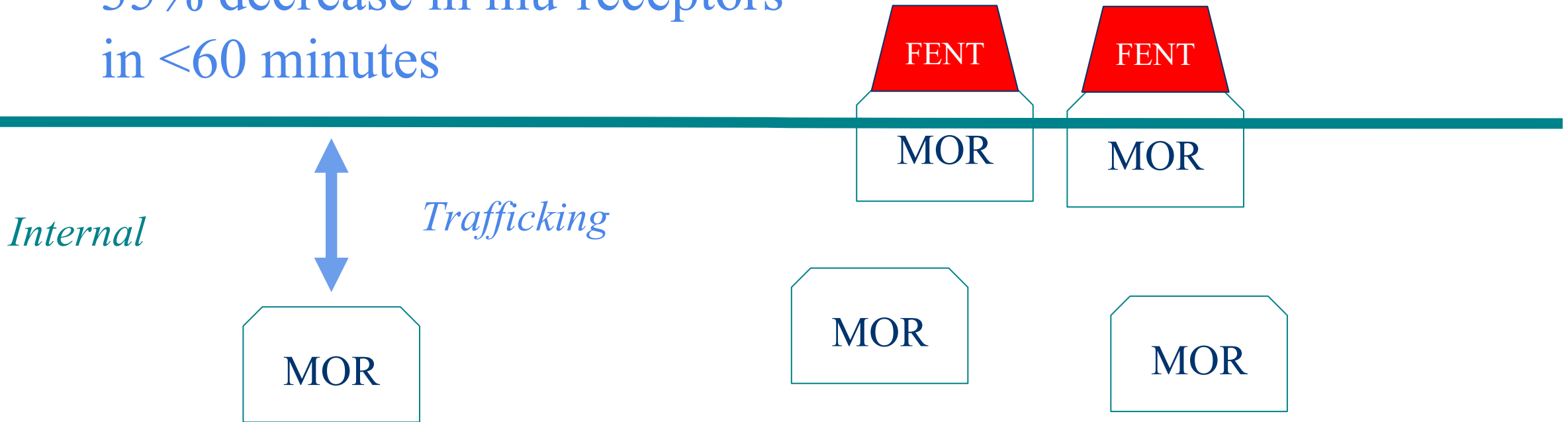
Buprenorphine:

- Safely and effectively treats withdrawal, craving, & overdose
- Partial agonist
 - Ceiling effect:
 - Respiratory depression
 - Sedation
 - No ceiling effect:
 - Analgesia
- High affinity
 - Blocks other opioids
 - Displaces other opioids
- Long acting
 - Half-life ~ 24-36 Hours

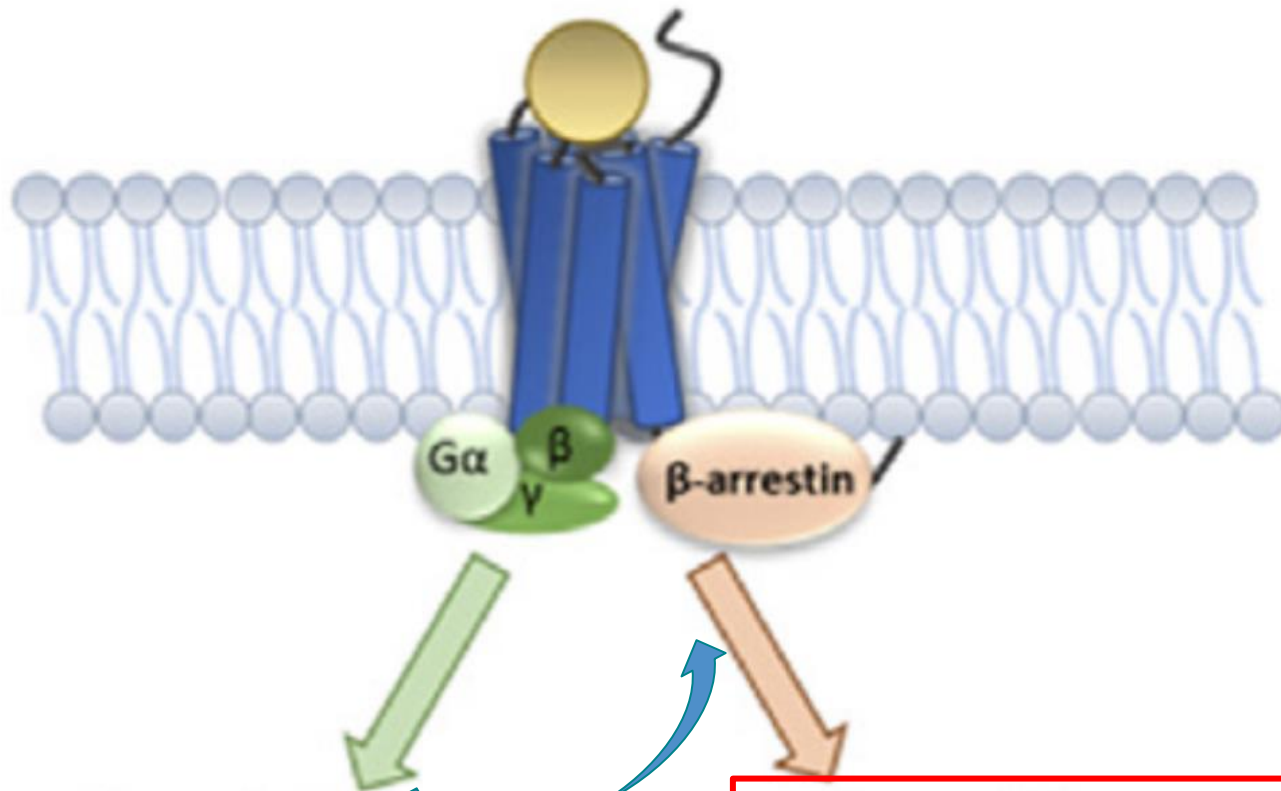


Fentanyl rapidly induces profound tolerance

35% decrease in mu-receptors
in <60 minutes



*MOR internalization & decreased MOR signal amplification
result in tolerance & desensitization*



G protein

Analgesia

Respiratory depression

Constipation

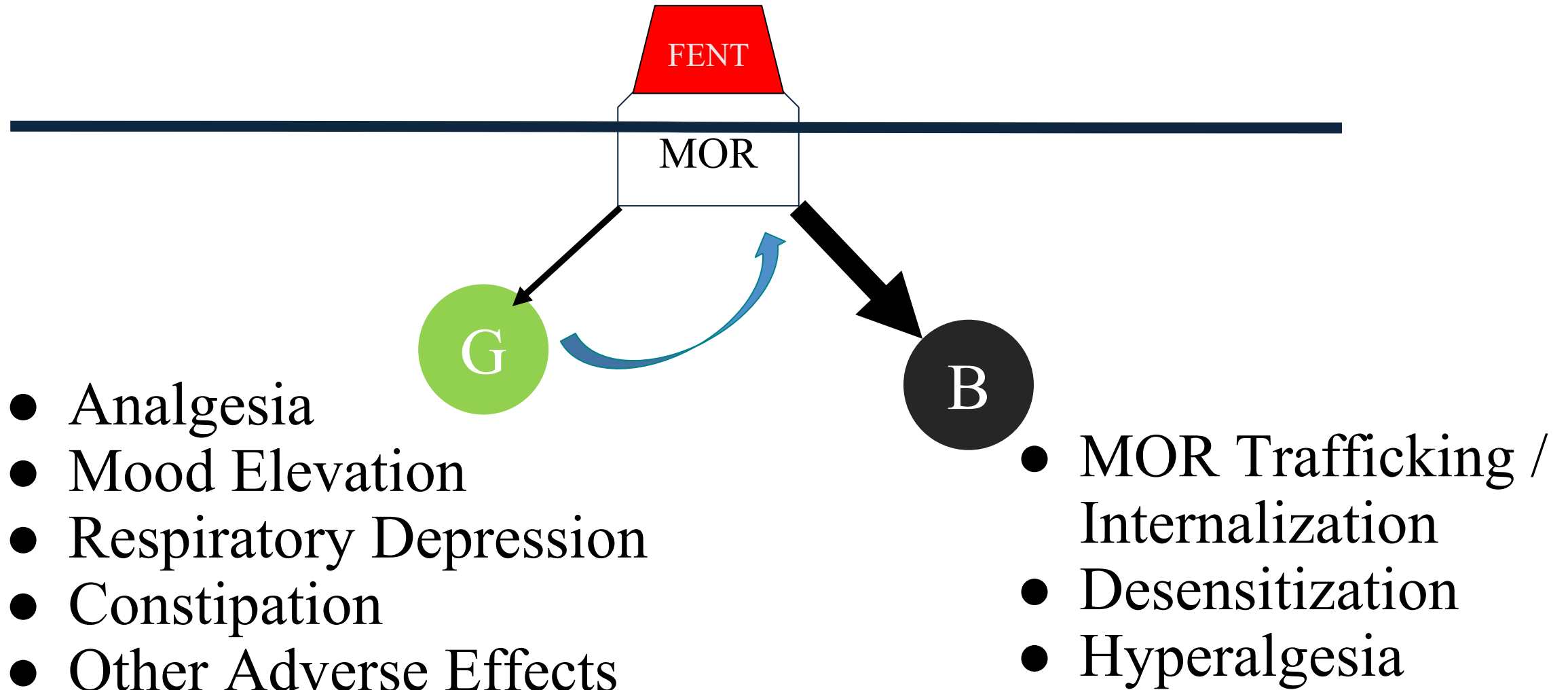
Other adverse effects

β -arrestin

Desensitisation – Decreased MOR signal amplification

Trafficking – MOR internalization

Fentanyl is a biased agonist

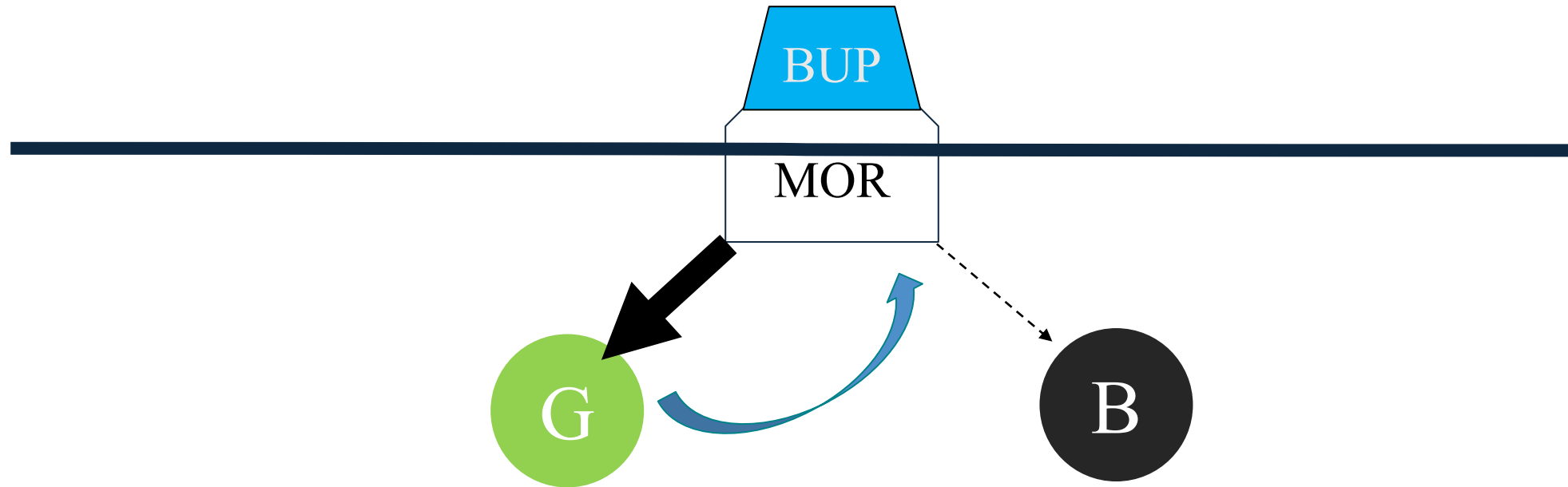


What is high opioid tolerance?

1. Countries who use full agonists for OUD treatment use 1200 MME/day
2. Typical person who uses fentanyl- "2 grams per day"
3. Community-based lab testing estimates of street fentanyl purity ~20%
4. 2 grams=2 million micrograms x 0.2=~400,000 mcg/day
5. Example of Vancouver General Hospital's full agonist protocol:
 - a. Fentanyl 200-400 mcg IV q5 minutes to comfort, then 50-100% of that dose q 1 hour prn
 - b. Typical dose fentanyl 2000-4000 mcg IV q1 hour prn

fentanyl 50 mcg/mL INJ 6 Dose: 1,500 - 3,000 mcg iv every one hour PRN Maintenance phase Hold if POSS score is 3 or higher and notify MD. (2500mcg/50 mL size) High alert Max. total number of PRN fentanyl doses in 24 hours = _____. See Dr's orders	21Sep22 1200 16x LB0635	Handwritten notes on a grid showing various times and doses: 0815 300mcg IV 0945 300mcg IV 1115 300mcg IV 1250 300mcg IV 1350 300mcg IV 1510 300mcg IV 1600 300mcg IV 1705 300mcg IV 1935 300mcg IV 2240 300mcg IV 0115 300mcg IV 0320 300mcg IV 0620 300mcg IV 0820 300mcg IV
naloxone 0.4 mg/mL INJ Dose: 0.1 mg = 0.25 mL iv every 2 minutes PRN To reverse opioid effect		

Buprenorphine only has partial Beta-arrestin activity

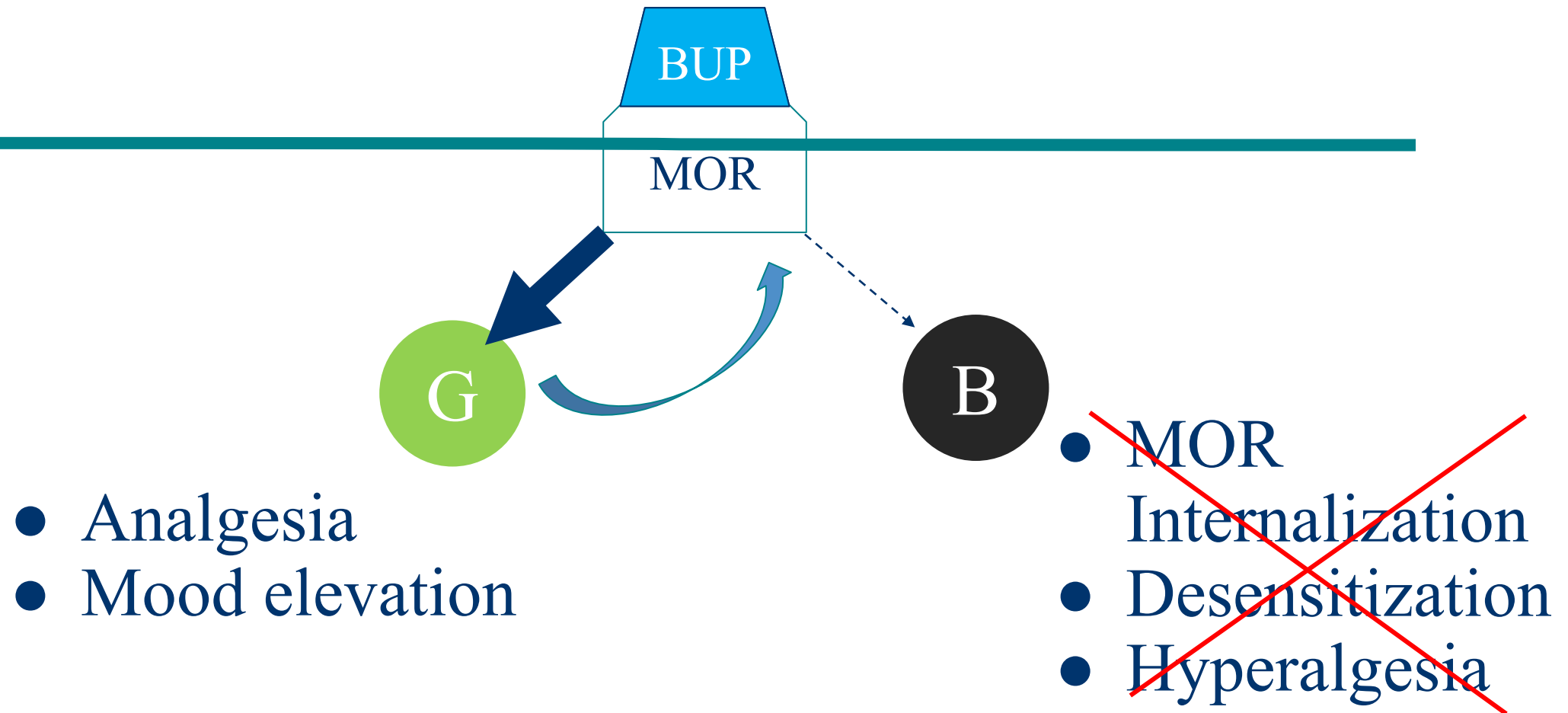


- Analgesia
- Mood elevation

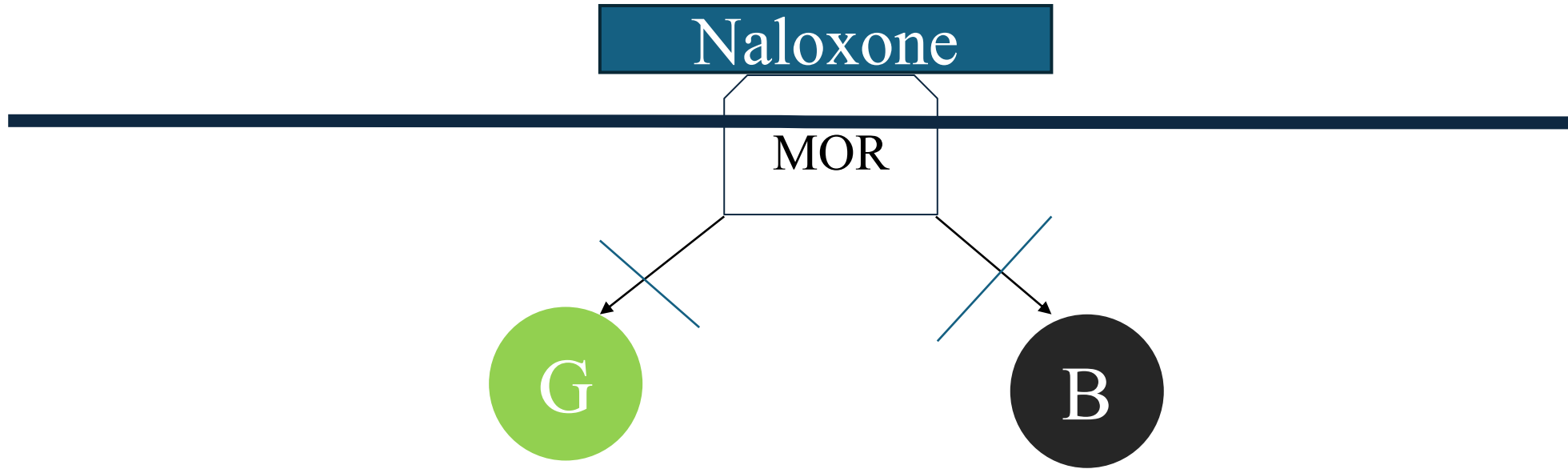
- ~~MOR~~
- ~~Internalization~~
- ~~Desensitization~~
- ~~Hyperalgesia~~

Virk MS, Arttamangkul S, Birdsong WT, Williams JT. Buprenorphine is a weak partial agonist that inhibits opioid receptor desensitization. J Neurosci. 2009 Jun 3;29(22)

Buprenorphine is a biased agonist that promotes recovery of sensitivity by suppression of Beta-arrestin



Naloxone completely blocks Beta-arrestin

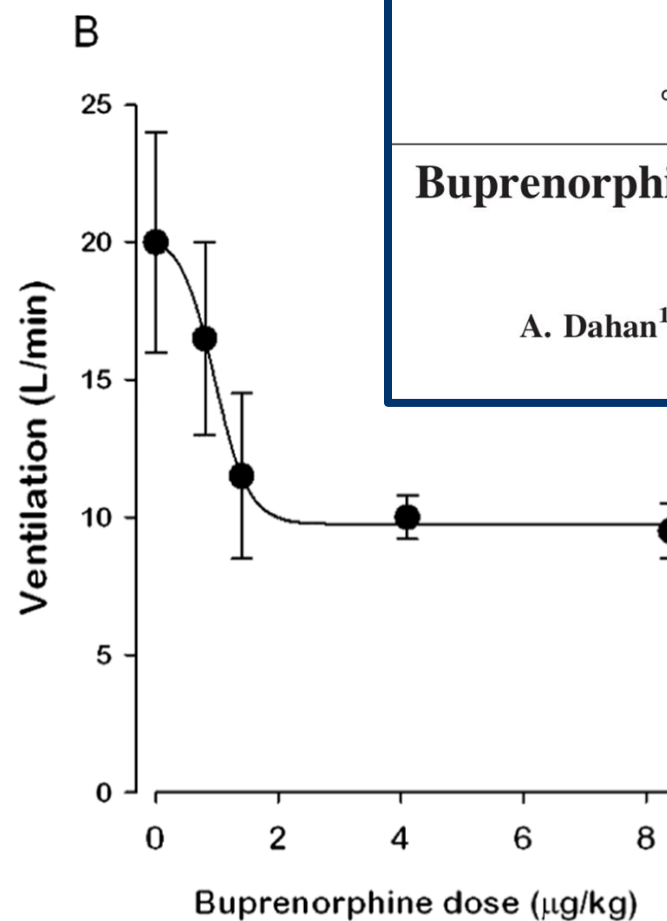
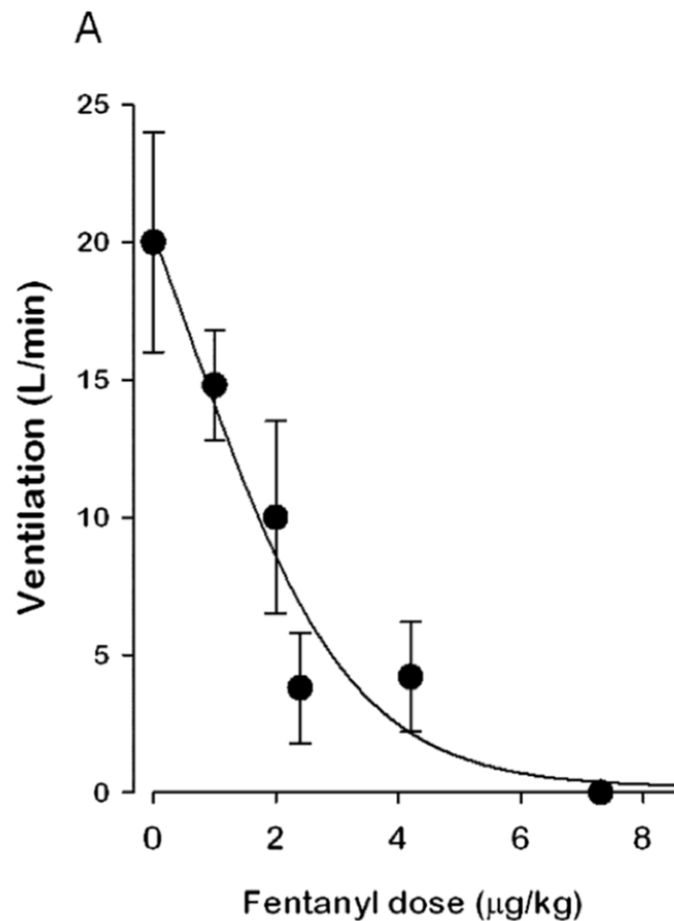


Blockade of beta arrestin activity triggers more rapid Mu receptor traffic to membrane surface

Díaz, A., et al. "Regulation of μ -opioid receptors, G-protein-coupled receptor kinases and β -arrestin 2 in the rat brain after chronic opioid receptor antagonism." *Neuroscience* 112.2 (2002): 345-353.

Bohn, Laura M., et al. " μ -Opioid receptor desensitization by β -arrestin-2 determines morphine tolerance but not dependence." *Nature* 408.6813 (2000): 720-723.

Ceiling on Respiratory Depression



British Journal of Anaesthesia **96** (5): 627–32 (2006)
doi:10.1093/bja/ael051 Advance Access publication March 17, 2006

BJA

Buprenorphine induces ceiling in respiratory depression but not in analgesia

A. Dahan^{1*}, A. Yassen², R. Romberg¹, E. Sarton¹, L. Teppema¹,
E. Olofsen¹ and M. Danhof²

High dose is safe

JAMA
Network | Open

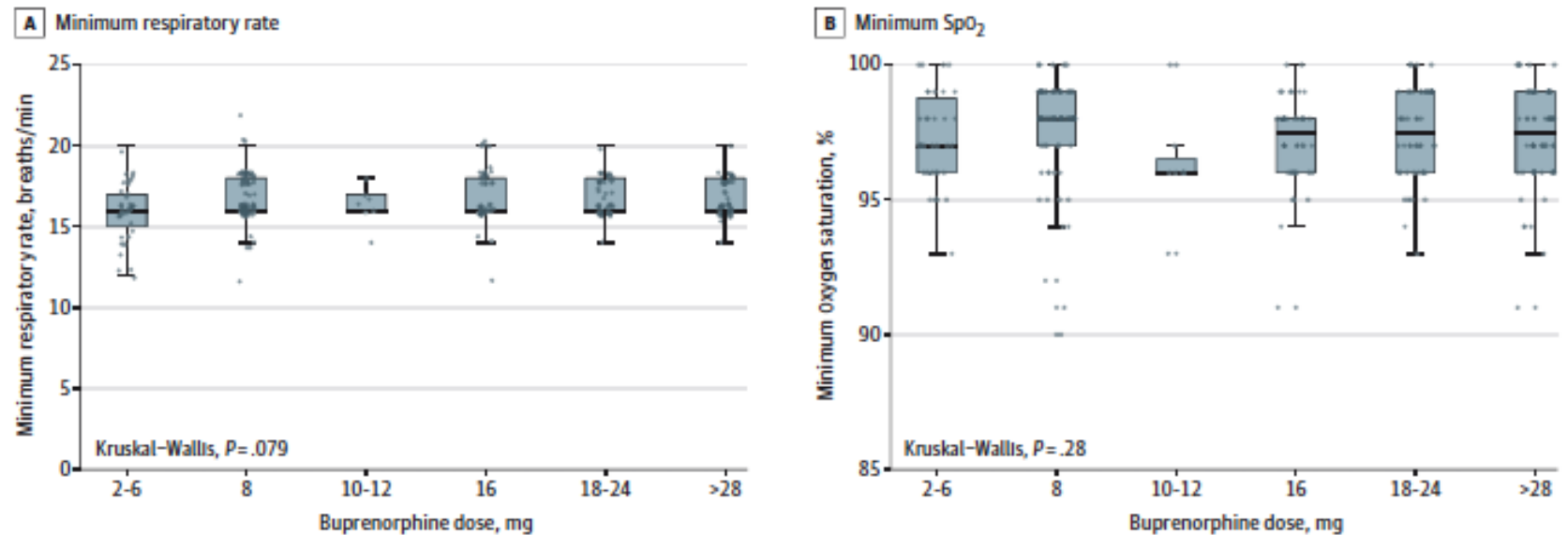


Original Investigation | Substance Use and Addiction

High-Dose Buprenorphine Induction in the Emergency Department for Treatment of Opioid Use Disorder

Andrew A. Herring, MD; Aidan A. Vosooghi, MS; Joshua Luftig, PA; Erik S. Anderson, MD; Xiwen Zhao, MS; James Dziura, PhD; Kathryn F. Hawk, MD, MHS; Ryan P. McCormack, MD, MS; Andrew Saxon, MD; Gail D'Onofrio, MD, MS

Figure 2. Minimum Respiratory Rate and Oxygen Saturation (SpO₂) Following Initial Dose by Buprenorphine Dose



Boxes correspond to 25th and 75th percentiles, with lines in boxes denoting medians. Dots denote outliers. Error bars denote 95% CIs. Kruskal-Wallis test compares distributions of respiratory rate and oxygen saturation across buprenorphine dose categories.

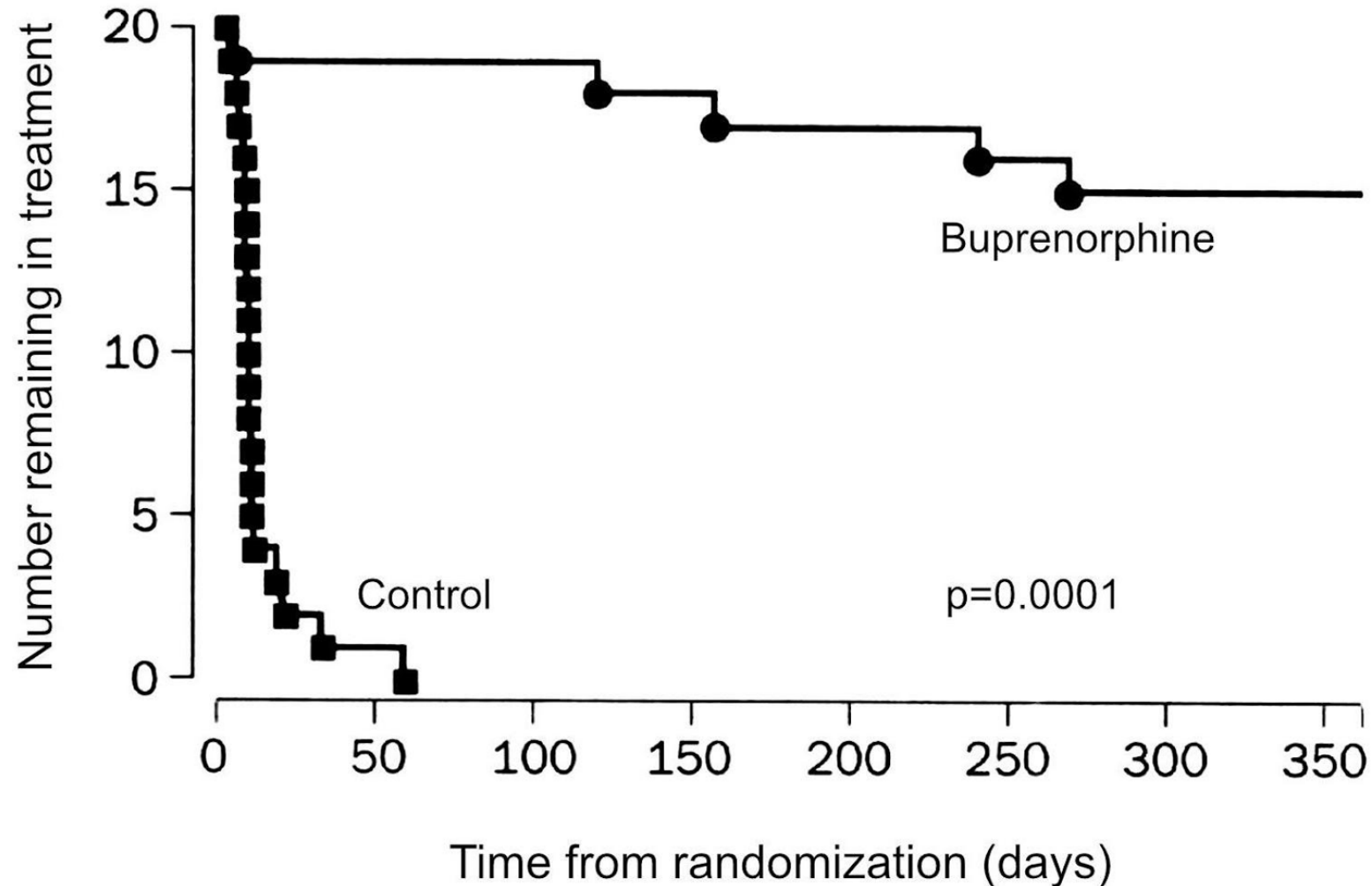
Herring, Vosooghi, and Luftig et al, 2021

NNT by Buprenorphine Dose

NNT	Buprenorphine Dose
<i>1 in 4</i>	<i>using low dose buprenorphine (2 to 6 mg)</i>
<i>1 in 3</i>	<i>using medium dose buprenorphine (7 to 16 mg)</i>
<i>1 in 2</i>	<i>using high dose buprenorphine ($\geq$ 16 mg)</i>

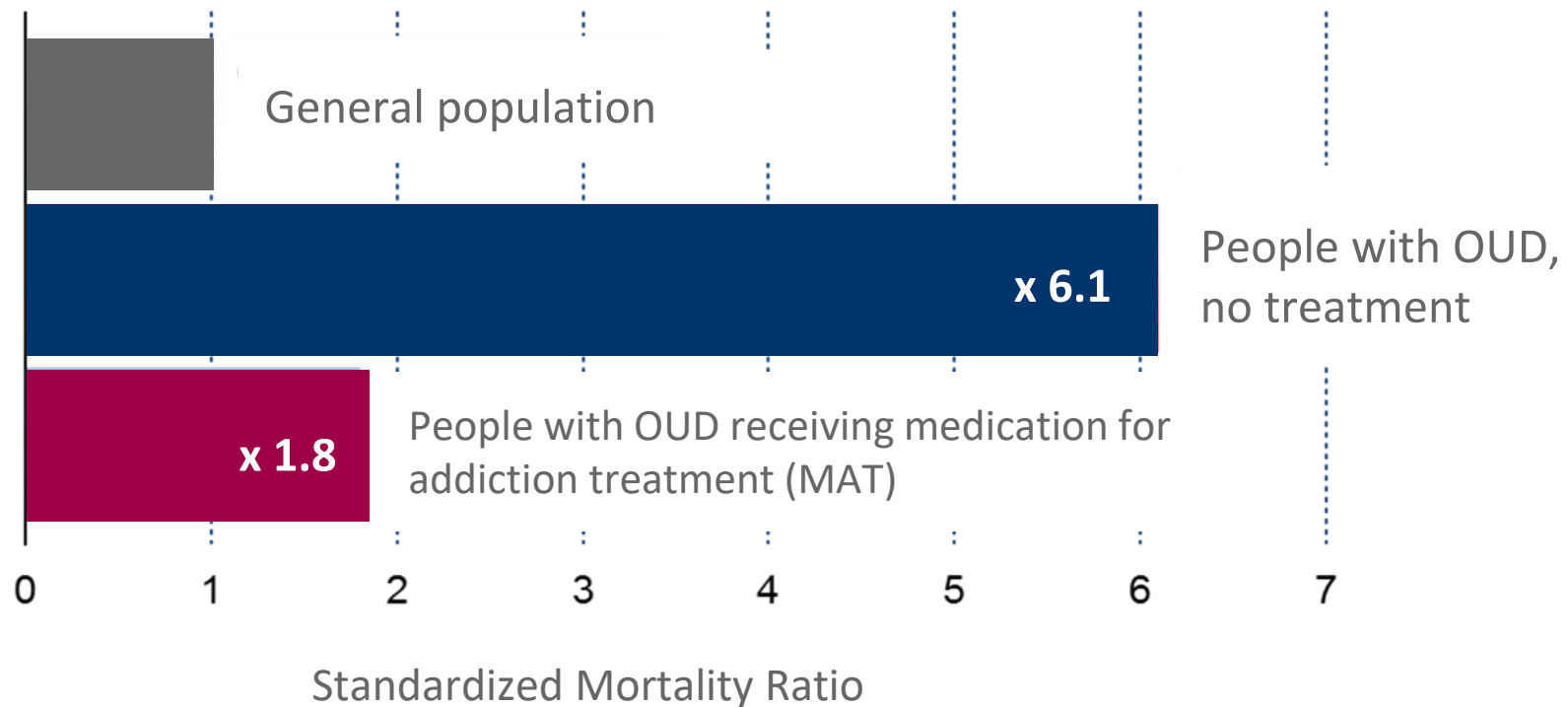
Mattick RP et al. Buprenorphine maintenance versus placebo or methadone maintenance for opioid dependence. Cochrane Database Syst Rev. 2014;(2):CD002207.

Buprenorphine Improves Retention



Buprenorphine Saves Lives

Mortality Risk Compared to the General Population

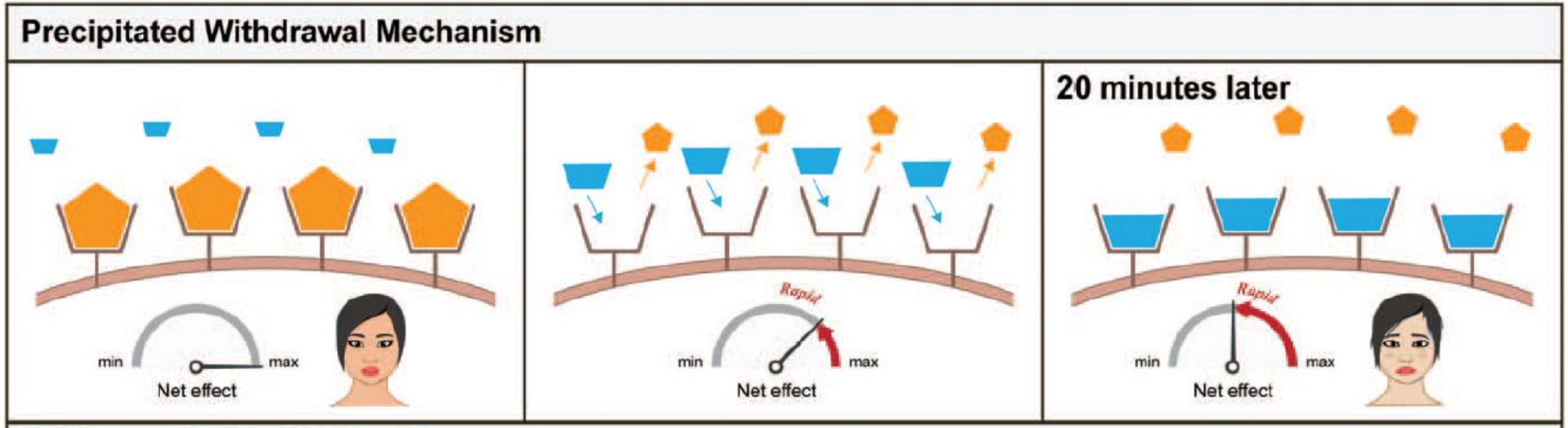


Number Needed to Treat (NNT)

Aspirin in STEMI	42 to save a life
Warfarin in Afib	25 to prevent a stroke
Steroids in COPD	10 to prevent tx failure
Defibrillation in Cardiac Arrest	2.5 to save a life
Buprenorphine in Opioid Use Disorder	2 to retain in treatment



Precipitated withdrawal



- A rough patient experience – and patients *talk* to each other!
- A rough provider experience – don't want to lose trust!

Ghosh et al, 2019

Precipitated Withdrawal is Uncommon

- 1200 patients starting buprenorphine from 28 EDs
 - most patients used fentanyl
- 9 cases of precipitated withdrawal (0.76% of participants)
- Treated precipitated withdrawal until symptoms resolved
- 86% attended follow-up MAT clinic appointment within 7 days

Incidence of Precipitated Withdrawal During a Multi-site Emergency Department-Initiated Buprenorphine Clinical Trial in the Era of Fentanyl

Gail D'Onofrio, MD, MS^{1,2,3}; Kathryn F. Hawk, MD, MHS^{1,3}; Jeanmarie Perrone, MD⁴ ; [et al](#)

JAMA Netw Open

Published Online: March 30, 2023

2023;6;(3):e236108. doi:10.1001/jamanet-workopen.2023.6108

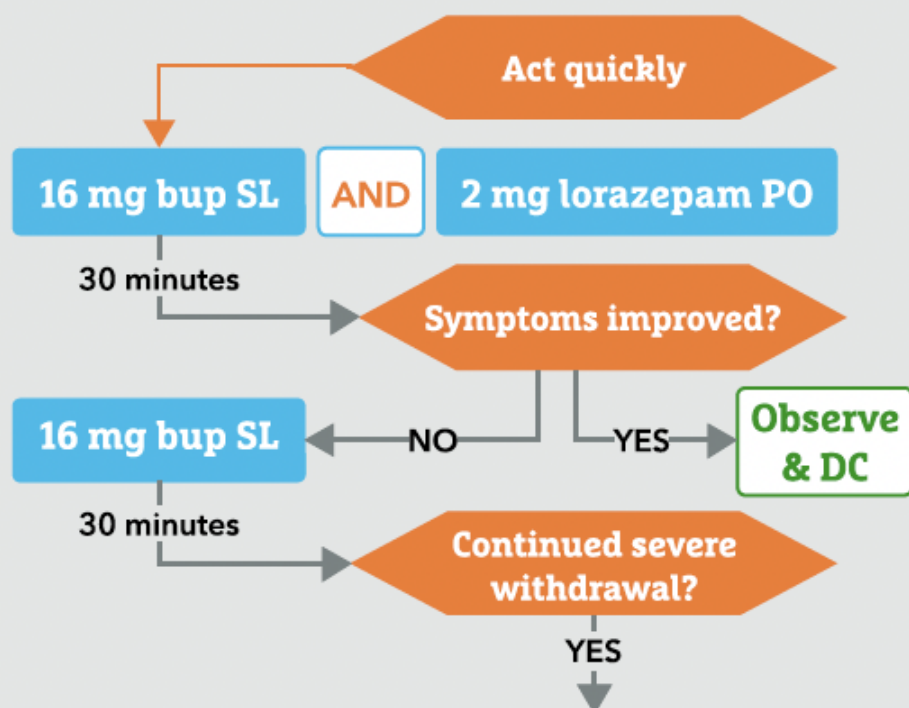
If you *do* precipitate withdrawal

Keep calm and give bup

If You Do Precipitate Withdrawal

Treatment of bup precipitated withdrawal

(Sudden, significant worsening of withdrawal soon after bup administration.)



Adjuvants:

OK but should not delay or replace bup. Use sparingly with appropriate caution.

Benzodiazepines:

- Lorazepam 2 mg PO/IV

Antipsychotics:

- Olanzapine 5 mg PO/IM

Alpha-agonists:

- Clonidine 0.1-0.3 mg PO

D2/D3 agonists:

- Pramipexole 0.25 mg PO

Gabapentinoids:

- Pregabalin 150 mg PO

Give 16+ mg more bup.

Add a benzo.

Use adjuvant therapy.

Escalate level of care to manage potential moderate to deep sedation including cardiac, pulse oximetry, and end tidal CO2 monitoring:

1. Ketamine (0.3 mg/kg IV slow push q 15 minutes and/or infusion).
2. Fentanyl 200 mcg IV q10 minutes. Total dose of > 2000 mcg has been reported.

Common Misconceptions

"Patients should be referred to counseling before starting treatment."

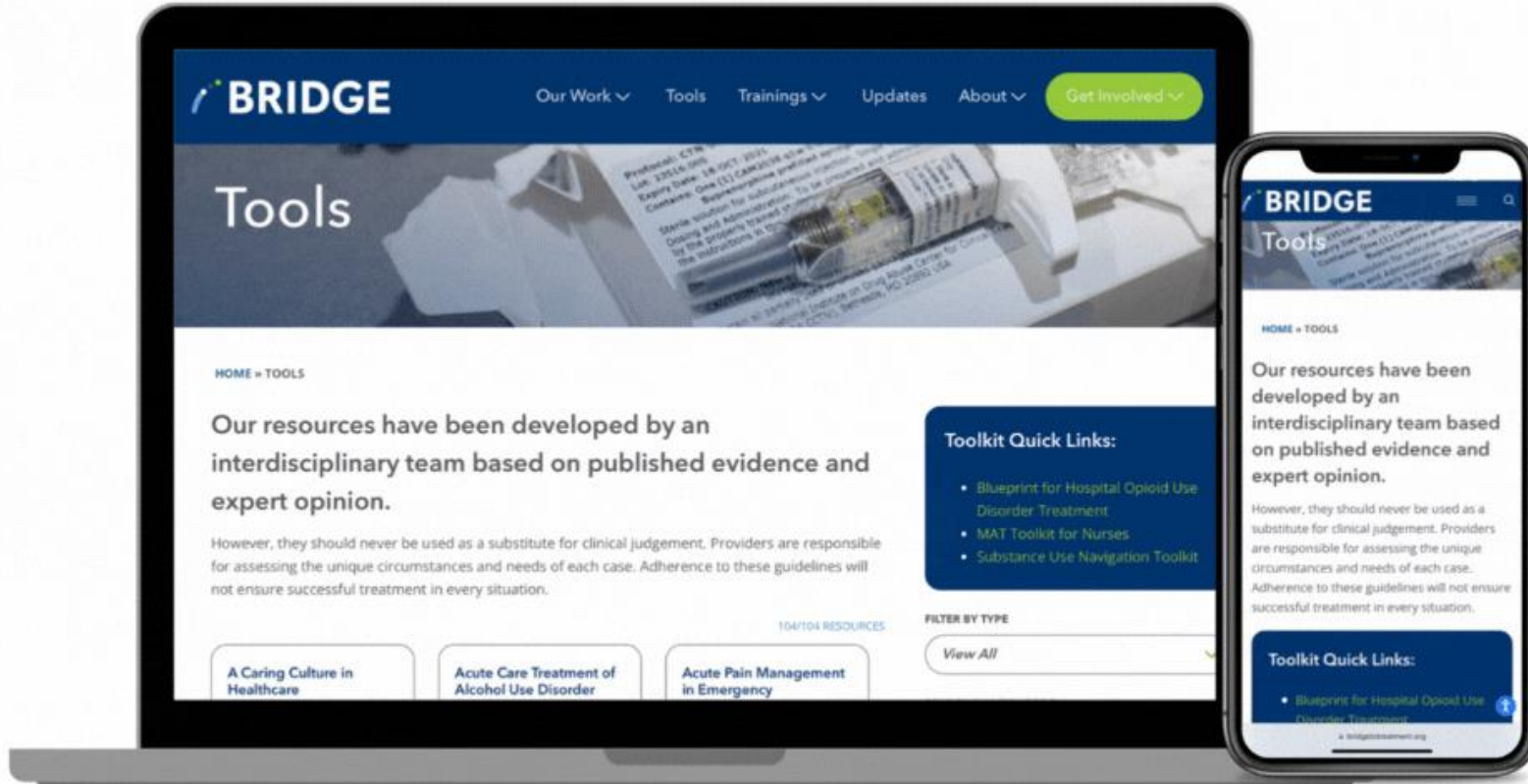
"Starting someone on buprenorphine is just trading one addiction for another."

"Starting Bup in the ED takes too long."

"Other patients deserve higher priority."

**Referral is not an adequate
crisis response.**

Resources



Summary

1. OUD is an emergency and EMS has a crucial part to play in reducing overdose deaths.
2. There is evidence that prehospital bup initiation increases retention in treatment for at least 30 days, which has the potential to save lives and reduce overdose call volume.
3. With proper training, increased scene time is minimal, bup is cheap to stock and safe to give, and the benefits of EMS MOUD outweigh the risks and challenges of administration

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