One Drug to Rule Them All: Phenobarbital in Alcohol Withdrawal

UTAH SOCIETY OF
HEALTH-SYSTEM PHARMACISTS

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Disclosures

- Relevant Financial Conflicts of Interest
  - **CE Presenter, Presley Whetman, PharmD**
    - None
  - **CE Mentor, Brianne Wolfe, PharmD, BCPS, BCCCP**
    - None
- Off-Label Uses of Medications
  - Phenobarbital for alcohol withdrawl

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Pharmacist Learning Objectives

- Assess a patient's overall withdrawal risk using PAWSS
- Differentiate BAWS assessment from CIWA-Ar assessment
- Recognize possible contraindications to the use of phenobarbital
- Construct a patient-specific dosing regimen for phenobarbital in alcohol withdrawal

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Technician Learning Objectives

- Identify medications that can interact with phenobarbital on a patient's medication list
- Recognize appropriate dosage forms of phenobarbital
- Apply appropriate storage of phenobarbital formulations

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Abbreviations

- ABW – Actual body weight
- AUD – Alcohol use disorder
- AWD – Alcohol withdrawal delirium
- AWS – Alcohol withdrawal order
- BAWS – Brief Alcohol Withdrawal Scale
- BP – Blood Pressure
- BZD – Benzodiazepine
- CIWA-Ar - Clinical Institute Withdrawal Assessment for Alcohol
- DT – Delirium tremens
- ED – Emergency department
- GABA - Gamma-aminobutyric acid
- HR – Heart rate
- IBW – Ideal body weight
- ICU – Intensive care unit
- IV – Intravenous
- NMDA - N-methyl-D-aspartate
- PAWSS – Prediction of Alcohol Withdrawal Severity Scale
- PO – By mouth
- PRN – As needed
- RR – Respiratory rate
- SEWS – Severity of Ethanol Withdrawal Symptoms Score
- yo – years old

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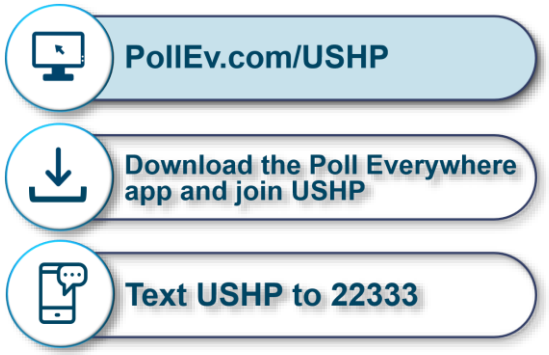
Audience Response Question

Respond at **PollEv.com/ushp**

Text **USHP** to **22333** once to join, then **A, B, or C**

When treating AWS, what is your current practice most aligned with?

Benzodiazepine regimen	**A**
Phenobarbital regimen	**B**
Mixed regimen	**C**



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Alcohol Use Disorder

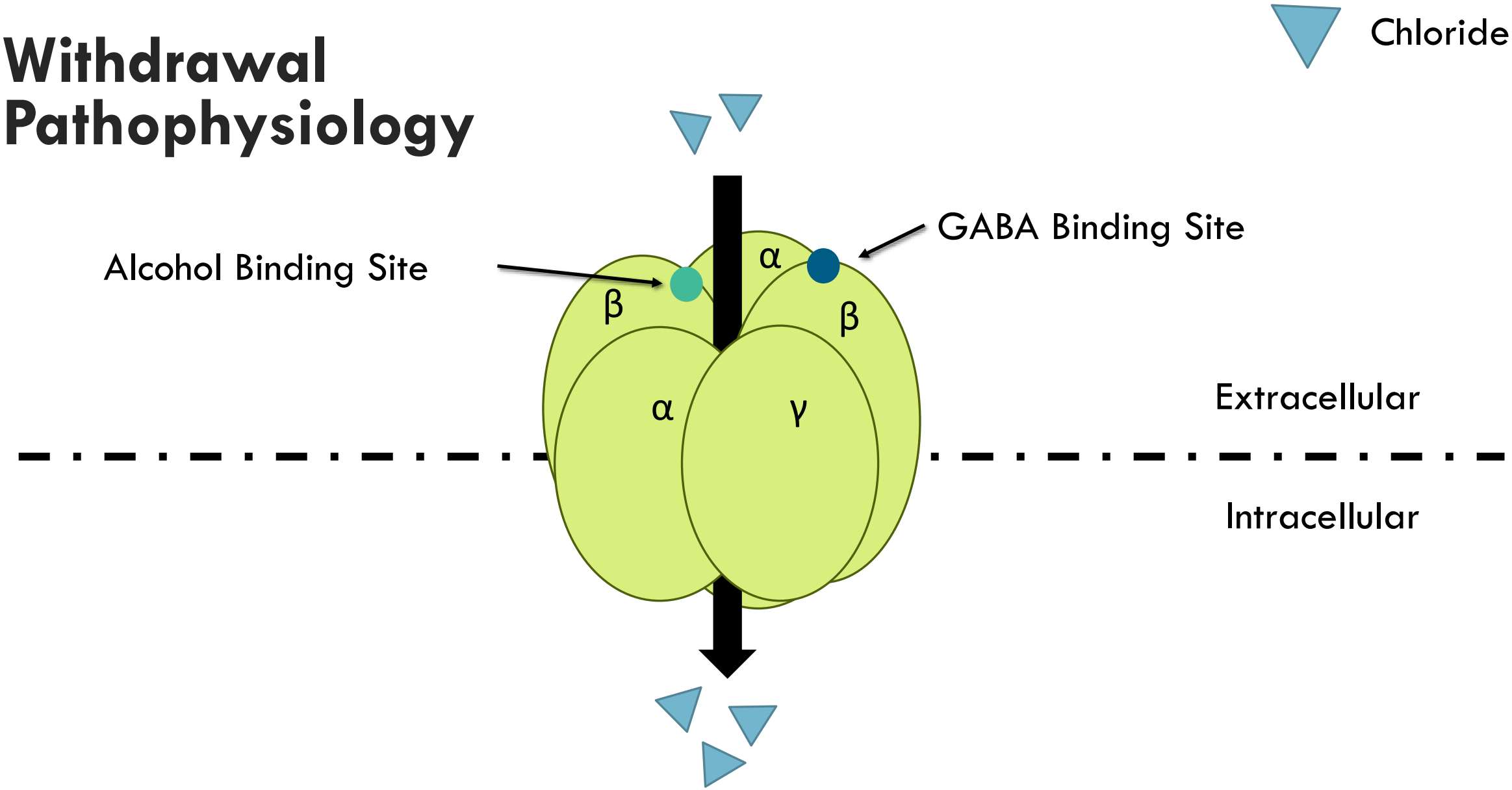
Heavy or frequent alcohol drinking causing problems, emotional distress or physical harm

Alcohol Withdrawal Syndrome

Imbalance in neurotransmitters in the brain caused by chronic consumption of alcohol

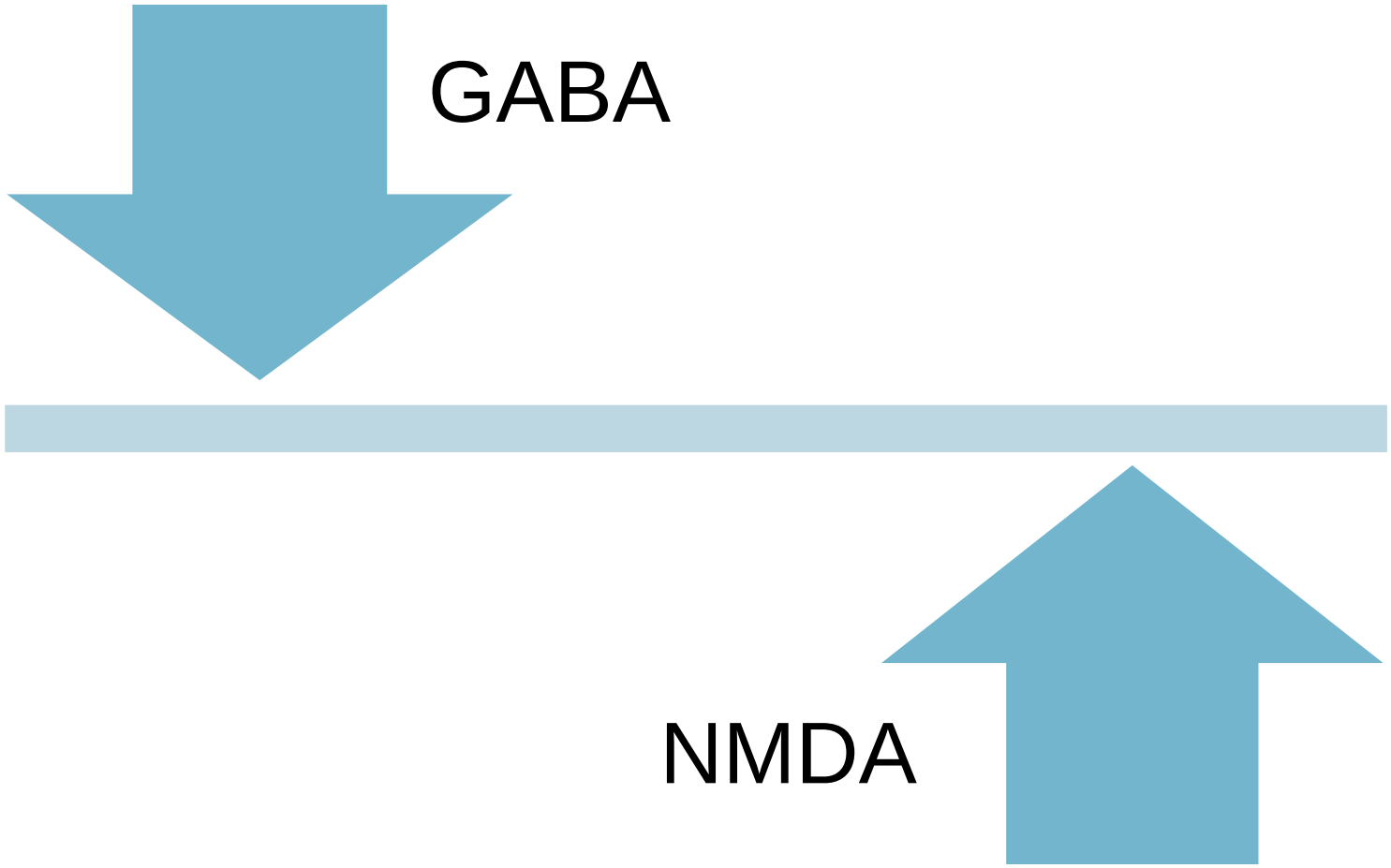
Banerjee N. Neurotransmitters in alcoholism: A review of neurobiological and genetic studies. *Indian J Hum Genet*. 2014;20(1):20-31.

Withdrawal Pathophysiology



Davies M. The role of GABAA receptors in mediating the effects of alcohol in the central nervous system. J Psychiatry Neurosci. 2003;28(4):263-274.

Pathophysiology Continued



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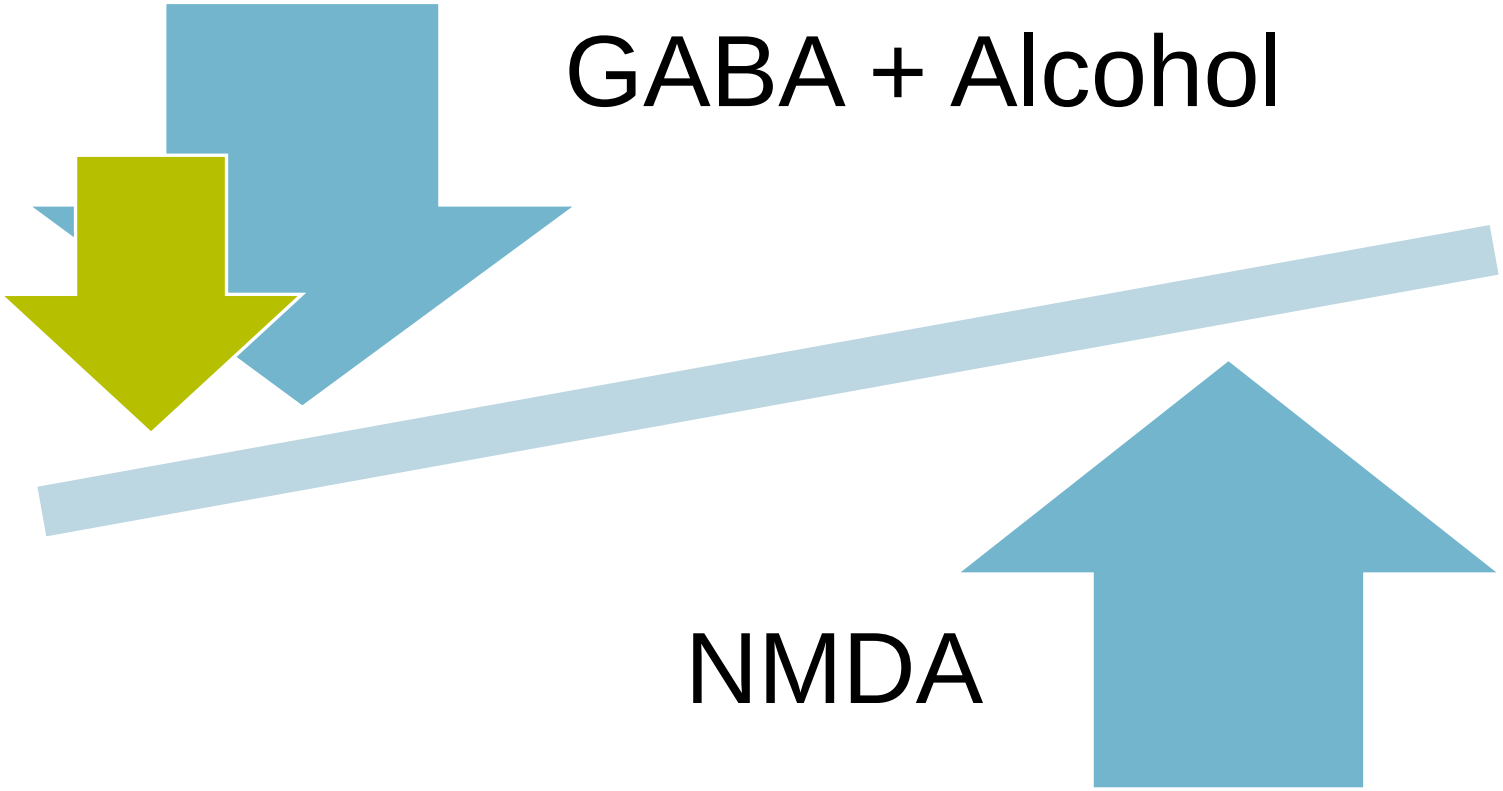

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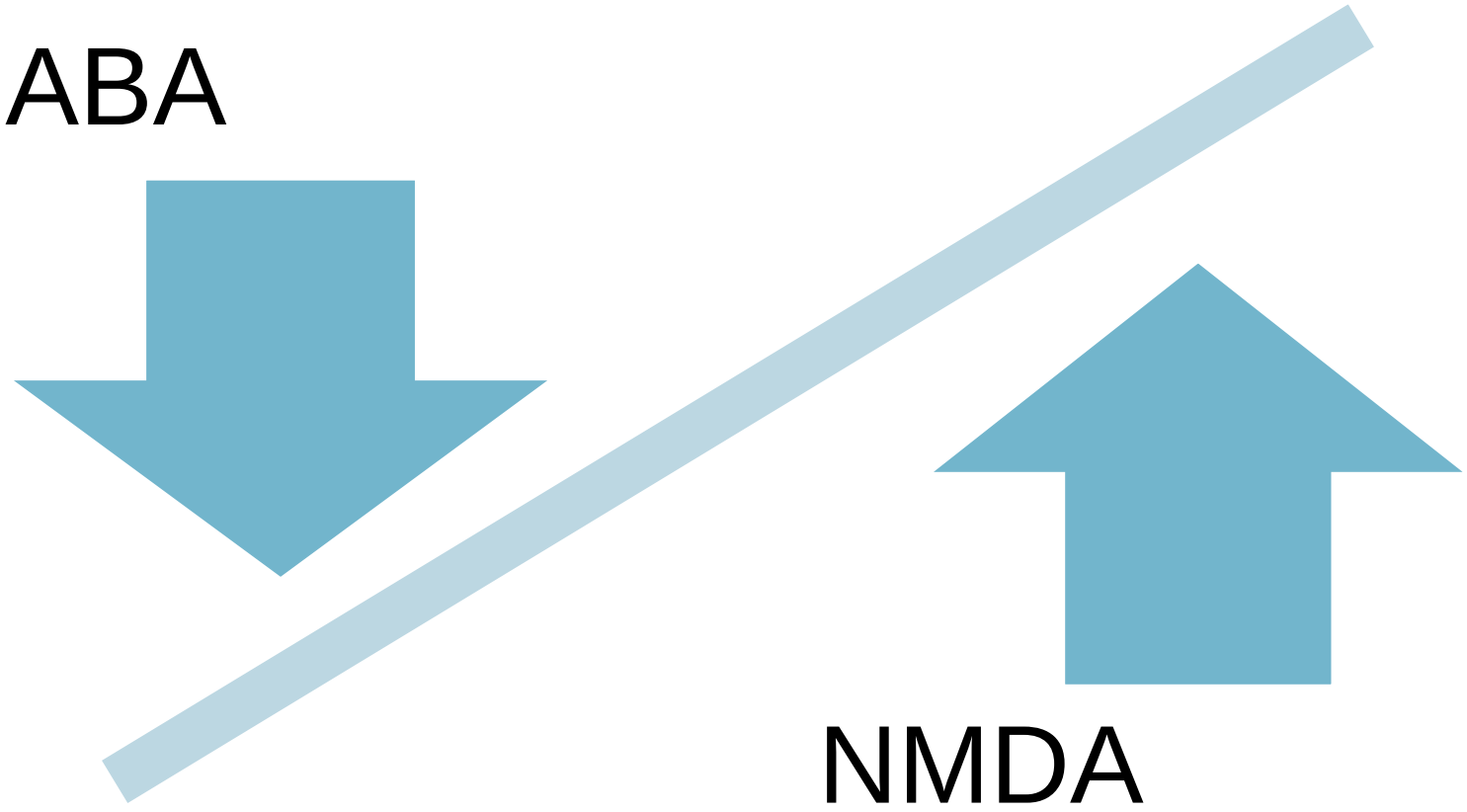
Pathophysiology Continued



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Davies M. The role of GABAA receptors in mediating the effects of alcohol in the central nervous system. J Psychiatry Neurosci. 2003;28(4):263-274.

Onset of Symptoms

Stage 1
1-8 hours

- Headache
- Insomnia
- Anxiety
- Hand tremor
- Gastrointestinal upset
- Heart palpitations

Stage 2
24-72 hours

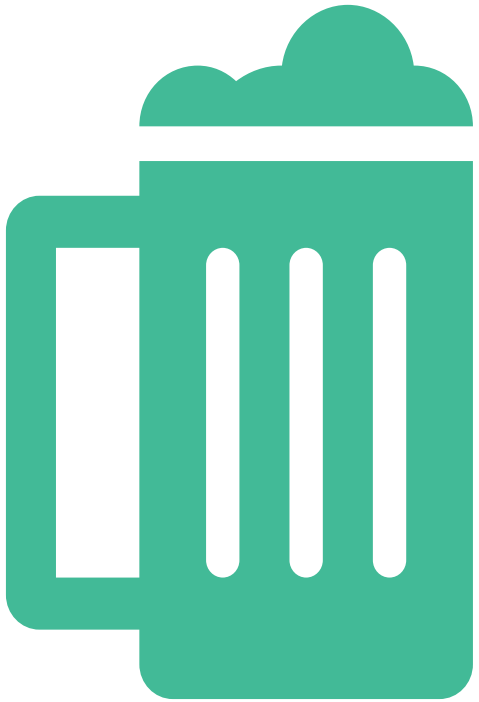
- Increased blood pressure
- Increased heart rate
- Confusion
- Mild hyperthermia
- Rapid abnormal breathing

Stage 3
1 week

- Tactile, visual or auditory hallucinations
- Seizures
- Disorientation
- Impaired attention

Kelley R, January 7 NLU, 2022. Alcohol Withdrawal: Symptoms, Timeline & Detox Process. American Addiction Centers. Accessed February 13, 2022.

Risk Factors



- Early alcohol use
- Family history
- Genetics
- Parental factors

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Patient Case

AA is a 35-year-old male with a history of alcohol withdrawal (started when 13 yo) who presents to ED for alcohol intoxication, headache and nausea. He is extremely agitated and states that he drank about 1/5 of vodka and a 6 pack of beer sometime in the last 24 hours. He was admitted to the hospital earlier this year for AWS complicated by a severe metabolic acidosis and seizure. Denies any other substance abuse. He denies visual/auditory hallucinations.

BP: 157/103

HR: 132

RR: 25

Temperature: 37 C

ETOH: 302 mg/dL

ABW 100 kg

IBW 73 kg

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Audience Response Question

Respond at **PollEv.com/ushp**

Text **USHP** to **22333** once to join, then **A, B, or C**

What stage of withdrawal is AA in based on is presenting symptoms?

Stage 1	**A**
Stage 2	**B**
Stage 3	**C**

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Assessment Tools

Prediction of Alcohol Withdrawal Severity Scale (PAWSS)

- Tool to identify patients at risk for developing complicated alcohol withdrawal

PAWSS Scoring Calculation

Alcohol within the last 30 days?

Intoxication within the last 30 days?

Ever experienced AWS? Withdrawal seizures? Delirium tremens? Blackouts?

Attended alcohol treatment program?

Ever combined with sedating medications? Other substances of abuse?

Positive blood alcohol level upon admission?

Evidence of autonomic activity?

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PAWSS Scoring Calculation

Average Risk Score:

- Answered yes on 0-3 questions

High Risk Score:

- Answered yes on 4-10 questions

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Patient Case

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What is AA's PAWSS score?

3	**A**
5	**B**
10	**C**

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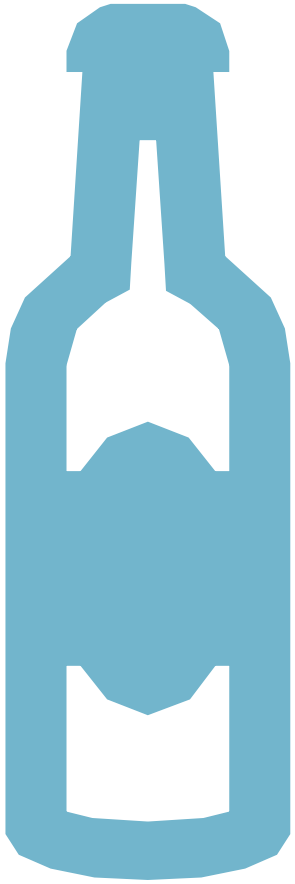
Other Assessment Tools



Clinical Institute Withdrawal Assessment for Alcohol (CIWA-Ar)

- Originally published 1981
- Developed to assess the severity of alcohol withdrawal
- Aimed at evaluating all patients suspected of being at risk to have alcohol withdrawal

Nausea? Tremor? Paroxysmal sweats? Anxiety? Agitation? Headache? Tactile disturbances? Auditory? Visual?

- Not Present - Extremely Severe (0-7)

Oriented?

- Oriented - Disoriented (0-4)

CIWA-Ar Scoring Calculation

Brief Alcohol Withdrawal Scale (BAWS)

Symptom	0	1	2	3
Tremor	None	Felt, not visible	With arms extended	At rest
Diaphoresis	None	Visible	Beads of sweat	Drenched
Agitation	Calm	Anxious	Agitated	Violent
Confusion	Oriented	Disoriented to time	Disoriented to time and place	Disoriented
Hallucinations	None	Vague	More defined	Severe

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Rastegar DA, Applewhite D, Alvanzo AAH, Welsh C, Niessen T, Chen ES. Development and implementation of an alcohol withdrawal protocol using a 5-item scale, the Brief Alcohol Withdrawal Scale (BAWS). Subst Abus. 2017;38(4):394-400.

Which one is best?

CIWA-Ar

+

Familiarity

−

Subjective

Difficult to apply in ICU

Many confounding variables

BAWS

+

Can convert CIWA-Ar to BAWS scores

Sensitivity 85%

Specificity 66%

Less Benzo use

−

Lack of familiarity

Treatment

Treatment

Phenobarbital

vs

Benzodiazepines

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Benzodiazepines

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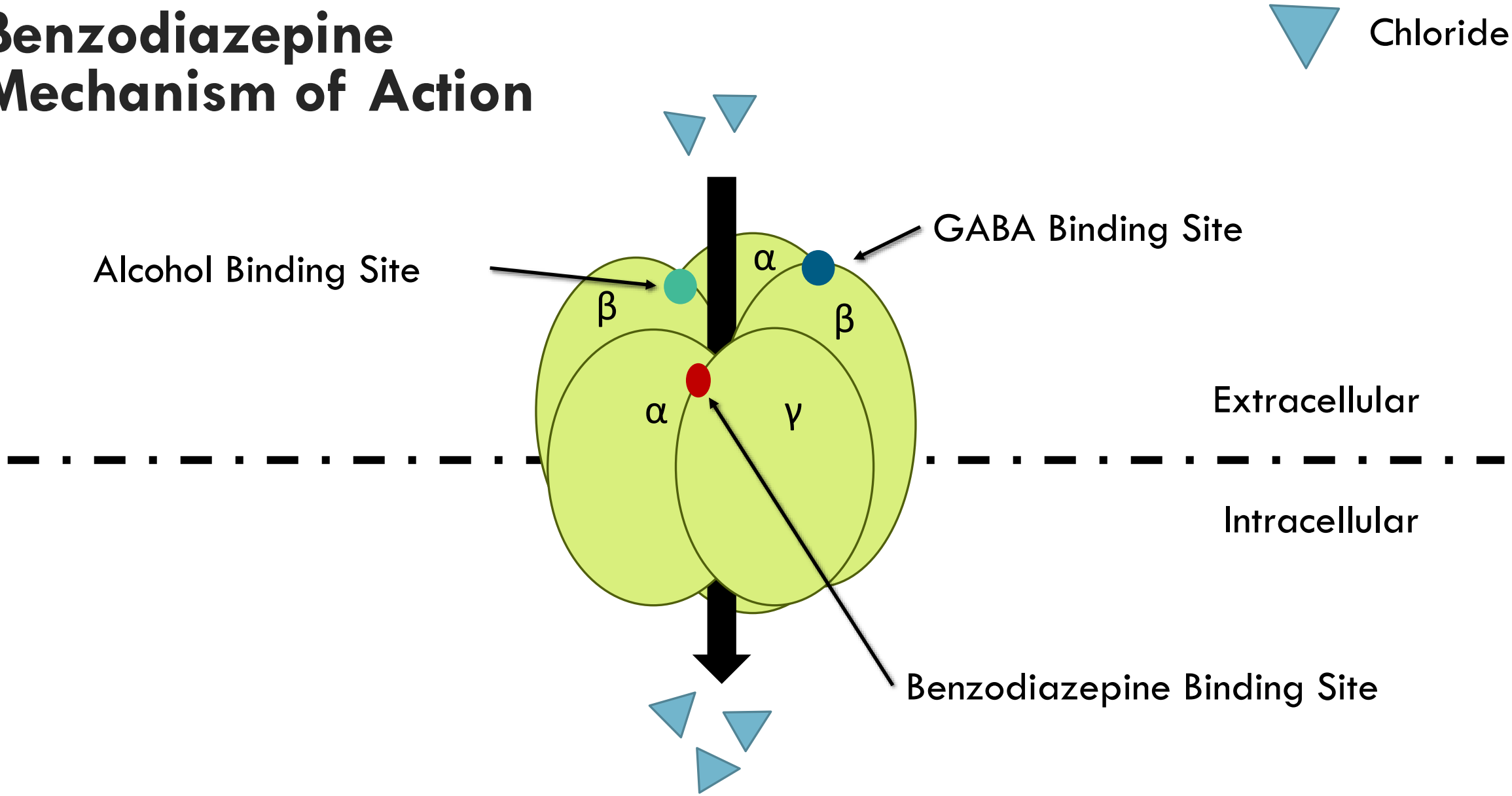
Benzodiazepine Mechanism of Action



Benzodiazepine Dosing

Benzodiazepine	Route	Dose	Onset	Half-life
Chlordiazepoxide	PO	• 25-100 mg PRN • 50 mg every 6 hours for 1 day, then 25 mg every 6 hours for 2 days	30 minutes - 2 hours	24-48 hours
Diazepam	IV PO	• 5-20 mg PRN • 10 mg every 6 hours for 1 day, then 5 mg every 6 hours for 2 days	IV: 10 minutes PO: 1 hours	33-48 hours
Lorazepam	IV PO	• 2-4 mg PRN • 6-8 mg/day then 4-day taper	IV: 10 minutes PO: 2 hours	12-14 hours

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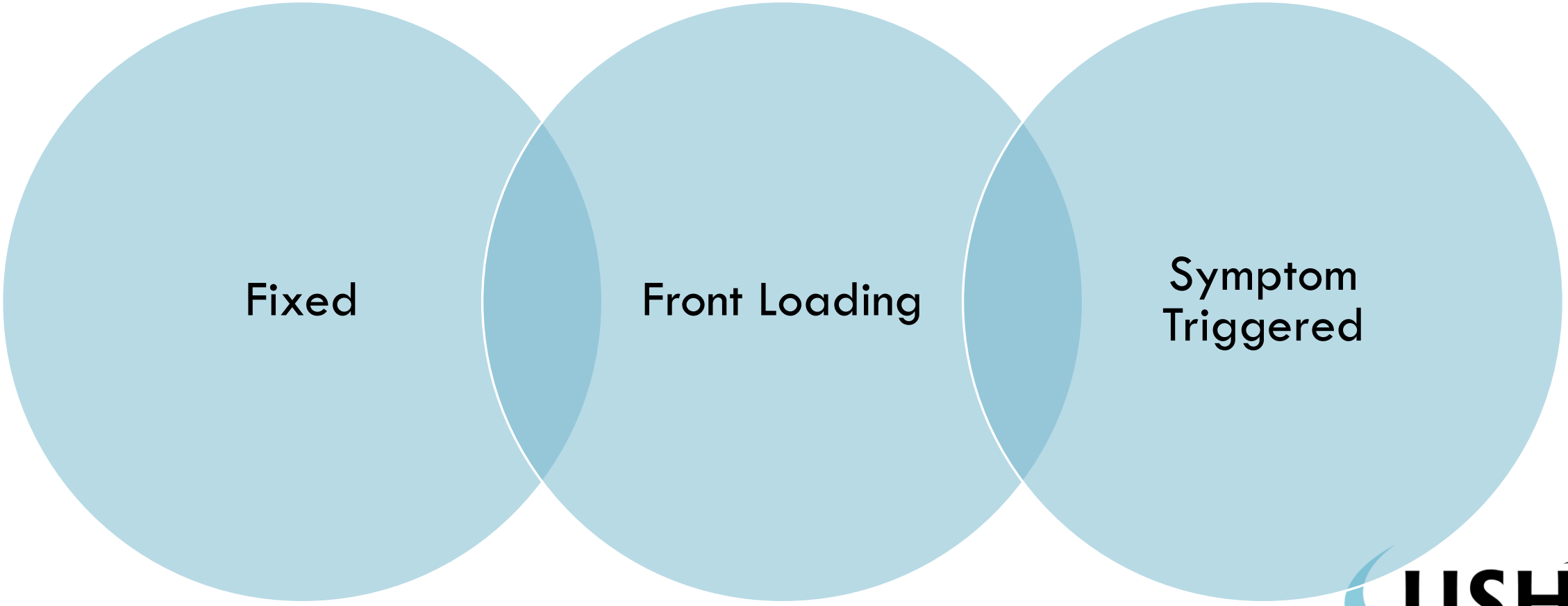
Chlordiazepoxide, Diazepam, Lorazepam – Lexicomp.

Benzodiazepine Dosing Strategies



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Management of moderate and severe alcohol withdrawal syndromes - UpToDate.

Dosing Considerations

- Pregnancy
  - Short acting benzodiazepine
  - Dose reduced benzodiazepine preferred
- Renal
  - Short acting benzodiazepine
- Hepatic
  - Short acting benzodiazepine
  - Dose reduced benzodiazepine preferred

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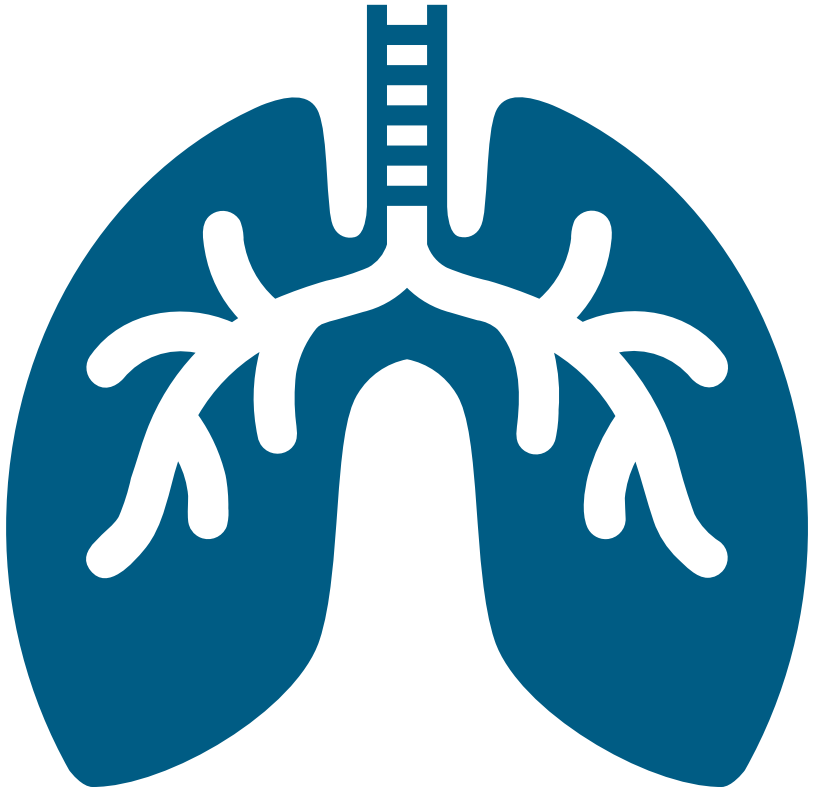
Chlordiazepoxide, Diazepam, Lorazepam – Lexicomp.

Monitoring

- Respiratory depression
- Hypotension
- Paradoxical reactions
- Anteretrograde amnesia
- Nausea/vomiting



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Benefits

- Clinical standard of care
- Improves discomfort associated with acute withdrawal
- Decreases risk of progression to:
  - Seizures
  - Delirium

Challenges

- Patients with chronic heavy alcohol use can develop cross-tolerance
- Increased risk of rebound withdrawal symptoms
- Increased risk of post-treatment drinking
- Other Risks:
  - Respiratory depression
  - Encephalopathy
  - Agitation in medically hospitalized patients

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Phenobarbital

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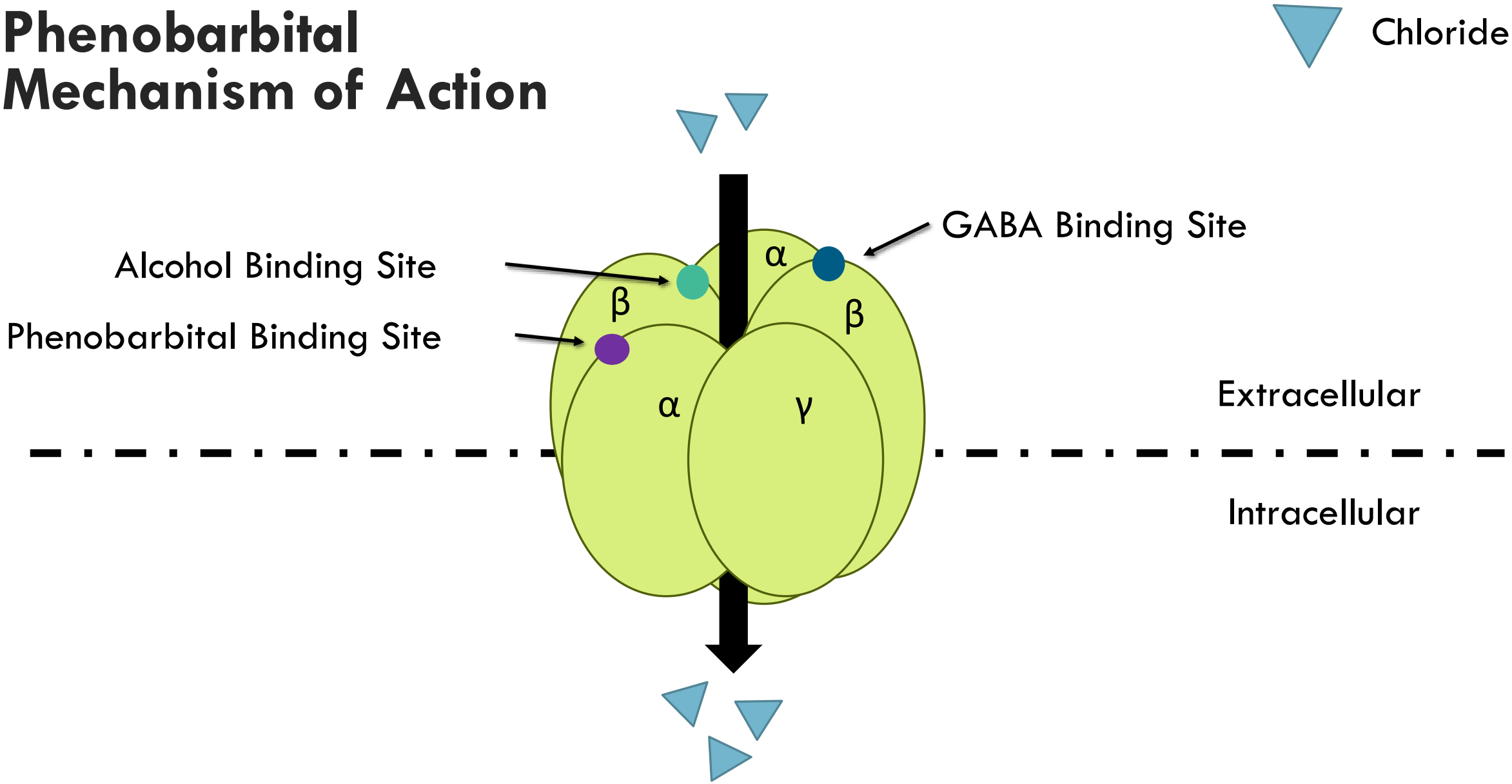
Phenobarbital Mechanism of Action



Phenobarbital Pharmacokinetics

Onset
- IV = 60 min
- PO = 5 min

Volume of Distribution
- 0.61 L/kg

Metabolism
- CYP2C9, 2C19, 2E1

Half-life
- 79 hours

Excretion
- Urine

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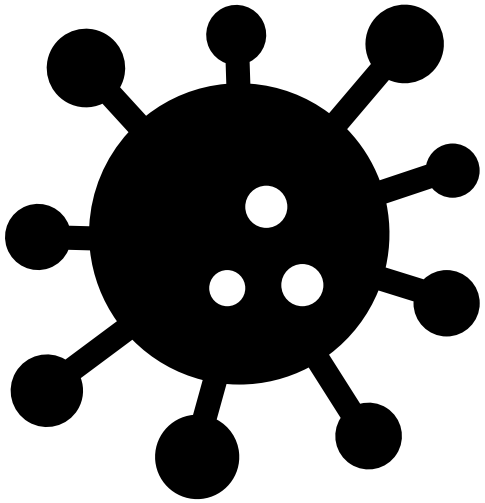
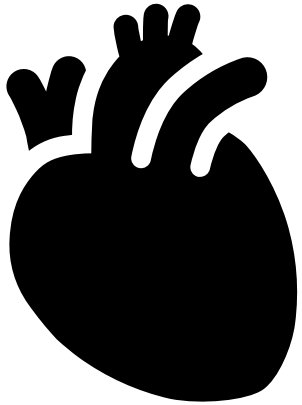
Phenobarbital – Lexicomp.





Phenobarbital Interactions **

- Aripiprazole
- Quetiapine
- Risperidone
- Ticagrelor
- Nifedipine
- Azole Antifungals
- Antiretrovirals

**not all inclusive

Storage of Compounded Dose

Oral

- Store between 20°C and 25°C (68°F and 77°F)
- Protect from light

Injection

- Store between 20°C and 25°C (68°F and 77°F)

Monitoring

- Respiratory depression
- Hypotension
- Drowsiness
- Nausea/vomiting
- Risk of necrosis if extravasation occurs
- Rash

Phenobarbital – Lexicomp.

Contraindications for Use

- Hypersensitivity reactions to phenobarbital
- Marked hepatic impairment:
  - Caution in patients with hepatic impairment
  - Avoid use in patients with hepatic encephalopathy
- Dyspnea or airway obstruction
- Porphyria
- Pregnancy

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Benefits and Challenges

- Benefits:
  - Long half life
  - Not a narrow therapeutic index drug
  - Levels are available

- Challenges:
  - Risk of respiratory depression
  - Not the clinical standard of care

Indication	Phenobarbital Level	Toxicity Severity
Seizures	10-40	N/A
Toxicity	> 50	Mild
Alcohol Withdrawal	> 65	Severe

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Management of moderate and severe alcohol withdrawal syndromes - UpToDate.

Audience Response Question

Respond at **PollEv.com/ushp**

Text **USHP** to **22333** once to join, then **A or B**

Based on patient characteristics, what agents are you most comfortable using for AA?

Benzodiazepines	**A**
Phenobarbital	**B**

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Patient Case

Your ED physician is interested in starting phenobarbital for AA. After her interview, she hands you a list of his current medications

Folic acid 1 mg once daily

Thiamine 100 mg once daily

Quetiapine 100 mg once nightly

Bupropion 100 mg once daily

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Audience Response Question

Respond at **PollEv.com/ushp**

Text **USHP** to **22333** once to join, then **A, B, C, or D**

What medications on AA's home list are you concerned about?

bupropion	**A**
quetiapine	**B**
folic acid	**C**
thiamine	**D**

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Evidence

Summary of Evidence

ED

Acute Care

ICU

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Safety and Efficacy in the ED

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Benzodiazepines vs barbiturates for alcohol withdrawal: Analysis of 3 different treatment protocols

Nelson et al. 2019

Study Design

- Retrospective observational cohort study

Population

- ED patients

Intervention

- Phenobarbital protocol
- Lorazepam + phenobarbital protocol

Comparator

- Diazepam protocol

Outcome

- No difference in:
  - Rate of mechanical ventilation
  - Rate of ICU admission from the ED

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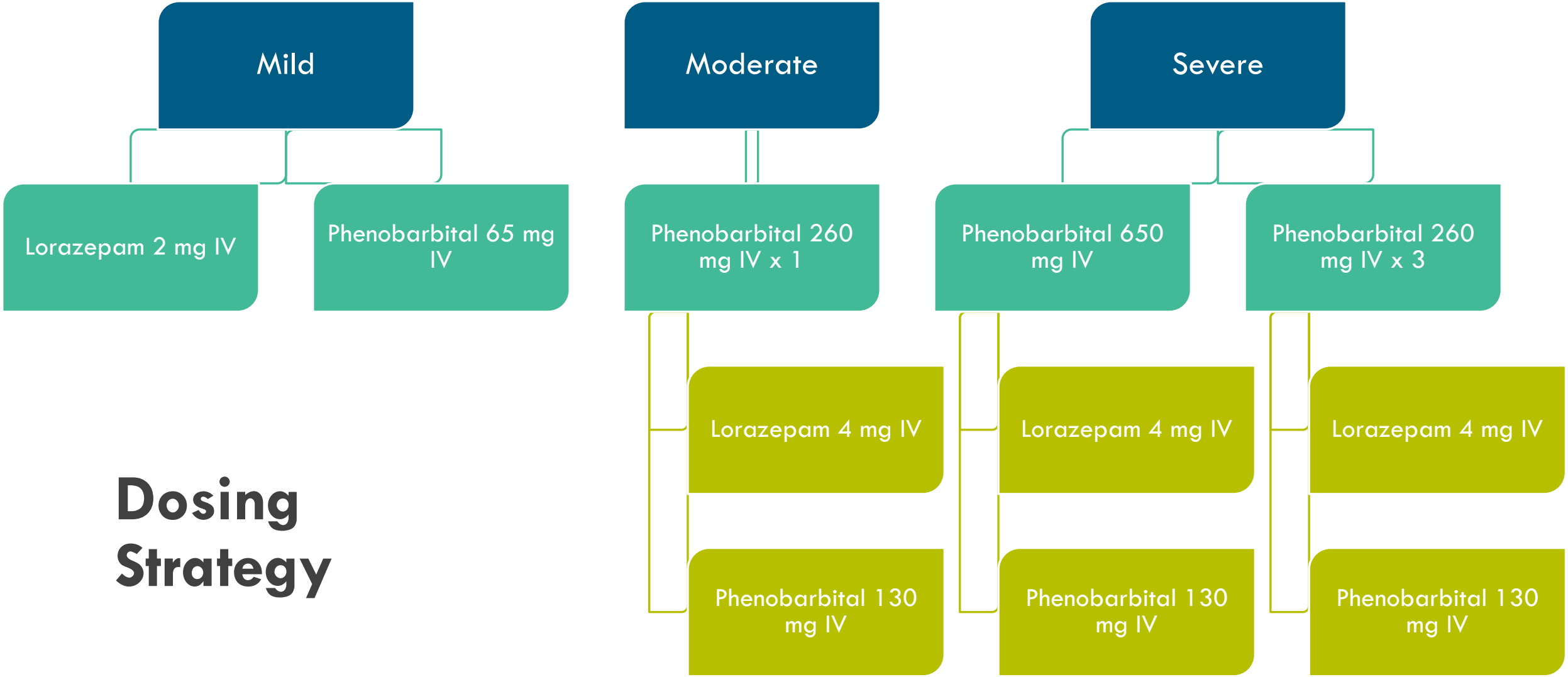
Nelson AC et al. Benzodiazepines vs barbiturates for alcohol withdrawal: Analysis of 3 different treatment protocols. Am J Emerg Med. 2019;37(4):733-736.

Severity of Withdrawal



Dosing Strategy

Nelson AC. Benzodiazepines vs barbiturates for alcohol withdrawal: Analysis of 3 different treatment protocols. Am J Emerg Med. 2019;37(4):733-736.

Phenobarbital For Acute Alcohol Withdrawal: A Prospective Randomized Double-blind Placebo-controlled Study

Rosenson et al. 2013

Study Design

- Prospective, randomized, double-blind, placebo-controlled study

Population

- ED patients

Intervention

- Phenobarbital protocol + symptom triggered lorazepam
  - Phenobarbital 10 mg/kg IV

Comparator

- Placebo

Outcome

- Fewer ICU admissions
- No difference in:
  - Adverse events

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Summary of Evidence

ED

Study	Nelson et al. 2019	Rosenson et al. 2013
Dosing Strategy	Alcohol withdrawal severity based	10 mg/kg IV x 1 + symptom triggered lorazepam
Outcome	No difference in: • Rate of mechanical ventilation • ICU admission from the ED	• Decreased ICU admissions • No difference in adverse events
Is phenobarbital safe and effective?	Yes	Yes

Safety and Efficacy in Acute Care

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Use of Phenobarbital in Alcohol Withdrawal Management: A Retrospective Comparison
Study of Phenobarbital and Benzodiazepines for Acute Alcohol Withdrawal Management in General Medical Patients

Nisavic et al. 2019

Study Design

- Retrospective cohort study

Population

- General medicine patients

Intervention

- Phenobarbital protocol

Comparator

- Fixed dose benzodiazepine protocol

Outcome

- Similar outcomes:
  - Development of AWS-related complications
  - Hospital length of stay
  - ICU admission rates/length of stay
  - Adverse events
  - Discharge against medical advice

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Phenobarbital for Acute Alcohol Withdrawal Management in Surgical Trauma Patients—A Retrospective Comparison Study

Nejad et al. 2020

Study Design

- Retrospective cohort study

Population

- Surgical Trauma Patients on all floors (ED to ICU)

Intervention

- Phenobarbital protocol

Comparator

- Fixed dose benzodiazepine protocol

Outcome

- Less alcohol withdrawal delirium
- Less alcohol withdrawal syndrome
- Less adverse side effects

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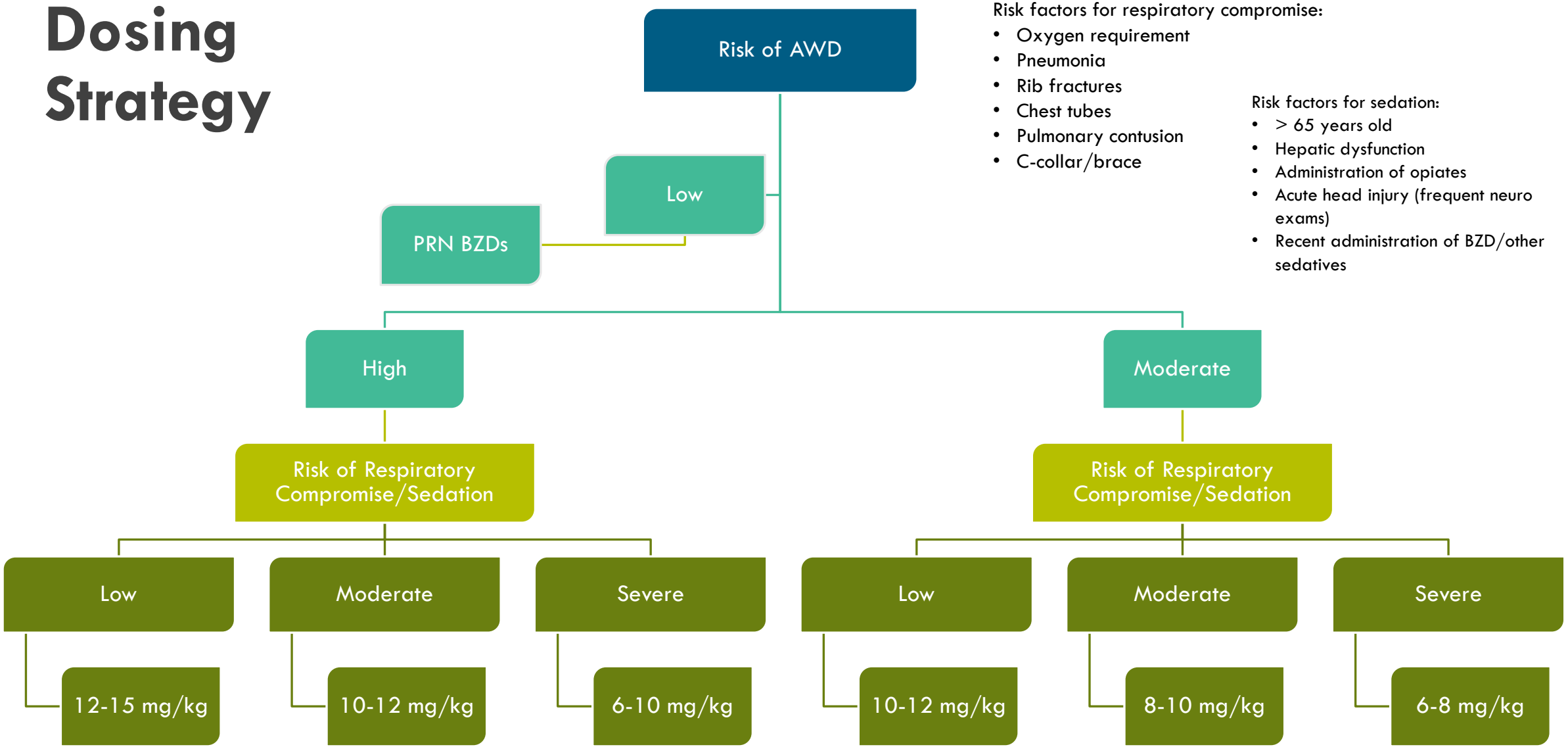
Nejad S et al. Phenobarbital for Acute Alcohol Withdrawal Management in Surgical Trauma Patients-A Retrospective Comparison Study. Psychosomatics. 2020;61(4):327-335.

Dosing Strategy



Risk factors for respiratory compromise:

- Oxygen requirement
- Pneumonia
- Rib fractures
- Chest tubes
- Pulmonary contusion
- C-collar/brace

Risk factors for sedation:

- > 65 years old
- Hepatic dysfunction
- Administration of opiates
- Acute head injury (frequent neuro exams)
- Recent administration of BZD/other sedatives

Nisavic M et al. Use of Phenobarbital in Alcohol Withdrawal Management - A Retrospective Comparison Study of Phenobarbital and Benzodiazepines for Acute Alcohol Withdrawal Management in General Medical Patients. Psychosomatics. 2019;60(5):458-467.
Nejad S et al. Phenobarbital for Acute Alcohol Withdrawal Management in Surgical Trauma Patients-A Retrospective Comparison Study. Psychosomatics. 2020;61(4):327-335.

Summary of Evidence

Acute Care

Study	Nejad et al. 2020	Nisavic et al. 2019
Dosing Strategy	Risk of AWD based	
Outcome	Less: • Delirium • Adverse events	No difference in: • Development of complications • Hospital length of stay • ICU admission rates • ICU length of stay • Adverse events • Discharge against medical advice
Is phenobarbital safe and effective?	Yes	Yes

Safety and Efficacy in the ICU

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Treatment of Alcohol Withdrawal Syndrome: Phenobarbital vs CIWA-Ar Protocol

Tidwell et al. 2018

Study Design

- Retrospective cohort study

Population

- Medical ICU patients

Intervention

- Phenobarbital protocol

Comparator

- Symptom triggered benzodiazepine protocol

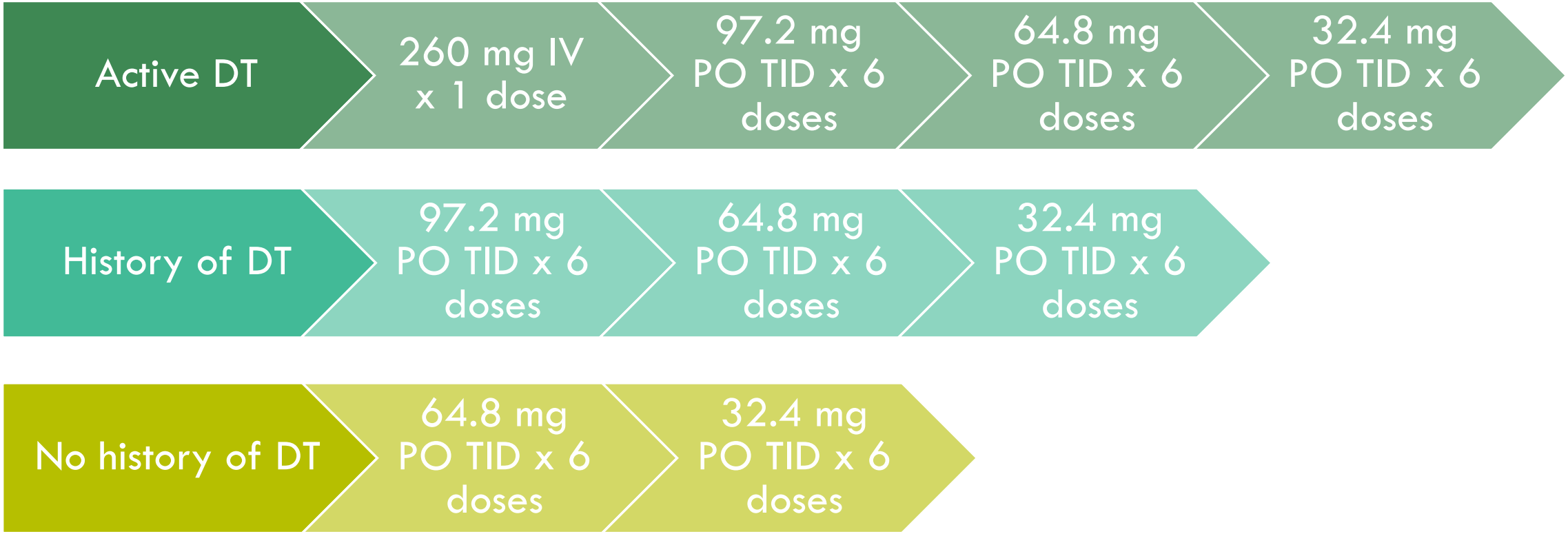
Outcome

- Shorter ICU stay
- Shorter hospital stay
- Less mechanical ventilation
- Less use of adjunctive agents

USHP

Tidwell WP, Thomas TL, Pouliot JD, Canonico AE, Webber AJ. Treatment of Alcohol Withdrawal Syndrome: Phenobarbital vs CIWA-Ar Protocol. Am J Crit Care. 2018;27(6):454-460.

Dosing Strategy



+ lorazepam 1 mg IV q 4 h PRN for agitation

Tidwell WP, Thomas TL, Pouliot JD, Canonico AE, Webber AJ. Treatment of Alcohol Withdrawal Syndrome: Phenobarbital vs CIWA-Ar Protocol. Am J Crit Care. 2018;27(6):454-460.

Phenobarbital and symptom-triggered lorazepam versus lorazepam alone for severe alcohol withdrawal in the intensive care unit

Nguyen et al. 2020

Study Design

- Retrospective cohort study

Population

- ICU Patients

Intervention

- Phenobarbital protocol

Comparator

- Symptom triggered benzodiazepine protocol

Outcome

- Duration of treatment shorter
- Similar ICU length of stay
- Lower CIWA-Ar from baseline at 24 hours
- Similar in adverse events

USHP

Nguyen TA, Lam SW. Phenobarbital and symptom-triggered lorazepam versus lorazepam alone for severe alcohol withdrawal in the intensive care unit. Alcohol. 2020;82:23-27.

Summary of Evidence

ICU

Study	Tidwell et al. 2018	Nguyen et al. 2020
Dosing Strategy	Risk/presence of DT based	Unspecified

Outcome	• Shorter ICU stay
	• Shorter hospital stay
	• Less mechanical ventilation
	• Less use of adjunctive agents
		• Shorter treatment duration
		• Lower CIWA-Ar from baseline at 24 hours
		• Similar in:
		  • Adverse events
		  • ICU length of stay

Is phenobarbital safe and effective?	Yes	Yes

Dosing Strategies

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Considerations

- Was initial dose of phenobarbital enough?
- Does my patient need additional titration?
- Which weight should I use to base dosing recommendations?
- What's the cumulative dose this patient has received throughout their stay?

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Dosing Pearls

Load based on patient's IBW

Titrate as needed

Do not exceed cumulative dose of 20 mg/kg IBW

- Consider other sedating medications patient has received
  - This may require a smaller cumulative dose (5-10 mg/kg)

Give total cumulative dose within 48 hours

- Significant metabolism may occur if administered over a longer time

Use caution in severe obesity (BMI >40)

Obtain a phenobarbital level

Parthvi R, et al. Update on Phenobarbital for Alcohol Withdrawal Syndrome in Intensive Care. Journal of Clinical Intensive Care and Medicine. 2019;4(1):036-039.

Patient Case

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Audience Response Question

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What is an appropriate phenobarbital dosing strategy for AA?

Load only: 10 - 15 mg/kg IV over 2 days	**A**
Titration: 10 mg/kg IV x 1, 65 mg PO x 6 doses, 32 mg PO x 6 doses	**B**
Titration: 10 mg/kg IV x 1, then 260 mg IV x 1 dose for moderate to sever symptoms	**C**
Titration: 10 mg/kg IV x 1, then 130 mg IV x 1 dose for mild symptoms	**D**

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What's Next?

(PARTI) Phenobarbital vs Ativan for Alcohol Withdrawal in the Intensive Care Unit

- Prospective, open-label, randomized, controlled trial
- March 2022
- NCT04156464

(PHENOMANAL) Phenobarbital for Severe Acute Alcohol Withdrawal Syndrome

- Prospective, placebo controlled, randomized
- November 2022
- NCT03586089

Aulakh B. Phenobarbital Versus Ativan for Refractory Alcohol Withdrawal Treatment in the Intensive Care Unit. clinicaltrials.gov; 2020.
Unity Health Toronto. PHENObarbital for the MANagement of Severe Acute ALcohol Withdrawal Syndrome (PHENOMANAL): A Prospective Randomized Feasibility Study. clinicaltrials.gov; 2020.

References

- Aulakh B. Phenobarbital Versus Ativan for Refractory Alcohol Withdrawal Treatment in the Intensive Care Unit. clinicaltrials.gov; 2020. Accessed February 10, 2022. https://clinicaltrials.gov/ct2/show/NCT04156464
- Prediction of Alcohol Withdrawal Severity Scale - MDCalc. Accessed February 13, 2022. https://www.mdcalc.com/prediction-alcohol-withdrawal-severity-scale
- Phenobarbital - Lexicomp. Accessed February 13, 2022. http://online.lexi.com.ezproxy.lib.utah.edu/lco/action/home;jsessionid=e02a04aafb82e5a7cfaa563f04d5?siteid=4
- Management of moderate and severe alcohol withdrawal syndromes - UpToDate. Accessed February 13, 2022. https://www.uptodate.com/contents/search
- Lorazepam - Lexicomp. Accessed February 13, 2022. http://online.lexi.com.ezproxy.lib.utah.edu/lco/action/home;jsessionid=e02a04aafb82e5a7cfaa563f04d5?siteid=4
- Diazepam - Lexicomp. Accessed February 13, 2022. http://online.lexi.com.ezproxy.lib.utah.edu/lco/action/home;jsessionid=e02a04aafb82e5a7cfaa563f04d5?siteid=4
- CIWA-Ar for Alcohol Withdrawal - MDCalc. Accessed February 13, 2022. https://www.mdcalc.com/ciwa-ar-alcohol-withdrawal
- Chlordiazepoxide - Lexicomp. Accessed February 13, 2022. http://online.lexi.com.ezproxy.lib.utah.edu/lco/action/home;jsessionid=e02a04aafb82e5a7cfaa563f04d5?siteid=4
- Alcohol Use Disorder: What It Is, Risks & Treatment. Cleveland Clinic. Accessed February 13, 2022. https://my.clevelandclinic.org/health/diseases/3909-alcoholism
- Davies M. The role of GABAA receptors in mediating the effects of alcohol in the central nervous system. J Psychiatry Neurosci. 2003;28(4):263-274.
- Kelley R, January 7 NLU, 2022. Alcohol Withdrawal: Symptoms, Timeline & Detox Process. American Addiction Centers. Accessed February 13, 2022. https://americanaddictioncenters.org/withdrawal-timelines-treatments/alcohol
- Nejad S, Nisavic M, Larentzakis A, et al. Phenobarbital for Acute Alcohol Withdrawal Management in Surgical Trauma Patients-A Retrospective Comparison Study. Psychosomatics. 2020;61(4):327-335. doi:10.1016/j.psym.2020.01.008
- Nelson AC, Kehoe J, Sankoff J, Mintzer D, Taub J, Kaucher KA. Benzodiazepines vs barbiturates for alcohol withdrawal: Analysis of 3 different treatment protocols. Am J Emerg Med. 2019;37(4):733-736. doi:10.1016/j.ajem.2019.01.002

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References

- Nguyen TA, Lam SW. Phenobarbital and symptom-triggered lorazepam versus lorazepam alone for severe alcohol withdrawal in the intensive care unit. Alcohol. 2020;82:23-27. doi:10.1016/j.alcohol.2019.07.004
- Nisavic M, Nejad SH, Isenberg BM, et al. Use of Phenobarbital in Alcohol Withdrawal Management - A Retrospective Comparison Study of Phenobarbital and Benzodiazepines for Acute Alcohol Withdrawal Management in General Medical Patients. Psychosomatics. 2019;60(5):458-467. doi:10.1016/j.psym.2019.02.002
- Rastegar DA, Applewhite D, Alvanzo AAH, Welsh C, Niessen T, Chen ES. Development and implementation of an alcohol withdrawal protocol using a 5-item scale, the Brief Alcohol Withdrawal Scale (BAWS). Subst Abus. 2017;38(4):394-400. doi:10.1080/08897077.2017.1354119
- Rosenson J, Clements C, Simon B, et al. Phenobarbital for acute alcohol withdrawal: a prospective randomized double-blind placebo-controlled study. J Emerg Med. 2013;44(3):592-598.e2. doi:10.1016/j.jemermed.2012.07.056
- Saitz R. Introduction to Alcohol Withdrawal. Alcohol Health Res World. 1998;22(1):5-12.
- Tidwell WP, Thomas TL, Pouliot JD, Canonico AE, Webber AJ. Treatment of Alcohol Withdrawal Syndrome: Phenobarbital vs CIWA-Ar Protocol. Am J Crit Care. 2018;27(6):454-460. doi:10.4037/ajcc2018745
- Unity Health Toronto. PHENObarbital for the MANagement of Severe Acute ALcohol Withdrawal Syndrome (PHENOMANAL): A Prospective Randomized Feasibility Study. clinicaltrials.gov; 2020. Accessed February 10, 2022. https://clinicaltrials.gov/ct2/show/NCT03586089
- Alcohol Facts and Statistics | National Institute on Alcohol Abuse and Alcoholism (NIAAA). Accessed February 13, 2022. https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/alcohol-facts-and-statistics
- Banerjee N. Neurotransmitters in alcoholism: A review of neurobiological and genetic studies. Indian J Hum Genet. 2014;20(1):20-31. doi:10.4103/0971-6866.132750
- Parthvi R, Agne P. Update on Phenobarbital for Alcohol Withdrawal Syndrome in Intensive Care. Journal of Clinical Intensive Care and Medicine. 2019;4(1):036-039. doi:10.29328/journal.jcicm.1001023
- A Comparison Of Baws (brief Alcohol Withdrawal Scale) With Ciwa-ar To Diagnose The Severity Of Alcohol Withdrawal In Hospitalized Medical Patients. Accessed February 14, 2022. https://shmabstracts.org/abstract/a-comparison-of-baws-brief-alcohol-withdrawal-scale-with-ciwa-ar-to-diagnose-the-severity-of-alcohol-withdrawal-in-hospitalized-medical-patients/

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