Recognizing the PPAT of AWS in the AUD-Patient: An Imperative for the Early Screening, Identification, and Treatment of Alcohol Withdrawal Syndrome in Alcohol Use Disorder Patients in Emergency and Intensive Care Settings by Distinguishing AWS Pathophysiology, Progression, Assessment, and Treatment More Directly

Nicholas A Kerna[1]*, Onyeka Olisemeka[2,3], Uzoamaka Nwokorie[2,3], Silile Ndhlovu Dube[2,3], Emmanuella Solomon[2,3], John V Flores[4,5] and Mitchell G Jomsky[2,3]

[1]SMC–Medical Research, Thailand

[2]University of Health and Humanities, Tortola, BVI

[3]University of Science, Arts and Technology, Montserrat, BWI

[4]Beverly Hills Wellness Surgical Institute, USA

[5]Orange Partners Surgicenter, USA

*Corresponding Author: Nicholas A Kerna, POB47 Phatphong, Suriwongse Road, Bangkok, Thailand 10500.
Contact: medpublab+drkerna@gmail.com

Abstract

Alcohol use disorder (AUD) is prevalent in 10–20% of hospitalized patients, while trauma patients have a significantly higher prevalence at 31–70%. However, the AUD-patient often goes undetected in an emergency or intensive care setting. Nonetheless, the early identification of AUD-patients can significantly reduce the risks associated with alcohol withdrawal syndrome (AWS). Thus, better understanding the pathophysiology, progression, assessment, and treatment (PPAT) of AWS promotes superior treatment and avoids undue harm to the AUD-patient and staff attending to them. This review article summarizes the PPAT of AWS and provides valuable assessment tools to promptly identify patients with alcohol use disorder (AUD) in the proactive prevention or amelioration of alcohol withdrawal syndrome (AWS).

Keywords: Alcohol Use Disorder; Alcohol Withdraw Syndrome; Emergency Department; Intensive Care

Abbreviations

AUD: Alcohol Use Disorder; AUDIT: Alcohol Use Disorders Identification Test; AWS: Alcohol Withdraw Syndrome; AUDIT-PC: Alcohol Use Disorders Identification Test-Piccienlli Consumption (AUDIT-PC); CAGE: Cut-Down, Annoyed, Guilty, and Eye-Opener; DTs: Delirium Tremens; DVM-5: Diagnostic and Statistical Manual, Fifth Edition: EtOH: Ethanol; ICU: Intensive Care Unit: MINI: Mini International Neuropsychiatric Interview; NIAAA: National Institute on Alcohol Abuse and Alcoholism; PAWWS: Prediction of Alcohol Withdrawal Severity Scale

Introduction

Alcohol (EtOH), in one form or another, is the most commonly consumed, mood-altering substance worldwide [1]. The World Health Organization (2014) estimates that 3.3 million deaths are attributed to alcohol use disorder (AUD). In the United States, nearly 88,000 Americans die annually directly related to AUD, making it the third leading preventable cause of mortality with tobacco use first and poor diet and sedentary lifestyle second [2]. AUD carries a sizeable economic burden to the nation at $223.5 billion annually. The health consequences of AUD are directly linked to over 200 diseases, such as anemia, cancer, cardiovascular disease, cardiomyopathy, cirrhosis of the liver, dementia, depression, seizures, gout, hypertension, suppressed immune function, neuropathy, and pancreatitis [3].

According to Swift and Aston (2015), "Alcohol use disorder is a heterogeneous illness with a complex biology that is controlled by many genes and gene-by-environment interactions" [4]. AUD is prevalent in 10–20% of hospitalized patients [5]. Trauma patients have a significantly higher prevalence at 31–70% [5].

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When hospitalized, without access to alcohol, AUD patients can develop acute alcohol withdrawal syndrome (AWS) [6]. According to Maldonado., *et al.* (2015), AWS occurs in the abrupt cessation of alcohol, resulting in a wide range of symptoms: confusion, agitation, aggressive behaviors, seizures, delirium tremens, hallucinations, permanent cognitive dysfunction, psychosis, surgical complications, and prolonged hospitalizations [7]. Thus, recognizing the pathophysiology, progression, assessment and treatment (PPAT) of AWS can help patients, affected family members, public health policymakers, and healthcare providers cope with, screen for, and treat AWS better.

Discussion

AUD is infrequently identified until alcohol withdrawal symptoms appear in the AUD-patient. If the initial signs and symptoms of AWS go undetected, more severe—even life-threatening—complications can result. A more severe symptom of AWS (e.g., violent behavior) can put patients and hospital staff at risk. Patient-restraint is utilized at this stage of AWS. The severely affected patient—exhibiting continuous agitation or delirium tremens (DTs)—might be transferred to the intensive care unit (ICU) for observation and treatment [8,9].

Pathophysiology and progression of alcohol withdrawal syndrome (AWS)

AWS occurs due to a cascade of neurobiological events, primarily by the disruption of healthy neurotransmitter equilibrium. According to Saitz (1998), long-term alcohol consumption alters the gamma-aminobutyric acid (GABA) inhibitory pathway. This pathway alteration decreases endogenous GABA and receptors; excitatory N-methyl-D-aspartate (NMDA) concentrations increase [10]. Thus, in AWS, there is neurotransmitter excitation and hyperactivity that run persistently and unimpeded [11].

According to Lautieri (2020), alcohol withdrawal side effects and symptoms can be divided into three stages, as follows:

- **Stage 1:** Anxiety, insomnia, nausea, and abdominal pain characterize this stage, which appear 8 hours after the last drink.
- **Stage 2:** High blood pressure, increased body temperature, atypical heart rate, and confusion occur at this stage, which appear 24–72 hours after the last drink.
- **Stage 3:** Hallucinations, fever, seizures, and agitation occur at this stage, which appear 2–4 days after the last drink.

Note: All symptoms tend to decrease within 5–7 days, barring any complications or comorbidities [12].

Assessment of AUD to prevent or ameliorate AWS

In a retrospective study involving trauma patients, Hosking., *et al.* (2007) discovered that patient histories (including AUD detection) were performed in just 7.3% of the patients [13]. However, there are a variety of screening tools and approaches used to detect AUD (see the links in the Supplemental Information section):

- Alcohol Use Disorders Identification Test-Piccienlli Consumption (AUDIT-PC)

- CAGE questionnaire tool, the Alcohol Use Disorders Identification Test (AUDIT)

- Prediction of Alcohol Withdrawal Severity Scale (PAWSS)

- DSM-IV-TR Mini-International Neuropsychiatric Interview (MINI)

Wong., *et al.* (2015) noted that each (above) detection method is useful in the early identification of AUD and, thus, limits the progression to AWS [14]. Biomarkers from laboratory findings aid in identifying chronic alcohol abuse and AUD; however, such biomarkers are not predictive for AUD-patients progressing to AWS [15].

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Component	Description
Alcohol withdrawal risk assessment	Performed in all adult patients at time of admission using Alcohol Use Disorders Identification Test-Piccinelli Consumption (AUDIT-PC)[11] If score is ≥ 5, perform CIWA-Ar
CIWA-Ar	Assessment to determine level of severity of alcohol withdrawal syndrome
Precautions algorithm	Followed when CIWA-Ar score is ≤ 8
Treatment algorithm	Followed when CIWA-Ar score is ≥ 9
Physician order set	Initiated for patients with alcohol withdrawal syndrome
Sedation Agitation Scale	Administered before each medication dose

Table 1: Components of the Alcohol Withdrawal Symptom Management Care Guideline.
CIWA-Ar: Revised Clinical Institute Withdrawal Assessment of Alcohol Scale.
Note: Table 1 reproduced from Improving Alcohol Withdrawal Outcomes in Acute Care [15].

Salottolo., *et al.* (2017) noted that AUD is calibrated by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as follows:

- In women, consuming greater than one drink daily or greater than three drinks on a given occasion, or greater than seven drinks per week.

- In men, consuming greater than two drinks daily or greater than four drinks on a given occasion, or greater than fourteen drinks per week.

Note: A standard drink is defined as a beverage containing 14 grams of alcohol (i.e., a 12-ounce beer, 5-ounce glass of wine, or 1.5-ounce shot of hard liquor) [16]. (For more information, follow the link to NIAAA: https://www.niaaa.nih.gov/).

Hasin., *et al.* (2013) noted that alcohol abuse, dependence, and withdrawal criteria are defined by the American Psychiatric Association in the Diagnostic and Statistical Manual, Fifth Edition (DSM-5) as follows:

- Meeting two of the eleven criteria within a 12-month timeframe, used to pick up cyclic remissions.

- The severity of AUD being dependent upon the number of criteria met (e.g., mild, moderate, or severe) [17].

Note: The DSM-5 lists diagnosis criteria for AWS is based upon a patient with a cessation or reduction of alcohol after heavy and prolonged drinking, meeting two of eight symptom criteria (see the link in the Supplemental Information section).

Treatment of AUD and AWS

In the early 1900s, lumbar puncture, electroconvulsive therapy, chloroform, digitalis, and insulin coma were employed to treat AWS [18]. In the 1950s, treatments included paraldehyde (for seizures) and promazine. In the1960s, chlorpromazine, chlordiazepoxide, and hydroxyzine were added as drug treatment for AWS; most of the drugs had antipsychotic properties. In the 1970s, diazepam and barbiturates were added as treatments for AWS [19].

According to Franck (2013), the current pharmacologic interventions for AWS are as follows:

- Benzodiazepines are the first-line treatment for AWS, although there is debate over which type is most effective.

- Clonidine is also being applied for the alpha-2 agonist effects of elevated heart rate and hypertension.

- Dexmedetomidine, like clonidine, is an alpha-2 agonist, which has been shown effective in some patients in acute DTs.

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- Baclofen, a muscle relaxant, has shown promise as a GABA-B agonist as well as traditional barbiturates for their GABA-B-agonistic effects.

- Propofol and dexmedetomidine are used in intensive care settings with anesthesia [14]. However, if propofol or dexmedetomidine is needed, the patient will require intubation and mechanical ventilation. Propofol is used in those patients that are refractory to large doses of benzodiazepines [20].
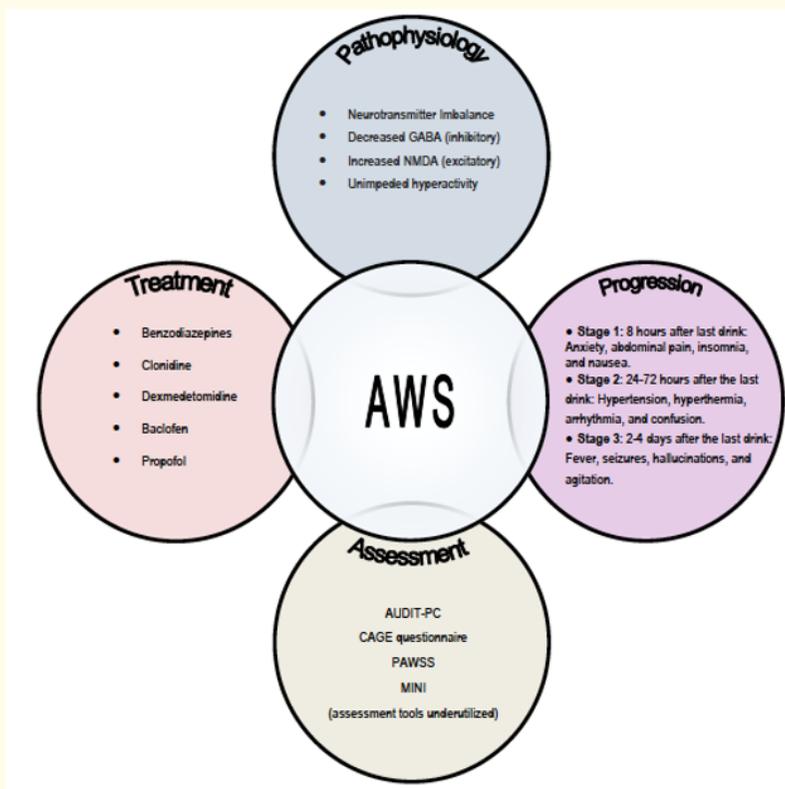
Figure 1: A graphic representation of the PPAT of AWS. Note. Concept and design by Nicholas A Kerna and Mitchell G Jomsky (2020).

Conclusion

Alcohol is the most commonly consumed, mood-altering substance worldwide. The health consequences of alcohol use disorder are directly linked to over 200 diseases. AUD is prevalent in 10–20% of hospitalized patients, while trauma patients have a significantly higher prevalence at 31–70%. Without access to alcohol, AUD patients can develop acute alcohol withdrawal syndrome.

The early identification of an AUD-patient in an in-patient setting can significantly reduce the risks associated with AWS, not only to the patient but also healthcare providers and staff. However, AUD-screening tools and specific history-taking to identify AUD-patients are gravely underutilized, especially in the intensive care setting. Thus, recognizing the PPAT of AWS (the pathophysiology, progression, assessment, and treatment of alcohol withdrawal syndrome) can help patients, affected family members, public health policymakers, and healthcare providers better cope with, screen for, and treat AWS, and protect the patient, healthcare providers, and facility staff from undue harm.

Conflict of Interest Statement

The authors declare that this paper was written in the absence of any commercial or financial relationship that could be construed as a potential conflict of interest.

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Supplementary Information

- Alcohol Use Disorders Identification Test-Piccienlli Consumption (AUDIT-PC); see Pecoraro., *et al.* (2014), "Using the AUDIT-PC to predict alcohol withdrawal in hospitalized patients" (https://www.ncbi.nlm.nih.gov/pubmed/23959745) [20].

- CAGE questionnaire tool, the Alcohol Use Disorders Identification Test (AUDIT); see Bush., *et al.* (1987), "Screening for alcohol abuse using the CAGE questionnaire" (https://www.ncbi.nlm.nih.gov/pubmed/2880504) [22].

- Prediction of Alcohol Withdrawal Severity Scale (PAWSS); see Maldonado., *et al.* (2015), "Prospective Validation Study of the Prediction of Alcohol Withdrawal Severity Scale (PAWSS) in Medically Ill Inpatients: A New Scale for the Prediction of Complicated Alcohol Withdrawal Syndrome" (https://www.ncbi.nlm.nih.gov/pubmed/25999438) [7].

- DSM-IV-TR diagnostic criteria for alcohol abuse and dependence with a specific section of the Mini International Neuropsychiatric Interview (MINI); see Francis., *et al.* (2015), "Validation of the MINI (DSM IV) Tool for the Assessment of Alcohol Dependence among Young People in Northern Tanzania Using the Alcohol Biomarker Phosphatidylethanol (PEth)" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4661629/) [23].

For the leading mode of AUD assessment in the emergency ward, see Richoux., *et al.* (2011) "Alcohol use disorders in the emergency ward: choice of the best mode of assessment and identification of at-risk situations" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3125196/) [24].

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