

## Alcohol-related Emergencies

新光急診 張志華醫師



## Agenda

1. Background
2. Blood and breath alcohol levels
3. ED evaluation and management
4. Alcohol withdrawal
5. Alcoholic ketoacidosis

## Background

- Alcohol **tolerance**
  - over time, the person must consume more alcohol to achieve the same intoxicating effects
- Alcohol **dependence**
  - develops withdrawal symptoms with cessation of alcohol
- Alcohol **addiction**
  - drastic behaviors used to maintain alcohol intake and often involves socially inappropriate behavior

## Epidemiology

- Alcohol dependence or abuse
  - 40% ED patients
  - 25~40% trauma patients

## Epidemiology

- Beneficial: 2~6 drinks per week
- Harmful: > 2 drinks per day
- In general, one drink
  - = 1 ounce of hard liquor
  - = 1 beer
  - = 1 glass of wine
  - = **25 mg/dL** blood alcohol level (BAL)

## Pharmacokinetics And Metabolism

- Absorption:
  - 20% in stomach, 80% in small intestine
- Metabolism:
  - Liver (90%), kidneys, lungs
  - Alcohol dehydrogenase (**ADH**),
  - Microsomal ethanol-oxidizing system (MEOS)
  - Peroxidase-catalase system

## Rate of ethanol metabolism

- Non-tolerant adult: 20 mg/dL/h
- Chronic drinkers: 30 mg/dL/h (induction of the MEOS system)
- Rule of thumb:
  - 25 mg/dL/h (USA)
  - 20 mg/dL/h (Taiwan)
- Alcohol hypersensitivity syndrome
  - Asians
  - Facial flushing – high aldehyde level

## Alcoholism = risk factor

- Trauma:
  - speeding, not wearing seatbelts
  - falling
  - fighting

## Alcoholism = risk factor

- Non-trauma :
  - pneumonia, lung abscess, meningitis
  - cardiomyopathy
  - coagulopathy
  - suicide

## Prehospital Care

- EMS transport
  - If > 5 times: 71% alcoholics
  - Refuse treatment or transport
- If altered mental status:
  - Check blood sugar
  - Protect cervical spine
  - Prevent aspiration

## Initial evaluation in ED

- Secure ABCs - when in doubt, a definitive airway should be secured
- If AMS
  - Protect and clear C-spine
  - Monitor SpO2
  - Check blood glucose (esp. children)
  - Give thiamine 100 mg (Wernicke's encephalopathy)

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  - Naloxone [X], flumazenil [X]

## Differential diagnosis

### Intracranial injury

- Hemorrhage
- Ischemia

### Infective processes

- Intracranial
- Systemic

### Metabolic abnormality

- Hypoglycemia
- Hyponatremia
- Hypoxemia
- Hypo- or hyperthermia
- Hepatic encephalopathy

### Toxic exposure (polysubstance abuse)

### Seizure disorder

- Postictal
- Nonconvulsive status

### Withdrawal syndromes

## History

- 別相信「小酌兩杯」
- 最後一次喝或減量是什麼時候？
- PHx: disulfiram, warfarin, phenytoin, sedatives
- Prior withdrawal seizure
- Abdominal pain, tachypnea
- Alternative drinks – wood / rubbing alcohols

## PE



- Complete secondary survey
- Horizontal nystagmus
- Serial NE, esp. if multiple caretakers
- Chronic alcoholics:
  - rhinophyma, palmar erythema, spider angiomas, hepatomegaly, testicular atrophy, “chipmunk cheeks” (parotid enlargement), gynecomastia, acne rosacea, Dupuytren's contractures

## Sobriety Tests

- Field / boating sobriety test (> 100 mg/dL)
  - Horizontal gaze nystagmus
  - Difficulty reciting alphabet from A to Z
  - Difficulty with clapping hands while counting

## Sobriety Tests

- Detect breath odors
  - Significant rate of false-negatives.
  - Failing to detect alcohol (false-negative), not in overestimating its presence (false-positive)
- Alcohol Symptom Checklist (a clinical scoring tool) did not correlate with the blood alcohol in intoxicated patients

## Blood Alcohol Levels

- BALs correlate poorly with the degree of intoxication observed clinically (e.g. using Alcohol Symptom Checklist)

酒精在血液內的濃度及其對人體的影響

| 血液酒精濃度<br>(mg/100mL) | 呼氣酒精濃度<br>(mg/L) | 症狀                             |
|----------------------|------------------|--------------------------------|
| 10~50                | 0.047~0.238      | 精神欣快，注意力、判斷力減低，<br>抑制力變小       |
| 50~100               | 0.238~0.467      | 興奮或鎮靜，肌肉協調能力受損，<br>反應遲鈍        |
| 150~300              | 0.714~1.428      | 精神錯亂，平衡感受損，言詞不清，<br>定向力障礙，感覺障礙 |
| 250~400              | 1.190~1.904      | 昏呆、木僵、昏睡、肌肉失調明顯，<br>大小便失禁      |
| 400~500              | 1.904~2.380      | 昏迷，完全失去意識，呼吸循環虛<br>脫、死亡        |

法規

- 駕駛人進行吐氣檢驗時，酒精濃度每公升○・二五毫克以上，將被處新台幣六千元至一萬兩千元以上罰鍰，當場禁止其駕駛，及吊扣駕照六個月（道路交通安全規則第一百一十四條及道路交通管理處罰條例第三十五條規定）
- 駕駛人吐氣時酒精濃度達○・五五毫克以上，駕駛人將以危害公共安全罪，處一年以下有期徒刑、拘役或處以三萬元以上的罰金（刑法第一百八十五條之三）

計算練習

- 深夜零時發生交通事故逃離現場，至上午六時才接受警方酒精檢測，經測出呼氣酒精濃度為 0.20 mg/L，請問事故發生時，他的血液酒精濃度是多少？

吹氣與血液中酒精濃度如何互相換算？

- 呼氣酒精濃度 x 200 = 血液酒精濃度
  - 0.25 mg/L x 200 = 50 mg/dL
  - 0.55 mg/L x 200 = 110 mg/dL
- 血液酒精排除(代謝)率
  - 每小時10~40 mg/dL
  - 倒算可用平均：20 mg/dL/hr

酒精濃度換算表

體重與呼氣酒精濃度達到 0.25mg/L 之飲酒量換算表

| 體重<br>酒精        | 50Kg    | 60Kg   | 70Kg     | 80Kg     | 90Kg     |
|-----------------|---------|--------|----------|----------|----------|
| 純酒精             | 40c.c   | 48c.c  | 56c.c    | 64c.c    | 72c.c    |
| 啤酒<br>( 5 % )   | 800c.c  | 960c.c | 1,120c.c | 1,280c.c | 1,440c.c |
| 紅酒<br>( 12 % )  | 333c.c  | 400c.c | 466c.c   | 533c.c   | 600c.c   |
| 紹興酒<br>( 16 % ) | 250c.c  | 300c.c | 350c.c   | 400c.c   | 450c.c   |
| 米酒<br>( 20 % )  | 200c.c  | 240c.c | 280c.c   | 320c.c   | 360c.c   |
| 米酒類<br>( 35 % ) | 114c.c  | 137c.c | 160c.c   | 183c.c   | 205c.c   |
| 白蘭地<br>( 40 % ) | 100c.c  | 120c.c | 140c.c   | 160c.c   | 180c.c   |
| 高粱酒<br>( 58 % ) | 69c.c   | 83c.c  | 96.5c.c  | 110c.c   | 124c.c   |
| 大啤酒<br>( 65 % ) | 61.5c.c | 74c.c  | 86c.c    | 98.5c.c  | 111c.c   |

\* 本表依個人體質不同而異，僅供參考。

BAL and GCS

- GCS is not statistically affected by the presence of alcohol until the BAL is 200 mg/dL or more
- Indications of head CT:
  - BAL < 200 mg/dL and GCS ≤ 14
  - GCS ≤ 13

## When to obtain BAL

- Routine BAL:
  - The American College of Surgeons' Committee on Trauma recommends drug and alcohol screening as "essential" for level I and II and "desirable" for level III trauma centers
- Recommended if:
  - diagnosis of intoxication is uncertain
  - clinical evidence of head injury

## Laboratory Testing

- Glucose: F/S
- K
- Mg
- Amylase, lipase
  - Elevated
  - Clinically diagnosis

## Head CT

- Clinical evidence of skull fracture
  - Basilar skull fracture: periorbital ecchymosis (raccoon's eyes), mastoid ecchymosis (Battle's sign), CSF otorrhea or rhinorrhea, hemotympanum
  - Palpable skull fracture
- Major mechanism of injury and altered mental status
- Level of consciousness more depressed than expected compared to the serum alcohol level
- Significantly altered mental status (GCS  $\leq$  13) and evidence or suspicion of head trauma
- Falling GCS
- Focal neurologic deficit

## CT for alcoholics

- Either:
  1. Liberal policy of CT (head, chest, abdomen)
  2. Admission for close observation or prolonged observation with frequent serial re-examination / ultrasound

## Cervical Spine Radiography

- NEXUS study: intoxicated patient can have asymptomatic CSI
- Recommendation:
  - minimum of 3 views or be maintained in spinal precautions until sober
  - restless or combative – consider succinylcholine and intubation in high-risk patients (e.g. thrown through the windshield)

## ED management

- Physical or chemical restraints
  - agitation
  - disruptive to staff
  - potentially threaten their own well-being

## Chemical restraints

- Benzodiazepines
  - combative / withdraw
  - Lorazepam
  - Dormicum
- Butyrophenones
  - behavioral emergencies
  - Haloperidol
  - Droperidol

## Alcohol withdrawal syndrome

- AWS develops 6~24 hrs after a decrease in ethanol intake and lasts from 2~7 days
- Mild symptoms: irritability and sleeplessness
- Major withdrawal:
  - Fever, diaphoresis, and hallucinations
  - Autonomic hyperactivity - tremulousness, sweating, nausea, vomiting, and agitation
  - Vital signs - elevated HR and BP
  - Generalized seizures (rum fits), within 12~24 hrs of abstinence

## Delirium tremens

- 3<sup>rd</sup>~4th post-abstinence day
- 5% of AWS
- S/S
  - Hallucinations – visual, tactile (**formication**)
  - Confusion, disorientation
  - Pronounced autonomic hyperactivity – **adrenergic storm**
- Tx = benzodiazepines
- Mortality less than 15%

## DDx of delirium tremens

- Metabolic disorders
  - Hypoxia
  - Hypoglycemia
  - Hyperthyroidism
  - Hepatic encephalopathy
- Infectious disorders
  - Sepsis
  - Meningitis
  - Encephalitis

## BZD for AWS

- Drug of choice = lorazepam
  - Ease of administration, rapid onset of action, non-hepatic metabolism, and lack of active metabolites
  - IV dose: 2~5 mg bolus, 2~5 mg q20min
- When using BZDs, avoid switching agents but instead administer repeated doses of a single agent

## AWS: adjunctive treatments

- Haloperidol, droperidol
- $\beta$ -blockers, clonidine, carbamazepine
- Alcohol detoxification units - only for those who have stable vital signs and are not hallucinating or confused

## Rum fits



- Alcohol withdrawal seizures
  - Onset: **12~48 hrs** after a major decline in blood alcohol levels
  - **6.2%** 1st-time seizure related to alcohol had intracranial lesions
- Tx: lorazepam
  - Anticonvulsant duration: 15 min for diazepam vs **12 hrs** for lorazepam
  - If lorazepam not used, **8 times** more likely to have 2nd seizure

## Alcoholic ketoacidosis (AKA)

### **Chronic alcoholic + poor nutrition**

recent binge drinking & decreased carbohydrate intake

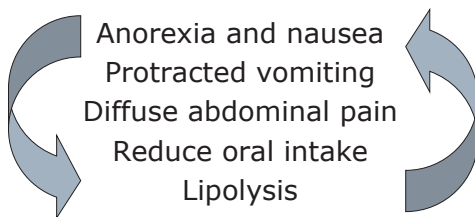


depletion of glycogen stores  
& reduced insulin production



Lipolysis → free fatty acids

## AKA: symptoms



## AKA: signs

- Volume depletion – tachycardia, orthostatic hypotension
- Odor of ketones
- Tachypnea and/or Kussmaul respirations (rapid and deep breathing)
- Metabolic acidosis - anion gap
- Fever is generally absent
- Mental status usually normal
  - unless co-existing sepsis or hypoglycemia
- Diffuse abdominal tenderness
  - can mimic pancreatitis and peritonitis

## AKA: DDx

- Diabetic ketoacidosis
- Methanol or ethylene glycol ingestion
- Iron overdose
- Salicylate poisoning
- Severe pancreatitis
- Ischemic bowel

## AKA: lab tests

- Hypokalemia
- Hyponatremia
- Hypomagnesemia
- Hypophosphatemia
- Blood glucose variable
- Alcohol levels typically low or undetectable, however, AKA can occur high BALs

## AKA: ketones

- A negative nitroprusside reaction does not rule out ketoacidosis
  - nitroprusside reaction - sensitive for acetoacetate and acetone but not for  $\beta$ -hydroxybutyrate (BOHB, the major ketoacid in AKA)
- An increasingly positive nitroprusside reaction is consistent with an improvement rather than a worsening of the ketoacidosis
  - nitroprusside reaction becomes more positive as the  $\beta$ -hydroxybutyrate is metabolized to acetoacetate

## AKA: management

- Cornerstones of therapy = volume repletion
- Fluid resuscitation in AKA should include dextrose and saline
- Patients in AKA do not need insulin
- Clinical response is the best way to follow the patient's response to intervention
- Supply potassium and magnesium
- Give thiamine
- Bicarbonates not indicated

## Summary

## Take home message

1. 酒精排除率
2. 吹氣與血液中酒精濃度如何互相換算？
3. 治療 AWS 的 drug of choice
4. AKA 的標準治療

## Take home message

1. 酒精排除率  
→ 20 mg/dL/h
2. 吹氣與血液中酒精濃度如何互相換算？  
→ 呼氣濃度  $\times 200$  = 血液濃度
3. 治療 AWS 的 drug of choice  
→ Lorazepam 2~5 mg
4. AKA 的標準治療  
→ Dextrose+saline; no insulin 、no Jusomin

## Thanks

