

Ministry of Defence

Synopsis of Causation

Alcohol Dependence/Alcohol Abuse Syndrome

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Disclaimer

This synopsis has been completed by medical practitioners. It is based on a literature search at the standard of a textbook of medicine and generalist review articles. It is not intended to be a meta-analysis of the literature on the condition specified.

Every effort has been taken to ensure that the information contained in the synopsis is accurate and consistent with current knowledge and practice and to do this the synopsis has been subject to an external validation process by consultants in a relevant specialty nominated by the Royal Society of Medicine.

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1. Definition

- 1.1. There are a number of terms that have been commonly used to describe alcohol-related problems: alcohol abuse/misuse, alcohol addiction, alcoholism, harmful use of alcohol, alcohol dependence etc.
- 1.2. The excessive use of many of these terms has led to a dilution and distortion of their meanings, with some having acquired pejorative connotations and deviating from the precise definitions that clinicians have attempted to give them. It is probably best to regard alcoholism as an umbrella term covering both alcohol abuse/misuse/harmful use (mild to moderate end of the spectrum) and dependence (severe end of the spectrum).
- 1.3. Chapter V of the International Classification of Diseases and Health Related Problems (ICD-10;1992) defines the (alcohol) dependence syndrome (F10.2) as “a cluster of behavioural, cognitive and physiological phenomena that develop after repeated (alcohol) use and that typically include a strong desire to take (alcohol), difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and sometimes a physical withdrawal state.”
- 1.4. The ICD-10 definition also stipulates that 3 or more of the above manifestations should have occurred together for at least 1 month or, if persisting for periods of less than 1 month, should have occurred together repeatedly within a 12 month period.
- 1.5. These diagnostic guidelines are based on the seminal Edwards and Gross paper¹ which first introduced the alcohol dependence syndrome and which emphasised the need to distinguish alcohol dependence from alcohol-related problems.
- 1.6. The key elements of the syndrome as defined by Edwards and Gross¹ were: narrowing of repertoire, salience of drinking, increased tolerance to alcohol, withdrawal symptoms, relief or avoidance of withdrawal symptoms by further drinking, subjective awareness of compulsion to drink and reinstatement after abstinence.
- 1.7. The fourth edition of the ‘Diagnostic and statistical classification of diseases and related health problems’ (DSM-IV), which is a system of classification used in the United States and some other parts of the world, defines alcohol dependence as ‘a maladaptive pattern of alcohol misuse, leading to clinically significant impairment or distress, as manifested by 3 (or more) of the following occurring at any time in the same 12-month period’:
 - Tolerance
 - Withdrawal
 - Alcohol is taken in larger amounts or over a longer period than was intended
 - Any unsuccessful attempt or a persistent desire to cut down or control alcohol use

- A great deal of time spent in activities necessary to obtain, use or recover from the effects of alcohol
 - Important social, occupational, or recreational activities given up or reduced because of alcohol use
 - Continued alcohol use despite knowledge of having had a persistent or recurrent physical or psychological problem that is likely to be caused or exacerbated by the substance
- 1.8. Using DSM-IV, one can also specify if alcohol dependence is accompanied by physiological dependence (the presence of tolerance or withdrawal symptoms) or not.

2. Clinical Features

- 2.1. This section describes the core features of the syndrome as well as the alcohol-related disabilities i.e. those physical, psychological and social problems that are a consequence of excessive drinking and dependence.²

The syndrome

- 2.2. **Narrowing of repertoire.** This refers to the gradual stereotyping of the heavy drinker's pattern of alcohol consumption; he/she begins to drink in the same pattern every day in order to ensure that a relatively high blood alcohol level is maintained and alcohol withdrawal is avoided.
- 2.3. **Salience of drinking.** Alcohol consumption achieves overarching importance at the expense of the drinker's physical and psychosocial wellbeing.
- 2.4. **Increased tolerance to alcohol.** The drinker needs progressively larger amounts of alcohol in order to obtain the same effect.
- 2.5. **Withdrawal symptoms** can be mild, moderate or severe and occur when the blood alcohol concentration falls; this is usually due to abstinence following a period of drinking but can occur in the absence of abstinence. The common symptoms include tremor, nausea, sweating and mood disturbance. Other symptoms like itching, muscle cramps, tinnitus, hyperacusis, sleep disturbance, seizures, hallucinations and other perceptual distortions, and delirium tremens (DT) may also occur. DT is a severe form of alcohol withdrawal that usually occurs 2-3 days after alcohol cessation. The symptoms include tremor, autonomic over-arousal, clouding of consciousness, disorientation, abnormal motor activity (tremors affecting hands, lips, tongue and rarely, the whole body), mood instability (anxiety, elation), seizures, illusions, delusions and hallucinations (including the so called Lilliputian hallucinations where the patient sees alarming images of animals, people etc. that are small in size).
- 2.6. **Relief drinking.** The drinker consumes alcohol, sometimes at unusual hours such as early morning upon waking up or in the middle of the afternoon or night, in order to alleviate or prevent the discomfort of withdrawal.
- 2.7. **Subjective awareness of compulsion to drink.** This refers to a sensation of impaired control over one's drinking habit and to the experience of 'craving' for a drink.
- 2.8. **Reinstatement after abstinence.** The drinker resumes his/her habit and relapses back into the previous stage of dependence.

Physical health consequences

- 2.9. **Neurological.** Structural and functional damage to the brain and peripheral nerves are well established³ sequelae of chronic alcohol consumption and occur due to a combination of the following: direct effect of alcohol and its by-products on brain cells, and thiamine depletion, hypoxia, electrolyte imbalance, and hypoglycaemia which result from acute or chronic intoxication and withdrawal.⁴ Alcohol related brain damage has been shown to be partially reversible⁵ on abstinence. Cognitive impairment (alcoholic dementia),⁶ Wernicke's encephalopathy,⁷ Korsakoff's

syndrome,⁸ cerebellar degeneration,⁹ hepatocerebral degeneration¹⁰ and foetal alcohol syndrome are well known alcohol-related complications.

- 2.10. **Gastrointestinal/liver.** Gastritis, severe diarrhoea, oesophageal tears, cirrhosis of the liver, hepatitis, pancreatitis, malabsorption/vitamin deficiency¹¹ can occur as a result of excessive alcohol intake. Alcohol appears to increase the risk of cancers of the mouth, pharynx, larynx, oesophagus, liver and rectum while a link to breast cancer has also been postulated.¹²
- 2.11. **Other sequelae.** These include: hypoglycaemia, myopathy, cardiomyopathy, cardiac failure, arrhythmias, renal failure, hypertension, skin changes (palmar erythema, spider naevi, exacerbation of psoriasis), cerebrovascular accidents, impotence, lowered male fertility.

Mental health consequences.

- 2.12. Depression and anxiety commonly, rarely mania, psychotic disorders (alcoholic hallucinosis, morbid jealousy or Othello syndrome), and alcohol-induced amnesias ('blackouts') are all recognised.
- 2.13. Of people who committed suicide in the UK, who had been in contact with mental health services within one year of death, 40%-60% had a history of alcohol misuse.¹³ There appears to be a high prevalence of alcohol use disorders in people who commit suicide worldwide.¹⁴ The lifetime risk of suicide is around 7% for alcohol dependence.¹⁵

Social consequences.

- 2.14. These include road traffic accidents (alcohol contributes to 15% of traffic deaths), home and leisure injuries (26-54%),¹⁶ violence,¹⁷ child abuse, crime,¹⁸ homicide (1/3 of all offenders in the UK),¹⁷ unemployment, debt, housing problems and damaged family relationships.

Global burden.

- 2.15. Alcohol causes 3.2% of deaths (1.8 million) and 4% of ill health and premature death (58.3 million years).¹⁹

Beneficial effects of alcohol

- 2.16. Moderate alcohol intake appears to lower the risk of coronary heart disease.²⁰
- 2.17. Some studies have suggested that, compared with moderate drinkers, heavy drinkers and abstainers have an increased prevalence of depressive and anxiety symptoms²¹ but these have been criticised on methodological grounds.

Occupation

- 2.18. Heavy drinking has been associated with certain occupations for specific reasons; for example: easy availability of alcohol (drinks industry and licensed trade), freedom from supervision and stress (doctors, lawyers, senior executives). Stress, separation from normal social and sexual relationships, and the adverse effect on family life have already been suggested as possible causes of alcohol problems²² in the military. Research has also shown that, of the mental health problems faced in

the armed forces, alcohol misuse and depression are more common than post-traumatic stress disorder (PTSD).²³

3. Aetiology

- 3.1. While historically, several factors have vied for primacy in the causation of alcohol dependence, the modern view is that this is probably a heterogeneous disorder with multiple causes, and that for each patient, it is the result of a different interaction of an array of aetiological factors, each factor being more or less important in an individual case.
- 3.2. Currently, the social learning and the disease models of alcoholism are the main theories that hold sway in this field. The former posits that alcohol misuse is an acquired behaviour which the individual is capable of correcting with adequate psychological training,²⁴ while the principle of the latter model is the inability of the individual to restrict the amount or frequency of drinking.²⁵

Sociocultural factors and **individual vulnerability** both appear to play important roles in the causation of alcoholism.

- 3.3. **Sociocultural factors** These risk factors include male gender, lower education, lower income, marital breakdown, certain occupations, cultural ambivalence about drinking, socially condoned drunkenness, anomie/marginalisation and social stress.²⁶

- 3.4. **Individual vulnerability**

- 3.4.1. **Genetic influences** An individual with alcoholic parents or siblings is twice as likely to develop the disorder; the risk is threefold if second or third degree relatives are also involved.²⁷ Many twin studies²⁸ have shown that there is greater concordance (i.e. the occurrence of the disorder in both the twins) in identical twins (who have a common genetic stock) than in fraternal twins (who only share 50% of their genes), thus strongly suggesting a genetic basis to alcoholism. However, as 40-70% of identical twins of alcoholics do not show the disorder, non-genetic causes are clearly implicated in the aetiological process as well. Adoption studies report an increased risk of the disorder in the children of alcoholics, regardless of the family environment they grew up in, that is, their own or an adoptive family.²⁸ The evidence also suggests that the biological parents of alcoholic adoptees are also more likely to show antisocial behaviour in tandem with alcoholism.²⁹
- 3.4.2. **Biological predisposition** Individuals with a family history of alcohol problems appear to be less sensitive to its effect, thus potentially predisposing them to heavier drinking patterns.³⁰ Biological markers of vulnerability to alcoholism appear to include lowered serotonin levels, abnormal findings in neurophysiological tests like event-related potentials (where a reduced amplitude and increased latency of the P300 brainwave is found), and transketolase deficiency.³¹
- 3.4.3. **Molecular genetics** The first genome-wide screens for alcoholism in humans have identified several chromosomal regions linked to both vulnerability³² and resilience³³ to alcohol dependence.

- 3.4.4. **Psychological factors**

- **Personality** While more than half the alcoholic population do not share any particular personality background, there is a significant minority

which appears to share certain distinctive traits. One such group scores low in novelty seeking and high in harm avoidance, while another group can be characterised as natural thrill seekers.³⁴ Also, conduct disorder and antisocial behaviour are strong predictors of alcohol misuse³⁵

- **Psychodynamic processes** The self medication hypothesis³⁶ of addictions postulates that deficiencies in self-care and self-esteem result in the individuals turning to alcohol to alleviate their distress
- **Learning** Alcohol abuse is seen as a behaviour that results from its association with cues, and from the action of positive (pleasant effects) and negative (stress reduction) behavioural reinforcement. Through social exposure, alcohol users learn to accentuate the positive aspects of drinking and minimise the negative³⁷
- **Comorbid psychiatric disorders** The risk of alcoholism appears to be elevated in persons with depression, anxiety, bipolar mood disorder, schizophrenia, panic disorder, social phobia, post-traumatic stress disorder, attention deficit hyperactivity disorder, and antisocial and borderline personality disorders³⁸
- **Mood and anxiety disorders** are especially prevalent among those dependent on alcohol. These 2 conditions appear to share some genetic components, a feature especially noted in women.⁴¹ In the majority of cases, depressive and anxiety symptoms are secondary to the primary alcohol habit³⁹ and abate when the alcohol consumption is reduced. The mechanism by which this occurs is not well understood but it is thought that dopamine and serotonin⁴⁰ neurotransmitter pathways in the brain may be involved. Also, psychosocial problems associated with alcohol dependence, such as unemployment, poverty, relationship difficulties etc. may increase the risk of comorbid depression and anxiety
- **PTSD** The combination of PTSD and alcohol abuse is a well recognised comorbidity.⁴² PTSD may be a risk factor for the development of substance (including alcohol) misuse.⁴³ This may have its onset in attempts by sufferers to self-medicate their PTSD symptoms.^{44,45} Also, higher rates of PTSD are found in persons with a prior history of substance dependence.⁴⁶ It is important that both the PTSD symptoms and comorbid alcohol (substance) misuse are treated simultaneously
- **Traumatic events** that have especially been linked with a tendency to drink alcohol excessively include for example:
 - Having been involved in a life-threatening accident
 - Having witnessed an accident with serious consequences
 - Having been raped
 - Having been the victim of an aggressive encounter⁴⁷

4. Prognosis

- 4.1. Due to the multifactorial aetiology of alcohol dependence, it is impossible to offer a 'one size fits all' view on prognosis. Prognosis will clearly depend on a number of factors including the pattern of alcohol consumption, environmental and individual factors.
- 4.2. Affected people who voluntarily seek help after realising they are alcoholics usually have the best prognosis. Those with social supports (family, employment) and resilient, non-impulsive personalities are more likely to recover.
- 4.3. Treatment of comorbidity is important. Attempts to identify the primary underlying disorder for example depression, and subsequent treatment of this condition will lead to the best possible outcome.
- 4.4. Treatment of alcohol dependence includes both management of acute crises such as withdrawal symptoms and longer term maintenance and relapse prevention strategies using a combination of pharmacological and psychological methods.
- 4.5. It is anticipated that significant advances will continue to be made in establishing a polygenic molecular genetic model of alcoholism.
- 4.6. The roles played by various biological markers will also be clarified in the short to medium-term future.

5. Summary

- 5.1. Alcohol dependence and alcohol abuse syndrome are disorders with features that range from the diagnostic elements of the syndrome to the maladaptive behaviours and the impaired physical, mental and psychosocial well-being that result from the disorder(s).
- 5.2. They are multi-factorial in aetiology with both environmental and biological factors playing important causative roles.

6. Related Synopses

PTSD

Depressive disorder

Generalised anxiety disorder

Schizophrenia

Bipolar Mood Disorder

Adjustment Disorder

Cirrhosis

Hepatitis

The Cardiomyopathies

7. Glossary

anomie	Lack of the usual social or ethical standards in an individual or group.
arrhythmia	Variation from the normal rhythm of the heart beat.
cerebellar degeneration	Degeneration, especially of Purkinje cell layer in the cerebellum of the brain, resulting in unsteady gait, dysarthria (imperfect articulation of speech) etc.
cirrhosis	Inflammation, usually of the liver.
cognitive	Refers to thinking and perceptual awareness.
delusion	Firmly held, usually false (and bizarre) belief, not amenable to proof of evidence to the contrary.
foetal alcohol syndrome	Results from (usually excessive) consumption of alcohol by the pregnant mother, characterised by foetal growth retardation, learning disabilities, structural facial abnormalities etc.
genome	The complete set of hereditary factors (genes) present in each set of 24 chromosomes in each cell of an organism.
hallucination	Abnormal perception in any of the 5 senses in the absence of an external stimulus.
hepatocerebral degeneration	Disorder resulting from brain damage secondary to liver damage with symptoms including delirium, seizures, tremors, coma etc.
hyperacusis	Exceptionally sensitive hearing ability.
hypoglycaemia	Deficiency of glucose levels in the blood.
hypoxia	Deficient oxygen supply to tissues.
illusion	Misperception of a normal external stimulus.

Korsakoff's syndrome	Amnesic syndrome usually with relative preservation of other faculties; a complication of alcohol misuse.
myopathy	Any disease of muscle.
palmar erythema	Redness of palms seen often in liver disorders.
physiological	Pertaining to (normal) bodily processes and functions usually at tissue and organ level.
serotonin	A hormone and neurotransmitter found in many tissues and especially in the brain.
spider naevi	Red spot on skin shaped like a spider, due to dilatation of superficial blood vessels; seen in liver disease and pregnancy.
syndrome	A set of symptoms occurring together.
thiamine	Vitamin B1.
transketolase	An enzyme.
Wernicke's encephalopathy	Disorder caused by thiamine deficiency, occurring as a complication of alcohol abuse and characterised by confusion, unsteady gait, eye problems etc.

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