Dying for a drink: The consequences of the sale of methanol in Vietnam.

Words: 3298

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# Abstract

Although not a common presentation in the world of Western Medicine, methanol poisoning is a regular occurrence at Bach Mai Poison Control Centre. Despite the physicians best efforts to reduce the availability of methanol in Vietnam, roughly two to three patients still present every day with the characteristic features accompanying methanol poisoning. In a country where economical gain is prioritised over the ever-expanding problem of harmful alcohol consumption, this report discusses the steps physicians and charities are taking to try and reduce the impact methanol is having in Vietnam.

# Introduction

Methanol is the simplest alcohol, which has a distinctive odour similar to that of ethanol, however it is mainly used as a solvent, in chemical synthesis and as a fuel. 1 Despite having a relatively low intrinsic toxicity, it is metabolised to highly toxic compounds such as formic acid which accumulates in the body. 2 The toxic metabolite, formic acid, accounts for the associated metabolic acidosis with a raised anion gap, and end-organ damage.3

In Vietnam, the number of hospital admissions due to methanol poisoning is on the rise. 4 At the poison Control Centre at Bach Mai Hospital in Hanoi, there were two to three hospital admissions due to methanol poisoning a day, which is significantly higher than the 77 referrals for methanol, ethylene glycol and antifreeze combined for the United Kingdom (UK) in 2016/17.  4 , 5 Bach Mai has the the only Poison Control Centre in Vietnam available for civilians and the activities in this centre make it one of the pioneers in East Asia. 6 The rise in admissions related to methanol poisoning in Vietnam is due to the addition of methanol to illicitly, or informally-produced alcoholic drinks for economical purposes. 7

When methanol is added to these beverages, it is unlikely that the patient is aware of the contents of what they are drinking as they usually are poorly packaged, poor quality alcohol. 8 This, combined with the latent period after methanol ingestion which can last approximately 12-24 hours, results in delayed presentation to hospital. 2 Late medical care contributes significantly to the high morbidity and mortality associated with methanol poisoning in Vietnam. 9 Given the high morbidity and mortality, physicians in Vietnam are eager for the Vietnamese Government to pass strict laws reducing the availability of methanol.

In 2010, the World Health Assembly endorsed a global strategy to reduce the harmful effects of alcohol. They identified ten recommended target areas of policy options and interventions at the national level, and four priority areas for global action (Figure 1). Of the ten areas for national action, this included reducing the public health impact of illicit alcohol and informally produced alcohol. 10 Despite the acknowledgement of these areas for national action, illicit alcohol and informally produced alcohol which contains methanol is still a large contributor to admissions in the Poison Control Centre of Bach Mai Hospital in Vietnam. 4

**The World Health Organization (WHO) : Global strategy to reduce harmful alcohol use 2010.**

The ten areas for national action:

* Leadership, awareness and commitment;
* Health services' response;
* Community action;
* Drink-driving policies and countermeasures;
* Availability of alcohol;
* Marketing of alcoholic beverages;
* Pricing policies;
* Reducing the negative consequences of drinking and alcohol intoxication;
* Reducing the public health impact of illicit alcohol and informally produced alcohol;
* Monitoring and surveillance.

Figure 1: WHO Global strategy to reduce harmful alcohol use- 2010.

Despite the impact methanol is having, there is currently no successful strategy in place to tackle this issue. This report will discuss the factors contributing to the rise in methanol poisoning, the Poison Control Centre at Bach Mai Hospital in Vietnam, and the current political climate surrounding harmful alcohol use in Vietnam.

# Methods

In order to conduct this report, I have reflected on some aspects of my experience at the Poison Control Centre at Bach Mai Hospital in Hanoi. Alongside these reflections, I have thoroughly researched the topic and added additional insight into the specific problems associated with methanol in Vietnam. When conducting my reflection, I used the Gibbs reflective cycle in order to help me think systematically about all the aspects of this particular topic. 11

# Why Choose Methanol?

## Cost

Unregulated alcoholic drinks are generally very cheap, and therefore are attractive to people with low incomes, and particularly those who are alcohol dependent. 12 Given this, methanol poisoning is seen to mainly affect the poorest and most vulnerable citizens in society, namely rural communities in Vietnam. However, it has also been sold in legitimate bars, particularly in some tourist areas. 8,13

With the correlation between alcohol dependence and increased risk of methanol poisoning, it is important to highlight the fact that Vietnam ranks among the countries with the highest rate of years of life lost due to alcohol. 14 There is a large number of alcohol dependent citizens in Vietnam, and therefore a large number of citizens at risk of methanol poisoning. This is a large contributing factor as to why stricter alcohol controls in Vietnam is vital to decrease the number of people potentially exposed to methanol.

Many citizens in rural areas of Vietnam brew their own alcoholic drinks, namely rice wine as there is a cultural connection. 15 There are weak quality assurance measures on these illegally brewed alcohol products as it is understandably difficult to monitor, but this means that many Vietnamese citizens may be at risk of methanol exposure due to improperly brewed alcoholic beverages. These citizens are usually in rural communities, which are further away from hospitals equipped to deal with methanol poisoning, resulting in a higher morbidity and mortality in this group of patients.

## Poor Understanding

After raising the very question of ‘why choose methanol?’ with the physicians at the Poison Control Centre of Bach Mai Hospital, one interesting reason they gave as to why many people were still consuming methanol was the fact that both methanol and ethanol translate to alcohol, and therefore some people lack the understanding that one is a toxic compound and the other is drinking alcohol.

One patient we met on the Intensive Care Unit joined to the Poison Control Centre had unfortunately purchased medical grade cleaning alcohol from a pharmacy as it was a cheaper option to other forms of alcohol, yet he believed that it was still ‘alcohol’. This was a rather shocking experience for myself as it was a case where the patient purchased medical grade methanol, rather than having it added to an alcoholic drink. This patient was dependent on alcohol, as it was upsetting to know that he had turned to methanol given the financial strain his dependency was causing. This highlighted the need of stricter packaging for such products so that there is no confusion in what is being purchased, and that it cannot be drank. Unfortunately, this patient remained in a coma for the duration of our stay at the Poison Control Centre.

Examples of such bottles that can be purchased from pharmacies can be seen in Figure 2.



Figure 2: Methanol purchased from a pharmacy in Hanoi.

## Ease of Purchase

As mentioned previously, methanol is easily purchased in Vietnam, with 70% of people in one study who drank homemade alcohol stated it was easier to purchase than branded commercial products. 15 Further to this, a 2007 policy review of alcohol control-related legislation showed that the Vietnamese government had adopted a number of individual policies designed to reduce the harmful use of alcohol, however they still failed to achieve any coverage of home-brewed products. 16

After discussing this particular topic with the physicians at the Poison Control Centre, it is evident that this is still an issue in Vietnam today. It would be seemingly impossible, if not very difficult, for the government to currently provide strict quality assurance measures for home-brewed alcohol as, as well as rice wine being a part of Vietnamese culture, much of this alcohol is brewed in rural villages, especially in Northern Vietnam. 15 It is these forms of alcohol that have the greatest risk of containing methanol.

# Bach Mai Poison Control Centre, Hanoi

As previously mentioned, the Poison Control Centre at Bach Mai Hospital in Hanoi is the only national poison control centre for civilians. 6 It was established in 2003 and is directed by three physicians specialised in critical care medicine, along with seven other physicians, laboratory technicians, nurses and medical assistants. In the centre, there are 35 patient beds, along with a toxicology laboratory and a specialised intensive care unit. Approximately 1700-1800 poisoned patients are annually treated at the centre, with poisonings ranging from pesticides, snakebites and methanol.

The work in the poison control centre has been crucial in lowering the mortality rate due to poisonings, from 8.5% in 1998, to 1.99% in 2013. 6 During my time at the Poison Control Centre, it was evident to see why. Dr N. Nguyen was a very passionate teacher, educating my colleagues and myself about the many different types of poison patients that he sees in daily practice. He also took the time to discuss with us the current political issues surrounding the acquisition of methanol and the sale of methanol-containing alcohols. During these discussions, we touched on the issues with regulating the sale of alcohol in Vietnam and the quality assurance measures the government has implemented with regards to alcoholic beverages to ensure the levels of methanol found are non-toxic.

During these discussions, it became evident that the Vietnamese government has a long way to go in order to successfully reduce the health burden that alcohol abuse has in Vietnam, with one of the most popular opinions in the ward being stricter laws on the sale of methanol.

# Spotting and Reversing the Damage

Methanol can be acutely toxic following inhalation, oral or dermal exposure. 17 A potentially lethal dose of methanol is approximately 30 to 240 mL or 1 gram per kilogram, with as little as 8 g (10 mL of100%) methanol having the potential to cause blindness, and blood methanol concentrations above 1500-2000 mg/L will lead to death in untreated patients. 18,19

Acute methanol toxicity often follows a characteristic symptomology, with most patients initially complaining of anxiety, headaches, nausea, and vomiting and ophthalmologic abnormalities. 17 The presentation of visual symptoms can range from blurred vision, photophobia and partial to complete visual loss, with dilated, non-reactive pupils being a common finding. 18 There is typically a delay between the onset of visual symptoms and other symptoms of concern due to the metabolic acidosis, varying from 12-24 hours, but can sometimes be up to 48 hours post-ingestion. 17 An increased delay in toxicity can be due to the co-ingestion of ethanol along with the methanol. 20 This is a common occurrence since methanol does not cause intoxication due to its lower molecular weight, and therefore it is added to alcoholic beverages along with ethanol. 21

Patients with methanol poisoning often recover when prompt diagnosis and treatment occur, however when patients present late or the diagnosis is not recognised, significant morbidity and mortality can occur. 21 Despite effective treatment once the patient reached the Poison Control Centre, there is commonly a delay in the transfer of the patient to the centre as the poisonings are more common in rural areas of Vietnam.

Methanol poisoning is managed in a similar way to that in other countries, including the United Kingdom (UK). The National Institute for Health and Care Excellence (NICE) guidance for the management of methanol poisoning states that initial management is the same as that in any medical emergency, using a thorough A to E approach, with emergency transfer to hospital. 22 For suspected or known methanol poisoning, further assessment should include weighing the patient, obtaining measurements for urea and electrolytes, bicarbonate, calcium and chloride blood measurements, blood glucose measurement and plasma osmolality. 23 Serum paracetamol and salicylates should also be undertaken, along with finger prick plasma ketones, a urine sample for oxalate crystals and for cases of suspected ethylene glycol poisoning which commonly contains methanol, a serum sample for ethylene glycol level. A 12 lead electrocardiogram and an arterial blood gas should also be conducted. 23

For diagnosis of methanol poisoning, there needs to be a documented recent history of methanol ingestion and an osmolar gap of greater than 10 mOsm/L, or a suspected methanol ingestion and an osmolar gap greater than 10 mOsm/L and an arterial pH of 7.3 or serum bicarbonate of <20 mmol/L. 23

Methanol poisoning can be reversed using Fomepizole, therefore if a patient presents early with no visual disturbance, this should be administered. If the patient presents with visual disturbance or acidosis, haemodialysis is administered. 23 There is little documentation available regarding how methanol is treated in Vietnam, however it is in a similar manner as to that in the UK, but there is less access to haemodialysis. Furthermore, during my time on the ward, I was never spoken to about the use of an antidote, mainly correcting the abnormalities that the patient presented with.

# The Politics of the Issue

There are numerous political issues surrounding the sale and consumption of alcohol in Vietnam, which has led to high alcohol dependence in the country, with alcohol use disorders and alcohol dependence in males being over twice that of the WHO Western Pacific Region. 24 The Ministry of Health in Vietnam have prepared the Law on Alcohol Harm Prevention to try and tackle the severe problems alcohol causes in Vietnam, as the WHO has reported that alcohol consumption and related harm will rise further if no alcohol policy measures are put in place. 25 Despite discussion of this new law since 2018, a current update in June 2019 has shown that the draft is still currently being discussed in the National Assembly. 26

Initially, the Law on Alcohol Harm and Prevention had three main objectives, seen in Figure 3. However, new concerns have emerged regarding unethical lobbying practices of the alcohol industry in Vietnam, which are proving successful. Their aim is to stop, if not minimise, any new policy with regards to alcohol in Vietnam, and therefore are directly going against the three aims of the Law on Alcohol Harm Prevention. Thus far, the National Assembly have voted to reject a curfew on the sale of alcoholic beverages between 10pm and 8am, as initially proposed by the Ministry of Health. 26 They have also rejected a provision to ban people found with alcohol content in their blood or breath from driving.

**The three main aims of The Law on Alcohol Harm Prevention:**

* Availability regulations: to curtail opening times for alcohol outlets; to ban the sale and consumption of wine and beer in public offices.
* Affordability regulations: to institute higher taxes on wine and beer.
* Health and development promotion: to develop new policies to prevent the negative impacts of alcohol on good health and raise the living standards of Vietnamese people.

Figure 3: The three main aims of the Law on Alcohol Harm Prevention

Many of the arguments against the stricter policies in the Law on Alcohol Harm Prevention are due to the negative implications that they would have on alcohol trade in Vietnam. However, it is not in the best interest of public health. This is what numerous physicians on the ward discussed with us. During these discussions, I found it unusual that the Vietnamese government would not want to prioritise the health of its citizens over trade, especially when the consumption of alcohol is such a big problem in Vietnam. However, from evaluating the situation it is easy to forget the large amount of revenue that alcohol consumption brings in for a still developing country. Vietnam was ranked 16th amongst the largest alcoholic beverage consuming countries in the world in 2016, with the industry being worth over VND122 trillion in 2015. 27,28 Given this, and the power of the large alcohol companies in Vietnam, it is understandable that the Vietnamese Government are conflicted about whether to continue allowing this trade to grow, or vote in the best interest of their citizens.

The third aim of the Law on Alcohol Harm Prevention aims to prevent the negative impacts of alcohol on good health. This includes monitoring the quality of alcohol products to ensure that there is a regulated amount of maximum methanol content in alcoholic beverages that is under the toxic range. However, it would be very difficult for the Vietnamese Government to successfully monitor the quality of illicitly produced alcoholic beverage, despite it being in their best interest. Illicit alcohol has both human, societal and economic cost. The human cost has been described previously, with raised morbidity and mortality affecting the individual person, societal cost is due to the ill health of the more vulnerable in society, and economic cost is due to the significant fiscal loss that illicit alcohol causes for the government. 13 Despite this, there does not seem to be any clear-cut laws stipulating how the Vietnamese Government can reduce the availability of illicitly produced alcohol, and along with it the risk of these beverage being laced with methanol.

Although the Law on Alcohol Harm Prevention is still in discussion, a five year educational programme has been launched by the Institute for Preventative Medicine and Public Health (IPMPH) and methanol institute (MI), in partnership with the Poison Control Centre at Bach Mai Hospital, entitled ‘The Viet Nam Methanol Education Programme (VMEP)’. This programme aims to protect Vietnamese consumers from the negative health implications caused by improperly brewed, homemade alcohol and methanol-laced alcoholic beverages. 29 This programme encompasses the training of medical personnel and public healthcare workers in community, regional and municipal hospitals. It will also provide educational outreach to the Vietnamese public, including at-risk communities. There have been successful programmes ran by MI in Indonesia in previous years. There is limited data on the success of this programme in Vietnam as it is due to end in 2020, however improper education regarding methanol consumption has been highlighted as one of the reasons for consumption. Education around this matter, combined with an increased number of medical personnel at a larger number of hospitals should both decrease the incidents of methanol ingestion, and improve treatment in more rural areas, leading to reduced morbidity and mortality.

# Discussion

It is evident that alcohol is a lucrative business in Vietnam, providing the country with a high revenue and an enjoyable social pass-time. However, there are many negative implications with regards to alcohol consumption, and the subsequent methanol consumption that comes along with it. Other than cases of non-accidental consumption, a majority of the cases of methanol toxicity seen in the Poison Control Centre are due to the consumption of alcoholic beverages containing methanol, or the consumption of methanol due to the presumption that it was drinking alcohol. Alcohol dependency increases your risk of being exposed to methanol and therefore, there is a correlation between increased alcohol dependency and an increase in incidents of methanol poisoning. This highlights the potential impact that the Law on Alcohol Harm Prevention could have in Vietnam, and therefore why the physicians at the Poison Control Centre were pushing so hard to get these measures passed.

In order to complete the reflective process regarding the consequences of the sale of methanol in Vietnam, it is important to consider how the health services in Vietnam could be improved, and what the alternative solutions there are. Despite the current issues regarding the acquisition of methanol in Vietnam, the treatment of methanol toxicity is very successful, with the Poison Control Centre in Hanoi doing their utmost to treat patients. Dr N. Nguyen, who guided us on our elective experience, has attended numerous conferences around the world to present his work from the centre, with himself and other members of staff thoroughly earning the title of being pioneers in their field in East Asia. The staff at the centre do the most with the resources they have, utilising their toxicology laboratory and providing excellent treatment to patients.

With regards to alternative solutions, currently there is work being conducted by the Poison Control Centre in Hanoi tackling public education with regards to methanol, and also providing training to medical professionals regarding the recognition and treatment of methanol. Although this will hopefully reduce the health burden methanol is having in Vietnam, national legislation making it more difficult to purchase methanol, and more nationwide education programmes would go further than the privately funded VMEP could.

Reflecting on my experience in the Poison Control Centre in Vietnam and further investigating the true extent of the political issues that physicians are fighting against has been a truly eye-opening experience. It has made me even more appreciative of having a system which, although not perfect, mainly prioritises public health where possible. The dedication and passion that I saw in the physicians actively campaigning against the government was inspiring. I thoroughly enjoyed my experience in the Poison Control Centre, and it has given me a greater insight into what practicing medicine is like around the world.

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