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Review Article

The cost effectiveness of brief intervention by primary health care workers to reduce alcohol related disease and injury in Vietnam

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Abstract

This study examines the cost-effectiveness of early identification and brief advice for people with hazardous and harmful alcohol use in Vietnam. Two scenarios in which BI is financed by the government (BI-GOV) and non-government organisations (BI-NGO) were compared with current practice. Costs and health outcomes were measured over a 10 year period, referenced to 2006 and discounted at 3%. Cost-effectiveness was modelled using a multi-state and multiple cohort life table approach using a Vietnamese health sector perspective. Cost-effectiveness ratios were measured in United State dollars per disability adjusted life year averted (DALY). When intervention costs are offset by savings to the health care system, BI-GOV will save US$0.27m while BI-NGO will cost US$3.96m. Both BI scenarios are very cost-effective with BI-GOV being a dominant intervention (i.e., cheaper and more effective). Vietnam is in need of a comprehensive and sustainable alcohol policy that can balance the government's commitment to remove barriers to economic growth with a long term public health approach to minimize preventable harms and related economic burden. These findings provide sound policy advice of an effective and cost-effective strategy to reduce the burden of harm associated with hazardous and harmful alcohol consumption in Vietnam.

Keywords: Alcohol; Brief Intervention; Policy; Vietnam, Cost-Effectiveness

Introduction

Alcohol consumption has been identified as an important risk for chronic disease and injury, with an estimated 3.8% of all global deaths and 4.6% of disability adjusted life-years (DALYs) attributed to alcohol [1]. Vietnam, one of the emerging economies of the developing world, is currently experiencing an increase in the amount of alcohol consumption. This can be attributable to a number of factors including liberalisation, economic growth, changing cultural attitudes towards drinking and a low level of market controls imposed by the government [2]. Higher rates of alcohol consumption are associated with higher alcohol-related crime, traffic accidents and adverse health outcomes and the recent burden of dis-

ease study conducted in Viet Nam quantifies the epidemiological harm at 5% of the total disease burden and the leading cause of disability among males [3]. This alcohol-attributable disease burden is likely to get worse given rising consumption levels, from 1,229 million litres (14.1 litres per capita) in 2005 to 2,363 million litres (27.5 litres per capita) in 2010 [2].

To curb this growth and address the burden of harm associated with alcohol misuse, a strengthened and more effective response is required by the Vietnamese government. A sensible public-health strategy would aim to be comprehensive by combining fiscal measures such as taxation with other supply and demand initiatives [4]. A comprehensive global assessment by WHO of the effectiveness and cost-effectiveness of policies and programs to reduce alcohol-related harm found brief advice is the most effective evidence-based treatment method [5]. Extensive evidence from systematic reviews and meta-analyses from a range of health-care settings in different countries has shown the effectiveness of early identification and brief advice for people with hazardous and harmful alcohol use but who are not severely dependent. In addition, brief advice has been found to be cost-effective relative to standard care [6-7], and relative to other interventions aiming to reduce the disease burden from hazardous and harmful alcohol consumption [8-9]. On the strength of this evidence there have been calls for universal uptake of screening and BIs into routine practice by GPs [5,10-11,]. The purpose of this study is to contextualise these global recommendations to Vietnam and to examine the potential cost-effectiveness of early identification.

Experimental Section

Intervention

For the purpose of this paper, brief intervention (BI) was defined to include: screening by the health care practitioner for hazardous and harmful alcohol consumption by using the Alcohol Use Disorders Identification Test (AUDIT) [12]; providing consultation to hazardous and harmful drinkers focusing on changing behaviour to reduce drinking; and following up patients and providing further advice if necessary. These services are further assumed to be provided by primary health providers. Modelled in our analysis are two scenarios: government funded BI (BI-GOV) and non-government funded BI (BI-NGO). Government funded primary health providers currently represent the largest workforce providing primary health care, and are employed on standard State contracts. Influencing behaviour in this workforce has the potential for change nationally. Health providers working in non-government facilities have higher salaries and benefits, and frequently operate in environments that offer greater motivation for change in their practice. With the Doi Moi economic reforms opening Vietnam to private provision of health services, the private not for profit sector, though more costly, is likely to continue to be seen as offering better quality services, and influence health system performance more broadly.

Measurement of health benefits

The methodology used to model the taxation scenarios is based on the ACE-Alcohol project (Assessing the Cost-Effectiveness of interventions to reduce the burden of harm from alcohol-related harm misuse. The method and several applications are reported in detail elsewhere [9,13]. Health outcomes were evaluated in disability adjusted life years (DALYs), using a multi-state, multiple cohort life table approach to determine changes in incidence, prevalence and mortality of alcohol-related diseases and injuries due to each intervention. A reduction in alcohol consumption affects the incidence, prevalence and mortality of alcohol-related diseases and injury, which in turn influence overall rates of mortality and disability in the intervention population. Diseases modeled are those related to alcohol and included ischaemic heart disease, ischaemic stroke, mouth and oropharynx cancer, oesophagus cancer, breast cancer, liver cancer and alcohol use disorders. Injury from road traffic accidents was also included.

All epidemiological inputs were based on the Vietnamese Burden of Disease study, a component of the "Vietnam Evidence for Health Policy" (VINE) project [3]. Where relevant epidemiological data was missing, DISMOD was used to estimate case fatality rates of all cancers and alcohol use disorders from prevalence, incidence and remission rates data [14]. The relative risks of diseases and injury for different alcohol exposure categories are shown in Table 1. Data on the prevalence of different levels of alcohol use were obtained for the Vietnamese population [15-17]. The model measures total health gains in DALYs averted. Disease specific disability weights were calculated from the Vietnamese Burden of Disease study with background disability weights based on Thailand disability rates [2, 17]. All costs and health outcomes were measured over a 10 year period, referenced to 2006 and discounted at 3%. The model was built in Excel and used the Ersatz software for uncertainty analysis [18].

In the absence of any local data on the effectiveness of BI, the effectiveness rate of Cobiac et al. (2009) was used [9]. Cobiac et al. (2009) conducted a meta-analysis using a random effects method and reported a pooled estimate of decrease in self-reported alcohol consumption of -44 grams of alcohol consumed per week ($p<0.001$). This is in addition to any decrease in consumption reported by the control groups in each study. Cobiac et al. (2009) interpreted this to mean that when BI are implemented with the guidelines there is potential to significantly reduce self-reported alcohol consumption by up to four standard drinks per week more than controls. This rate converts to a reduction of 6.29 grams of alcohol per day for those drinking alcohol at risky levels (i.e., harmful and hazardous levels) [9].

To account for the increased affordability of alcohol relative to GDP this rate of effectiveness is decayed by an annual factor of 14% [2].

Table 1: Relative risks of alcohol-related diseases and injuries at different categories of alcohol consumption (with abstinence§ as the reference value)

Disease/Injury*	Alcohol intake level			
	Sex	Low§	Hazardous§	Harmful§
Ischaemic heart disease	Male	0.85 (0.82–0.88)	0.84 (0.80–0.87)	1.00 (0.94–1.07)
	Female	0.87 (0.84–0.90)	0.92 (0.87–0.96)	1.20 (1.06–1.35)
Ischaemic stroke	Male	1.02 (0.84–1.21)	1.44 (1.15–1.79)	1.84 (1.02–3.04)
	Female	0.62 (0.50–0.77)	0.77 (0.52–1.09)	1.47 (0.41–3.77)
Breast cancer	Male	–	–	–
	Female	1.14 (1.09–1.20)	1.41 (1.32–1.50)	1.59 (1.43–1.78)
Mouth and oropharynx Cancer	Male	1.58 (1.35–1.87)	2.95 (1.92–4.63)	5.41 (1.78–16.53)
	Female	1.32 (1.11–1.63)	2.01 (1.44–2.85)	3.89 (1.97–10.62)
Oesophagus cancer	Male	1.32 (1.19–1.46)	2.17 (1.71–2.75)	4.42 (0.91–2.57)
	Female	1.18 (1.11–1.26)	1.56 (1.38–1.76)	2.05 (1.65–2.57)
Liver cancer	Male	1.13 (1.07–1.20)	1.39 (1.21–1.60)	1.79 (1.23–2.57)
	Female	1.07 (1.04–1.11)	1.22 (1.13–1.31)	1.49 (1.29–1.75)
Road traffic accidents (Years of life lost)	Male	1.30	2.19	4.84
	Female	1.15	1.53	2.58
Road traffic accidents (Years lived with disability)	Male	1.23	1.85	3.46
	Female	1.15	1.54	2.65

*Nhung et al (2011). Viet Nam Burden of Disease and Injury Study 2008. Hanoi: Hanoi School of Public Health.

+ Values are mean relative risk and 95% CI at average alcohol consumption for intake category versus abstinence.

§ Definition of alcohol categories:

Abstinence: 0.2 g alcohol consumption per day for males and females;

Low: 16.2 g alcohol consumption per day for males, and 8.9 g alcohol consumption per day for females;

Hazardous: 48.4 g alcohol consumption per day for males, and 27.1 g alcohol consumption per day for females;

Harmful: 98.3 g alcohol consumption per day for males, and 60.8 g alcohol consumption per day for females.

Measurement of intervention costs

Although a societal perspective is considered to be the gold standard in economic evaluation, this study used the viewpoint of the government given the purpose was to provide advice on alcohol harm reduction measures that the government would be responsible for implementing. The WHO-CHOICE Cost It program developed by World Health Organization (WHO) was used to guide the identification of resources used in the development and implementing and management of the intervention [19]. Cost It provides a standardized and context-specific analytic framework for collecting and estimating economic costs related to interventions. Using this framework, resource use was grouped into three categories: human resource requirements; program supplies; and, overhead costs (rent, automobiles, equipment, utilities, and office supplies).

Human resource (HR) requirements include the cost of person time required to discuss, develop, train for, implement and manage BI at both the National and Provincial levels. The key cost drivers associated with HR issues are the cost of allowances for health care professionals to attend meetings and the time required to deliver the intervention once it is implemented. At the National level each province is assumed to have two persons (staff of health department of province) participating in the training course. They will become trainers who are responsible for the courses at their province later. Two experts will be lecturers for all courses at national level. There is assumed to be one National training course conducted in the 3 main geographical regions of the country. . The BI will be conducted at commune health centres (CHC). All heads of CHC would be trained as providers at this level. Each province would organize training courses depending on the number of participants. The costing assumes 30 participants for each training course with each training course being 5 days. The AUDIT is used to detect consumption of alcohol among population. People aged 18 and more who visit CHC to check their health will be invited to participate in the program. Based on result of AUDIT score, people will be classified as abstainers, low drinker or hazardoua/harmful drinkers. People who are classified as hazardous/harmful drinkers will be consulted and followed up.

Program management costs and costs associated with delivering BI are assumed to be constant each year (notwithstanding an adjustment for inflation). Professional staff receive refresher training courses once every 3 years. The cost of providing the service for BI-GOV is driven by the number of people eligible for the intervention (discussed in results under target population) multiplied by the cost of a consultation (i.e., VND1,000). For BI-NGO, the cost to the patients is nothing. Rather government providers receive salary support based on time spent on the program – up to 40% of salary in mountainous communes.

Program supplies include the cost of materials used in training health care professionals and other meeting related travel and logistical expenses. Rent and utilities are apportioned using a formula advised by the Government which considers such expenses equivalent to two-thirds the cost of HR.

Different sources of data were used to measure and value resource use. The bottom-up ingredient approach was used predominantly in the measurement phase, while the top down approach was used to generate estimates of unit prices from budget and other government reports. All assumptions and resource items were checked with national experts to ensure the costing templates captured the full spectrum of resource use and appropriate values were being used. The relevant value of each resource is estimated using one of the three based sources: Government norm for expenditure of program financing by government or ODA (the latest legal documents); actual cost data at the time of investigation; and, expert opinion. The key difference between the two scenarios i.e., BI-GOV and BI-

NGO; is the reimbursement of time. NGOs reimburse at much higher rates than the government.

Cost offsets

The interventions reduce alcohol use and thereby reduce the future prevalence of alcohol-related disease and injury. Intervention costs are offset by these avoided future alcohol-related health care costs. Cost offsets, for seven alcohol-related diseases including IHD, mouth and oropharynx cancer, oesophagus cancer, breast cancer, ischaemic stroke, liver cancer and alcohol dependence, were valued using inpatient costs from a national hospital in Hue City [20]. For alcohol-related road traffic accidents (RTAs) injuries, costs were assumed to accrue per year lived with disability that is averted. Due to lack of injuries cost data, direct costs at health facilities associated with treatment of traumatic brain injury due to motorcycle accidents in Vietnam were taken as a proxy for RTAs injury costs [20].

Cost-effectiveness analysis

When calculating cost-effectiveness ratios, we considered what would happen from today if all resources could be re-allocated. The cost-effectiveness of each intervention was assessed in relation to the counterfactual scenario, in which none of the proposed interventions was implemented; this is the average cost-effectiveness ratio. Classification of cost-effective interventions was based on the suggestions from the Commission on Macroeconomics and Health (CMH) [21] in which to be considered cost-effective, an intervention has to have a cost-effectiveness ratio of less than three times gross domestic product (GDP) per capita (i.e, US$2,181) [22,23]. Below that threshold, WHO-CHOICE considers an intervention to be very cost-effective if each DALY can be averted at a cost of less than GDP per capita (ie., US$727). All cost results are reported in US dollars.

Sensitivity and uncertainty analysis

Parametric bootstrap was conducted to provide the uncertainty interval (UI) of ICERs. These UIs are represented diagrammatically in the cost-effectiveness plane. Key input parameters were subject to extensive senstivity analysis by assuming distributions (beta, lognormal, triangular) around the point estimate. These variations test the robustness of results to changes in key parameters. Ersatz software was employed to perform bootstrap by re-sampling the values of parameters 2,000 times from those distributions [18].

Results

Target population

In 2006 the population of Vietnam was 82.78 million with an estimated 62.54 million people aged 18 years and over. Data suggests that around 12% of adult population will visit a primary health care facility each year, equivalent to 7.4 million adults. The 2009 Health Strategy and Policy Institute survey found 8.12% of adults consumed alcohol at harmful and hazardous levels) [15]. Assuming that hazardous/harmful drinkers frequent a health service at the same rate as other members of the population suggest that a total of 601,740 hazardous/harmful drinkers would be eligible to receive a brief intervention for their alcohol use. If these drinkers attended a health service and were screened for their alcohol use using the AUDIT (which has an estimate local sensitivity rate of 81.85%) [24], approximately 492,524 hazardous/harmful drinkers will be detected and then offered an intervention. If 70% of these come back for a follow-up visit a total of 344,767 hazardous/harmful drinkers would have been screened, offered a BI and then followed up.

Intervention costs

Intervention costs were collected for a ten year period and converted to 2006 prices. Table 2 provides a summary of first year operating costs for BI-GOV and BI-NGO expressed in VND billions and USD. For most categories these costs were indexed annually to account for inflation. As noted previously training refresher courses are offered once every three years to maintain the skills required to implement the intervention. As noted in the table, for BI-GOV, 45% of expenses relate to human resource requirements with provincial level training costs and intervention delivery costs representing 81% and 11% of total HR costs. This is a driven by the need to train heads of each CHC (i.e., 10,979) and then to deliver the actual BI. Program supplies account for 55% of total expenses with the cost of provincial training materials representing 97% of all program expenses. The cost of rent, utilities, equipment and office supplies is estimated to account for less than 1% of total expenses.

For BI-NGO, 55% of expenses relate to human resource requirements and 43% related to program supplies. As highlighted previously, a key difference between funding sources is rates of remuneration – whereby NGO rates are substantially higher. Another feature is the cost of delivering the intervention. BI-GOV costs less than 1 billion VND (US$52,591) to deliver the intervention whereas BI-NGO the cost is 9.3 billion VND (US$581,441). For NGO financed services, patients are required to pay nothing while providers are given additional salary support, with funding for these programs provided by international donors.

Across all cost categories the BI-NGO was considered more expensive than BI-GOV which reflects the higher remuneration rates offered by the private sector.

Table 2: Year 1 cost estimates for BI-GOV and BI-NGO

Cost component	BI - Gov	BI - NGO	BI - Gov	BI - NGO
	VND - billions	*VND - billions*	*USD*	*USD*
Human resource requirements				
National level management	405,804	655,488	25,489	41,172
Provincial level management	160,000	796,677	10,050	50,040
National level training	84,610	302,268	5,314	18,986
Provincial level training	6,269,700	7,395,600	393,808	464,527
Cost of delivering intervention	837,291	9,256,944	52,591	581,441
Subtotal	*7,757,405*	*18,406,976*	*487,253*	*1,156,166*
Program supplies				
National training materials	285,080	343,800	17,906	21,595
Provincial training materials	9,178,515	14,081,100	576,515	884,452
Subtotal	*9,463,595*	*14,424,900*	*594,421*	*906,047*
Rent, utilities, equipment, office supplies				
Subtotal	*103,870*	*694,776*	6,524	43,640
TOTAL	**17,324,870**	**33,526,653**	**1,088,198**	**2,105,853**

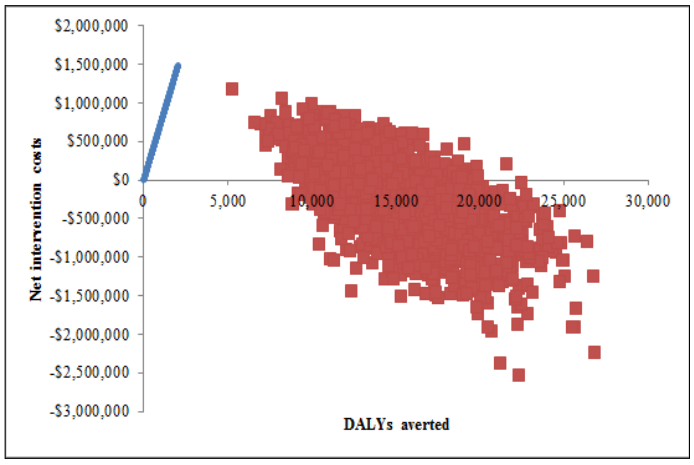
Cost-effectiveness analysis

Table 3 represents health effectiveness in terms of mean DALYs averted, median cost offsets, median intervention costs and median net costs (in 2006 USD) and, the average cost-effectiveness ratio for BI-GOV and BI-NGO. In terms of effectiveness, both BI scenarios avert around 15,000 DALYs and generate similar cost-offsets with similar confidence intervals identified by the uncertainty analysis. BI-GOV is the least costly intervention at around US$1.9 million with BI-NGO costing US$6.13m. BI-GOV saves US$0.27 million when intervention costs are adjusted for cost offsets. Conversely, BI-NGO results in a positive next cost of US$3.96 million.

Table 3: DALYs averted, costs and ICERs for BI-GOV and BI-NGO

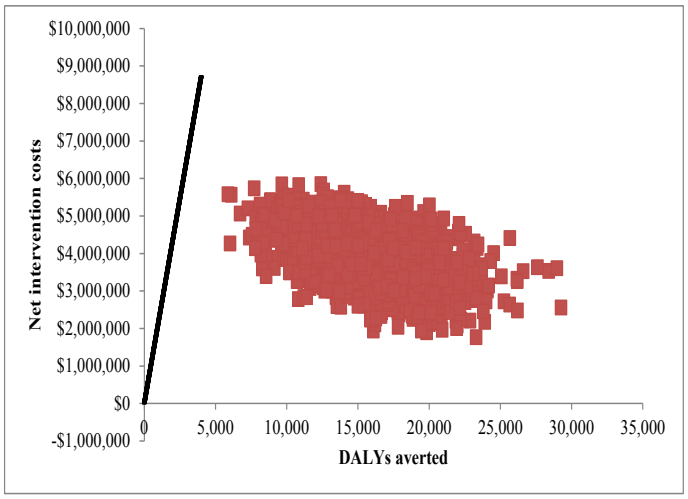
Intervention	DALYs	Cost offsets (US$m)	Intervention Cost (US$m)	Net cost (US$m)	ICER ($/DALY)
	(95% UI)	*(95% UI)*	*(95% UI)*	*(95% UI)*	*(95% UI)*
Brief intervention (government fund)	15,366	-$2.18	$1.90	-$0.27	Dominant
	(9,539 – 22,516)	(-$3.14 to -$1.34)	($1.61- $2.20)	(-$1.32- $0.62)	(Dominant - $60)
Brief intervention (NGOs fund)	15,211	-$2.16	$6.13	$3.96	$260
	(9,427 – 22,528)	(-$3.16 to - $1.34)	($5.17 -$7.07)	($2.57 to $5.26)	($126 - $520)

Figure 1: Cost-effectiveness plane of BI-GOV



NB: line through axis represents cost-effectiveness threshold

Figure 2: Cost-effectiveness plane of BI-NGO



NB: line through axis represents cost-effectiveness threshold

According to the Commission on Macroeconomics and Health's classification, both BI scenarios are very cost-effective, i.e. below the threshold of less than GDP per capita (i.e., < US$727). BI-GOV is a dominant intervention which means it will save money (through averting alcohol-related disease and injury) at the same time as improving population health (though reducing alcohol related consumption). Figures 1 and 2 provides the cost-effectiveness planes for BI-GOV and BI-NGO indicating that all results fall on the right of the threshold of affordability (i.e., <US$727) which means the interventions are both very cost-effective.

Discussion

Adopting a widely accepted definition of brief intervention, two scenarios were examined, a government funded BI (BI-GOV) and non-government funded BI (BI-NGO), given the desirability of the introduction of these interventions in all primary health services. A multi-state and multiple cohort life table approach was used to evaluate the cost-effectiveness of BI. All epidemiological inputs were based on the Vietnamese Burden of Disease study and empirical evidence related to risk of diseases and injury according to hazardous and harmful alcohol consumption. The WHO-CHOICE CostIt program was used to guide the identification, measurement and valuation of resources. A bottom-up ingredient approach was used predominantly in the measurement phase, while the top down approach was used to generate estimates of unit prices from budget and other government reports. All assumptions and resource items were checked with national experts to ensure the costing templates captured the full spectrum of resource use and appropriate values were being used. Cost-offsets were also factored into the model by considering the potential savings to the health care system of preventing alcohol-related disease and injury.

Before discussing the key findings it is important to acknowledge certain limitations. First, in the absence of any local data on the effectiveness of BI, the effectiveness rate of Cobiac et al (2009) was used [9]. Although the methodology used to derive this estimate was valid, the review was based on evidence from developed countries. The delivery and financing of healthcare in Vietnam is different to most Western societies and there may be potential issues with transferring results of a study examining Western behaviour to an emerging country. This rate of effectiveness has been diluted by the inclusion of a 14% annual decay rate to account for the increased affordability of alcohol relative to GDP. Second, the WHO-CHOICE Cost-IT program has five categories (strategy development and evaluation; human resource requirements; program supplies; mass media; and, overhead costs). This study did not include cost components for strategy development and evaluation or mass media. Our assumption is that Vietnam is operating in a steady state situation in that the State has the necessary infrastructure currently in place to implement and support a BI. Mass media was not part of the intervention per se and therefore not included in the costing.

Our results suggest that a BI is able to reach approximately 492,524 hazardous/harmful drinkers and avert up to 15,000 DALYs and an intervention cost of US$1.9 million for BI-GOV and US$6.13m for BI-NGO. This intervention, however, will prevent alcohol-related disease and injury and will save the health care system over US$2 million over a 10 year period. When intervention costs are offset by savings to the health care system, BI-GOV will save US$0.27 million while BI-NGO will cost US$3.96 million. When using the Commission on Macroeconomics and Health's classification of affordability, i.e. less than GDP per capita of US$727, both BI scenarios are very cost-effective with BI-GOV being what is referred to as a dominant intervention which means it will save money (through avoiding future alcohol-related health care costs) at the same time as improving population health (though reducing alcohol related consumption).

These findings provide sound policy advice of an effective and cost-effective strategy to reduce the burden of harm associated with alcohol misuse in Vietnam. The study presents the first economic evaluation examining the cost-effectiveness of brief intervention to reduce the burden of harm associated with alcohol misuse in Vietnam. Both interventions proposed are feasible, acceptable and affordable In comparison with previous WHO studies investing the cost-effectiveness of BI for the Western Pacific B sub-region (WprB) that included Vietnam our result reported lower ICERs.

Viet Nam is in need of a comprehensive and sustainable alcohol policy that can balance the government's commitment to remove barriers to economic growth with a long term public health approach to minimize preventable harms and related economic burden. An effective response will require not only the state, but also non-governmental organizations to support and hold regulatory agencies to account. An essential part of this progress is the development of evidence-based alcohol policy that is independent of commercial interests

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Conflict of Interest

The authors declare no conflict of interest.

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