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Now is the Time to Advocate for Interventions Designed Specifically to Prevent and Control Waterpipe Tobacco Smoking

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Abstract

Waterpipe tobacco usage is spreading rapidly worldwide, with reports of more youth being waterpipe users compared to adults. In many areas of the world, waterpipe usage surpasses cigarette smoking. Waterpipes and cigarettes are both mechanisms for inhalation of tobacco smoke and therefore have serious health consequences. However, because of the many differences between the two products, prevention and control strategies that have proven effective for cigarettes may not transfer readily to waterpipe. This report highlights the differences between waterpipes and cigarettes in toxicant exposure and physiologic effects, patterns of use, social norms, the extent of evidence, and the policy environment. There is little evidence to date around effective interventions for waterpipe prevention and control. The current state of evidence for intervention to curb or control waterpipe is at ground zero and critically needs attention from both scientists and policy makers. National and global efforts aimed at cigarette prevention have succeeded, particularly in developed countries. We suggest the time has come to harness what we know works for cigarette prevention and control and adapt it to tackle the growing epidemic of waterpipe tobacco use.

Keywords

waterpipe; interventions; cigarette; evidence

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Conflict of Interest

All authors declare that they have no conflicts of interest.

Contributors

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Introduction

Waterpipe tobacco smoking (WTS; Maziak et al., 2004) is spreading rapidly worldwide, particularly among youth (Maziak, 2015; Maziak, Ben Taleb, et al., 2015a). A waterpipe, also known as arghile, hookah, narghile, or shisha, is composed of the head where the tobacco is placed, a body, a water bowl, a hose and a mouthpiece (Figure 1; see also Maziak et al., 2004). The instrument's design allows smoke to pass through the water or other liquid before reaching the smoker [World Health Organization (WHO), 2015a]. In many countries, WTS prevalence among youth surpasses prevalence among adults (Akl et al., 2011; Maziak, Ben Taleb et al., 2015a). In addition, WTS prevalence often exceeds cigarette smoking prevalence among youth globally (Maziak, 2011; Wareen et al., 2009; Barnett et al., 2013; Jawad, Lee and Millett, 2016). A recent analysis of Global Youth Tobacco Survey results among 13–15 year olds in 25 countries around the world has indicated rates of current WTS of over 20% in 6 countries (Jawad et al., 2016). Accumulating research indicates serious health effects associated with WTS (Bou Fakhreddine et al., 2014; El Zaatari et al., 2015; Akl et al., 2010; Jawad et al., 2013; Al Ali et al., 2013; WHO, 2015a). Clearly there is a need for urgent action to prevent and control WTS.

Cigarette tobacco smoking (CTS), though historically a more recent type of tobacco use, has garnered much more attention due to its relatively high prevalence worldwide and clearly documented increases in cigarette-caused dependence, disease, disability, and death (U.S. Department of Health and Human Services, 2014; WHO, 2015b). Effective interventions have been identified to prevent and control CTS at the individual, interpersonal, organizational, community, and policy level [U.S. Department of Health and Human Services (USDHHS), 2014; WHO, 2015b] culminating with the implementation of the first world health treaty in 2003: the Framework Convention on Tobacco Control (FCTC; WHO, 2003). The FCTC sets out evidence-based policy interventions to control tobacco use generally, but its specific guidelines are for the most part particular to cigarettes. For example, Article 16.3 of the FCTC states that “Each Party shall endeavor to prohibit the sale of cigarettes individually or in small packets which increase the affordability of such products to minors,” thus aiming to discourage the purchase and consumption of cigarettes among minors.

CTS and WTS are both mechanisms for inhalation of tobacco smoke and both therefore have serious health consequences. Both behaviors are a result of a variety of factors at the individual psychosocial, interpersonal, organizational, community normative, and policy levels (Fong et al., 2006; Nakkash et al., 2011; Akl et al., 2015; Jawad et al., 2015). Although previous reviews of WTS have focused on its epidemiology and determinants, and often compared aspects of those to CTS, none have addressed specifically how the differences between these two methods of tobacco use affect intervention development and implementation. Because of the many differences between the two products, CTS prevention and control strategies may not transfer readily to WTS. Instead, the interventions that have proven effective at the various ecological levels for CTS prevention and control will need to be adapted to address WTS specifically. Below we highlight the differences between CTS and WTS in toxicant exposure and physiologic effects, patterns of use, social norms, the

extent of evidence, and the policy environment. We then suggest how these differences indicate the necessity for a distinctive approach to WTS prevention and control.

Toxicant Exposure & Physiological Effects

A waterpipe emits many of the same toxicants as a cigarette does and, due to the large volume of smoke inhaled in a single waterpipe use session, the amount of these toxicants in waterpipe smoke is often many times more than the amount found in the smoke of a single cigarette (Shihadeh et al., 2015). The volume of smoke is greater due to the cooler temperature of the smoke and lower draw resistance of the waterpipe: the volume from a single puff from a waterpipe can range from approximately 500 to 900 mL, compared to a volume from a single puff on a cigarette ranging from 50 to 100 mL (e.g., Cobb et al., 2011; Blank et al., 2011; Brinkman et al., 2015). Within a 45-minute WTS episode, users take 50 or more puffs, while a single cigarette is consumed in approximately 10 puffs, meaning that WTS involves inhalation of 25 or more liters of smoke, as compared to about 1 liter for a single tobacco cigarette (e.g., Cobb et al., 2011; Maziak et al., 2009; Brinkman et al., 2015).

Like cigarette smoke, waterpipe smoke contains “tar” and carbon monoxide (CO). The tar is composed of at least 82 toxicants, including carcinogenic polyaromatic hydrocarbons (PAH) and tobacco-specific nitrosamines (TSNA), as well as carbonyl compounds and volatile organic compounds that can contribute to pulmonary disease (Shihadeh et al., 2015). Intake of PAH differed between cigarette and waterpipe smokers, with the greater molecular weight PAHs being higher in waterpipe smoke, suggesting a higher risk for cancer in such smokers (Jacobs et al., 2013). Exposure to TSNA in waterpipe smokers was similar to that of pack-a-day cigarette smokers (Al Ali et al., 2015). Metabolites of both these compounds have been found in waterpipe smokers (Jacob et al., 2013, Al Ali et al., 2015).

There are also reports of higher amounts of metals and volatile organic compounds in the smoke emitted by a waterpipe relative to that of a single cigarette, and these toxicants include cobalt, chromium, nickel, cadmium, lead, and benzene, with benzene mainly released by the burning charcoal (Shihadeh et al., 2015). Heating the waterpipe tobacco (particularly the flavored ‘ma’aasel’) has also been reported to release a number of other chemical toxicants, including furanic compounds (Schubert et al., 2012a) and toxic carbonyls such as formaldehyde and acetaldehyde (Schubert et al., 2012b). Formaldehyde is a class 1 carcinogen (IARC, 2006), and acetaldehyde is classified as possibly carcinogenic to humans (IARC, 1999).

The CO in waterpipe smoke is on the order of 30 times that of a cigarette (Schubert et al., 2011). Expired breath CO levels from waterpipe smokers after a single waterpipe use episode have been reported to be, on average, 3–6 times those seen after a single cigarette (Eissenberg & Shihadeh, 2009; see also Salameh, Aoun, & Waked, 2009; Singh et al., 2011;). Nicotine is an important toxicant to examine, as it is the tobacco smoke constituent that supports compulsive use (i.e., dependence) in cigarette smokers (USDHHS, 1988) and waterpipe tobacco smokers (Aboaziza & Eissenberg, 2015). Due to the long duration of a WTS session, waterpipe users receive almost twice the nicotine in a single WTS session compared to the exposure from a single cigarette (Eissenberg & Shihadeh, 2009). In terms of

nicotine exposure, daily waterpipe use is estimated to be equivalent to smoking 10 cigarettes per day (Neergaard et al., 2007). While many waterpipe smokers deny dependence and believe they can stop at any time (Afifi et al., 2013) those who desire to quit are often unsuccessful (Auf et al., 2012; Ward et al., 2005; Ward et al., 2013). At least in some users, WTS supports nicotine/tobacco dependence (Salameh et al., 2014; Kassim et al., 2014; Auf et al., 2012; Sidani et al., 2016)

As a result of exposure to all these toxicants, WTS has many of the same health risks as CTS (American Lung Association, 2007). Similar to cigarette smokers, waterpipe users are at risk to a number of diseases, including lung, stomach, and esophageal cancers, impaired pulmonary function, and cardiovascular disease, among others (Akl et al., 2010; Cobb et al., 2010; El Zaatari et al., 2015).

WTS age of initiation, use patterns and perceptual and social components

The patterns of WTS are different compared to those of CTS. Among college students in the United States, WTS is the second most popular tobacco product after cigarettes, with more than half of current waterpipe users also being non-cigarette smokers (Primack et al., 2013). In cultures where WTS has long been practiced, the age of initiation of WTS can happen at quite an early age (Alzyoud et al., 2016). Ever WTS was 44% in a national sample of 6th and 7th graders in Lebanon (Jawad et al., 2015), with higher rates of ever and current WTS compared to CTS in 7th graders in Irbid Jordan (Mzayek et al., 2012). In addition, the pattern of waterpipe smoking may differ from that of cigarette smoking; whereas cigarettes are mostly smoked daily, waterpipes are mostly smoked intermittently (Maziak et al., 2015a). Also whereas one cigarette can be smoked in minutes and often in conjunction with other activities (e.g., walking, driving), a waterpipe smoking session can last up to an hour and, due to the nature of the apparatus and the set-up required, restricts the user's ability to perform some other activities simultaneously.

Compared to cigarettes, waterpipe use has a number of product-specific and appealing perceptual components such as the visual and tactile features of the device and its hose, the sight and smell of the voluminous smoke exhaled by the user, the fragrant smells of the tobacco itself, and the sounds produced from the bubbling water within the bowl (Nakkash et al., 2011; Ward, 2015). Traditionally, WTS is a social activity, with more than one person engaged in smoking from the same waterpipe via one or more hoses attached to the body (Blank et al., 2014). Waterpipes tend to be shared by more than one user when in the company of family members and friends, and they commonly are used in cafés or restaurants, especially amongst less-established users (Asfar et al., 2005). In these group settings in the natural environment, access to the hose may be limited when there are few waterpipes available, leading to an individual receiving fewer puffs with a longer inter-puff interval (Blank et al., 2014). On the contrary, if there is a smaller group or access to more than one waterpipe, individuals take a greater number of puffs (Blank et al, 2014). These group constraints on puffing topography may affect the nicotine and other toxicant content of the smoke and/or user exposure (Ramôa et al., 2016). Group use is thus also another salient difference between WTS and CTS, and may also need consideration in intervention development. Importantly though, group use may give way to individual use in the more

dependent waterpipe smoker, potentially facilitated by personal ownership of the instrument itself (e.g., Sidani et al., 2016). Frequency and amount of WTS, location of use (public vs. private), the sharing of the waterpipe session, and the type of withdrawal symptoms experienced by smokers are all perceived to be related to dependence (Afifi et al., 2013; Sidani et al., 2016) and thus also are relevant to intervention at various levels.

Social Norms

Compared to CTS, the social norms surrounding WTS are quite different. For example, while some research has illustrated that WTS is socially acceptable, even in societies where any tobacco use among females is socially unacceptable (Akl et al., 2015; Ward et al., 2015), others have reported the negative image of women using waterpipes (Afifi et al., 2013; Khalil et al., 2013). Furthermore, regional differences also emerge regarding women using waterpipe. In Lebanon, WTS may be considered as a symbol of emancipation for women as compared to a disrespectful act to society in Egypt (Khalil et al., 2013). An important consideration is the age and marital status of the woman using a waterpipe; some consider it to be offensive if a young, single woman is using waterpipe while it is more acceptable for an older, married woman to be engaging in the same activity (Afifi et al., 2013). Family members also play an influential role in WTS initiation and continuation of use within the home and at social gatherings (Akl et al., 2015; Afifi et al., 2013). Parental figures tend to not discourage use in their children, with familial attitudes in Syria and Pakistan reported to be either neutral or positive when compared to CTS (Akl et al., 2015). Mother or father WTS has also been directly correlated with waterpipe use in youth as young as 11 years of age (Jawad et al., 2015). The apparent influence of parental smoking as well as research that has linked early initiation of WTS to higher dependency (Alzyoud et al., 2016), suggests parents as a potential target for intervention to prevent initiation. Social norms far outweigh health concerns in decision making around WTS (Afifi et al., 2013).

Policy Environment

The policy and regulatory environment of WTS does not easily mirror that of CTS. For example, while the United States Food and Drug Administration’s Center for Tobacco Products has the authority to regulate tobacco products generally, and currently regulates cigarettes, it does not regulate waterpipes and waterpipe tobacco at this time though some regulations are to come into effect in August, 2016 (FSPTCA, 2009; FDA, 2016). For example, the FDA recognizes concerns regarding the safety of waterpipe tobacco given the nicotine and carcinogens in waterpipe tobacco smoke, and the availability of waterpipe tobacco in a variety of flavors that could be appealing to youth and young adults. Thus, the FDA has included waterpipe tobacco within its regulatory scope of products subject to its tobacco control authority. Internationally, although the FCTC is intended to guide regulation of all tobacco products, policy statements on waterpipes have previously been based on evidence derived from cigarette policy effectiveness (WHO, 2014a) with a recent Framework Convention Alliance report acknowledging a number of policy challenges that differ for waterpipes. These included articles 6, 8, 11, and 13. For example, taxation of products (article 6) is an important consideration, as waterpipe tobacco is taxed at a lower rate compared to cigarettes (Jawad & Millett, 2014; Morris et al., 2012; WHO, 2014a). In

addition, the actual waterpipe device and charcoal are untaxed, thus providing another target for taxation intervention. Indoor clear air legislation (article 8), with hookah bars claiming exemption (Noonan, 2010; WHO, 2014a), is another challenge and avenue to pursue in regards to policy interventions for public health protection.

Interestingly, deceitful labeling is another possible target for policy intervention. Nicotine content labelling – particular Ma'asel – seems unrelated to actual nicotine delivery (Vansickel et al., 2012). In addition, some labels misleadingly communicate that the waterpipe mouthpieces are efficient in reducing the risk of communicable disease, among other deceptive descriptors (Nakkash & Khalil, 2010). Other advertising may include such phrases as "diet shisha", misleading consumers into false claims that waterpipe use may not only be healthy, but that it can be used to help lose weight as CTS is commonly associated with appetite control and weight loss (Audrain-McGovern & Benowitz, 2010). Deceitful labeling must be a target for intervention due to consumers' lack of knowledge not only about the dangers of WTS previously aforementioned, but also due to false claims regarding its potential health benefits (Vansickel et al., 2012).

Extent of Supporting Evidence

Whereas the supporting evidence around the dangers of CTS and effective interventions is strong and based on over 50 years of robust research (U.S. Department of Health and Human Services, 2014; WHO, 2015b), a recent WHO document produced by the parties (countries) who are signatories to the FCTC noted: "Well documented experience with respect to WP tobacco products among the Parties is limited or non-existent. There are limited data available for Parties on consumption, manufacturing practices, advertising and promotional activities, contents, harmful effects and sociocultural factors associated with the use of WP." (WHO, 2014b). Research gaps have been identified and span from identification of biomarkers of exposure to the influence of social practices on maintenance of use to long term health effects to indictors of dependence to effective interventions and many more (WHO, 2015a). To date, most WTS research has focused on intrapersonal and interpersonal determinants of use (Akl et al., 2015). A systematic review reported on health effects associated with WTS but the overall quality of the data included in the systematic review varied from very low to low and longitudinal studies are warranted (Akl et al., 2010). Interventions on waterpipe use reduction and cessation need to be developed and evaluated (Akl et al., 2015; Jawad et al., 2015a; Asfar et al., 2014).

Implications for WTS Interventions

What do these differences between CTS and WTS in toxicant exposure and physiologic effects, patterns of use, social norms, the extent of evidence, and the policy environment suggest in terms of the necessity for a distinctive approach to WTS prevention and control? A variety of interventions have been successful in decreasing CTS (WHO, 2016). The WHO's M-POWER guidance document (2016) suggests effective measures to prevent tobacco use including: Monitor tobacco use and prevention policies, Protect people from tobacco smoke, Offer help to quit tobacco use, Warn about the dangers of tobacco, Enforce

bans on tobacco advertising, promotion, and sponsorship, and to raise taxes on tobacco. In the text that follows, we point to how these measures may need to be adapted to WTS.

'Warning about the dangers of tobacco smoke' has led to reductions in CTS over time through mass media campaigns as well as school-based interventions (USDHHS, 2012; 2014). Many of the same *toxicants, physiologic effects, and health consequences* have been linked to WTS. One strategy then, might be crafting awareness campaigns for young people that compare WTS to CTS, pointing specifically to the similarities in toxicant exposure and tobacco-caused disease. Enlisting youth in this process likely will be critical to the success of these interventions, as they may be most aware of the messages that will resonate with their age group. In addition, *the deceitful labeling* must be highlighted in WTS awareness campaigns, potentially building on and adapting from past successful campaigns related to CTS (e.g., Farrelly et al., 2005; 2009). The differences in *social norms* between CTS and WTS also suggest the need for innovative strategies to warning about the dangers of waterpipe tobacco smoke. More specifically, raising awareness among parents may be as critical as raising awareness among youth. In some cultures, parents may be unaware of waterpipe tobacco smoking, while in others, parents may model it: both issues must be addressed as appropriate. In addition, whereas school-based interventions for CTS have indicated the critical importance of skill-building to resist peer pressure (USDHHS, 2012), such skill-building for WTS may need to tackle the more sensitive area of parent encouragement for WTS.

Warning about the dangers of CTS also includes warnings that are printed on the tobacco packs themselves. In addition to tobacco packaging, WTS includes additional features that may require labeling, including, potentially, health warnings on the apparatus itself as well as on other accessories, on the charcoal packaging, and perhaps on the doors and walls of venues where waterpipes are used (i.e., hookah cafés). This increased attention to labeling likely is necessary, as many users who frequent hookah cafés may never see tobacco/charcoal packaging. There is a small literature addressing this point, and more research clearly is needed (e.g., Islam et al., 2016; Jawad et al., 2015b; Mohammed, 2013; Nakkash et al., 2011). Text-only versus graphic warning labels have been investigated with waterpipe users using an online-questionnaire (Mohammed, 2013). Compared to text-only, graphic warnings elicited unfavorable emotional reactions, increased beliefs that WTS is harmful to their own health and also dangerous to non-users, and revealed higher quit intentions (Mohammed, 2013). Health warnings were more impactful as the warnings were large and decreased the pack branding; warnings at the point of consumption were reported to be more impactful compared to warnings at the point of sale (Jawad et al., 2015b). In the first study to test waterpipe-specific warning labels and location on the device, text-only messages and pictorial labels warning about harm to children were most effective in motivating waterpipe smokers to consider quitting, and the base, mouthpiece and stem of the apparatus were all equally noticeable locations for a warning label (Islam et al., 2016). Finding the combination of warning label content and placement that is most effective is a necessity.

With respect to 'offer(ing) help to quit smoking', a recent review highlighted limited knowledge of health professional students about the dangers of WTS and gaps in the education of health professional students about WTS and smoking cessation (Akl et al,

2015). Perhaps as a result, clinic based prompts – such as the 5As for CTS - to ask about WTS are lacking. Information regarding the physiological and behavioral effects of WTS should be integrated into the existing health care services. Providers should be educated on the prevalence and risks of WTS, as well as on methods of prevention and cessation. WTS's *patterns of use* such as the higher prevalence in younger age groups, intermittent use, among social groups, sharing of the waterpipe, and longer use sessions – as well ability to deliver nicotine – will influence the dependence potential, and create the need for cessation interventions that potentially differ from the classical cigarette interventions (Maziak, 2011; Maziak et al., 2005). In addition, *the visual, auditory and olfactory perceptual aspects* of WTS are likely important to deal with in cessation interventions. To date, two cessation intervention have been tested with some success (Dogar et al., 2013; Asfar, Al Ali, Rastam, Maziak, &Ward, 2014). Both behavioral support with bupropion treatment for 7 weeks (BSS +) or behavioral support without bupropion (BSS) were effective in achieving indicated 6-month smoking abstinence among waterpipe-only smokers (Dogar et al., 2013), but were less so among cigarette smokers, thus suggesting potentially important differences in dependence (Dogar et al., 2013) linked to toxicants or patterns of use. Also, the efficacy and feasibility of a behavioral cessation program modeled on cigarette smoking cessation interventions was tested with 50 willing-to-quit adult waterpipe smokers in Syria. Both a brief (one in person session and three phone calls) or intensive (three in-person sessions and five phone calls) behavioral cessation treatment in a clinical setting were found to be effective in abstinence 3 months post quit day (Asfar, Al Ali, Rastam, Maziak, &Ward, 2014). However, process evaluation of this intervention indicated that participants requested more group sessions, and more phone calls than in person sessions. The authors suggest that this may be due to waterpipe smokers being younger and more educated than cigarette smokers. Overall, relatively few resources have been devoted to developing and testing cessation interventions that are specific to WTS, though the need for efficacious treatments is growing.

At the policy level, WTS-specific policies that protect people from waterpipe tobacco smoke (WTS clearly influences indoor air quality; Cobb et al., 2013), raise taxes on waterpipe tobacco and accessories, and enforce bans on waterpipe tobacco advertising, promotion, and sponsorship urgently are needed. These policies will need to be tracked for effectiveness. For example, there is some evidence that waterpipe tobacco may be less price elastic than cigarettes, therefore changes in taxation may not be as effective in changing behaviors (Maziak et al., 2014), although more evidence is needed regarding the behavioral economics of waterpipe. Bans on advertising will need to address deceitful labeling, as well as enticing promotions such as for the 'diet shish (Vansickel et al., 2012; Nakkash & Khalil, 2010). The vast number of manufacturers and importers of waterpipe devices, tobacco, and assorted accessories add complexity (Jawad et al., 2015a) to policy level interventions.

All the WTS-adapted interventions suggested above are needed to change the *social environment and norms* conducive to WTS. Too many waterpipe users do not believe WTS is dangerous, nor do they believe they are dependent (Afifi et al., 2013; Akl et al., 2015). The social normativity of WTS being safe and not contributing to dependence leads to both initiation and sustained use. Indeed, the positive social norm around WTS may require new intervention emphases. Positive youth development approaches suggest that a key factor to

reducing uptake of risk behaviors is engagement in productive use of non-school time (USDHHS, 2012). Young people often cite boredom as a reason for WTS initiation (Akl et al., 2015), particularly in relation to the socialization it provides. Enhancing options for pro-social alternative activities such as participation in clubs and sports may be an effective strategy to curb WTS, and youth themselves may be key to identifying which strategies are likely to work best.

Our ability to curb this epidemic successfully is dependent on continued research to close the gaps in knowledge. More specifically, the relationships between pharmacological, contextual, and social factors need to be explored and understood under a wide variety of cultural backgrounds (Blank et al., 2014). Exploring the interactions of waterpipe use with other types of tobacco use is warranted (Akl et al., 2010), especially as polytobacco use remains a public health problem among adolescents (USDHHS, 2012; USDHHS, 2014; Arrazola et al., 2014) and adults in the United States (Backinger et al., 2008; USDHHS, 2014) and globally among youth (Jaber et al., 2015; Jawad et al., 2016) and adults (Agaku et al., 2014). Furthermore, better validated instruments are needed to comprehend and perhaps predict dependence in waterpipe tobacco users (Aboaziza & Eissenberg, 2015; Fagerström and Eissenberg, 2012). Evaluation of the waterpipe specific interventions suggested above for their effectiveness on WTS is critical to identify best practices. In addition, establishing surveillance systems for WTS, or adding specific items on WTS to available surveillance systems including the Global Tobacco Surveillance System (GTSS; USDHHS, 1999) is necessary to monitor use and track the (hopefully) decreasing epidemic. In line with this recommendation, recently, an update to the recommendations for standardizing the measurement of waterpipe use has been suggested (Maziak et al., 2016; see also Maziak et al., 2005).

Conclusions

As noted above, there is little evidence to date around effective interventions for WTS prevention and control. The current state of evidence for intervention to curb or control WTS is at ground zero; akin to prior to the ‘cancer by the carton’ news report on the dangers of CTS of 1961 (Toch et al., 1961). National and global efforts have succeeded, particularly in developed countries, in changing social norms around CTS (USDHHS, 2012; 2014; WHO 2003; 2015b). We suggest the time has come to harness what we know works for CTS prevention and control and adapt it to tackle the epidemic of WTS.

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Highlights

- Waterpipe use is spreading worldwide, surpassing cigarette use in many areas.
- Waterpipes and cigarettes are forms of tobacco use and have grave health effects.
- Little evidence exists of effective interventions for waterpipe prevention/control.
- Cigarette and waterpipe use differ in toxicant exposure, patterns of use and norms.
- These differences suggest the need to adapt not adopt cigarette interventions.

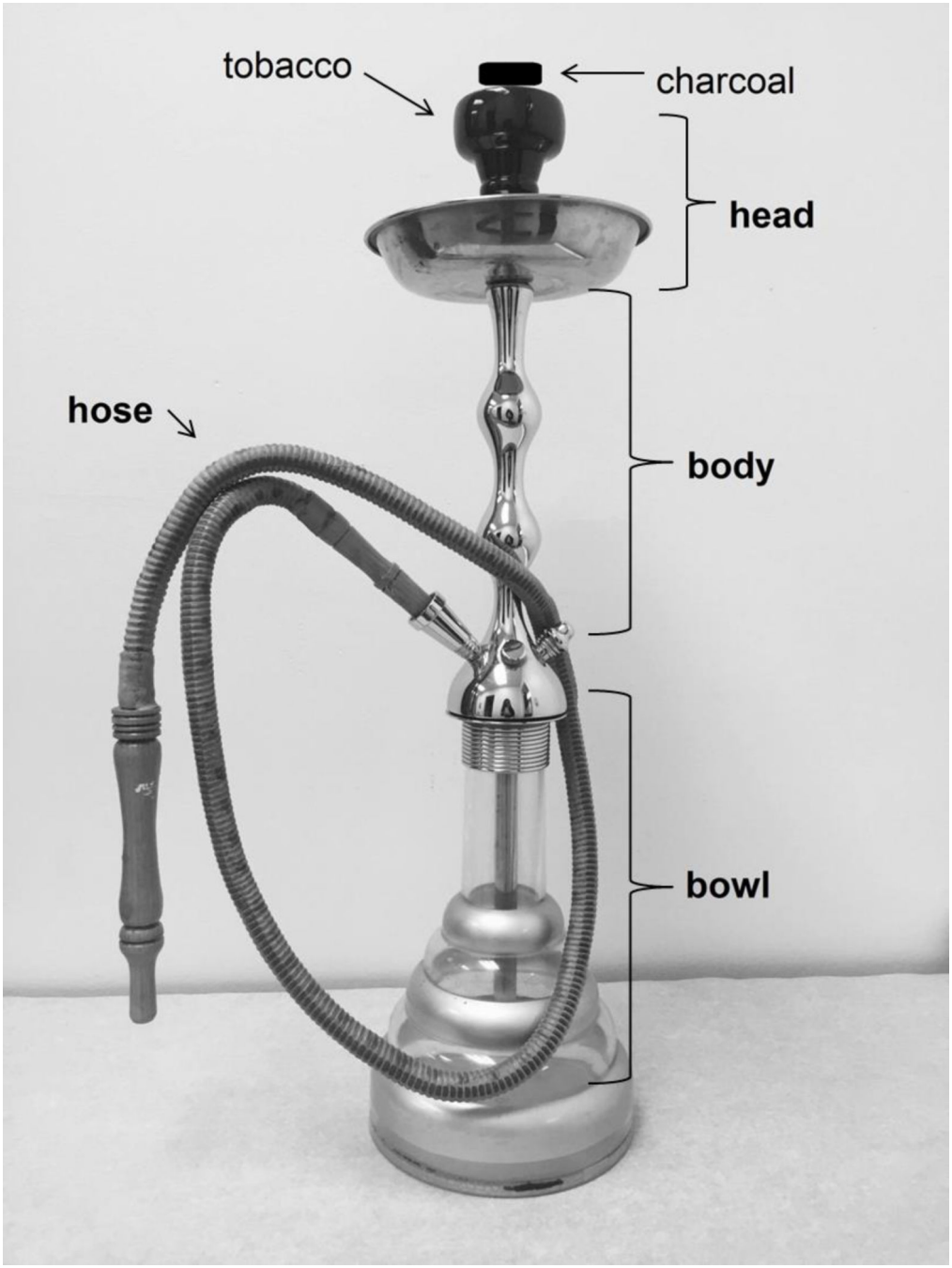

Figure 1.
Narguile waterpipe (shisha, hookah)