

Internet Information About Health Risks from Smokeless Tobacco

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Poster, 10th Annual Meeting for Society for research on Nicotine and Tobacco

Phoenix, Arizona

19 February 2004

Introduction

There is no doubt that Western smokeless tobacco products are substantially less harmful than smoking cigarettes (notwithstanding certain recent high-profile statements by a certain high-profile official from this state).

Even with the worst case scenario supported by the research, ST is in the order of 1/100 as likely to cause life-threatening disease, and the best estimates for the true value for modern moist snuff, the most popular product, are lower still.

Smoking cigarettes is a well established cause of many diseases and is widely described as the largest (theoretically) preventable source of premature mortality. ST, by contrast, has mostly been linked to risk for only one relatively rare life-threatening disease, oral cancer. Even that link is tenuous, based largely on a single study by Winn et al. (1981). (For more details on this, see Phillips et al. (2003) and our other poster in this session.)

Potential health benefits of this fact: Smoking and ST use are obvious substitutes. Among the several things a smoker can do to eliminate almost all excess risk from his nicotine use (e.g., quitting nicotine entirely or using pharmaceutical nicotine products), switching to ST is unique in allowing continued consumption of nicotine through the use of a legal (for adults), widely-available product for which there is a history of consumer demand. The potential for switching may be increasing with the recent advent of new products that are non-messy and require little or no spitting. For some smokers, this switch – a "harm reduction" strategy – offers the best chance of changing their behavior to eliminate the huge risk from smoking.

But most people have little chance of learning that ST is much less dangerous than smoking, and are thus unaware that switching from cigarettes to ST provides huge health benefits or that switching from ST to cigarettes is a terrible mistake. Popular information, provided by experts and advocates, appears to intentionally overstate the health risks from ST quite dramatically.

Unethical messages

A preeminent tenet of modern health and medical ethics is the right of individuals to make fully-informed autonomous decisions, and the obligation of health experts, clinicians, and policy makers to provide the information and permit the autonomy. This obligation is clearly not being met in this case.

Kozlowski and O'Conner (2003) recently challenged the CDC and the Substance Abuse and Mental Health Services Administration (SAMHSA) over the content of their websites, which included clearly false claims that ST poses a similar health risk to cigarettes. Kozlowski and O'Conner reported that following their protests, CDC changed their website (SAMHSA did not), though the change was merely from out-and-out falsehood ("Is smokeless tobacco safer than cigarettes? NO WAY!") to a literally true statement that still misleads readers, as discussed below.

With an increasing portion of those seeking health information turning to the web (Fox S and Rainie L 2000; Rideout 2001), information found there provides a good measure of what people might learn. Given the prevalent messages about ST, it seemed likely that the information on the web would on average be misleading.

Methods

To examine the extent of systematic overstatement of the risks from ST, we conducted a systematic review of popular sources of information, looking at websites that implicitly purport to deliver a public service message about ST and health risks. While websites do not contain all popularly available information, many people searching for information on this topic would start with a web search and most organizations who have a stated position on the topic, particularly those actively trying to influence popular opinion, have a web page that reflects their claims.

We performed a Google search for [tobacco AND cancer AND (smokeless OR snuff OR dip OR spit OR chew OR chewing)], the latter disjunction covering most of the synonyms for "smokeless". We conducted the search on 3 May 2003 and stored the results offline so they would not change when re-accessed.

The search reported 124,000 page hits. Google's filter (which eliminates poor matches, similar pages, including most (but not all) similar multiple page hits at a single domain, as well as many less popular pages that are not good matches to the search terms) narrowed this to 763 displayed matches. We restricted our analysis to these 763 as a way of narrowing the analysis to a manageable scope that focuses on sites that are more popular.

We were interested in public service sites (as implicitly self-defined, without an attempt on our part to judge what is a genuine public service) or health advice/information sites which state an entity's own opinion about the health risks from ST, so our protocol eliminated: sites that were selling tobacco products or methods for quitting tobacco (with one exception discussed below); news of the day; search engine, web maps, and other sites that just provide links; sites from South Asia (because the products dipped there contain other major ingredients have a very different epidemiology from Western moist snuff); and scientific literature (scholarly papers, journals, and conference abstracts).

Eliminating these and the double counting from organizations that were duplicated resulted in **316** web presences in our population.

For each included website, we searched the entire website (not just the page hit(s) from the Google search) for statements about the health effects of ST and collected the results. We ignored information that was clearly not the position of the sponsoring organizations. We initially reviewed the websites between 4 May 2003 and 11 June 2003 and printed out relevant pages. We audited our results and expanded the collected data during the period 25 September 2003 through 8 December 2003. To maximize consistency, multiple authors viewed each website, and ambiguous codings were discussed by the group.

The ordering of the websites in our list is important because those that are higher on the list are already more popular (more likely to be linked to from other sites, accessed more often) and are much more likely to be found and accessed by someone doing a search. In the results presented below, the hit number is a website's the ranking within in our list of 763, with lower numbers being higher ranked (closer to the top of the list). For websites that generated multiple hits, we use the highest ranked hit unless otherwise noted.

It should be noted that despite the reporting of some numbers (counts), this should not be viewed as a quantitative analysis, but more of a systematic qualitative analysis. The characterizations of the data are descriptions rather than statistics. The categories used to best summarize the results were determined after examining the data (though most were predicted *ex ante*).

To streamline this poster, we have omitted URLs and other details about most websites we mention. These details appear in the manuscript versions of this research.

Systematically Misleading Information about the Comparative Risks from ST and Cigarettes on the World Wide Web

The risk from ST is widely conflated with the risk from cigarettes on websites that provide health advice and information. Almost every website we searched had statements that played up the health risks from ST without caveat, making it difficult for consumers to recognize the huge contrast with cigarettes. (The quantitative claims of health risks from ST were very often beyond even a worst-case-scenario interpretation of the scientific literature.) A large portion of websites directly stated or implied that the risks from ST and cigarettes are similar.

As noted above, the most salient feature of the comparative risks of smoking and ST is how different they are, a message that is buried deeply in the results of our search.

Accurate Comparative Risk Information

Very few websites provided accurate information.

Two organizations, the American Council on Science and Health (ACSH) and ASH (Action on Smoking and Health, in the U.K.) were the most prominent sources of accurate comparative risk information in our search results. ACSH has made various statements promoting harm reduction and a more realistic view of ST. ASH has argued for a revision of current European Union policies on ST (which is partially banned in the EU) and consideration of the use of ST in a harm reduction strategy for smoking because of its much lower risks (Bates C et al. 2003).

To say they are the most prominent sources of accurate information, however, is not to say they are prominent. The first reference to ACSH was hit 93 in our search (i.e., it did not appear until the tenth page of the search) and to ASH was hit 96. These numbers still overstate the prominence of the accurate information, since the ASH position on the EU and harm reduction does not appear until hit 491 (hit 96 is a reprint of a news article that reflects an anti-ST position). Similarly, hit 93 is a third party's anti-harm-reduction message as part of a point-counterpoint presented by ACSH, with the pro-harm-reduction side only appearing at hit 120.

The lower rankings for the pages that contain the harm reduction messages probably reflects the pages with a strong anti-ST message being linked to from other websites. Thus, even for these organizations that make scientifically accurate statements about comparative risks, someone searching the web would have to already know what to look for or be digging particularly deeply.

Brad Rodu, a professor of pathology and dentistry at the University of Alabama at Birmingham (UAB), is the longtime leading advocate of the use of ST as a harm reduction strategy for smoking. His pages at UAB provide comprehensive information on the topic, but was only hit 625 on our list. A commercial site (included because of its extensive health message) for a quit-smoking product, hit 408, is a mirror of an old version of Rodu's UAB pages, posted under Rodu's name with his permission.) These sites contain information similar to that in his book (Rodu B 1995), designed to try to persuade smokers who will not quit tobacco entirely to switch to ST. This information is quite complete, but unlikely to be found by anyone not specifically looking for it. Despite his numerous publications on the topic, the only earlier entries on our list that would lead to Rodu's work was hit 276, one of his op-eds in the news archives from an anti-tobacco organization, and the aforementioned ACSH hit 120.

A few other sites contained more subdued accurate statements about comparative risks. As an aside in a discussion of baseball, hit 156 overstates the risks of ST, but does point out that it is not as bad as cigarettes. However, the information is subtle and buried in the document, and so does not appear to be a promising source of education. A lesson plan for discouraging tobacco at the Utah Education Network (hit 568) states without further comment that ST is less dangerous than cigarettes. At hit 680 was English-language information from the government of Sweden about the risks of ST, which states ST is safer than smoking.

That's all.

Astonishingly, we were unable to find any other statements about the much lower risk of ST compared to smoking. No high-ranking sites provided the information tobacco users would need to make choices based on which product is safer. Notably, no U.S. government sites provided such information (excluding a few scholarly or technical papers that can be downloaded from the sites but not presented as the government's message to consumers). Indeed, they consistently provided misleading information, as did popular medical advice sites and the best-known advocacy groups.

Misleading Comparative Risk Information

The most prevalent messages were those that would tend to convince readers that the health risk from ST is comparable to that from smoking.

We identified 237 of the remaining 309 websites in our population as discussing the risks of smoking and ST in proximity to each other. Any juxtaposition of health claims about the two products that does not make clear the very different absolute risk, even if it makes no explicit comparison, implies to readers that the risks are comparable. Most websites did more than juxtapose, making specific statements that reinforced this implication.

Explicit Claims of Equal Risk

We identified 108 websites that claimed that the **risks from ST are as bad as or worse than those from smoking**. Most often this took the form of an explicit statement that ST is not safer than smoking. It is worth noting that this is equivalent to saying that you are better off smoking (or at least no worse off) compared to using ST.

Examples include various authoritative entities:

- American Cancer Society: "Some people believe that using smokeless tobacco is safer than smoking. This is not true."
- World Health Organization: "There is also a prevalent myth that it is less dangerous than smoking. The reality is that smokeless tobacco is just as addictive and fatal as cigarettes."

- U.S. Department of Health and Human Services (at SAMHSA's health.org and samhsa.gov, the same statement noted by Kozlowski and O'Conner):
"Q. Isn't smokeless tobacco safer to use than cigarettes? A. No." The CDC does not appear to make this claim anymore, though the U.S. National Institute of Dental and Craniofacial Research (hit 15) still says in its link to the slightly revised CDC pamphlet, "refutes the myth that smokeless tobacco is safer than cigarette".

The recent statements of the Surgeon General ("I cannot conclude that the use of any tobacco product is a safer alternative to smoking" (Carmona, 2003)) came subsequent to our data gathering, and would thus not appear in our results.

Implicit Claims that ST is Worse than Cigarettes

Of the 108 websites making claims that ST is as bad or worse than cigarettes, 26 suggested that **ST is worse than smoking** by likening the risks and then identifying differences that exclusively favor smoking.

A typical example appears in the second highest-ranking website from our search, the Academy of General Dentistry: "Isn't it safer than smoking? Absolutely not. Some wrongly believe that spit tobacco is safer than smoking cigarettes. But spit tobacco is more addictive because it contains higher levels of addictive nicotine than cigarettes and can be harder to quit than cigarettes. One can of snuff delivers as much nicotine as 60 cigarettes." Though there is no explicit claim that ST is worse – the explicit claim is simply that it is no better – the comparisons that follow imply that it is better to smoke than to use ST.

Implicit Claims of Equal Risk

Of the websites not making explicit claims that ST is as bad as or worse than cigarettes, **141 made statements that directly imply that risks from ST are comparable to those of smoking**, while another 29 simply juxtaposed the two risks without suggesting there are differences.

There are various literally true statements that are apparently intended to dissuade readers from the (accurate) belief that ST is safer than smoking.

(Aside: Some might argue that these statements that are not literally false but imply the risks of ST and cigarettes are similar, do not violate ethical rules that prohibit lying. On the other hand (as has been pointed out in discussions of recent U.S. foreign policy), clearly misleading statements that are carefully crafted to be literally true are arguably worse than literally false statements. They suggest that the authors know the truth and believe that the truth is sufficiently clear that they should maintain a plausible claim they are not contradicting it, but are still trying to get people to believe the falsehood.)

The most popular type of literally true misleading information are comparisons with smoking where ST is characterized as "not a safe substitute to smoking cigarettes" or "not harmless," or by saying "there is no safe tobacco." (The former of these is quoted from the 1986 U.S. Surgeon General's report (1986) or the similar warning on 1/3 of the units of ST products sold in the U.S.)

We identified 62 websites making such claims.

Since basically nothing is perfectly safe, these statements are literally true, but the comparison implies more than the literal interpretation, "it would not eliminate every last bit of risk to switch from cigarettes to ST." Saying "ST is not a safe alternative" without any hint of the fact that it is *much safer* implies that there is no benefit from switching from smoking to ST or, equivalently, no loss in switching from ST to smoking.

ST and smoking risks were frequently combined in lists of health effects or attributable risk, either by conjunction or by using the word "tobacco" in contexts where it refers to both products. A popular health advice site, Virtual Hospital, (hit 8) states, "Both cigarettes and smokeless tobacco are harmful to your child's health," followed immediately by detailing the known health effects of smoking. The U.S. National Library of Medicine's MedlinePlus (hit 11), under the heading "Tobacco use, smoking and smokeless tobacco," states, "Tobacco and its various components increase the risk of cancer (especially in the lung, mouth, larynx, esophagus, bladder, kidney, pancreas, and cervix), heart attacks and strokes, and chronic lung disease.

We identified 55 websites making such claims.

Without actually stating relative effects, these tend to imply that the components of the conjunction contribute similarly to the claimed health effects. These conjunctions are particularly common in the later Google hits which only briefly mentions ST, often in a broad discussion of risk factors, suggesting that most brief presentations of the health effects of ST conflate the exposure with smoking.

The U.S. National Cancer Institute (NCI) had the largest number of search hits (all of the first 4 and 16 others). To NCI's credit, we found no literally false claims. However, they did exemplify the many ways in which literally true misleading claims can be made, including "not a safe alternative," lumping together attributable risk from ST for oral cancer with the (many times greater) risk from cigarettes, and unsupported claims about ST causing oral cancer in young people. A particularly misleading conjunction is, "Smoking tobacco, using smokeless tobacco, and being regularly exposed to environmental tobacco smoke are responsible for one-third of all cancer deaths in the United States each year." Even the worst-case scenario for claims about the risk from ST would make it responsible for about 1/1000 of this total attributable risk.

Relative popularity

The imbalance of good and bad information is worse if we focus on the hits from earlier in the list (i.e., the ones more likely to be found and accessed). Looking at the first 90 hits, those that appear before a searcher would see ACSH, ASH, or any accurate comparative risk information yields 44 websites. Those include 13 that claim ST is as bad or worse than cigarettes and 19 others that use one of the rhetorical devices to imply the risks are similar.

Repeated quoting of the same few sources creates the perception of a well-supported "fact"

The large number of organizations making similar statements might sound like a large body of evidence, until we look at the sources for their claims.

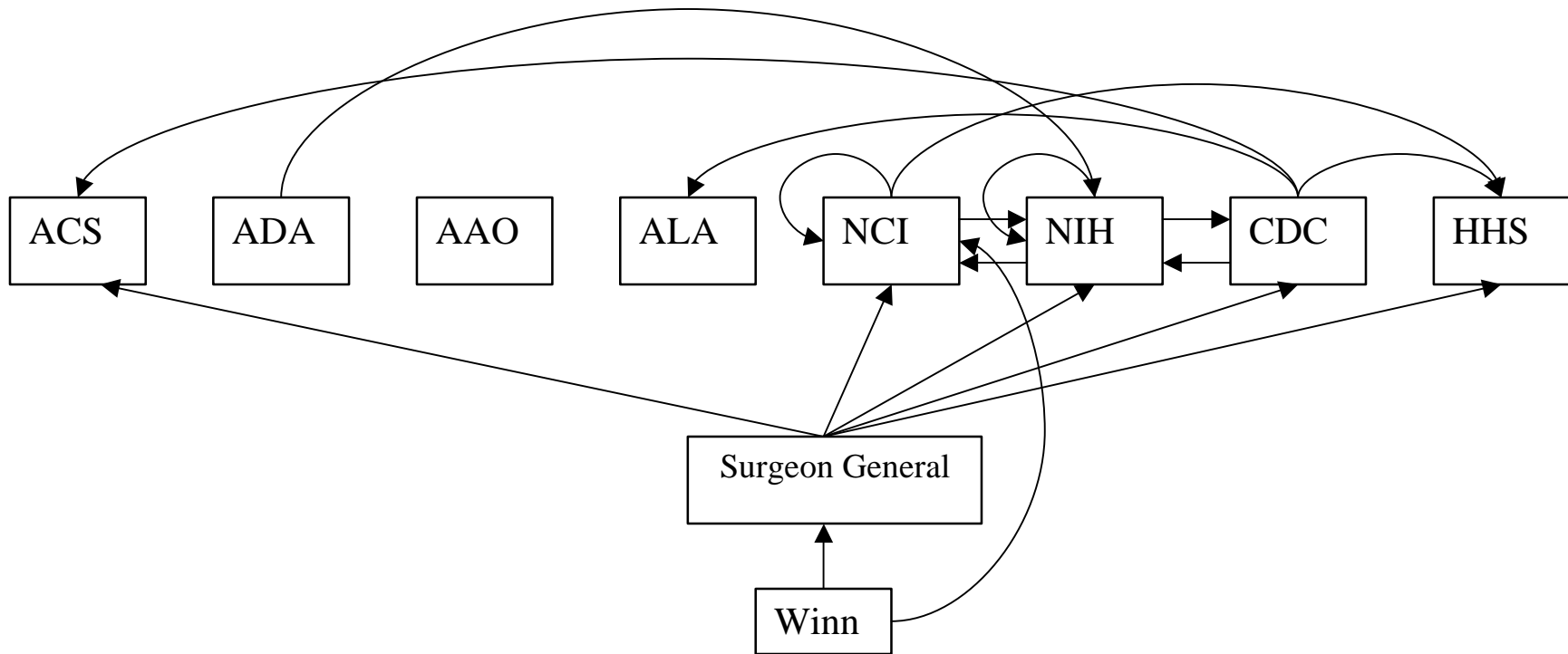
We identified *9 opinion leaders*, which we defined as any source (organization or document) that is cited by 5 or more websites in our population. (We originally considered 3 as the cutpoint, but we found that those with 5 or more citations clearly stood out as the genuine opinion leaders and counts of 2 vs. 3 vs. 4 were often ambiguous.) The opinion leaders are listed by name in **Figure 1**, along with arrows representing references to the websites of other opinion leaders.

Observations:

The pattern of mutual inter-referencing among the most-cited sources is clear.

The opinion leaders all deliver a strong anti-ST message, with no acknowledgment that ST is much less harmful than smoking, that the link to oral cancer (OC) is far from proven, or that ST has not been strongly linked to any other life-threatening disease.

Figure 1



ACS: American Cancer Society

ADA: American Dental Association

AAO: American Academy of Otolaryngology

ALA: American Lung Association

NCI: National Cancer Institute

NIH: National Institutes of Health

CDC: Centers for Disease Control and Prevention

HHS: U.S. Department of Health and Human Services

Surgeon General: 1986 Surgeon General's Report and other references to 'the Surgeon General'

Winn: Winn et al. [1981]

Notes on the chart and definitions of opinion leaders:

Winn (representing Winn et al. (1981), the single study that is largely responsible for the claim that ST causes OC) does not actually qualify as an opinion leader. Even though the paper is substantially responsible for the Surgeon General's report (1986) and most of the reported RR numbers trace to it, Winn and that paper are specifically mentioned only a few times. We include her/the paper in Figure 1 to emphasize the ultimate source of much of the information.

We found mentions of Rodu's work at six sites in our population, but several of these do not qualify as citations. One was his personal site (and so effectively is the representation of him/his work). Two do not really reference his body of work: one uses him as a source for a single statistic and the other mentioned him only to insist that his opinions are wrong, without presenting his arguments. One of the other websites was UAB, which is arguably another presentation of Rodu's own work. The remaining citations to him are from ASH and the ACSH

The proper level of subdivision of the U.S. government opinion leaders was ambiguous; in particular, some websites reference NCI, some NIH, and a very few reference other specific Institutes. We chose to list NCI as an opinion leader because it was frequently cited by name. We then defined all the rest of NIH as a single opinion leader, though we considered each Institute an individual site for other parts of our analysis. NCI referencing itself in Figure 1 represents the website citing the position of the Institute as an independent authority. NIH referencing itself represents various Institutes' websites' citing themselves or other Institutes. Because references to the Surgeon General were often ambiguous (not clear if they were to the 1986 report or a particular SG), we consolidated these into a single entity.

Note that when an organization or document is referenced it does not necessarily refer to anything that appears on the web. Thus, the boxes in the figures need to be thought of as representing the website for most purposes, but the organization or document when the box represents a cited source – i.e., at the origin of an arrow. For example, the several references to the AAO are clearly not to its website, which contains very limited information.

Our prior expectations about who opinion leaders would be also included the American Medical Association, the American Academy of Pediatrics, and WHO/IARC but none of these turned out to be opinion leaders by our definition. WHO might have qualified but for the elimination of sites that dealt primarily with South Asian products.

Figure 2 includes all the websites in our population. Of these, 128 identified at least one specific source for their claims. All such citations are represented by lines in Figure 2. The opinion leaders and other sources of information appear at the bottom (citations already represented in Figure 1 are omitted).

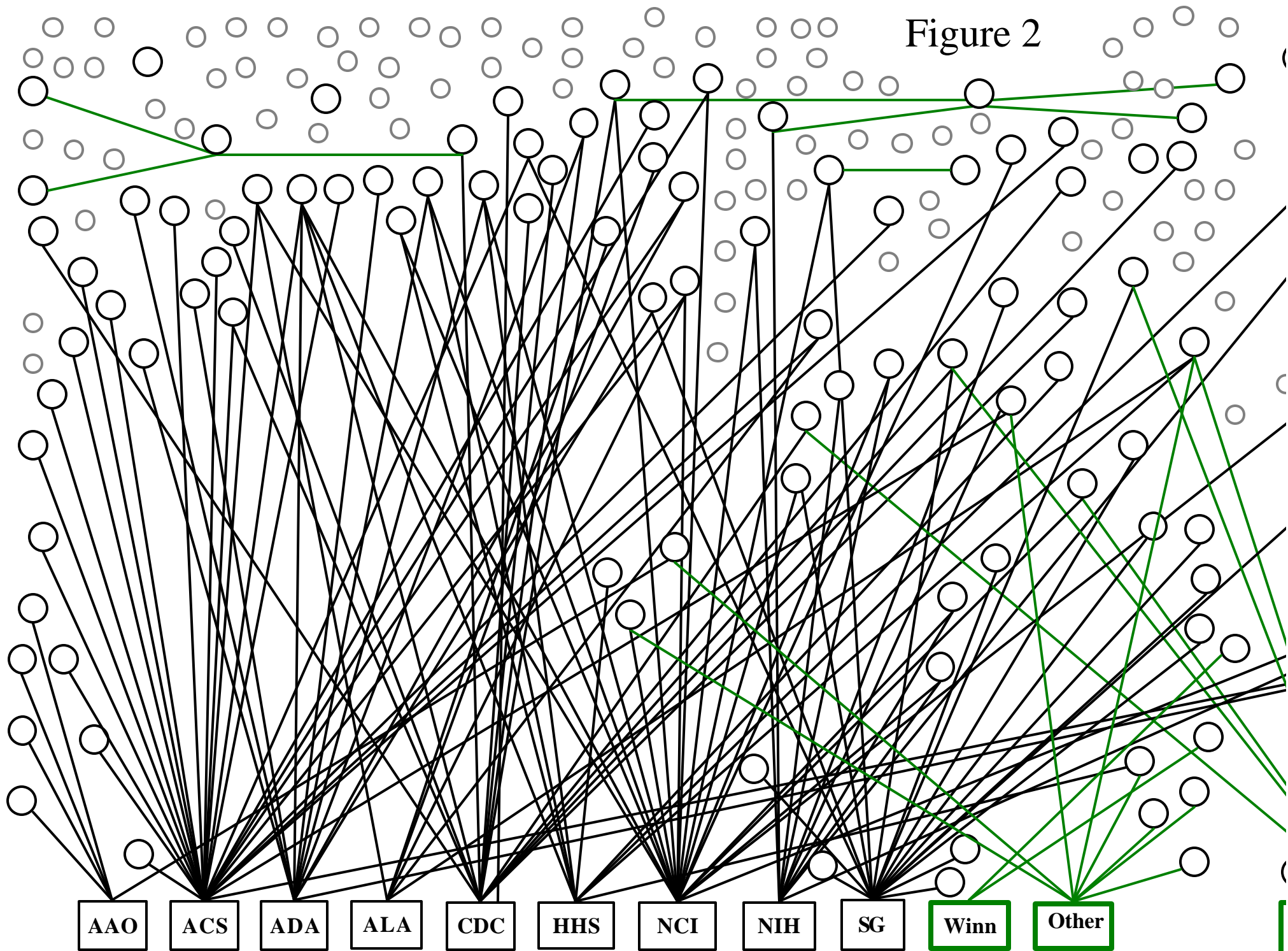
The circles represent the websites in the population.

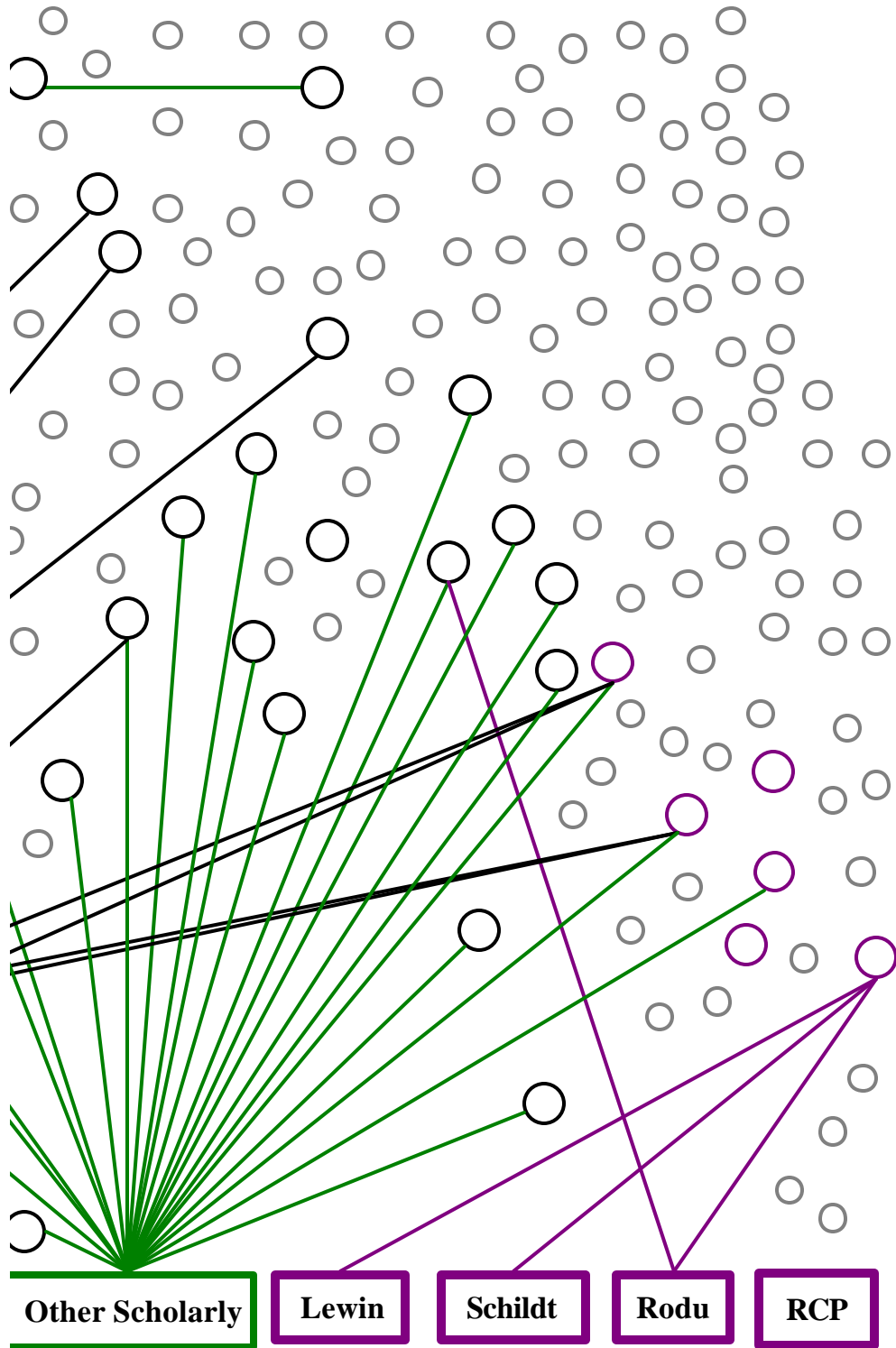
Black lines from circles represent references to one of the opinion leaders.

The purple boxes on the right hand side of the figure represent sources that should be cited to provide a balanced picture of the OC risk (and other risks) from ST. They represent the Lewin et al. and Schildt et al. papers, Rodu and his writings, and the recent report by the Royal College of Physicians. (All of these are described above.) The site that references several of these is ASH. The other line to Rodu is UAB.

Green lines represent references to other sources, including organizations that are represented by one of the website circles in the figure, a box representing all other scholarly writing (journal articles other than Winn, Lewin, Schildt, Rodu), and "other" (all identifiable references not fitting into any of the above categories, generally organizations that did not have websites in our population).

Figure 2





Telling Lies

Some pieces of misinformation make it particularly clear that the apparent large amount of information is really a lot of copying and pasting. A particularly telling example appears in lists of "bad for you" chemicals in ST that are presented as reasons for avoiding it. (Thanks to Brad Rodu (unpublished work) for pointing out this example.) The lists usually provide context for what a chemical is (e.g., "arsenic, which is found in rat poison"), and get it wrong by identifying cadmium as an ingredient in car batteries (it is not; it is in rechargeable dry cell batteries).

Repeated accurate or non-specific information can represent multiple sources or re-derivations of the same point. Repeated clear simple errors usually have a common source. This error is really inconsequential and is probably not an intentional lie, but it is telling. (The lists are inherently misleading, since some of the nasty sounding chemicals are not actually harmful, and harmful metals and other pollutants can be found in trace quantities in all plants (e.g., broccoli).) 64 websites in our data include lists of chemicals found in ST, and 22 of those (including some high-ranking ones) say that cadmium is found in car batteries.

Mistaken information about car batteries does not matter, but the apparent willingness to blindly quote any negative information about ST, and the apparent lack of interest by those advocating against the use of ST to find and correct their errors, is troubling and telling. We have been unable to trace the error to its source, which is also troubling, since it illustrates the repeating of information as fact without any citation of sources.

Popular myth: the relative risk for oral cancer (OC) is 50

Our results include findings about several specific common claims. A particularly interesting one is reporting of relative risk numbers. About one fifth of the sites contain an actual number for relative risk, with the prevalence higher among the more popular sites.

Some give a value of 4 or 4.2, which is the main number reported from the Winn et al. (1981) study. (Sometimes this is presented as a 300% increase, which probably sounds larger to some readers.) This is the largest number that could be considered consistent with any meaningful published result in the literature (however, see our other poster in this session). It could be legitimately offered as a worst plausible case (though no caveat that this is a worst-case value appears in the websites). Other websites contain a variety of RR numbers, ranging from 1.5 to 28. The origins of most of these are not clear.

The most popular claim, however, appearing in a majority of the sites that contain a relative risk number, is a 50-fold increase for OC risk, a misinterpretation of another result from Winn (explained in more detail in our other poster in this session). This is a very curious number to be so widely quoted since such a high relative risk falls outside the confidence intervals for even the largest estimated relative risks for the effect of ST on OC. Moreover, a true relative risk of that magnitude would be impossible to miss, yet most studies have not found an elevated risk. Most importantly, given the prevalence of exposure, it would mean that a large majority of U.S. OC cases would be ST users, which is not even close to being true.

Why this misinterpretation is so popular is not clear. The U.S. Department of Health and Human Services seems to have actively contributed to it: Former Secretary Louis Sullivan has made public statements that include this number and SAMHSA (in the pamphlet quoted from their website, above) states "Smokeless tobacco users are 50 times more likely to get oral cancer than non-users." The NIH National Library of Medicine's MedlinePlus (consumer information) site also contains the statement. However, DHHS is not alone among authorities making this claim – unqualified statements of a relative risk of 50 also appear on at the American Cancer Society and American Dental Association sites.

Conclusions

Even knowing that the available popular information was skewed, we were astonished to find the ubiquity of misinformation, the prevalence of claims that risks from ST are similar to those from smoking, and the rarity of accurate information. We expect that the mix of information in our search is similar to that provided in pamphlets, public service messages, and other popular media, particularly since the same organizations represented in our websites are the ones that provide that information.

Our review of patterns of citation and quoting shows that most of the information is simply repetition of a few results and claims. When sources of information are cited this is evident. When sources are not cited, it is still possible to infer.

The negative health implications of preventing people from realizing that ST is relatively safe should not be underestimated. ST users are told, in effect, that they might as well switch to smoking if they find they enjoy it a bit more or it is more convenient. The much larger population of smokers is told, in effect, that they cannot use tobacco in a relatively safe way, a message that is often characterized as "quit or die." It is extremely difficult for anyone to deliver the harm reduction message in the face of the widespread misperception that is fueled by the misinformation. At this point, we can only speculate about how many smokers would take advantage of this opportunity to reduce their risk by two orders of magnitude or more.

Health advocates, particularly those in public service, have an affirmative ethical duty to tell the truth. It is difficult to justify keeping the truth from people, even when it might be harmful; it is clearly unjustified when it would be beneficial.

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Constance Wang also contributed to this research. This research was supported by the non-profit Center for Philosophy, Health, and Policy Sciences, Inc. CPHPS is the recipient of an unrestricted gift from U.S. Smokeless Tobacco Company for support of research of Dr. Carl V. Phillips. This research was investigator-initiated. USST did not influence the content or see this material before it was publically released.