

Is the Narrative that E-Cigarettes Reduce 95% of Harm a Myth?

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A Narrativa de que os Cigarros Eletrônicos Reduzem 95% do Dano É um Mito?
¿Es un Mito que los Cigarrillos Electrónicos Reducen el 95 % de los Daños?

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INTRODUCTION

Claiming that e-cigarettes would be 95% less harmful than traditional cigarettes is grounded on a 2015 report of the Public Health England (PHE)¹ that relied on a 2014 estimate from a consensus experts article which utilized the multi-criteria decision analysis (MCDA)^{2,3}. The MCDA panel consisted of 12 members convened in a single meeting. Some authors were funded by or had confirmed ties to the tobacco or e-cigarette industry. The methodology applied, according to the literature, had significant flaws: failed to apply systematic criteria of selection of experts, did not conduct a comprehensive review of evidences and mixed dissimilar criteria of damages, including environmental and economic impacts together with health damages whose outcome was an extremely subjective classification^{2,4}.

The journals *The Lancet* and the *British Medical Journal* (BMJ) published incisive editorials pointing out that the numbers of the United Kingdom government were not evidences-based^{2,4}. These editorials stated that the affirmation was premature and potentially misleading and indicated that PHE underscored the fact that these products were 95% less damaging than conventional cigarettes, failing to meet the minimum requirements of evidence effectiveness^{2,4,5}. According to the literature^{2,4,8}, notwithstanding these warnings, PHE continued to force the adoption of these numbers, first in the media and then in scientific events and in lawmaking processes. The outcome was the popularization of the idea that more than 90% of all the diseases would disappear without any drugs or treatments. This number has soon become an integral part of the public narrative of policies and advocacy pieces of the tobacco and nicotine industry products^{2,4,8}.

DEVELOPMENT

CONFLICTS OF INTEREST AND DISINFORMATION

Publications have shown that the MCDA panel had conflicts of interest and that the criteria utilized

to conclude that 95% of e-cigarettes were less harmful gathered opinions from participants, in addition to not being based on robust evidences. These criteria included different dimensions of harms as health impacts and social risks; however, the application was subjective and lacked objective data as the authors themselves have declared⁴. The conflicts of interest and the subjective evaluation process could lead to influences aligned with commercial interests⁴. Subsequent revisions showed that the tobacco and e-cigarettes industry capitalized this allegation and used it in the global market to counter regulatory initiatives⁷. The persistent myth of the 95%, regardless of the rising rejection from researchers and health organizations, illustrates the “continued influence effect (CIE)”⁹, since disinformation creates an aura of truth hard to be fought^{2,4,5,7,8}.

The continued influence effect (CIE) is a phenomenon that retracted information often continues to influence judgements and inferences⁹. Even with correction or retraction, the persons tend to keep their beliefs or conclusions based on the original information⁹.

The repeated disclosure of these information on e-cigarettes appeared to have favored the construction of misleading beliefs through a phenomenon called illusory truth effect (ITE)¹⁰. It happens because repeated information is perceived by the individuals as more truthful, even in the absence of solid evidences. Therefore, when some information is reiterated systematically in analyzes, in the media or is the object of debates, even health experts and lawmakers believe they are more trustworthy¹⁰. This procedure determines a set of beliefs that holds steadily through corrections, hindering the reversion of deceptive perceptions, despite the abundance of researches discrediting the veracity of the information¹⁰.

EVIDENCES OF HEALTH RISKS

Scientific evidences show that e-cigarettes users are not free from significant health risks. For outcomes as

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metabolic dysfunction and oral disease, the risks among exclusive e-cigarette users were indistinguishable from those found in exclusive cigarette smokers. Although the risks of cardiovascular disease (CVD) and stroke for e-cigarettes alone have been statistically lower than conventional cigarettes, they remain substantial and high being three to ten times higher than the risks previously estimated by some health authorities¹¹. There are evidences that e-cigarettes offer but modest risk reduction of respiratory diseases as asthma and chronic obstructive pulmonary disease (COPD)¹¹. The dual use (conventional cigarettes + e-cigarettes), today a common pattern, results in even greater odds of sickening than exclusive smoking¹¹. These findings are particularly relevant given the high global prevalence of dual use countering the narratives of “risk reduction” that consider that the users will switch products completely¹².

Studies of biomarkers and with experimental animals determined that the exposure to e-cigarettes results in the absorption of carcinogenic and toxic substances, DNA damage and tissue and cellular alterations comparable in nature, even if not in the same level, as those observed with cigarette smoke¹³. Experimental animals showed that the chronic exposure to e-cigarette aerosols can produce tumors and eventually lung adenocarcinoma¹³. Molecular analyzes of human tissues reveal that the profile of DNA methylation of the oral epithelium of e-cigarettes smokers was altered, affecting genes and signaling pathways involved in the defense against cancer and tumor suppression¹³. In addition, recent researches show that components of e-cigarettes promote pro-carcinogenic pathways as the epithelial-to-mesenchymal transition and immunosuppression, essential processes in the formation and tumor dissemination¹³.

In addition, studies suggest that there is no safe levels of chronic exposure to e-cigarettes aerosols in relation to the risk of endothelial dysfunction and cardiovascular commitment, also dismantling the argument of “harms reduction”¹⁴.

BEYOND THE 95%: HARMS TO YOUNG ADULTS, GATEWAY EFFECT, DEPENDENCE AND BEHAVIORAL RISKS

Evidences indicate that the use of e-cigarettes increases the risk of subsequent smoking initiation in young people, three-times higher for e-cigarettes users than for non-users¹⁵. The so called “gateway effect” is robust in longitudinal studies and was confirmed in meta-analyzes involving more than 20 reviews and hundreds of primary studies¹⁵. There are also substantial evidences linking the use of e-cigarettes to high risk of use of other substances (marijuana and alcohol), worse health outcomes (including

depression and suicidal ideation) and respiratory damages as asthma and sibilance in adolescents¹⁶.

The dual use and continuous exposure to nicotine among young adults are associated with worse outcomes as mental health, substance use and trajectories of dependence compared with the exclusive use of a single product. United Kingdom cohorts studies highlight the stagnation of the drop of use of traditional cigarettes among young adults and that the users of e-cigarettes now represent a disproportionately high risk group of future conventional cigarettes smoking initiation¹⁷. Cohort and cross-sectional studies have also revealed that rarely the use of e-cigarettes among young people is restricted to ex-smokers or cessation attempts, it introduces nicotine to new populations until then non-users¹⁵ instead. In addition, a study suggested that, in England, the use of disposable e-cigarettes mainly in young adults would be responsible for the reversion of the historical declines in nicotine use and now the use of nicotine appears to be rising, driven primarily by sharp increases in vaping among young people¹⁸.

CURRENT SCIENTIFIC CONSENSUS AND IMPLICATIONS FOR PUBLIC HEALTH

International health authorities rejected the allegation that e-cigarettes are 95% less dangerous, underscoring the uncertainty and the evolution of the evidences on e-cigarettes risks⁷. The PHE endorsement to this number is defined by some as “an evidence-based confusion”² rooted on a flawed methodology and excessive rely on a panel opinion and not on systematic reviews and epidemiological data^{2,4,5,11}. Critics argue that the strong influence of the industry and selective use of evidences shaped permissive recommendations in certain jurisdictions that may not be safe in other contexts with different regulatory scenarios and products¹⁹.

Today, scientific and health professionals communities converge more in pointing out that the “95% less harmful” narrative is outdated, inaccurate and should neither steer public policies nor clinical guidelines, but it is still relayed, especially by the manufacturers, scientists tied to these companies, front groups or by professionals and lay individuals with no ties to e-cigarettes manufacturers necessarily, replicating this narrative, especially if the influence of CIE and ITE is considered. Simplistic percentages of harms cloud the actual complexity and uncertainty of the evidences mainly when young adults, dual users and individuals who had never smoked are involved. Instead, policies must require clear communications of risk, strict management of conflicts of interest, protection of young adults and thorough

monitoring by lawmakers of the rising spectrum of ENDS (Electronic Nicotine Delivery Systems).

ENDS BANNING IN BRAZIL

On April 19, 2024, the National Health Surveillance Agency (Anvisa)²⁰, after more than four years of analysis, reiterated ENDS banning and endorsed Anvisa's jurisdiction to ENDS banning in Brazil, the National Tobacco Control Policy, the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC/WHO), the positions of the Ministry of Health and the National Committee to Implement the FCTC (Conicq)²⁰.

Their votes made clear there is no safe tobacco product and that ENDS contain toxic and carcinogenic substances associated with severe diseases that increase nicotine dependence and are gateways to dual use especially in young adults²⁰.

The votes pointed out still the lack of robust evidences of harms reduction or successful tobacco cessation among the population and underscored the strong appeal of these products among adolescents, their environmental impacts and flimsy evidences that regulation would reduce the illicit market.

Ultimately, they concluded that the most responsible measure is to maintain the banning, strength the inspection and invest in educative actions and already consolidated tobacco control policies²⁰. After a thorough process, Anvisa's decision rejected the misleading argument that e-cigarettes would be 95% less damaging than conventional cigarettes.

CONCLUSION

The root of the affirmation and tenacious myth that e-cigarettes would be 95% less damaging illustrate the danger of weak consensus-based estimates unsubstantiated by empirical validation as well as potential adverse effects of commercial interests over public health communications. Rising scientific evidences refute the initial allegations about health outcomes of these products, including disease risks, behavioral damages, dependence and carcinogenicity. A responsible and evidence-based approach requires the abandonment of the 95% in favor of an accurate and updated scientific perspective and of policies that recognize the rising understanding about e-cigarette harms, especially among young adults, dual use and long-term diseases. Health professionals and educators should avoid replicating this affirmation, reaffirm the impacts of these products and conclude they can pose an even greater risk to public health than

conventional cigarettes given their appeal among young adults, its high power of dependence, associated risks and a false perception of harms reduction or even absence of health damages.

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CONTRIBUTIONS

Both authors contributed substantially to the study conception or design, acquisition, analysis and interpretation of the data, writing and critical review. They approved the final version for publication.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

DATA AVAILABILITY STATEMENT

All the content underlying the text is contained in the manuscript.

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