

# Estimating Nicotine Consumption Among Poly-Tobacco Users

Compassion: Research and Practice Initiatives Day (RAPID)

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# Learning Objectives

- Define the meaning of cigarettes-equivalents.
- Describe how cigarettes-equivalents are calculated for different forms of tobacco.
- Assess the number of cigarette-equivalents for an individual using more than one form of tobacco.
- Realize the usefulness of cigarette-equivalents for determining the appropriate dose for nicotine replacement therapy

# Introduction

- In 2018, the CDC estimated that around 14% of U.S. adults are current cigarettes smokers, which is the lowest ever recorded prevalence rate of smoking since 1965.
- However, 19.3% of U.S. adults use tobacco products, and 3.7% are poly-tobacco (PTP) product users.
- Around 14% U.S. adults have used e-cigarettes, hookahs, cigars, and/or smokeless tobacco in the past 30 days.
- In a study involving 44 countries between 2008 and 2012 (U.S. not included), poly-tobacco use rates were as high as 12%, with 28 countries reporting 20% of current cigarettes smokers using at least one other tobacco product.

# Who have the highest risk of PTP use ...

- Males
- Adults aged less than 65 years.
- American Indian/Alaska Natives, Whites, Blacks, or bi-racial compared to Hispanics or non-Hispanic Asians.
- Adults living in the South or Midwest regions in the U.S. compared to adults living West or Northeast.
- Income less than \$35,000.
- Sexual orientation other than heterosexual/straight.
- Having a disability or limitation.
- People with serious psychological distress.

# Examples of Other forms of tobacco ...

9.3 million users



Cigars



Little cigars/cigarillos



Loose snus

1.3 million users



Pouched snus (Snuff)

5.1 million users



Smokeless (Dip, spit, Chew)

2.6 million users

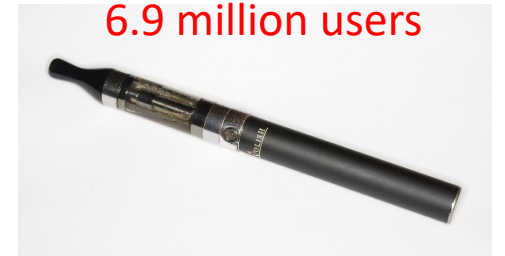


Hookah



Pipe

6.9 million users



E-cig

# Methods

- We conducted a literature search for nicotine content (NC), nicotine yield, cotinine level, and plasma nicotine concentration (PNC) for cigars, cigarillos, snus, smokeless tobacco, hookahs, pipes, and e-cigarettes.
- Average NC, yield, or plasma concentration found in one cigarette was used to estimate the number of cigarette-equivalents for each of these products.

## Results

Tobacco Product	Nicotine Content (Concentration)	Amount of Nicotine Reaching Bloodstream (Free Nicotine/Unprotonated Nicotine/Nicotine Yield)	Number of Cigarettes Equivalence
<b>1 cigarette</b> Endorsing that 1 cigarette weighs approximately 1 gram.	18.5mg/cigarette	1.1mg of <u>nicotine</u> /cigarette or 18.8ng/ml <u>plasma nicotine concentration</u>	1
<b>1 cigar</b> Based on average total nicotine content from cigars weighting between 3.4g and 21.4g, with total nicotine contents ranging between 46mg and 211mg, respectively.	88mg/cigar	6.2 ng/ml and 24.2ng/ml of <u>cotinine</u> for current cigar/never cigarette smokers and current cigar/former cigarette smoker, respectively	5 <sup>a</sup>
<b>1 cigarillo/little cigar</b> Based on average total nicotine content from cigars weighing between 0.53g and 2.75g, with total nicotine contents ranging between 5.9mg and 19.6mg, respectively.	13.7mg/cigarillo or little cigar	---	0.74 <sup>a</sup>
<b>1 can of snus (loose)</b> Based on 1 can of snus containing 19mg nicotine per 1 gram and weighing 42g.	796mg/can	14.3 ng/ml of <u>plasma nicotine</u> for a single portion (1 gram)	32 <sup>b</sup>
<b>1 can of snus (pouches)</b> Based on 1 can of snus containing 12.7mg nicotine per 1 gram and weighing 42g.	533mg/can	12.1 ng/ml of <u>plasma nicotine</u> for a single portion (1g/pouch)	27 <sup>b</sup>
<b>1 can of loose smokeless tobacco (dip, spit, chew, or snuff)</b> Based on the average total nicotine yield, <u>in a 34g can</u> , found in fine cut original, long cut straight, long cut wintergreen, and long cut mint tobacco forms, from common smokeless tobacco commercial brands (Copenhagen, Skoal, Kodiak, and Grizzly).	421mg/can	8.4mg of <u>free/unprotonated nicotine</u> for a single portion (2.3g)	124 <sup>c</sup>

## Results

Tobacco Product	Nicotine Content (Concentration)	Amount of Nicotine Reaching Bloodstream (Free Nicotine/Unprotonated Nicotine/Nicotine Yield)	Number of Cigarettes Equivalence
<b>1 session of smoking hookah using flavored tobacco</b>  Based on smoking an average of 20g of flavored tobacco per session (45 minutes session with an average of 90 puffs).	67mg/session	---	20 <sup>a</sup>
<b>1 bowl of pipe tobacco</b>  Based on the average nicotine content found in a 3g-bowl of pipe tobacco (38mg/g).	114mg/bowl	---	6 <sup>a</sup>
<b>E-cig (vaping)</b>  Based on <i>times</i> of ad lib vaping, using an average liquid strength (18mg/ml). Each <i>time</i> of ad lib vaping (using new generation devices) was estimated by smoking around 15 puffs or lasting around 10 minutes.	18mg/ml (medium strength)	5.2ng/ml of <u>plasma nicotine</u>	0.3 <sup>d</sup>



# Conclusion

- Knowledge of cigarette-equivalents may be useful for tobacco treatment specialists in establishing appropriate nicotine replacement therapy dosage for PTP users.
- Additionally, cigarettes-equivalents are an objective approach for researchers to assess nicotine consumption for PTP users.

## Pharmacotherapy Choices

Quick Reference for Pharmacotherapy to Manage Nicotine Withdrawal

A practice tool to help clinicians decide on nicotine withdrawal management pharmacotherapy

### Nicotine Replacement Equivalencies\*

Cigarettes	Snuff	Cigars
2 packs/day → two 21mg patches	3 cans/week → two 21mg patches + 4mg gum	1-2 cigars/day → one 7mg patch
1.5 packs/day → 21mg + 14mg patches	2 cans/week → two 21mg patches	
1 pack/day → one 21mg patch	1 can/week → one 21mg patch	
0.5 pack/day → one 14mg patch		
5 or less cigarettes/day → 4mg gum OR 4mg lozenge PRN		

\*These nicotine replacement equivalencies are based on research studies and clinical experience to provide adequate replacement of nicotine during tobacco free hospitalizations. As such these equivalencies may be off-label prescribing/use.

Agaku, I. T., & Alpert, H. R. (2016). Trends in annual sales and current use of cigarettes, cigars, roll-your-own tobacco, pipes, and smokeless tobacco among US adults, 2002-2012. Tobacco Control, 25(4), 461-467.

Anantharaman, D., Chabrier, A., Gaboriau, V., et al. (2014). Genetic variants in nicotine addiction and alcohol metabolism genes, oral Cancer risk and the propensity to smoke and drink alcohol: A replication study in India. PLoS One, 9(7), e88240.

Using adequate pharmacotherapy can help manage withdrawal and optimize success while stopping tobacco use

### Evidence Based Clinician Approach

ASK	ASSESS	PROVIDE
<b>amount of tobacco use</b> "What kind of tobacco products do you use? How often do you use them?"	<b>nicotine withdrawal</b> "Have you experienced any of the following symptoms in the past 24 hours: (cravings, depressive symptoms, insomnia, anger, anxiety, poor concentration, restlessness, and decreased appetite)?"	<b>nicotine replacement</b> Offer nicotine replacement based on withdrawal score and tobacco product use.

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# Questions

