



## **PPS-TOBACCO CONTROL ADVOCACY GROUP POSITION STATEMENT ON ENDS/ ENNDS**

Electronic Nicotine Delivery System (ENDS) ,Electronic Non-Nicotine Delivery System (ENNDS) are handheld devices that produce aerosol from a solution commonly called e-juice contains +/- nicotine, flavoring chemicals and carrier solvents such as propylene glycol and vegetable glycerin for inhalation by the user. These devices are commonly battery operated and produce emissions for inhalation. This aerosol is inhaled by the user,who then exhales it. Non users can be exposed to this emissions both from the aerosol that is exhaled as well as from the aerosol that is generated from the device.<sup>1</sup>

The recent 2015 GYTS data revealed an increasing trend of smokers among the Filipino youth ( from 12% in 2010 to nearly 16 % in 2015) . For ENDS , **42.7 %** of students have ever heard of electronic cigarettes and **11.7%** of these students ever tried or experimented with electronic cigarettes, even just one or two puffs. <sup>2</sup>

The youth would try e-cigarettes out of curiosity ( 57%) , good flavors ( 41.8%) , friends use it ( 32.6%) ,healthier than cigarette perception ( 25.6%).

E.O.26 which is the Nationwide Smoking Ban on public and enclosed spaces is meant to protect everyone on mainstream smoke and that of the secondhand smoke. This ban does not cover the electronic nicotine delivery system/electronic non-nicotine delivery systems <sup>3</sup>.

The current statistics on usage among our youth of e-cigarettes could have increased to date due to their proliferation in the malls, internet vendors, retail outlets and vape shops.

### ***Health Hazards of ENDS /ENNDS***

#### ***Nicotine***

The adolescent brain is uniquely susceptible to nicotine addiction. It has neurotoxic effects on the developing brain<sup>4</sup>. In early adolescence ,development of executive function and neurocognitive process in the brain has not fully matured. Adolescents are more likely to engage in experimentation with substances such as cigarettes and ENDS and they are more physiologically vulnerable to addiction.<sup>4</sup>

Severe nicotine toxicity in children has been reported with nicotine doses as low as 2mg. ENDS solution have been advertised to contain as much as 36mg/ml of nicotine (3.6%).The oral lethal dose of nicotine by the body weight that is estimated to kill 50% of adults is projected between 0.8mg-13mg/kg .<sup>5</sup> Using the mid-range estimate (6mg/kg) of a lethal dose of nicotine, an ingestion of the contents of 2ml of an ENDS concentrated solution could be fatal to the average 12kg, 20 month old child. There is a significant risk of pediatric morbidity and mortality with the

current unregulated packaging and volume of nicotine concentrations available in ENDS solution.

#### *Humectants :Propylene Glycol(PG) and Vegetable Glycerin (VG)*

Both are considered GRAS ( generally regarded as safe) for use in flavorings ,drugs, cosmetics but there is unknown health impacts from repeated inhalation.

Propylene Glycol offers a strong pleasant hit at the back of the throat like tobacco ,generally tasteless an thinner in consistency but could cause eye and respiratory irritation when inhaled and potentially cause allergic reaction.

Vegetable Glycerin delivers great plumes of vapor when exhaling , is thicker and sweeter.

Humectants when heated and vaporized forms carbonyls like acrolein which is an upper respiratory tract irritant and linked to cardiovascular disease and lung cancer.<sup>6</sup>

#### *Flavourants/Flavorings*

There is nearly 8,000 e-liquid flavors and most of them pose appreciable health risks of heated and inhaled flavorants from long term use especially those that are sweet.<sup>7</sup> Most are not pharmaceutical grade . Many are irritants and increases airway inflammation.

Flavors are known to be appealing to youth and the most common reason for teens to vape.

Cinnamon flavor turns to cinnamadehyde, butter flavor turns to diacetyl causing bronchitis obliterans or “popcorn workers lung” .<sup>8</sup> These different flavors may have gene-altering effects on the cells in the delicate lining of the respiratory tract.

#### *Second Hand and Third Hand Aerosol*

The heated aerosol generated by ENDS produce tiny particles ( i.e.chromium, nickel, lead) that can trigger inflammation which have been linked to asthma, stroke, heart disease.<sup>9</sup>

Harmful toxicants and carcinogens have been found in ENDS emissions .These include polycyclic aromatic hydrocarbons,nicotine, volatile organic compounds,ultrafine particles and particulate matter. Metal and silicate particles some of which occur at higher levels than conventional cigarettes have also been detected in ENDS aerosol.<sup>10</sup>

Thirdhand aerosol, is the residual aerosol that remains on surfaces and in dust after ENDS use may react with oxidants in the environment to yield secondary pollutants .Nicotine on surfaces has been shown to be increased after ENDS use. Nicotine can combine with indoor substances such as ozone and nitrous oxide to become irritants and tobacco specific nitrosamines which is a potential carcinogen.<sup>11</sup>

#### ***Recent research developments on use of ENDS***

- The PATH ( Population Assessment of Tobacco and Health) Study 2013-2015, showed that any use of electronic cigarettes , hookah, non-combustible tobacco or smokeless tobacco in one year among 10,384 youths ages 12-17 y.o . doubled the chance with cigarette initiation within 1 year.<sup>12</sup>
- NASEM( National Academy of Science Engineering and Medicine ) report ,January 23,2018.<sup>13</sup>

Important conclusive evidence shown as follows:

- E-cigarette use increases airborne concentrations of particulate matter and nicotine in indoor environments.

- Nicotine from e-cigarettes is highly variable and depends on product characteristic ( including device and e-liquid characteristic) and how the device is operated.
- In addition to nicotine, most e-cigarette products contain and emit potentially toxic substances.
- E-cigarette devices can explode and cause burns and projectile injuries .Such risks is significantly increased when batteries are of poor quality, stored improperly or being modified by users.
- Intentional or accidental exposure to e-liquids ( from drinking, eye contact, or dermal contact) can result in adverse health effects including but not limited to seizures, anoxic brain injury, vomiting and lactic acidosis.
- Intentionally or unintentionally drinking or injecting e-liquids can be fatal.
- Completely substituting e-cigarettes for combustible tobacco cigarettes reduces user’s exposure to numerous toxicants and carcinogens present in combustible tobacco cigarettes.

Important Substantial evidence cited are as follows:

- Nicotine intake from e-cigarette devices among experienced adult e-cigarette users can be comparable to that from combustible tobacco cigarettes.
  - Except for nicotine, under typical conditions of use, exposure to potentially toxic substances from e-cigarettes is significantly lower compared with combustible tobacco cigarettes.
  - E-cigarette aerosols contains metals .The origin of the metals could be the metallic coil used to heat the e-liquid,other parts of the e-cigarette device, or e-liquids.
  - E-cigarette aerosols can induce acute endothelial dysfunction .
  - Components of e-cigarette aerosols can promote formation of reactive oxygen species/oxidative stress. This supports the biological plausibility of tissue injury and disease from long term exposure to e-cigarette aerosols .
  - E-cigarette use results in symptoms of dependence on e-cigarettes.
  - Heart rate increases after nicotine intake from e-cigarettes.
  - Some chemicals present in e-cigarette aerosols ( formaldehyde, acrolein) are capable of causing DNA damage and mutagenesis. This supports the biological plausibility that long term exposure to e-cigarette aerosols could increase the risk of cancer and adverse reproductive outcomes.
  - E-cigarette use increases risk of ever using combustible tobacco cigarettes among youth and young adults.
- Recent PEDIATRICS report last March 5,2018 “ *Adolescent exposure to toxic volatile organic chemicals from e-cigarettes* ”, <sup>14</sup>.showed urine excretion of metabolites of benzene, ethylene dioxide , acrylonitrile, acrolein and acrylamide was significantly higher in dual users versus e-cigarette only. Excretion of metabolites of acrylonitrile, acrolein, propylene oxide, acrylamide and crotonaldehyde were significantly higher in e-cigarette only users compared to those who do not smoke or use e-cigarettes. Messaging to teenagers should include warnings about the potential risk from toxic exposure to carcinogenic compounds generated by these products.

With the above report and recent researches, here are the recommended actions .

#### RECOMMENDED ACTIONS FOR THE PEDIATRICIANS

1. Screen children and adolescents, parents and care givers for ENDS use.
2. Counsel children and adolescents about the harms of ENDS and counsel to be a non-user of ENDS and nicotine containing products.
3. ENDS should not be recommended as treatment product for tobacco dependence .
4. Educate parents, teens and children about the health hazards of second hand and third hand aerosol.
5. Lobby to increase legal age for ENDS and tobacco products to 21 years of age to protect the youth's developing brain and body from nicotine addiction.

#### RECOMMENDED PUBLIC POLICY INTERVENTIONS<sup>15</sup>

1. Regulate and reduce youth access to ENDS. Ban the sale of ENDS to youth younger than 21 years old .
2. Regulate internet sales of ENDS and ENDS solutions since minors can access and buy via internet even with warnings that the products are only for those of legal age.
3. Media has a direct impact to children and teens hence it is recommended to regulate any TV show, movie, games and advertisements showing the use of ENDS. Any scene with ENDS should be rated R or PG (Parental Guidance -13) or M (mature ).
4. The E.O. 26 , Nationwide Smoking Ban on cigarettes on public and enclosed spaces should also include the use of ENDS/ENNDS to protect the children on SHA(second hand aerosol) and THA (Third Hand Aerosol).
5. Protect Children from unintentional nicotine exposure and poisoning by using containers which is child proof and dispensed in amounts that would not be lethal to a young child if ingested.
6. Regulate proliferation and advertising specially online on the flavorings which is very attractive to teens. FDA should strictly check the pharmaceutical quality /grading of the ENDS solution. This is to reduce harm and use among our youth and increase risk of ingestion of the ENDS solution by young children.
7. Higher Tax for ENDS/ENNDS and ENDS solution since adolescents are price sensitive.
8. Restrict Sales of ENDS /ENNDS and ENDS solution beyond school perimeters( 100 meters) , convenience stores, malls and retail shops where children can see the products in full view.

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