Smoking and Reproductive Health
The Adverse Effects of Tobacco Exposure on Women’s Health and Reproductive Outcomes

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Disclaimer

- I have no financial relationship with any pharmaceutical company

- I have no financial relationship with any company involved in the production, advertisement distribution, or sale of any tobacco products
Learning Objectives

- Discuss the global tobacco epidemic
- Describe the risks associated with the use of tobacco products
- Analyze the correlation between tobacco use and altered reproductive physiology
- Apply evidence-based guidelines for smoking cessation
- Implement a smoking cessation program in the practice setting
QUICK FACTS ABOUT TOBACCO USE
Tobacco Use is One of the Biggest Public Health Threats the World Has Ever Faced

- Almost half of the world's children breathe air polluted by tobacco smoke.

- **Tobacco use kills 5.4 million people a year - an average of one person every six seconds** - and accounts for one in 10 adult deaths worldwide.

- It is a risk factor for six of the eight leading causes of deaths in the world.
Global Causes of Death

WHO World Health Report 2002

* WHO World Health Report 2002
TOBACCO KILLS UP TO ONE IN EVERY TWO USERS

Of the more than 1 billion smokers alive today, around 500 million will be killed by tobacco.
TOBACCO WILL KILL OVER 175 MILLION PEOPLE WORLDWIDE BETWEEN NOW AND THE YEAR 2030

Cumulative tobacco-related deaths, 2005–2030

Environmental Tobacco Smoke (ETS)

- Second-hand tobacco smoke is dangerous to health.
- *It causes cancer, heart disease and many other serious diseases in adults.*
- Almost half of the world's children breathe air polluted by tobacco smoke, which worsens their asthma conditions and causes dangerous diseases.
- *At least 200,000 workers die every year due to exposure to second-hand smoke at work.*
Worldwide approximately 1.1 billion people smoke
About 200 million of the world smokers are women
Globally, about 40% of men smoke as compared with nearly 9% of women
However, the epidemic of tobacco use among women is increasing in some countries
WORLDWIDE ADULT TOBACCO USE PREVALENCE (Men/Women)

USA
21.5/17.3

UK/Northern Ireland
27.0/25.0

China
66.0/3.1

Russian Federation
60.4/15.5

Japan
43.3/12.0

Philippines
57.5/12.3

India
32.7/1.4

Iran
24.1/4.3

South Africa
36.0/10.2

France
33.3/26.5

Brazil
20.3/12.8
How Prevalent Is The Problem in the United States?

• Tobacco use, primarily cigarette smoking, is the leading cause of preventable morbidity and mortality in the United States.

• Tobacco use kills approximately 440,000 Americans every year.

• **One in every five** U.S. deaths.

• **70.9 million** Americans aged **12 or older** reported current use of tobacco.
“Cigarette smoking is the major single cause of cancer mortality in the United States”
“Cigarettes kill more Americans than alcohol, car accidents, suicide, AIDS, homicide and illegal drugs combined”
ANNUAL U.S. DEATHS ATTRIBUTABLE to SMOKING, 2000–2004

Percent of all smoking-attributable deaths

<table>
<thead>
<tr>
<th>Cause</th>
<th>Deaths</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular diseases</td>
<td>128,497</td>
<td>29%</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>125,522</td>
<td>28%</td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>103,338</td>
<td>23%</td>
</tr>
<tr>
<td>Second-hand smoke</td>
<td>49,400</td>
<td>11%</td>
</tr>
<tr>
<td>Cancers other than lung</td>
<td>35,326</td>
<td>8%</td>
</tr>
<tr>
<td>Other</td>
<td>1,512</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

TOTAL: 443,595 deaths annually

ANNUAL SMOKING-ATTRIBUTABLE ECONOMIC COSTS

Health-care expenditures: $96.7 billion
Lost productivity costs: $97.6 billion
Total federal-state Medicaid program costs: $30.9 billion
Total Medicare program costs: $18.9 billion
Total economic burden of smoking, per year: $194 billion

Societal costs: $10.28 per pack of cigarettes smoked
Adult Per Capita Cigarette Consumption and Major Smoking-and-Health Events—United States, 1900-2005

- 1st Surgeon General's Report
- Fairness Doctrine Messages on TV and Radio
- 1st Smoking-Cancer Concern
- Federal Cigarette Tax Doubles
- Master Settlement Agreement
- Great Depression

Cigarette Smoking* Among Adults by Gender—United States, 1955-2004


*Estimates since 1992 include some-day smoking
STATE-SPECIFIC PREVALENCE of SMOKING among ADULTS, 2010

Prevalence of current* smoking (2010)

- < 13.0%
- 13.0 – 15.9%
- 16.0 – 18.9%
- 19.0 – 21.9%
- ≥ 22.0%

* Has smoked ≥ 100 cigarettes during lifetime and currently smokes either every day or some days.

Cigarette Smoking in FL

Overall, 17.4% of the Florida adult population currently smokes cigarettes. Of current cigarette smokers, 13.5% smoke everyday and 3.9% smoke some days. More than a quarter (28.2%) of all adult Floridians are former smokers while about half (54.4%) have never smoked.

For more information about the Florida Adult Tobacco Survey (FLATS), please contact Lori L. Westphal, PhD, MPH, Epidemiologist at lori_westphal@doh.state.fl.us or 850-245-4444 ext 2472.
• “While the adult smoking smoking prevalence rate in Florida (17.5%) is close to the national median rate (Centers for Disease Control and Prevention, 2010b), smoking rates among some population subgroups greatly exceed this average”.

• “For instance, 32% of adults in Florida living below the poverty level are current smokers (Florida Department of Health, 2007)”.
In this study areas of Miami-Dade county with high smoking prevalence rate (37%) and very low cessation rate (5%) were identified.
Major factors in the spread of the Tobacco Epidemic

- *Addiction* to nicotine
- *Profitability* to manufacturers
- *Accommodation* by Society
- *Inattention* by clinicians, public health community, and community leaders
ADDICTION

- Compulsive behavior despite negative consequences
- Behavior is reinforcing, or rewarding
- Loss of control in limiting intake
Addiction Facts

Cigarette addiction is a 3-Part Phenomenon

- **Physical addiction** – as evidenced by the biochemical changes in the brain
- **Physiological addiction** - becoming reliant on it to do for “us” what we think we can’t, and use it to buy us time and distract others from us
- **Habit** - smoke 60% of our cigarettes because of an environmental or behavior trigger

Nicotine addiction is now referred to as tobacco use disorder in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5)
Pharmacokinetics

Inhalation of nicotine is the most addictive
Nicotine in cigarette smoke affects mood and performance and is the source of addiction to tobacco. It meets the criteria of a highly addictive drug, in that is a potent psychoactive substance that induces euphoria, reinforces its own use, and leads to nicotine withdrawal syndrome when it is absent. As an addictive drug, nicotine has two very potent effects, being both a stimulant and a depressant.
Maximizing Efficiency of Nicotine Delivery for Addiction
Mesolimbic dopamine system—from the ventral tegmental area to the basal forebrain. Nucleus accumbens, a dopamine-rich area is an intersection where all addictive behaviors meet. The release of dopamine at this site promotes pleasure and reinforces the associated behaviors, such as the use of alcohol and drugs, to replicate the positive experience.
Marketing

• Tobacco companies design their products to attract new users
• Tobacco companies make it their business to create and sustain an addiction and discourage quitting
The tobacco industry aggressively targets women in order to increase its consumer base and to replace those consumers who quit or who die prematurely from cancer, heart attack, stroke, emphysema or other tobacco–related disorders.
Smoking behaviour of women differs from that of men...more highly motivated to smoke...they find it harder to stop smoking...women are more neurotic than men...there may be a case for launching a female oriented cigarette with relatively high deliveries of nicotine

1976 Research Report
British American Tobacco
Recruiting Women Smokers – the Origin of the Problem

1934 - cures depression and tiredness!

1929 - avoid getting fat

1932 - must be good for your health!

1942 - it’s patriotic to smoke!

1926 - don’t be left out!
Before you scold me, Mom... maybe you'd better light up a

Marlboro

Yes, you need never feel over-smoked. That's the Miracle of Marlboro!
Targeting Women — Taking Aim at Minorities
Current Ads in Women’s Magazines
"Chesterfields are completely satisfying. They're Milder - much Milder. It's MY cigarette."

Lucille Ball

"Interference"

"Always Buy CHESTERFIELD... the Best Cigarette for YOU to smoke."

PROMINENT TOBACCO FARMERS SMOKE CHESTERFIELD

"Chesterfield always buys the highest quality mild, ripe tobacco. I find it's the best cigarette for me to smoke because I enjoy its taste and it's Milder."

H. P. Rasberry
Kinston, N. C.
According to a recent Nationwide survey:

More DOCTORS SMOKE CAMELS
THAN ANY OTHER CIGARETTE

DOCTORS are everyman's ideal cigarette user. America's
leading doctors are the ones who smoke Camel.

Your T-Zone will tell you...

T for Taste
T for Thrill
T for Trend

Camels Cigarettes

CAMELS
CIGARETTE
Mellisa Williamson, 35, a Bullitt Avenue resident, worries about the effect on her unborn child from the sound of jackhammers.
A Poisonous & Noxious Weed

4,000 chemicals in mainstream and sidestream (passive) smoke, including many cellular poisons and carcinogens.

What’s Your Poison?

When you smoke you inhale up to 4000 chemicals including these poisons:

- Acetone
- Ammonia
- Benzene
- Carbon Monoxide
- Cadmium
- Dimethylnitrosamine
- Hydrogen Cyanide
- Methanol
- Naphthalene
- Naphthylamine
- Phenol
- Pyrene
- Toluene
- Urethane
- Vinyl Chloride
- Butane
- Butylated Hydroxytoluene
- DDT
- Dibenzacridine
- Polonium-210
- Thallium
- Trichloroethylene
- Toluene diisocyanate
- Zine

It’s enough to make you sick. Very sick.

*Known cancer-causing substances
Forms of Tobacco

**Smoking Tobacco**
- Cigarettes (10 mgs of nicotine/each)
- Cigars (equal to 1.5 packs of cigarettes)
- Pipes
- Bidis
- Cloves
- Hookah
- E-cigarette

**Smokeless Tobacco**
- Chewing Tobacco (1 can = 3 packs of cigarettes)
- Moist Snuff (aka spit or “dip”)
- Moist Snus
- Dissolvable Products
  - Tablets
  - Sticks
  - Strips
  - Candy flavored
E-Cigarette Device Description

Looks like a traditional cigarette
ELECTRONIC CIGARETTES

- Battery operated devices that deliver vaporized nicotine
  - Cartridges contain nicotine, flavoring agents, and other chemicals
- Battery warms cartridge; user inhales nicotine vapor or ‘smoke’
- Available on-line and in shopping malls
- Not labeled with health warnings
- No proof of greater quit rates

Preliminary FDA testing found some cartridges contain carcinogens and impurities (e.g., diethylene glycol)
No data to support claims that these products are a safe alternative to smoking
E-cigarette use

![Graph showing the percentage of U.S. adults ever using e-cigarettes from 2010 to 2011.](graph.png)

- **Current smokers**: 21.2% in 2011 (up from 9.8% in 2010)
- **Former smokers**: 7.4% in 2011 (up from 2.5% in 2010)
- **Never smokers**: 1.3% in both 2010 and 2011

*Source: King et al, 2013*
CO and Hookah Smoking

- One hour of hookah can yield a CO level equal to an entire pack of cigarettes and involves inhaling 100-200 times the volume of smoke of a cigarette.

*CDC Fact Sheet, Smoking and Tobacco Use/Hookahs.*
I TOLD YOU CIGARS WERE BAD FOR YOU!
Adverse Health Effects of Smoking

- Cancers
  - Lung
  - Laryngeal, pharyngeal, oral cavity, esophagus
  - Pancreatic
  - Bladder and kidney
  - Cervical
  - Gastric
  - Acute myeloid leukemia

- Cardiovascular diseases
  - Coronary heart disease
  - Stroke
  - Abdominal aortic aneurysm

- Respiratory diseases
  - Acute respiratory illnesses, e.g., pneumonia, otitis media, asthma
  - Chronic respiratory diseases (COPD)

- Reduced fertility in women, poor pregnancy outcomes, low birth weight babies, sudden infant death syndrome

- Cataract
- Periodontitis
- Diabetes (2-fold increased incidence)
  - (Diabetes Care 28:10 Oct 2005)
Tobacco is a Women’s Health Issue
FACT SHEET

- Of the more than 5 million people who die every year from tobacco use approximately 1.5 million are women. Most (75%) of these women live in low- and middle-income countries.
- One in four women who die from cancer die from lung cancer.
- 50% who continue to smoke will die from diseases caused by smoking.
- Smoking – major cause of coronary heart disease.
- Quit greatly reduced risk of dying prematurely.
FACT SHEET

- Prevalence of daily smoking in the United States for women 21% (men 25.7%) – gap has been narrowing in the past decades
- Prevalence rates are higher among white, non-Hispanics, followed by Hispanics and African Americans
- Smoking higher among women with lower education and among women living below the poverty line
- Younger women have higher rates of smoking than older women
- Higher smoking rates in adolescents
- Presently in the United States more girls than boys are current smokers
- 30% of HS senior girls currently smoke
FACT SHEET

- 22% continue smoking in pregnancy with increased risk of LBW and infant mortality
- 12.3% of mothers report smoking while pregnant and smoking during pregnancy is higher for low-income women
Several reports have indicated an impact of smoking on irregularities of the menstrual cycle.

Use of oral contraceptives have been linked with increased risk of cardiovascular and peripheral vascular disease in women smokers.

This interaction does not decrease the efficacy of hormonal contraceptives.

Women who are 35 years of age or older AND smoke at least 15 cigarettes per day are at significantly elevated risk.
Tobacco and Menopause

- Current smoking significantly associated with early menopause - menopause occurs 1-4 years earlier in women with smoking habits.
- Total exposure to smoking positively related to early menopause
- Stopping smoking more than 10 years before menopause considerably reduced the risk of early menopause
- ETS also associated with increased risk of earlier age at menopause
Insomnia

Insomnia is an unrelenting problem affecting 10-35% of Americans. As might be expected, the use of nicotine affects sleep. Nicotine reduces total sleep time, interferes with sleep Initiation, and reliably fragments the sleep cycle.
Tobacco and Osteoporosis

- The longer you smoke and the more cigarettes you consume, the greater your risk of fracture in old age.
- Smokers who fracture may take longer to heal than nonsmokers and may experience more complications during the healing process.
- Significant bone loss has been found in older women and men who smoke.
- Exposure to secondhand smoke during youth and early adulthood may increase the risk of developing low bone mass.
- It may take several years after quitting to lower a former smoker’s risk.

Tobacco and Osteoporosis

- Current smokers lose bone at faster rates than non-smokers
- One in eight hip fractures is attributable to cigarette smoking
- Hip fracture risk among smokers is greater at all ages
- Risks are lower in former smokers- quitting slows rate of bone loss
Effects on Cardiac Function

- Endothelial dysfunction
- Vasospasm
- Inflammation
- Thrombosis
- Arrhythmogenesis
- Decreased oxygen delivery
Cardiovascular Health

- Heart Attack
- Stroke
- Hypertension
- Atherosclerosis
- Platelet adhesion
- Abdominal Aortic Aneurysm
- Peripheral Vascular Disease
Pulmonary Health

Smoking causes:

- COPD
- CO poisoning
- Lung cancer
- Pneumonia
- Asthma exacerbation

Rate Per 100,000

*Age-adjusted to the 2000 US standard population.

Lung cancer is now the leading cause of cancer death among US women, surpassing breast cancer in 1987.

About 90% of all lung cancer deaths among women who continue to smoke are attributable to smoking.
Memory and Alzheimer’s

- Several studies have shown a positive link between smoking and cognitive decline.
- Ex-smokers had a 30% lower risk of decline.
- Current smoking increases the risk of Alzheimer’s disease by 2.3x and is dose related.

Depression

The association between depression and smoking is well established. A lifetime history of major depression is more than twice as common in people who smoke than in people who do not.

A history of major depressive disorder (MDD) is associated with decreased ability to quit smoking and an increased likelihood of smoking relapse.
Hair loss

Smoking causes premature graying and hair loss. This is probably due to:

- Decreased oxygenation of the hair follicle.
- Decreased microvasculature of the dermal hair papilla.
- Damage to the DNA of the hair follicle.
- Oxidative stress that may lead to follicular micro inflammation and fibrosis.
- An imbalance between estradiol (a hormone) and aromatase (an enzyme).

Skin Damage

- Smoking causes irreversible wrinkling on all parts of the body.
- Chemicals narrow the blood vessels, depleting skin of needed oxygen and nutrients.
- Damages collagen and elastin fibers.
- Heat from burning cigarettes, pursing lips, and squinting eyes contribute to wrinkles.

Lawrence E., Gibson, M.D., Mayo Clinic dermatologist, MayoClinic.com
Skin Cancer

- Research shows smokers are 3X more likely to develop cutaneous squamous cell carcinoma than non-smokers.
- Believed that chemicals in smoke act as a skin carcinogen through the bloodstream as well as by suppressing the immune system.

Journal of Clinical Oncology, Vol 19, No 1, pp231-238, 2001
Oral Health

Bad breath
Tooth discoloration
Increased plaque formation
Increased risk of leukoplakia
Increased risk of developing oral cancer
Delayed healing process
Lower success of implant procedures
Eyes

- Cataracts are 2X more likely in smokers
- AMD, age-related macular degeneration: smoking is the major preventable risk factor.
- Diabetic Retinopathy: blood vessels damaged, hypoxia, increased CO.
- Thyroid eye disease: due to smoking-induced impairment of the immune system.
- Optic neuropathy: 16x risk for smokers

Nose

- Smoke irritates nasal passages and causes mucus to thicken.
- Sense of smell is diminished.
- Both primary and environmental tobacco smoke are related to increases in nasal and sinus cancer.

Cervical Cancer

Smoking, or exposure to another person’s tobacco smoke is associated with an increased risk of cervical cancer. The risk increases the longer a person smokes and if they smoke heavily. Women exposed to active or passive tobacco smoke have up to three times the risk of nonsmokers or those not exposed to tobacco smoke. The best advice is to stop smoking and take measures to avoid the smoke of others.
Bladder Cancer

- The single most important cause in the Western world - 40-70% of all cases
- Smoker’s risks 2-3 times higher than non-smokers
- Role of carcinogenic polyaromatic hydrocarbons
Colon Cancer

- Smoking appears to double risk of colon cancer
- Role of carcinogens
- Dose-response relationship with polyps-precursor growths for cancer
Breast Cancer

• Women who smoke for many years may increase their risk of developing breast cancer. New research shows that for women who had smoked for 40 years or longer, the risk of breast cancer was 60% higher than that of women who had never smoked.

• Among those who smoked 20 cigarettes or more a day for 40 years, the increased risk rose to 83%.
Cigarette Smoking and Reproductive Function

The majority of the published works suggest that female reproductive function can be compromised by tobacco smoke in all of the target systems directly involved in the fertility process.
Cigarette Smoking and Reproductive Function

Smoking’s ill effects on fertility:
Conception delay
Ovarian follicular depletion
Mutagenic potential
Effects on sperm parameters
Decrease sperm counts in offspring
Assisted reproductive therapies rendered less effective
Adverse pregnancy effects
Tobacco and Infertility

- Smoking has an adverse impact on fertility
- Prevalence of infertility is higher and the time it takes to conceive is longer
- ETS appears to have a only a slightly smaller impact
- Components in cigarette smoke accelerate loss of eggs and cause oocytes to be more prone to genetic abnormalities
- Nearly twice as many IVF cycles are required to conceive in smokers than in nonsmokers
- Increased risk of SAB’s and ectopic pregnancy
Ovary

- Estrogen availability
- Progesterone synthesis
- Expansion of OCC
- Oocyte maturation
- Chromosomal errors (oocyte)
- Oocyte/embryo quality
- Ovarian vascularization
- Follicular depletion
Fallopian Tube

↓ Ciliary beat frequency
↓ Oocyte pickup
↓ Infundibular muscle contraction
↑ Ectopic pregnancy rate
↓ Pregnancy rate
Uterine Receptiveness

- Myometrial contraction
- Endometrial vascularization
- Implantation rate
- Dizygotic gestation rate
- Pre-term delivery rate
- Obstetric complications
In-Vitro Fertilization (IVF) Parameters Altered by Female Cigarette Smoking
Controlled Ovarian Hyperstimulation (COH)

- Gonadotrophin dose
- Duration of COH
- Peak E2 level
- Oocytes retrieved
Oocyte/Embryo Quality

- Mature oocytes
- Fertilization rate
- Embryos per cycle
- Embryo quality
Clinical Outcomes

- Implantation rate
- Pregnancy rate
- Miscarriage rate
Impact of Cigarette Smoking on the Reproductive Health of Men
Epidemiological Data

Sperm production and motility

Time to pregnancy (>15 cig./day)

SMOKING PROGENITORS:
Mother: Sperm count down
Father: Genetic diseases up
Biochemical and Genetic Alterations

- Antioxidants concentration
- Reactive oxygen species
- Aneuploidy rate
- DNA damage
IVF Parameters

- Sperm fertilizing capacity
- Ongoing pregnancy rate (>12w)
- Implantation rate
TOBACCO and PREGNANCY
Cigarette Smoking During Pregnancy—United States, 1989-2004

Note: Percentage excludes live births for mothers with unknown smoking status.

## Smoking During Pregnancy

<table>
<thead>
<tr>
<th>Cigarettes Per Day</th>
<th>Cumulative Fetal Exposure (Cigarettes per day x 270)</th>
<th>Full Packs of Cigarettes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>270</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>1350</td>
<td>67</td>
</tr>
<tr>
<td>10</td>
<td>2700</td>
<td>135</td>
</tr>
</tbody>
</table>

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**Larry Burd, Ph.D. | Fetal Alcohol Syndrome Center | laburd@medicine.nodak.edu**

A component of the Face up to wake up™ Resource Kit to help reduce the risk of Sudden Infant Death Syndrome, produced by the CJ Foundation for SIDS.

Tel: 1.888.8CJ.SIDS | Website: www.cjsids.com

© 2005 CJ Foundation for SIDS
Smoking is the most important modifiable risk factor associated with adverse pregnancy outcomes. 23% of American women of reproductive age smoke cigarettes. Overall estimates of smoking rates during pregnancy are 10-20%. In populations of women with high prevalence of smoking, it is estimated that cessation during pregnancy could prevent:

- 10% of perinatal deaths
- 35% of low birth weight infants
- 15% of preterm deliveries
During pregnancy, nicotine freely crosses the placenta and has been found in amniotic fluid and the umbilical cord blood of newborn infants.

Source: American Cancer Society http://www.cancer.org/docroot/PED/content/PED_10_2x_Smokeless_Tobacco_and_Cancer.asp?sitearea=PED
Pathophysiology

- Carbon monoxide displaces oxygen and nicotine produces vasoconstriction- resulting in impaired fetal oxygen delivery
- Smoking may also result in direct damage to fetal genetic material
- Direct toxicity of the more 2500 substances found in cigarettes, such as ammonia, aromatic hydrocarbons, hydrogen cyanide, vinyl chloride, and nitrogen oxide.
- Effect of over 4000 chemicals in mainstream tobacco smoke
- Nicotine mediated sympathetic activation leads to acceleration of fetal heart rate and a reduction in fetal breathing movement-
Fetal Health

Smoking during pregnancy causes:

- Increased stillbirth and neonatal deaths.
- Premature birth
- Lower birth weight
- Increased chance of lung development problems.
- Increased chances of SIDS

* 2004 Surgeon General’s Report: The Health Consequences of Smoking
SMOKING DURING PREGNANCY

MOST PREVENTABLE CAUSE OF ILLNESS AND DEATH IN MOTHERS AND INFANTS

- Increases the risk of stillbirth by 40 to 60 percent.
- Up to 8% of all babies who die less than a week after birth do so because of problems caused by their mothers’ smoking during pregnancy.
- Babies born to smokers are 1.5–3.5 times more likely to have low birth weight and are at risk for serious health problems throughout their lives.
- Up to ¼ of low birth weight births could be prevented by eliminating smoking during pregnancy.
- The risk for sudden infant death syndrome (SIDS) increases three-fold for mothers who smoke during and after pregnancy and two-fold for mothers who smoke only after delivery.
Tobacco Use During Pregnancy
Maternal Harm

• Possible causal association
  - placenta previa
  - spontaneous abortion

• Probable causal association
  - ectopic pregnancy
  - preterm PROM

• Causal association
  - abruption placenta
Breastfeeding and Tobacco

Minimal amounts of nicotine are excreted into breast milk and absorption of nicotine through the infant’s gut is minimal, but tobacco smoking can have other effects on breastfeeding that might indirectly affect the baby.
Children’s Health

Children of smokers:

- Are more likely to become smokers themselves.
- Have more ear infections.
- Are more likely to develop allergies or asthma.
- Have more bronchitis and pneumonia.
- May have decreased lung function.

*cdc MMWR weekly, Dec.14, 2001/50(49): 1101-6
Environmental Tobacco Smoke (ETS)

- 6,200 children die annually in the US directly related to their parent’s smoking
  - 2,800 from LBW complications
  - 2,000 from SIDS
  - 1,100 from Respiratory Infections
  - 250 from Burns
  - Asthma (smaller number)
- 56% higher chance of being hospitalized in the 1st year of life
- The level of secondhand smoke a child is exposed to at home or in a work environment is directly proportional to the child becoming a smoker
Maternal Smoking During Pregnancy Increases Risk of Offspring Behavior Problems

- *1-2 day old infants* - elevated scores on measures of stress and excitability
- *Toddlers* - at increased risk for aggressive behavior, negativity and hyper activity
- *Teenagers* - at risk for memory problems and other cognitive difficulties and an increase in risk for cigarette addiction during adolescence.
Prenatal secondhand smoke exposure worsens ADHD, aggressive behaviors, and poor school performance in these children.
## Effects of Prenatal Tobacco Exposure Across Periods of Development

<table>
<thead>
<tr>
<th>Period</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infancy</strong></td>
<td>SIDS, LOW BIRTH-WEIGHT/PREMATURE, STARTLES &amp; TREMORS</td>
</tr>
<tr>
<td><strong>Childhood</strong></td>
<td>VERBAL/LEARNING DEFICITS, ATTENTION DEFICITS, EXTERNALIZING BEHAVIORS</td>
</tr>
<tr>
<td><strong>Adolescence</strong></td>
<td>INATTENTION, CONDUCT DISORDER, SMOKING UPTAKE</td>
</tr>
<tr>
<td><strong>Adult</strong></td>
<td>CRIMINAL OFFENSES, ASPD, NICOTINE DEPENDENCE</td>
</tr>
</tbody>
</table>
The good news is...
Most smokers \underline{Want} to QUIT
90% regret ever having started to smoke

89% plan to quit; only 3% don’t want to quit

89% believe health will improve if quit

84% have tried to quit in the past

27% try to quit each year...
Percentage of Ever Smokers* Who Have Quit, Adults Aged > 18 Years, by Sex—United States, 1965 - 2004

Source: National Health Interview Surveys, 1965-2004; Centers for Disease Control and Prevention: National Center for Health Statistics and Office on Smoking and Health.

*Ever-smoked ≥100 cigarettes,
†Also known as the quit ratio. Note: estimates since 1992 incorporate same-day smoking
Smoking Cessation is more cost-effective than other commonly provided clinical preventive services, including mammography, colon cancer screening, PAP smears, hypertension treatment and treatment of high cholesterol.
# Health Benefits of Quitting

**Immediately** Air around you no longer dangerous to children and other adults.

<table>
<thead>
<tr>
<th>Duration</th>
<th>Benefits</th>
</tr>
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<tbody>
<tr>
<td><strong>20 minutes</strong></td>
<td></td>
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</tbody>
</table>
  - Blood pressure drops to normal  
  - Pulse rate drops to normal  
  - Temperature in hands and feet increase to normal |
| **8 hours** |  
  - Carbon monoxide level in blood drops to normal  
  - Oxygen level in blood increases or normal |
| **48 hours** |  
  - Nerve endings start regrowing  
  - Ability to smell and taste is enhanced |
| **2-12 weeks** |  
  - Circulation improves  
  - Breathing improves  
  - Walking becomes easier |
| **1-9 months** |  
  - Coughing and sinus congestion decreases  
  - Shortness of breath decreases  
  - Overall energy increases  
  - Lungs increase ability to self-clean and reduce infection |
| **1 year** |  
  - Excess risk of coronary heart disease is half that of a smoker |
| **5 years** |  
  - Stroke risk reduced to that of a nonsmoker  
  - Risk of cancer of the mouth, throat, and esophagus is half that of a smoker |
| **10 years** |  
  - Life expectancy comparable to a nonsmoker  
  - Lung cancer death rate is about half the rate of a smoker  
  - Risk of cancer of mouth, throat, esophagus, bladder, kidney and pancreas decrease  
  - Precancerous cells are replaced |
| **15 years** |  
  - Risk of coronary heart disease comparable to that of a nonsmoker |
Effective Interventions for Tobacco Cessation

- Provider intervention – 5A’s
- Counseling (individual, group, quitlines)
- Pharmacotherapy
- Reducing patient out-of-pocket costs (insurance coverage)
- Increasing the unit price of tobacco products
- Smoking bans and restrictions
- Mass media campaigns
- Reminder systems (for clinical settings)
Tobacco Training and Cessation Program Sources

- CDC Best Practices Guidelines
- Public Health Service Guidelines
Institutionalize a system to identify tobacco users at every visit.

Advise all who use tobacco to quit at every visit.

Use the 5 A’s or the 2 A’s and an R, or MI (Motivational Interviewing) approaches.

All stages of change should receive tobacco counseling.

Use effective Nicotine Replacement Therapy (NRT) medications in assisting clients; very few contraindications exist.

Provide counseling, or refer to AHEC or the Florida Quitline for local cessation resources.
Tobacco User Identification

- For paper charts:
  - After the initial question, the physician could further initiate intervention with:
    - ASK
    - ADVISE
    - REFER

<table>
<thead>
<tr>
<th>VITAL SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP:</td>
</tr>
<tr>
<td>Pulse:</td>
</tr>
<tr>
<td>RR:</td>
</tr>
<tr>
<td>Temp:</td>
</tr>
<tr>
<td>Weight:</td>
</tr>
<tr>
<td>Height:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tobacco Use:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
</tr>
<tr>
<td>Former</td>
</tr>
<tr>
<td>Never</td>
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</table>

<table>
<thead>
<tr>
<th>Form of Tobacco Used:</th>
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</table>

<table>
<thead>
<tr>
<th>How often:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Did you advise patient to quit?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Referral:</th>
</tr>
</thead>
</table>
Tobacco User Identification

For Electronic Charts

Encourage healthcare providers to implement a provider reminder system to automatically flag the provider to ask about patient’s tobacco status and usage at each visit.
## Provider Reminder System Increases Intervention Rates

<table>
<thead>
<tr>
<th>Provider Reminder System</th>
<th>Estimated rate of clinician intervention (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No provider reminder system in place to identify smoking status</td>
<td>38.5</td>
</tr>
<tr>
<td>Provider reminder system in place to identify smoking status</td>
<td>65.6 (58.3-72.6)</td>
</tr>
</tbody>
</table>

Source: 2008 CPG Treating Tobacco Use and Dependence Public Health Service
Modified Fagerström Test for Nicotine Dependence

1. How soon after you wake up do you smoke your first cigarette?
   - Within 5 minutes (3 points)
   - 5 to 30 minutes (2 points)
   - 31 to 60 minutes (1 point)
   - After 60 minutes (0 points)

2. Do you find it difficult not to smoke in places where you shouldn't, such as in church or school, in a movie, at the library, on a bus, in court or in a hospital?
   - Yes (1 point)
   - No (0 points)

3. Which cigarette would you most hate to give up; which cigarette do you treasure the most?
   - The first one in the morning (1 point)
   - Any other one (0 points)

4. How many cigarettes do you smoke each day?
   - 10 or fewer (0 points)
   - 11 to 20 (1 point)
   - 21 to 30 (2 points)
   - 31 or more (3 points)

5. Do you smoke more during the first few hours after waking up than during the rest of the day?
   - Yes (1 point)
   - No (0 points)

6. Do you still smoke if you are so sick that you are in bed most of the day, or if you have a cold or the flu and have trouble breathing?
   - Yes (1 point)
   - No (0 points)

**Scoring:** 7 to 10 points = highly dependent; 4 to 6 points = moderately dependent; less than 4 points = minimally dependent.
5 A’s of Tobacco Intervention

1) **Ask** if they smoke
   - At every visit
   - Chart the answer

2) **Advise** them to quit
   - Health care providers have a great impact on their patients

3) **Assess** their readiness
   - If ready, go to step 4
   - Or refer them to a specialist
   - Remain available
   - Those not ready to quit should receive motivational interviewing (MI)

4) **Assist** them in quitting
   - Quit date
   - Quit plan
   - NRT or smoking cessation drug
   - Behavioral therapy
   - Support groups

5) **Arrange** follow up
   - Call
   - Reassess
   - Reassure
Most health care providers ask about tobacco usage and advise against it, but up to only 23% make the arrangements to help their patients quit.

Health Care Provider Referral Rates

- **Ask**: 99.50%
- **Advise**: 94.90%
- **Assess**: 88.40%
- **Assist**: 63.70%
- **Arrange**: 23.10%

From Elisa Tong, MD; Richard Strouse, BA; John Hall, JD, MS; Martha Kovac, MPH, and Steven Schroeder, MD. “National Survey of U.S. Health Professionals’ smoking prevalence, cessation practices, and beliefs” Nicotine and Tobacco Research Vol 12, N 7
2 A’s + R

3 MINUTE VERSION

• **ASK** – every patient about tobacco use and document in their medical record – 1 minute

• **ADVISE** – urge every tobacco user to quit; employ the teachable moment and link visit findings with advice – 1 minute

• **REFER** – patients to quitline or cessation classes and document in medical record – 1 minute
Quitline

• Call the toll-free Florida Quitline at 1-877-U-CAN-NOW (1-877-822-6669) to speak with a trained and certified Quit Coach® who will help you assess your addiction and help you create a personalized quit plan. You’ll receive proactive coaching sessions, self-help materials, and quit aids like nicotine replacement therapy (NRT) (available while supplies last).

• Ready to get started? Call the toll-free Florida Quitline 1-877-U-CAN-NOW (1-877-822-6669)
AHEC Tobacco Cessation Services

- Referral and Assessment
- Education on Five (5) Core Essentials:
  - Dangers of smoking
  - Benefits of quitting
  - Challenges of quitting
  - Aids for quitting
  - Support for quitting
- Free NRT (while supplies last)
- Provided by trained Tobacco Cessation Specialists or Facilitators

- Quit Smoking Now
  - Six (6) class format
- Tools to Quit
  - Two (2) hour seminar
- Supportive Follow up
UM-JMH EXPERIENCE
Jackson Health System
Tobacco Cessation Program

Mabel Castro, Tobacco Treatment Specialist

Call 305-585-5319

E-mail: stopsmoking@jhsmiami.org

Visit www.jacksonhealth.org/wellness-quitsmoking
Individual Counseling

- Improves quit rates for adults\(^1\)
- Recommended by US Public Health Service for adolescents
- May be more effective than team-based counseling\(^2\)
- When possible, should be >10 minutes, face-to-face, with trained specialist\(^3\)

Motivational Interviewing

“A directive, client-centered counseling style for eliciting behavior change by helping clients explore and resolve ambivalence”

The goal of using motivational interviewing is to help patients move through the stages of readiness for change in dealing with risky or unhealthy behavior.

Adapted from Prochaska JO, DiClemente CC. J Consult Clin Psychol 1983; 51: 390-5
Pharmacotherapy

"Gasp! - New nicotine patch...New nicotine patch..."
Pharmacotherapy + behavioral counseling improves long-term quit rates

Smokers of 10 or more cigarettes a day who are ready to stop should be encouraged to use pharmacological support as a cessation aid.

Aveyard P, West R. Managing smoking cessation. BMJ 2007;335;37-41
Nicotine Replacement Therapy

• Nicotine Patches
  • Nicotine Gum
• Nicotine Lozenge
• Nicotine Nasal Spray
  • Nicotine Inhaler
Nicotine Replacement

- Begin NRT on the quit date, (apply patches the night before)
- Use a dose that controls the withdrawal symptoms
- NRT provides levels of nicotine well below smoking
- Prescribe in blocks of two weeks
- Arrange follow up to provide support
- Use a full dose for 6 to 8 weeks then stop or reduce the dose gradually over 4 weeks.

NRT increases the odds of quitting about 1.5 to 2 fold

NRT: Nicotine patches

- Patches provide a slow, consistent release of nicotine throughout the day.
- Available in various shapes and sizes.
- Common side effects with patches include skin sensitivity and irritation.

Over-The-Counter (OTC) Nicotine Replacement Therapies

**Nicotine Patch 21 mg** (or 14mg, 7mg)
Dispense one month supply
Replace patch daily

**Nicotine Gum 4 mg** (or 2 mg)
Dispense one month supply
Chew up to 20 pieces a day as needed

**Nicotine Lozenges 4 mg** (or 2 mg)
Dispense one month supply
Use up to 20 times a day as needed
Prescription Medication

- Bupropion HCl or “Zyban”
- Varenicline or “Chantix”
Bupropion

• Alleviates symptoms of nicotine withdrawal
• Begin Bupropion a week before the quit date
• Normal dose 150mg bid, (reduce in elderly, liver/renal disease)
• Contra-indicated in patients with epilepsy, anorexia nervosa, bulimia, bipolar disorder or severe liver disease.
• The most common side effects are insomnia (up to 30%), dry mouth (10-15%), headache (10%), nausea (10%), constipation (10%), and agitation (5-10%)
• Interaction with antidepressants, antipsychotics and anti-arrhythmics

Bupropion increases the odds of quitting about 2 fold
Varenicline

• Partial agonist selective for alpha-4, beta-2 nAChRs
• Begin Varenicline a week before the quit date, increasing dose gradually.
• Alleviates withdrawal symptoms, reduces urge to smoke
• Common side effects include: nausea (30%), insomnia, (14%), abnormal dreams (13%), headache (13%), constipation (9%), gas (6%) and vomiting (5%).
• Contra-indicated in pregnancy
• Severe changes in mood and behavior and serious adverse cardiovascular events have been reported

Varenicline increases the odds of quitting about 2.5 fold

Nortryptiline

- Tri-cyclic antidepressant
- Not licensed for smoking cessation
- Low cost
- Side-effects include sedation, dry mouth, light-headedness, cardiac arrhythmia
- Contra-indicated after recent myocardial infarction

Nortryptiline increases the odds of quitting about 2 fold

Are there gender differences in tobacco smoking?

- Women smoke fewer cigarettes per day
- *Tend to use cigarettes with lower nicotine content*
- Do not inhale as deeply as men
- *Women are less likely to initiate quitting and may be more likely to relapse if they do quit*
- Nicotine does not seem to reduce craving as effectively for women as for men
- *Withdrawal syndrome may be more intense for women*
- More likely than men to gain weight upon quitting
- *Standard treatment regimens adjusted for gender differences*
- Root cause may be differences in nicotine sensitivity
Pregnancy

- Smoking has adverse effects on unborn child
- 20-30% of smoking women quit in pregnancy
- Smoking cessation programmes are effective
- NRT is assumed to be safe
- Bupropion and varenicline are contra-indicated
- Post-partum follow up reduces the 70% relapse rate

CODING
REIMBURSEMENT
Medicare Billing

- Tobacco use cessation counseling visit:
  - **99406**: 3-10 minutes
    - $13.06 non-facility; $12.25 facility
  - **99407**: >10 minutes
    - $25.05 non-facility; $23.84 facility
- 305.1: Tobacco Use Disorder
- V15.82: History of Tobacco Use
- Must provide other clinically relevant diagnosis code, such as cough 786.2
Billing for Cessation Counseling

- 8 visits in 12 months (4 per attempt)
- Can use modifier – 25
- Any eligible provider
- Inpatient or outpatient
- Document time spent counseling
PRIVATE INSURANCE

Florida does not mandate cessation coverage for private insurance plans.

- When plans do cover counseling, physicians can bill for it using the ICD-9 code for tobacco dependence, 305.1 (tobacco abuse).
- Include the appropriate CPT code for preventive medicine and counseling and risk factor reduction interventions services codes # 99401-99404. Not to be used for patients with symptoms of established illness.
- Prescription drug coverage varies according to plan.
- Generally, insurance companies may reimburse at Medicare rates, if not higher.

Note: Reimbursement is dependent upon the patient’s plan and the contract with the insurance company.
TAKE HOME MESSAGE

- Tobacco is an addiction with significant adverse health consequences.
- *Smoking during the reproductive years is associated with significant risk to the mother, the fetus, and her children.*
- Effective behavioral and pharmacologic interventions are available to achieve tobacco cessation.
- *We can implement cessation programs in our daily clinical practices.*
THANK YOU