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Comparison of Medications used for Smoking Cessation

Medication	Contraindications	Adverse Effects**	Dosage	Onset/Duration	Interactions
Nicotine Replacement Therapy (NRT)					
<p>Nicotine Patch (NicoDerm®, Habitrol®, other pharmacy store brands) 7 mg, 14 mg, 21 mg per 24 hours</p> <p>Average \$3-\$4/day</p> <p><i>No prescription required</i></p>	<p>All NRT Products:</p> <ul style="list-style-type: none"> - Avoid during immediate post-myocardial infarction period, angina (severe or worsening), life-threatening arrhythmias - Uncontrolled hypertension - Recent stroke - Severe kidney/liver disease - Pregnancy & lactation - Allergy to nicotine - Non-smokers 	<p>All NRT Products:</p> <ul style="list-style-type: none"> - Headache - Insomnia - Dyspepsia, nausea <p>Patch Only (in addition to above)</p> <ul style="list-style-type: none"> - Skin irritation or sensitivity, pruritis - Vivid dreams (only wear patch during the day with occurrence) 	<p>**Patients are to stop smoking while using ***</p> <p>Heavy smokers > 20/day:</p> <p><i>One strategy:</i> 21 mg/day x 6 wk, 14 mg/day x 2 wk, 7 mg/day x 2 wk.</p> <p>Light smokers, heart disease or < 45 kg:</p> <p><i>One strategy:</i> 14 mg/day x 6 wk, 7 mg/day x 2 – 4 wk</p> <p><i>Titration schedule should be personalized.</i> <i>Rotate patch site daily to avoid skin irritation</i> <i>Wear patch for 16-24 hours</i> <i>Never cut patch</i></p>	<p>Onset of action (Tmax):</p> <ul style="list-style-type: none"> - Patch: 6-8 hours (slow) - Gum/ Lozenge/Inhaler: 20-60 min (intermediate) - Intranasal spray: 5-20 min (fast) <p>Duration of therapy: Up to 12 weeks or longer if needed.</p> <p>Do not use for > 6 months without consulting physician.</p>	<p>Smokers: Nicotine itself does not impact hepatic enzymes and is not subject to cytochrome P-450 interactions. Tobacco smoke however produces polycyclic aromatic hydrocarbons (PAHs) which are potent inducers of CYP1A1, 1A2, and possibly 2E1. Smokers may require increased doses of substrate drugs. In contrast, when smoking is discontinued, the substrate drug may require a dosage decrease over a period of several days. Some authors have suggested a 10% daily-dose reduction over 4 days for substrates that have a narrow therapeutic range. (14,15)</p> <p>CYP1A1, 1A2 substrates: Theophylline Caffeine Clozapine Olanzapine Fluvoxamine Tacrine TCAs (partial substrate)</p>
<p>Nicotine Gum (Nicorette®, other pharmacy store brands) 2 mg, 4 mg</p> <p>Average \$2-\$8/day (6-25 pieces)</p> <p><i>No prescription required</i></p>	<p><i>Nicotine can cause tachycardia and worsen underlying cardiac conditions. It may cause delayed healing of peptic ulcer disease and worsen vasospastic diseases.</i></p> <p>Patch Only (in addition to above)</p> <ul style="list-style-type: none"> - Adhesive allergy - Use during MRI – thermal burns reported due to aluminum lining. <p>Gum Only (in addition to above)</p> <ul style="list-style-type: none"> - TMJ (temporomandibular joint disorder) - Caution with dentures 	<p>Gum Only (in addition to above)</p> <ul style="list-style-type: none"> - Mouth or throat soreness - Jaw muscle ache - Hiccups - Taste perversion - Flatulence <p>Inhaler Only (in addition to above)</p> <ul style="list-style-type: none"> - Cough - Mouth or throat soreness - Hiccups - Rhinitis 	<p>Bite gum once or twice, then “park it” between cheek and gum. Wait and repeat, (one piece will last for approx 30 minutes). Chew slowly.</p> <p>Use 2 mg: < 25 cigarettes/day or smokes after first 30 minutes of waking.</p> <p>Use 4 mg: > 25 cigarettes/day or smokes within 30 minutes of waking.</p> <p>10 – 12 pieces/day chewed every 1 – 2 hour for first month. Maximum dose: 20 pieces /day</p> <p><i>Titration schedule should be personalized.</i> <i>Avoid acidic beverages (i.e. coffee, colas and citrus juices – prevent absorption)</i></p>	<p>Typically, gradual withdrawal with personalized titration schedule and duration is recommended.</p>	
<p>Nicotine Lozenge (Nicorette® 2 mg, 4 mg; Thrive® 1 mg, 2 mg)</p> <p>Average \$4-\$10/day (6-15 lozenges)</p> <p><i>No prescription required</i></p>	<p>Lozenge Only (in addition to above)</p> <ul style="list-style-type: none"> - Caution with dentures <p>Nasal Spray Only (in addition to above)</p> <ul style="list-style-type: none"> -Chronic nasal disorders (i.e. allergies, rhinitis, polyps, sinusitis) 	<p>Lozenges Only (in addition to above)</p> <ul style="list-style-type: none"> - Mouth or throat soreness - Hiccups <p>Spray Only (usually diminished after 1 week)</p> <ul style="list-style-type: none"> - Transient burning and stinging of nasal mucosa - Throat irritation - Flushing - Cough - Sneezing - Rhinorrhea - Lacrimation 	<p>Use 2mg: smokes after first 30 minutes of waking. Use 4mg: smokes within 30 minutes of waking.</p> <p>Slowly dissolve 1 lozenge in mouth, moving side to side over 20-30 minutes. Typically use 1 lozenge every 1-2 hours for 6 weeks, then every 2-4 hours for 3 weeks, then every 4-8 hours for 3 weeks. Maximum dose 15 lozenges/dayx2mg lozenges. Do not chew or swallow whole.</p> <p><i>Titration schedule should be personalized.</i> <i>Avoid eating or drinking 15 minutes before or while using the lozenge.</i></p>		
<p>Nicotine Inhaler (Nicorette® Inhaler) 4 mg per cartridge</p> <p>Average \$6-\$12/day (6-12 cartridges)</p> <p><i>No prescription required</i></p>			<p>Usual dose: 6 – 12 cartridges/day by frequent continuous puffing over 5--20 minutes. Inhale as puffs through the tapered end of mouthpiece as required to control cravings. Maximum: 12 cartridges/day</p> <p><i>Titration schedule should be personalized.</i> <i>Recommended use only at room temperature</i></p>		

Medication	Contraindications	Adverse Effects**	Dosage	Onset/Duration	Interactions
Nicotine Nasal Spray (Nicolrol NS®) 0.5 mg nicotine per spray (10 mg/mL, 10mL bottle) Available in USA- Pfizer			1-2 doses (2-4 sprays)/ hour; maximum 5 doses (10 sprays) per hour and 40 doses (80 sprays) per day. Use a minimum of 8 doses/day for efficacy. 0.5 mg nicotine per spray 1.0 mg nicotine per dose (2 sprays, one spray per nostril)		
Other Drugs					
Bupropion SR (Zyban®) 150 mg tabs Average of \$2-\$3/day <i>Prescription required</i>	<i>Not recommended for those at high risk of seizures or those who have a seizure disorder.</i> - Current seizure disorder - Brain tumor, brain surgery, closed head injury - Eating disorders (inc. seizures with anorexia/bulimia) - Abrupt alcohol, benzodiazepine or other sedative withdrawal - MAO Inhibitors within 14 days - Thioridazine - Caution in stroke patients (particularly if recent stroke and prone to seizures).	- Agitation type events with self-harm. - Anorexia, nausea - Xerostomia - Tremor - Tachycardia - Dizziness - Headache - Insomnia - Agitation, Anxiety - Hallucinations - Seizures (at higher than recommended doses) - Hypotension	150 mg once daily x 3 days, then 150 mg twice daily (minimum 8 hr dosing interval) Initiate while still smoking Quit smoking after 7 – 14 days of therapy Max total daily dose: 300 mg Max single dose: 150 mg <i>Do not chew, divide or crush tablets</i>	7 – 12 weeks, or longer if necessary <i>Discontinue current treatment course if patient not abstinent by 7th wk of therapy.</i> Maintenance (prevention of relapse) 300 mg/day for up to 1 year on individual basis	Contraindicated with MAO inhibitors and thioridazine. Caution with levodopa and amantadine (increased CNS side-effects). (12) CYP2B6 substrate (metabolized to active hydroxybupropion); CYP2D6 inhibitor. (12) -Caution with drugs that lower seizure threshold (i.e. antipsychotics, antidepressants, theophylline, systemic steroids, etc.) (12) - CYP2B6 inhibitors or inducers may increase or decrease bupropion concentrations, respectively. - Potent inducers of various CYPs may also decrease bupropion concentrations (i.e. rifampin, carbamazepine, phenytoin, phenobarbital), Antiretrovirals (AVRs): - Ritonavir - boosted ARVs: <i>in vitro</i> data suggest an increase in bupropion concentrations. (17) However, <i>in vivo</i> up to 57% decrease AUC bupropion is seen, depending on dose and duration of ritonavir therapy. <i>May require an increase in bupropion dosage.</i> (18-20) - Nelfinavir & Efavirenz : <i>in vitro</i> data suggest an increase in bupropion concentrations due to CYP2B6 inhibition. (17) One case series reported no increased episodes of seizures with either nelfinavir, ritonavir or efavirenz. (21) One study with efavirenz showed a 55% decrease AUC of bupropion. (22) <i>May require an increase in bupropion dosage when combined with</i>

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Medication	Contraindications	Adverse Effects**	Dosage	Onset/Duration	Interactions
					<i>efavirenz.</i> Bupropion may increase the levels of CYP2D6 substrates. Caution is warranted ;a decreased dosage of the substrate drug may be required (i.e. antidepressants, antipsychotics, beta-blockers, type 1C antiarrhythmics). (12)
Bupropion SR & Nicotine Transdermal System (Patch) Combination Average \$5-\$7/day (patch and bupropion) <i>See Individual Agents</i>	Caution in patients with hypertension <i>See Individual Agents</i>	<i>See Individual Agents</i>	Initiate while still smoking: Bupropion 150 mg daily X 3 days, then 2 times daily (minimum 8 hr dosing interval). Add nicotine patch to bupropion after 1 week of stop smoking. 21 mg/d x 7 wk, 14 mg/d x 1 wk then 7 mg/d x 1 wk. Taper patch during week 8 and 9.	10 – 12 weeks, or longer if necessary	<i>See Individual Agents</i> Monitor for treatment emergent hypertension when NRT is combined with bupropion.
Varenicline (Champix®) 0.5 mg, 1 mg tabs Average \$4-\$4.50/day <i>Prescription required</i>	- Pregnancy and lactation - Use cautiously in those with schizophrenia, bipolar disorder or another major depressive disorder. - Use cautiously in those with kidney disease. Dosage adjustment required if the creatinine clearance is < 30 mL/minute. <i>Not studied in the following populations: safety and efficacy data is lacking and caution is warranted (psychiatric disorders, pediatrics, epilepsy, gastro-intestinal disease such as irritable bowel syndrome, heart disease, COPD, chemotherapy, uncontrolled hypertension, controlled diabetes).</i>	- Nausea - Constipation, flatulence - Xerostomia - Insomnia - Abnormal dreams (vivid) - Headache - Agitation, depression, suicidal thoughts	Varenicline 0.5 mg once daily for 3 days, then 0.5 mg twice daily for 4 days, then 1 mg twice daily (interval of at least 6 hours between doses). Initiate while still smoking. Quit smoking after 7-14 days of therapy.	12 weeks or longer if necessary	Not hepatically metabolized. Mainly excreted unchanged in the urine. No known clinically significant interactions. (13) Nicotine transdermal & varenicline may result in increased side-effects (i.e. nausea, headache, dizziness, and fatigue)

ARVs= antiretrovirals; AUC= area under the concentration-time curve; CNS= central nervous system; COPD= chronic obstructive pulmonary disease; MAO= monoamine oxidase; NRT= Nicotine Replacement Therapy;

TCAs= tricyclic antidepressants; Tmax= time to peak concentration

** Note: Smoking cessation and resulting nicotine withdrawal may mimic certain adverse effects of smoking cessation medications. Symptoms of **nicotine withdrawal** may include: cravings, depression, insomnia, irritability, anxiety, nervousness, drowsiness, increased appetite & weight gain. **Nicotine toxicity** is characterized by: nausea, salivation, abdominal pain, vomiting, diarrhea, diaphoresis, flushing, dizziness, confusion, palpitations, etc.

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