A Review of Over-the-Counter Oral Dosage Forms

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Goals and Objectives

**Goal:**
- The goal of this program is to educate fellow pharmacists regarding the selection process of appropriate over-the-counter medications

**Objectives:**
- Understand the QuEST and SCHOLAR process for OTC consultation
- Identify appropriate oral over-the-counter medications for self-treatable conditions
- Appropriately consult patients on proper dosage and side effects of oral OTC medications.
Pharmacist role in OTC product consultation

- One of six adults admit taking three or more pills in single dose, despite label recommendations
- 47% children given wrong dose of OTC fever medicine
- OTC labels: Drug Facts hard to understand. Example: Tylenol infant drops vs. Tylenol elixir.
  - 1 teaspoonful of infant drops = 500mg
  - 1 teaspoonful of elixir = 160mg

Inaccuracy in liquid measurements

- Use of a common household teaspoonful may vary from 4mL to 8.8mL.
- Provide parents and patients with proper measuring devices. Can be given away as promotional items.
- Use only specially marked “oral syringes”.
- Show patient which markings to use mL versus teaspoonfuls.
QuEST - Process for OTC consultation

- Quickly and accurately assess the patient
- Establish that the patient is an appropriate self care candidate
- Suggest appropriate self care strategies
- Talk with the patient
SCHOLAR

- Symptoms
- Characteristics
- History
- Onset
- Location
- Aggravating factors
- Remitting factors
Aspirin (acetyl-salicylic acid—ASA)

- Introduced in 1899 by Bayer Pharmaceuticals in Germany
- Mechanism: inhibit prostaglandin synthesis from arachidonic acid by inhibiting enzymes COX-1 and COX-2
- Up to 3-4 g per day for rheumatoid arthritis, lupus, and other rheumatologic conditions.
- Most common use: cardio protection
- Kids under 18 at risk of Reye’s syndrome. See little ASA use.
Aspirin Dose

- 325-1000mg every 4-6 hours.
- Maximum dose = 4000 mg/day
- Antiplatelet dose 81-325mg/day
- Irreversibly binds to platelets, rendering them inactive for their lifetime of 7 days.
- Used along with Plavix: ONLY for ACS (acute coronary syndrome) and post stent.
Aspirin Uses

- Newest recommendations: low-dose aspirin for men age 45 to 79; women age 55 to 79. Diabetics over age 40.
- Men benefit by MI prevention
- Women benefit by ischemic stroke prevention
- Avoid aspirin in patients with additional GI risks unless their CV risk is high enough to outweigh the higher bleeding risk.
- Make sure BP is controlled before starting aspirin to reduce the risk of hemorrhagic stroke.
Acetaminophen (Tylenol®)

- Known as “paracetamol” outside the US
- *N*-acetyl-para-aminophenol = APAP
- Available since 1894, but marketed as elixir for children in mid 1950’s. Tablets soon after.
- Mechanism: main mechanism of action is the inhibition of cyclo-oxygenase (COX), an enzyme responsible for the production of prostaglandins, which are important mediators of inflammation, pain and fever. Blocks COX-3 (NO-anti-inflammatory effect)
- Tylenol murders: September 29, 1982
  - Due to cyanide laced capsules
Acetaminophen Dosage

- Maximum Adult Dose = 4000 mg (4 grams) of acetaminophen in a 24-hour period.
  - (12) of the 325 mg tablets
  - (8) of the extra-strength (500 mg) tablets.
  - BE SURE to count Rx that contain APAP!!!

- HALF of acute liver failure cases due to APAP overdosage

- Child: 10-15mg/kg every 4-6 hours
Acetaminophen Uses

- Fever reduction and relief of mild to moderate pain. NO anti-inflammatory effect
- Regular use of 3 gm APAP per day has been shown in the elderly in nursing homes to decrease behavioral symptoms by 63% and allow 75% of psychotropic meds to be STOPPED in patients with cognitive impairment.

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Acetaminophen toxicity

- About half the cases of acute liver failure are now due to acetaminophen poisoning.
- This amounts to twelve of the 325 mg tablets, or eight of the extra-strength (500 mg) tablets.
- Remind patients NOT to use the 20+ Acetaminophen products OTC when taking Rx with acetaminophen (Vicodin, Endocet, Darvocet).
- Avoid using “APAP” abbreviation on Rx so patients know the product contains acetaminophen.
Ibuprofen (Motrin, Advil)

- Ibuprofen is 2-(4-isobutylphenyl) propanoic acid
- Ibuprofen binds non-covalently to a COX enzyme and thus competes with the enzyme's natural substrate. (reversible inhibition.)
- Aspirin forms a covalent bond to a serine residue in the enzyme, and this bond cannot be broken. (irreversible inhibition.)
Ibuprofen Dosage

- Rx dose is 3200 mg/day
- OTC package dose is 1200 mg/day
- Pediatric Dose
  - 5mg/kg if fever under 102.5 °F
  - 10mg/kg if fever 102.5 °F
Ibuprofen Uses

- Pain
- Arthritis
- Fever
- Menstrual pain: blocks prostaglandin mediated cramping.
- Migraine Headache: NSAIDs are first line treatment for migraine.
Ibuprofen Side Effects

- GI upset
- Decrease in platelet aggregation
- Risk of GI bleeding - especially with ASA
- “Triple Whammy”: ACE + HCTZ + NSAID such as Ibuprofen. Renal toxicity
- Increase bleed risk with SSRI
Antihistamine Overviews

- First generation are the older, and more sedating antihistamines. They cross the BBB. Example: Benadryl; Chlor-trimeton. Avoid in kids under 6 due to paradoxical stimulation. Watch for sedation, BPH, and other warnings.

- The second generation (non-sedating) do NOT cross BBB, causing minimal sedation, and NO anticholinergic side effects. Claritin; Zyrtec

- Should not be given on a "prn" basis. Therapy should be started 2 weeks before a known allergy season, or several hours before a known allergen exposure (dogs, cats, etc)
Claritin (loratadine)

- Considered a 2\textsuperscript{nd} generation antihistamine
- Mechanism of Action: long acting antihistamine with selective peripheral histamine (H\textsubscript{1}) − receptor antagonism
**Loratadine Dosage**

- **Adults:** 10 mg once daily
- **Children**
  - 2-5 years old: 5mg once daily
  - ≥ 6 years old: 10 mg once daily

Always best to give antihistamines BEFORE exposure to a known allergen
Loratadine Uses

- Relief of nasal and non-nasal symptoms of seasonal allergic rhinitis
- Drug of choice in breastfeeding. Least likely to cause sedation or irritability in baby.
- Pregnancy category-B
Zyrtec (cetirizine)

- Newest to become OTC
- Considered a 2\textsuperscript{nd} generation antihistamine. Still causes sedation.
- Mechanism of Action: long acting antihistamine with selective peripheral histamine (H\textsubscript{1}) –receptor antagonism
- Is the active metabolite of Hydroxyzine (Atarax\textsuperscript{®}, Vistaril\textsuperscript{®})
Cetirizine Dosage

- **Adults:** 5-10 mg daily
  - Also combined with pseudoephedrine (Zyrtec-D- 5/120)
- **Children**
  - 2-5 years: 2.5 mg daily, but may increase to every 12 hours if needed OR 5 mg once daily
  - ≥ 6 years: 5-10 mg daily
  - Available as tablets, chewable tablets and liquid (1 mg/ml).
Cetirizine Uses

- Treatment of perennial and seasonal allergic rhinitis and other allergic symptoms including urticaria.
- For patients age 2 and up for allergies
- Age 6 and up for itching due to hives.
- Works faster than loratadine; 1 hour versus 3 hours for loratadine.
Benadryl® (diphenhydramine)

- 1st generation, sedating antihistamine
- Mechanism of action: histamine (H₁) receptor antagonist, also activate serotonin and α-adrenergic receptors and block cholinergic receptors
Diphenhydramine Dosage

- Adults: 25-50 mg q 6-8 hours
- Children
  - 2-6 years old: 6.25 mg q 4-6 hours
  - 6-12 years old: 12.5-25 mg q 4-6 hours

- Should be in everyone’s first aid kit.
Diphenhydramine Uses

- Relief of symptoms of allergic rhinitis and other types of immediate hypersensitivity reactions, such as insect stings, poison ivy.
- Also used for mild nighttime sedation
- Effective for nausea and motion sickness.
- Side effects: sedation, anticholinergic side effects.
Chlor-trimeton®
(Chlorpheniramine)

- 1st generation, sedating antihistamine
- Mechanism of action: histamine (H₁) – receptor antagonist
- Considered first line choice of the first generation antihistamines if pregnant.
Chlorpheniramine Dosage

- Adult: 4 mg every 4-6 hrs; maximum dose: 24 mg/day
- Children (6-11 years old): 2 mg every 4-6 hrs; maximum dose: 12 mg/day
Chlorpheniramine Uses

- Relief of symptoms of allergic rhinitis and other types of immediate hypersensitivity reactions
- Side effects: sedation, anticholinergic side effects.
Sudafed ® (pseudoephedrine)

- Recently moved behind pharmacy counter
- Alpha/Beta agonist
- Directly stimulates alpha-adrenergic receptors of the respiratory mucosa causing vasoconstriction and stimulates beta-adrenergic receptors causing bronchial relaxation
Pseudoephedrine Dosage

- **Adults:** 60 mg every 4-6 hours, maximum daily dose of 240 mg
- **Children:**
  - < 2 years old: 4 mg/kg/day in divided doses every 6 hours
  - 2-5 years old: 15 mg every 4-6 hours, maximum daily dose of 60 mg
  - 6-12 years old: 30 mg every 4-6 hours, maximum daily dose of 120 mg
Pseudoephedrine Uses

- For the temporary relief of nasal congestion due to the common cold and cough associated with postnasal drip
- “Reserve antibiotics for patients given decongestants and analgesics for 1 week, who have purulent nasal discharge, if severe illness (pain or fever) treat sooner. Usually requires hospitalization, if severe”.

(Sanford Guide 2009 p.46)
Pseudoephedrine precautions:

- OK with mild & controlled hypertension. Avoid with uncontrolled hypertension. (Sudafed, up to 180mg/day have produced no measurable changes in HR or BP in normotensive patients)
- Can increase heart rate, caution with arrhythmias.
- Hyperthyroid patients are more sensitive to sympathomimetics
- Diabetics see minimal effects on blood sugars.
- BPH: may exacerbate by constricting smooth muscle of bladder neck.
- Narrow angle glaucoma: dilation of pupil increases IOP
Combat Meth Act of 2005

- Any products containing oral pseudoephedrine, require a signature, and valid photo ID to purchase.
- The new law limits such purchases to 3.6 grams in any one day and 9 grams in any 30 day period. Mail order maximum per month is 7.5 grams.
- Sudafed 30mg  max daily= 120 tablets maximum month= 300 tablets
- Sudafed 60mg  max daily= 60 tablets maximum month= 150 tablets
Sudafed-PE ® (phenylephrine)

- Potent direct acting alpha-adrenergic stimulator, weak beta-adrenergic activity
- Causes vasoconstriction of the arterioles of the nasal mucosa and conjunctiva
- For the temporary relief of nasal congestion due to the common cold and cough associated with post-nasal drip
Phenylephrine Dosage

- Adults: 10 mg every 4 hours, maximum daily dose of 60 mg
- Children:
  - 2-6 years old: 2.5 mg every 4 hours, maximum daily dose of 15 mg
  - 6-12 years old: 5 mg every 4 hours, maximum daily dose of 30 mg
Treatment of Cough

- Acute Cough due to the **common cold**:
- Description: cough and throat clearing caused by a viral upper respiratory infection.
- Treatment: first generation antihistamine/decongestant combination (Grade-A)
- Be sure to rule out ACE-I induced cough

Source: Current Recommendations from the American College of Chest Physicians (evidence based guidelines) (as of Oct-2006)
Mucinex® (guaifenesin)

- Only FDA approved expectorant
- Loosens and thins lower respiratory tract secretions to make cough more productive.
- Mechanism: causes irritation of the gastric mucosa, which stimulates respiratory secretions, thereby decreasing the viscosity of the sputum making it easier to expectorate.
Guaifenesin Dosage

- Adults: 200-400 mg every 4 hours, maximum daily dose of 2.4 grams
- Children:
  - 2-6 years old: 50-100 mg every 4 hours, maximum daily dose of 600 mg
  - 6-12 years old: 100-200 mg every 4 hours, maximum daily dose of 1.2 grams
Guaifenesin Uses

- Indicated for the symptomatic relief of acute, ineffective productive coughs
- Mechanism: causes irritation of the gastric mucosa, which stimulates respiratory secretions, thereby decreasing the viscosity of the sputum, making it easier to expectorate.
Dextromethorphan

- Mechanism of Action: Acts centrally in the medulla to increase the cough threshold
- Delsym: Dextromethorphan polistirex equivalent to 30 mg dextromethorphan hydrobromide Allows for every 12 hour dosing.
  - Age 4-6: ½ teaspoonful BID
  - Age 6-12: 1 teaspoonful BID
  - Adults: 2 teaspoonfuls BID
Dextromethorphan Dosage

- Robitussin-DM (and other generics) are dosed every 6-8 hours
- Adults: 10-20 mg every 4 hours OR 30 mg every 6-8 hours, maximum daily dose of 120 mg
- Children:
  - 2-6 years old: 2.5-5 mg every 4 hours OR 7.5 mg every 6-8 hours, maximum daily dose of 30 mg
  - 6-12 years old: 5-10 mg every 4 hours OR 15 mg every 6-8 hours, maximum daily dose of 60 mg
Dextromethorphan Uses

- Indicated for the suppression of a nonproductive cough caused by chemical or mechanical respiratory tract irritation
- Warnings: interactions with MAOI, and SSRI. May cause serotonin syndrome.
- Consult physician if cough lasts more than 7 days.
Dextromethorphan ABUSE

- Dextromethorphan, the d-isomer of the opiate agonist levorphanol, is metabolized by the cytochrome P450 2D6 enzyme system in the liver. This metabolite, dextrorphan, has a high affinity for the excitatory amino acid receptor, the N-methyl-D-aspartate (NMDA) receptor, producing a “high.”
- Symptoms following ingestion of high doses (five to ten times the normal therapeutic dose) include euphoria, an altered sense of time, paranoia, and disorientation. In addition, tactile, visual, and auditory hallucinations may occur.
- The effects seen with dextromethorphan abuse are similar to those seen after phencyclidine (PCP) use, another agent which blocks NMDA receptors.
Imodium® (loperamide)

- Antidiarrheal
- Mechanism of Action: synthetic opioid agonist that works by stimulating \( \mu \)-opioid receptors on the intestinal circular muscles slowing intestinal motility and decreasing GI secretions
Loperamide Dosage

- Adults: 4 mg initially, then 2 mg after each loose stool, maximum of 8 mg/ day
- Children: NOT recommended in children <6 years old unless under medical supervision
Loperamide Usage

- For the treatment of chronic diarrhea associated with inflammatory bowel disease, acute nonspecific diarrhea, or traveler’s diarrhea.
- Rule out antibiotic induced Clostridium difficile infections.
- **Remember**: diarrhea is body's way of removing unwanted substances.
Gas-X® (simethicone)

- Mixture of inert silicon polymers, used as a defoaming agent to relieve gas
- Acts in the stomach and intestine to reduce the surface tension of gas bubbles in mucus making elimination of gas easier
- Dosage for Adults: 125-250 mg as needed after meals and at bedtime, maximum daily dose of 500 mg
Prilosec-OTC® (omeprazole)

- Proton Pump Inhibitor
- Potent antisecretory drug that works by decreasing gastric acid secretion
- Mechanism of Action: Inhibit hydrogen potassium ATPase, therefore irreversibly blocking the final step in gastric acid secretion
Omeprazole Dosage

- Adults: 20 mg (1 tablet) with a glass of water 30 minutes before morning meal
- Take for 14 days
- May take 3-5 days to see effect
- Pregnancy Category-C
- For the treatment of frequent heartburn in patients who have symptoms 2 or more days per week
H$_2$ Receptor antagonists:
Zantac, Pepcid-AC, Avid, Tagamet

- H$_2$RA are the drug of choice for heartburn for pregnancy & breastfeeding. Avoid Tagamet due to possible feminization of fetus.
- Zantac® available as: 75mg and 150mg tablets
- Pepcid® available as: 10mg and 20mg and Pepcid-AC (famotidine/calcium carb)
- Avid AR® available as: 75mg
- Tagamet HB® available as: 200mg tablets
Motion Sickness – Meclizine (Dramamine-II, Bonine)

- Motion sickness: A mismatch or conflict is thought to occur when input from the semicircular canals and the otolith apparatus in the inner ear does not match the input from the visual and proprioceptive systems.
- Are available OTC in 25mg dose. Dose 1 or 2 tablets once daily. Start 1 hour before departure. May cause drowsiness. Avoid alcohol.
- Meclizine is less sedating than other motion sickness meds Ex: Dramamine® (dimenhydrinate)
Sleep aids: Diphenhydramine
Doxylamine (Unisom® Sleeptabs)

- Unisom (doxylamine) is a sedating antihistamine
- Doxylamine is categorized as Pregnancy Category-A, may combine with Vitamin B-6 (pyridoxine) to help control nausea of pregnancy.
- Most sleep aids use Diphenhydramine (Benadryl) and often combined with acetaminophen (Tylenol-PM) or ibuprofen (Advil-PM).
- Avoid in prostate patients.
Colace® (docusate sodium)

- Stool softener in patients who should avoid straining during defecation and in patients with hard, dry stools.
- Emollient
- Anionic surfactant (soap), which increases the wetting efficiency of intestinal fluid and facilitate a mixture of aqueous and fatty substances softening the fecal mass
Docusate Sodium Dosage

- Adults: 50-360 mg daily
- Children: NOT recommended in children <6 years old unless under medical supervision
- Categorized as Pregnancy Category C BUT appears in some formulations of Prenatal Vitamins!
Phenazopyridine

- Mechanism: is an “azo” excreted in the urine, where it exerts a topical analgesic effect, on urinary tract mucosa.
- Indication: symptomatic relief of discomfort and pain, before antibacterial therapy becomes effective.
- OTC dose: 95mg.
- Rx Dose: 100-200mg
- Give TID with meals.
Phenazopyridine

- Do not administer for more than 2 days with antibacterial agents. (no benefit if longer).
- May mask symptoms of inappropriate antibiotic choice.
- Causes orange discoloration of urine.
- Advise women to wear minipads to avoid undergarment staining.
Brand name extensions

- Dulcolax (bisacodyl) versus Dulcolax softener (docusate)
- Maalox® (alum/mag hydroxide) Maalox Total Stomach Relief® (bismuth subsalicylate)
- Kaopectate (bismuth subsalicylate) versus Kaopectate stool softener (docusate). Kaopectate no longer contains kaolin & pectin!!
- Unisom® sleep gels contain diphenhydramine, original tablets contain doxylamine!!
Questions?