



Dealing with Uninvited Guests: Excipients

Mark Klang, MS, RPh, PhD, BSNSP
Research Pharmacy Manager
Memorial Sloan Kettering Cancer
Center

Excipients

- Fillers, solubilizers, preservatives, lubricants, flavoring, sweeteners, perfumes, colors, binders and disintegrants are found in most medications.
- Many issues; clogs, diarrhea, GI intolerance are not caused by drug, but other ingredients





Snakes in the GRAS

- All excipients are GRAS – generally recognized as safe.
- Sorbitol is a common sugar used in most liquid medications
- Thickening agents keep suspensions uniform, but contribute to clog formation

Sorbitol Issues

Sorbitol

ticky - it's a sugar

smolarity - causes diarrhea

eproducible - NOT, content changes often

loated feeling - causes gas

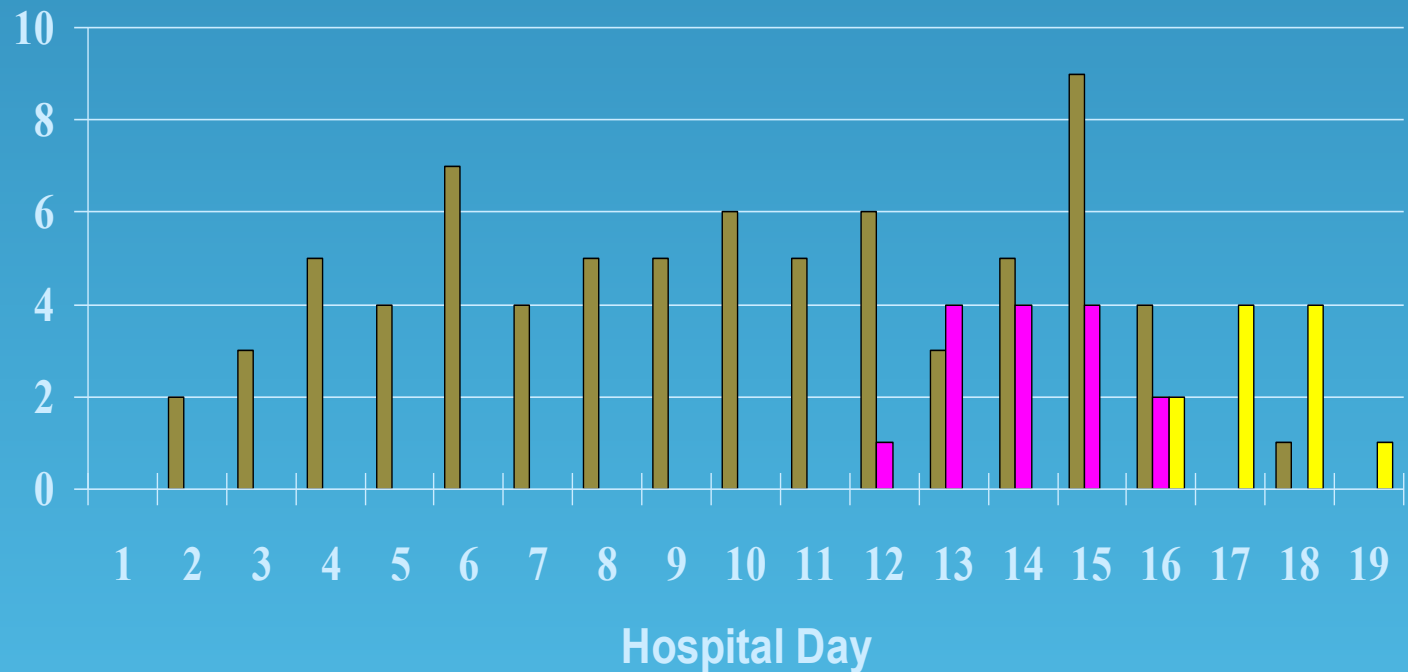
gnites - Cauterized diabetic bowels

heophylline - has most sorbitol

bscure - amount not on label

liquids- present in most liquid medications

U.S.P. Drug Problem Product Report Stools & Drug Doses per Hospital Day



■ # Stools ■ # Diphenoxylate ■ # Loperamide



↑ Osmolarity liq. meds in sm. bowel

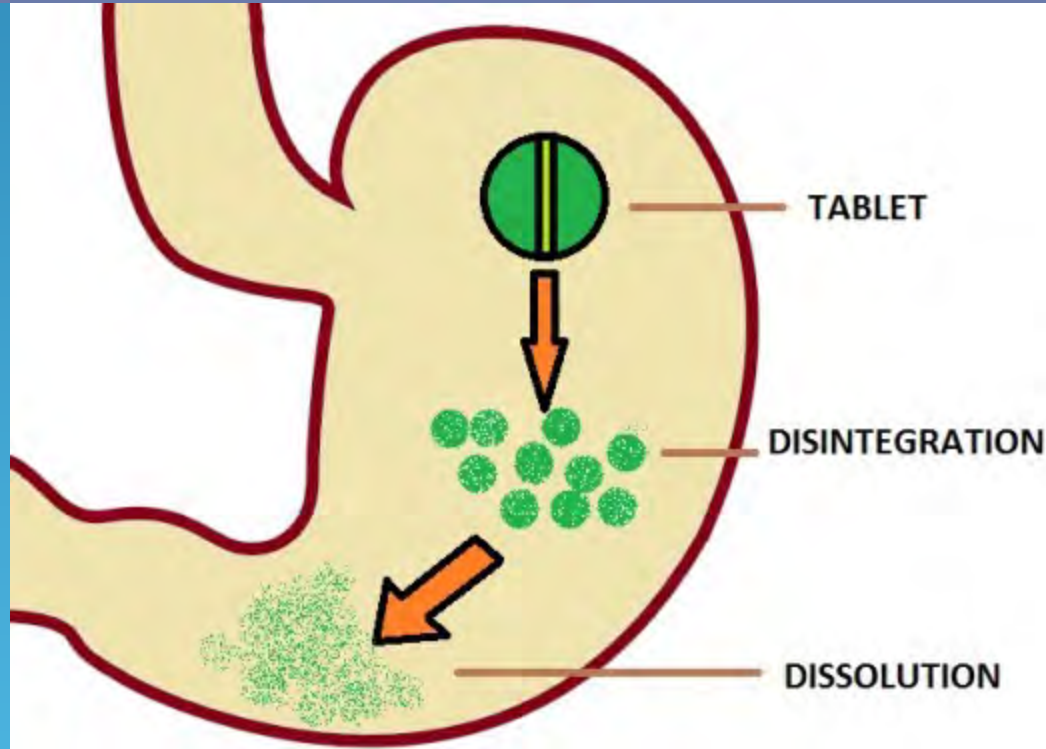
- Small bowel exposed to osmotic loads - “dumping syndrome”
- 10%: <1000 mOsm/kg
- 90%: 1050-10,950 mOsm/kg
- Acetaminophen: 5400 mOsm/kg
- Metoclopramide: 8350 mOsm/kg
- KCl Liquid: 4350 mOsm/kg

Solubility

- Most drugs to be active in physiologic areas must be lipid soluble.
- To be absorbed, must dissolve, must be water soluble
- Many drugs are formulated to dissolve in stomach and get absorbed once in jejunum

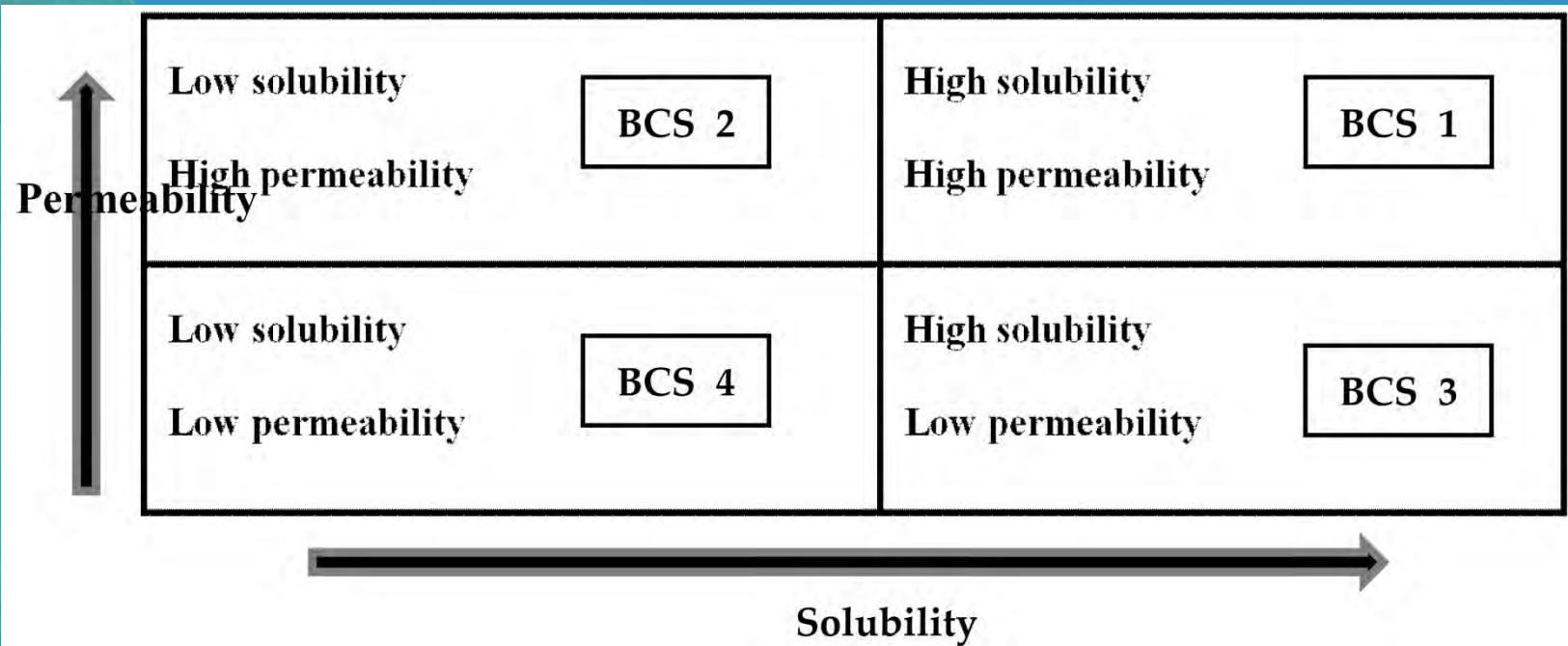


Gee you're swell



As tablet breaks up it swells, it may require more than 15 ml to dissolve

Ya gotta have class



Drugs in Class 4 will have excipients that enhance solubility



Crushing tablets with water

- MSKCC has evaluated about 300 medications for suitability of mixing crushed tablet with water.
- Not all worked out
 - High Osmolar crushed medications
 - Mesna, Metformin, Calcium Acetate

Excipients that alert

- If the drug has ingredients like povidone – a co-precipitate
 - Mix in syringe, not separately in bottle.
 - This is a class IV drug
 - Insoluble in water.
 - When mixed in a bottle, drug will separate from povidone and precipitate out
- Look at rxlist.com for drug solubility and ingredients



Rinsing the tube

- Use water or juice?
 - Drug beads many times are enteric coated
 - Resistant to acid – mix with water and will clump
 - Mix with juice – will not clump.
 - Good for stomach – not for lower GI tract





What about Duodenum/ jejunum ?

- pH is important.
- Enteric coating must be removed
 - Crush drug

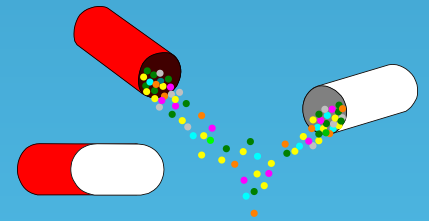
Or mix with sodium bicarbonate

Crush thoroughly as jejunum tubes are small

Flush with water

Ittsy Bitsy beads in drugs

- Many beads in drugs are extended release.
 - If you crush these, ALL the drug is released
- Some beads are active drug sprayed onto delivery agent
 - Emend, Sporanox
 - Mix in a slurry, give as a slurry.
 - Don't mix separately



Pharmaceutical Issues:

- Crushing Extended Release Drug Products
 - Destroys Extended Release properties
 - Increased risk of **side effects and toxicities**
- Example: Trental® Tablets

	<u>Intact Tab</u>	<u>Crushed Tab</u>
C_{max} :	184 ng/mL	1789 mg/mL
t_{max} :	2.25 hr	0.6 hr
S.E.:	none	Nausea, dizziness diaphoresis, vomiting

- But a suspension can be made using Trental – just administer more frequently



Hazardous drug

- Do not crush oral Chemotherapy
- Add drug to syringe and allow to dissolve in 15 ml Water.
- Capsules take long time to dissolve
 - Injection can be given
 - Through tube
 - Etoposide, Cytosin



Syrups

- Besides being thick and sticky, they are acidic
 - Will form clogs with Ensure, Osmolite and most formulas
 - Very sweet. See if a crushed drug is available
 - High Osmolarity – dilute before giving





Pharmacy Compounding

- Pharmacists use Ora-Sweet Ora-Plus
 - Contains high sorbitol/ parabens.
 - Suggest Syr-Spend, lower osmolarity
 - Or 0.5% Carboxymethylcellulose
 - Takes 1 day to mix from powder
 - Feeding-tube doesn't need sweeteners, flavors

Avoiding clogs

- Water, Water, Water
 - Some reports say pancreatic enzymes, other sodas, other cranberry juice.
 - Feeding tubes degrade with all the above
 - None are superior to water
 - Juices, soda are acidic and makes clogs worse.



Thick as a brick



5 mg dissolved readily

Clogged syringe



Capsules do not dissolve



Leur syringes/devices

A mistake waiting to happen

- ❖ ISMP, ASPEN and many organizations have advised to avoid mixing enteral and parenteral devices for drug administration

- ❖ NEVER use leur fitting devices

- ❖ “Addto” attachment

- ❖ Added to Leur-lok – do not use

- ❖ Crushing Syringe





PPI's and gastric feeding tubes

- **Pick one:**
 - Open capsule, mix with juice, rinse well
 - Mix capsule with sodium bicarbonate
 - Use Orally Disintegrating Tablet (ODT) – mix with water – Teva version forms clogs
- **Avoid**
 - ODT to get “under-the-tongue” absorption Needs an intact GI tract to get drug to site of absorption
 - Although small pellets still forms clogs
 - Mix oral capsule content with water – mixes better with acidic juice (apple juice is best)

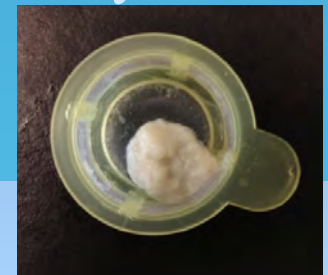
Dissolving a drug clog

- Warm water is best,
 - but cola soda can work
 - Most drugs are weak bases, so adding an acid will dissolve drug
 - But excipients, which cause the clog, may not clear
 - Try water



Pancreatic Enzyme to unclog

- Viokase was removed from US by FDA. Viokace was released by same company.
- Crush the drug with 5 mL Na Bicarbonate 8.4%
- Will only dissolve protein based clog
- There is a gummy center
 - May make clog worse
- Many nurses use Cola
 - Will make clog worse if protein – but may remove drug





Recommendations

- Liquid Drug forms preferred
 - If hypertonic, viscous, thick dilute w/50-60mL water (3 times the volume)
- **Do NOT crush sustained-release drugs**
- Mix tablets / hard gelatin capsules with 10-15mL water
- **Most clogs are drugs**

Recommendations (cont.)

- Do not add drugs to container or formula
- Continuous feeding stopped (0-30min.) and tube flushed with 15-30mL water
- Administer each dose separately and flush with 3-5mL between doses
- Flush tube with 15-30mL water after last dose

