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# Medications that should not be crushed

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## Medications That Should Not Be Crushed

\*Please note that this table provides a list of many common medications that should not be crushed, yet there are many more not listed. The considerations presented in the narrative portion of this document will assist the healthcare professional in determining what other medications should not be crushed.\*

Generic Name	Brand Name	Dosage Form
<b>Sustained-release Medications<sup>1-5</sup></b>		
Acamprosate	<i>Campral</i>	Tablet
Acetaminophen	<i>Tylenol Arthritis Pain Extended Relief</i>	Tablet
Acetazolamide	<i>Diamox Sequels</i>	Capsule
Albuterol	<i>VoSpire ER</i>	Tablet
Alprazolam	<i>Xanax XR</i>	Tablet
Amoxicillin/Clavulanate	<i>Augmentin XR</i>	Tablet
Aspirin	<i>ZORprin</i>	Tablet
Aspirin/Dipyridamole	<i>Aggrenox</i>	Capsule
Belladonna Alkaloids	<i>Donnatal Extentabs</i>	Tablet
Bisacodyl	<i>Fleet Bisacodyl, Modane</i>	Tablet
Bupropion	<i>Wellbutrin SR, XL, Zyban</i>	Tablet
Carbamazepine	<i>Carbatrol</i>	Capsule
Carbamazepine	<i>Tegretol-XR</i>	Tablet
Chlorpheniramine Maleate	<i>Chlor-Trimeton Allergy SR</i>	Tablet
Ciprofloxacin	<i>Cipro XR</i>	Tablet
Clarithromycin	<i>Biaxin XL</i>	Tablet
Colestipol	<i>Colestid</i>	Tablet
Dexmethylphenidate	<i>Focalin XR</i>	Capsule
Dextroamphetamine/Amphetamine	<i>Adderall XR</i>	Capsule
Diclofenac	<i>Voltaren-XR</i>	Tablet
Diclofenac/Misoprostol	<i>Arthrotec</i>	Tablet
Didanosine	<i>Videx EC</i>	Capsule
Diltiazem	<i>Cardizem CD, Cartia XT, Dilacor XR, Diltia XT, Dilt XR, Taztia XT, Tiazac</i>	Capsule
Diltiazem	<i>Cardizem LA</i>	Tablet
Disopyramide	<i>Norpace CR</i>	Capsule
Divalproex	<i>Depakote Sprinkle</i>	Capsule
Divalproex	<i>Depakote, Depakote ER</i>	Tablet
Doxycycline	<i>Doryx</i>	Tablet
Duloxetine	<i>Cymbalta</i>	Capsule
Enalapril/Felodipine	<i>Lexxel</i>	Tablet
Erythromycin	<i>ERYC</i>	Capsule

More . . .

Generic Name	Brand Name	Dosage Form
<b>Sustained-release Medications, continued</b>		
Erythromycin	<i>Ery-Tab, PCE Dispertab</i>	Tablet
Esomeprazole	<i>Nexium</i>	Capsule
Felodipine	<i>Plendil</i>	Tablet
Ferrous Sulfate	<i>Slow FE</i>	Tablet
Fexofenadine/Pseudoephedrine	<i>Allegra-D</i>	Tablet
Fluoxetine	<i>Prozac Weekly</i>	Capsule
Fluvastatin	<i>Lescol XL</i>	Tablet
Glipizide	<i>Glucotrol XL</i>	Tablet
Hyoscyamine	<i>Cystospaz-M, Levsinex Timecaps</i>	Capsule
Hyoscyamine	<i>Levbid</i>	Tablet
Indomethacin	<i>Indocin SR</i>	Capsule
Isosorbide Dinitrate	<i>Dilatrate-SR</i>	Capsule
Isosorbide Mononitrate	<i>Imdur</i>	Tablet
Isradipine	<i>DynaCirc CR</i>	Tablet
Lansoprazole	<i>Prevacid</i>	Capsule
Lansoprazole	<i>Prevacid SoluTab</i>	Tablet
Levodopa/Carbidopa	<i>Sinemet CR</i>	Tablet
Lithium Carbonate	<i>Eskalith CR, Lithobid</i>	Tablet
Loratadine/Pseudoephedrine	<i>Claritin-D, Claritin-D 12 Hour</i>	Tablet
Lovastatin/Niacin	<i>Advicor</i>	Tablet
Magnesium	<i>Slow-Mag</i>	Tablet
Mesalamine	<i>Pentasa</i>	Capsule
Mesalamine	<i>Asacol</i>	Tablet
Metformin	<i>Fortamet, Glucophage XR</i>	Tablet
Methylphenidate	<i>Metadate CD, Ritalin LA</i>	Capsule
Methylphenidate	<i>Concerta, Metadate ER, Ritalin SR</i>	Tablet
Metoprolol	<i>Toprol XL</i>	Tablet
Metronidazole	<i>Flagyl ER</i>	Tablet
Morphine Sulfate	<i>Avinza, Kadian</i>	Capsule
Morphine Sulfate	<i>MS Contin, Oramorph SR</i>	Tablet
Naproxen	<i>EC Naprosyn, Naprelan</i>	Tablet
Niacin	<i>Niaspan, Slo-Niacin</i>	Tablet
Nicardipine	<i>Cardene SR</i>	Capsule
Nifedipine	<i>Adalat CC, Procardia XL</i>	Tablet
Nisoldipine	<i>Sular</i>	Tablet
Omeprazole	<i>Prilosec</i>	Capsule
Omeprazole	<i>Prilosec OTC</i>	Tablet
Oxybutynin	<i>Ditropan XL</i>	Tablet
Oxycodone	<i>OxyContin</i>	Tablet
Pantoprazole	<i>Protonix</i>	Tablet
Paroxetine	<i>Paxil CR</i>	Tablet
Pentoxifylline	<i>Trental</i>	Tablet
Phendimetrazine	<i>Bontril</i>	Capsule

More . . .

Generic Name	Brand Name	Dosage Form
<b>Sustained-release Medications, continued</b>		
Phentermine	<i>Ionamin</i>	Capsule
Phenylephrine/Brompheniramine	<i>Bromfed PD</i>	Capsule
Phenylephrine/Guaifenesin	<i>Entex ER, LA, others</i>	Capsule
Phenylephrine/Guaifenesin	<i>Liquibid D, others</i>	Tablet
Potassium Chloride	<i>Micro-K, others</i>	Capsule
Potassium Chloride	<i>K-Dur, Kaon-CL, Klor-Con, others</i>	Tablet
Procainamide	<i>Procanbid, Pronestyl SR</i>	Tablet
Propafenone	<i>Rythmol SR</i>	Capsule
Propranolol	<i>Inderal LA, InnoPran XL</i>	Capsule
Pseudoephedrine	<i>Sudafed 12 Hour, 24 Hour</i>	Tablet
Pseudoephedrine/Brompheniramine	<i>Bromfenex PD, Brovex SR, Iofed PD, others</i>	Capsule
Pseudoephedrine/Carbinoxamine	<i>Coldec D, Rondec-TR, others</i>	Tablet
Pseudoephedrine/Chlorpheniramine	<i>Deconamine SR</i>	Capsule
Pseudoephedrine/Chlorpheniramine	<i>Chlor-Trimeton Allergy Decongestant SR</i>	Tablet
Pseudoephedrine/Dexbrompheniramine	<i>Disophrol, Drixoral</i>	Tablet
Pseudoephedrine/Guaifenesin	<i>Entex PSE</i>	Capsule
Pseudoephedrine/Guaifenesin	<i>Mucinex D</i>	Tablet
Pyridostigmine	<i>Mestinon Timespan</i>	Tablet
Rabeprazole	<i>AcipHex</i>	Tablet
Theophylline	<i>Theo-24</i>	Capsule
Theophylline	<i>Theochron, Uniphyl</i>	Tablet
Tolterodine	<i>Detrol LA</i>	Capsule
Venlafaxine	<i>Effexor XR</i>	Capsule
Verapamil	<i>Verelan SR, PM</i>	Capsule
Verapamil	<i>Calan SR, Covera-HS, Isoptin SR</i>	Tablet
Zolpidem	<i>Ambien CR</i>	Tablet
<b>Enteric-coated Medications<sup>1-5</sup></b>		
Aspirin	<i>Easprin, Ecotrin, others</i>	Tablet
Bisacodyl	<i>Dulcolax</i>	Tablet
Budesonide	<i>Entocort EC</i>	Capsule
Diclofenac/Misoprostol	<i>Arthrotec</i>	Tablet
Dirithromycin	<i>Dynabac</i>	Tablet
Divalproex	<i>Depakote</i>	Tablet
Ferrous Gluconate	<i>Fergon</i>	Tablet
Ferrous Sulfate	<i>Feosol</i>	Tablet
Lansoprazole	<i>Prevacid</i>	Suspension Particles
Naproxen	<i>EC-Naprosyn</i>	Tablet
Pancrelipase	<i>Creon, Lipram, Pancrease, Pancrease M, Pancrecarb MS, Ultrase MT, others</i>	Capsule

More . . .

Generic Name	Brand Name	Dosage Form
<b>Enteric-coated Medications, continued</b>		
Sulfasalazine	<i>Azulfidine En-Tabs</i>	Tablet
Tamsulosin	<i>Flomax</i>	Capsule
<b>Medications With Poor Taste<sup>1-5</sup></b>		
Carbenicillin	<i>Geocillin</i>	Tablet
Cefuroxime	<i>Ceftin</i>	Tablet
Ciprofloxacin	<i>Cipro</i>	Tablet
Docusate Sodium	<i>Colace</i>	Capsule
Eszopiclone	<i>Lunesta</i>	Tablet
Ibuprofen	<i>Motrin, Advil</i>	Tablet
Imatinib	<i>Gleevec</i>	Tablet
Indinavir	<i>Crixivan</i>	Capsule
Penicillin	<i>Betapen-VK</i>	Tablet
Praziquantel	<i>Biltricide</i>	Tablet
Promethazine	<i>Phenergan</i>	Tablet
Propoxyphene/Acetaminophen	<i>Darvocet</i>	Tablet
Raloxifene	<i>Evista</i>	Tablet
Tetracycline	<i>Sumycin</i>	Tablet
Topiramate	<i>Topamax</i>	Capsule/Tablet
Trazodone	<i>Desyrel</i>	Tablet
<b>Medications That Can Be Irritating<sup>1-5</sup></b>		
Alendronate	<i>Fosamax</i>	Tablet
Benzonatate	<i>Tessalon Perles</i>	Capsule
Diflunisal	<i>Dolobid</i>	Tablet
Ganciclovir	<i>Cytovene</i>	Capsule
Isotretinoin	<i>Accutane</i>	Capsule
Piroxicam	<i>Feldene</i>	Capsule
Temozolomide	<i>Temodar</i>	Capsule
Valproic Acid	<i>Depakene</i>	Capsule
<b>Medications That Can Be Teratogenic<sup>1-5</sup></b>		
Dutasteride	<i>Avodart</i>	Capsule
Finasteride	<i>Propecia, Proscar</i>	Tablet
Lenalidomide	<i>Revlimid</i>	Capsule
Mycophenolate	<i>Cellcept</i>	Capsule/Tablet
Ganciclovir	<i>Cytovene</i>	Capsule
Valganciclovir	<i>Valcyte</i>	Tablet
Ribavirin	<i>Copegus, Rebetol</i>	Tablet, Capsule

### **Background**

There is a wide range of circumstances that make it either impractical or impossible to administer solid oral medications. For example, some patients might need their medications to be given through a feeding tube, such as a nasogastric (NG) tube. Some patients may have dysphagia (difficulty swallowing) due to the effects of age, stroke, chemotherapy, etc. Other

patients might have trouble swallowing due to impaired cough/gag reflexes or due to problems with oral secretions.

An alternative way to provide medication is necessary for these types of patients. Oral medications are frequently crushed to allow for better ease of administration; however, there are many solid oral medications that should not be crushed or broken.<sup>1,2</sup>

*More . . .*

### ***Types of Drug Formulations***

There are a variety of reasons why crushing or breaking some solid oral medications is not a good idea. One is that this process can alter the pharmacokinetics of certain drug formulations. For example, sustained-release medications are designed to release the drug over an extended period of time, maintaining steady drug levels over 8, 12, or 24 hours. These formulations usually either contain layers where drug is released as each layer is dissolved, pellets that dissolve at different time intervals, or inert matrixes that slowly release the drug over a period of time. Crushing or breaking these formulations can ruin their sustained-release properties and can cause the patient to receive a large dose all at once. This increases the risk of side effects and toxicity. It also eliminates the benefits of giving a sustained-release formulation because the drug's action will not last for the full dosing interval.<sup>1-3</sup>

Sustained-release medications generally have an abbreviation attached to the brand name. This abbreviation is a clue that crushing or breaking the medication might alter the formulation. Examples of abbreviations include LA (long-acting), SR (slow- or sustained-release), CR (controlled-release), CRT (controlled-release tablet), XL (extended-release), XR (extended-release), SA (sustained-action), TD (time-delay), TR (time-release), and 24 (24-hour). The words "Spansules," "Sequels," "Timecaps," "Sprinkle," etc., are also often added to the end of the brand name to signify a sustained-release product.<sup>1-3</sup>

Another example of oral medications that should not be crushed is enteric-coated medications. These medications are designed to remain intact as they pass through the stomach and not release the drug until the tablet reaches the intestines. This formulation is frequently used for drugs that can be irritating to the stomach, for drugs that are destroyed by stomach acids, and to achieve a delayed onset of action. Destroying the enteric coating of these medications can jeopardize the stability of the drug and its intended action, or increase the risk of side effects. They also don't pulverize well and can end up clogging tubes.<sup>1,3</sup>

Some medications can irritate the oral mucosa and upper gastrointestinal tract, while others are bitter tasting, or can even stain the mouth and

teeth. Also, some medications have coatings to prevent drug absorption during handling because they are potentially carcinogenic. Even though crushing or breaking these drugs may not affect their drug delivery mechanisms, it might cause aerosolization of drug particles. This increases the risk of exposure to drug handlers or healthcare personnel and possible health risks.<sup>1</sup>

Sublingual or buccal tablets are placed under the tongue or between the gum and cheek. These formulations are designed to dissolve and release medication for rapid absorption by the large supply of blood vessels in the mouth. Swallowing or chewing these formulations might cause them to not be effective, or to be less effective.<sup>1,2</sup>

### ***Alternatives to Crushing***

Alternatives to crushing are available for many medications on the market today. Some may be given in ways other than being swallowed whole. For example, some capsules can be opened and the contents sprinkled on soft food such as applesauce or pudding. If the capsule is a sustained-release formulation, be careful that the patient doesn't chew the pellets. Other capsules contain a liquid, which can be removed and administered. Some medications are already conveniently supplied in a liquid formulation. If there is not a liquid formulation commercially available, it may be possible to compound one.<sup>1-3</sup>

Sometimes, the injectable form of a drug can be used by placing the appropriate amount of injectable solution into an appropriate fluid such as water or juice. However, it is necessary to make certain that there are no problems with compatibility or changes in drug absorption before doing this. Another possible option is to use a chemically different but clinically similar drug that is available in liquid form.<sup>1</sup>

### ***Other Considerations***

Whenever medications must be administered to patients with enteral feeding tubes, special considerations must be recognized. These considerations include the type of feeding tube, the tubing bore, its placement site, the drug absorption site, the time necessary for drug absorption, physical or chemical incompatibilities of the drug or drugs

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to be administered with feeding formula, other administered drugs, and tube-flushing solution. Some of the small-bore tubes include nasogastric (NG) tubes which can be placed into the stomach, duodenum, or jejunum. Needle catheter jejunostomy (NCJ) tubes are very small-bore tubes that are surgically inserted into the jejunum. Only liquid dosage forms should be placed in NE tubes and drug administration into a NCJ tube should be avoided whenever possible due to clogging. Large-bore tubes present less risk for clogging. These large-bore tubes include nasogastric (NG) and orogastric (OG) tubes as well as tubes that are surgically inserted across the abdominal wall using open, laparoscopic, endoscopic, or fluoroscopic techniques. Gastrostomy (G) tubes and jejunostomy (J) tubes are included in this group. More information on drug therapy administration in patients with enteral feeding tubes can be found in an article by Beckwith et al.<sup>6</sup>

### Conclusion

There are frequent circumstances where patients are unable to swallow solid oral medications whole, making it necessary to find a suitable alternative for administration. Watch for medications that should not be crushed or broken because of the risk of destroying the drug delivery mechanism, or exposing the patient or handler to potentially irritating or harmful compounds. When considering the alternatives available, it is important to remember that substituting other formulations of the same medication might require a change in the dosing regimen, particularly for sustained-release medications. The tables identify some medications that should not be crushed. Keep in mind that the examples

listed are commonly used drugs and are representative of drugs that should not be crushed or broken, but they do not make up a complete list.<sup>1</sup>

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