



## CLINICAL DRUG ADMINISTRATION NOTES

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### TO CRUSH OR NOT TO CRUSH? THAT'S THE QUESTION...

#### INTRODUCTION

The administration of whole tablets and capsules may be challenging for patients with swallowing difficulties (dysphagia) or with an enteral feeding tube, where there is a concern of blockage with administration of solid formulations. In these circumstances, crushing the medication into a fine powder or opening the capsule may be desirable to facilitate the administration of the drug. However, crushing a tablet or opening a capsule to deliver its content may not always be possible because of the drug's pharmaceutical formulation or characteristics.

#### DRUG FORMULATIONS THAT CANNOT BE ALTERED:

**Enteric-coated formulation:** Some medications are designed to pass through the stomach intact as the intent is to have the drug released in the intestine. They have a special coating called enteric-coating, often referred to as EC. This enteric coating may: 1) prevent the destruction of the drug by gastric acidity; 2) prevent stomach irritation; 3) delay the onset of action.

**Sustained-released formulation:** This type of formulation is designed to release the drug over an extended period of time to prolong its duration of action. These formulations, often labelled as CD, ER, LA, MR, PA, SR, XC, XL, XR, may have: 1) multiple coatings that will dissolve over different periods of time; 2) multiple pellets (often encapsulated in a gelatin capsule) that will dissolve at different time intervals; 3) a matrix in which the drug is embedded to slowly release the drug over time.

**Sublingual/buccal formulations:** These formulations are meant to dissolve in the mouth and be absorbed by the oral mucosa through the abundant capillary system. They are not designed to dissolve in the stomach, and therefore should not be administered orally or directly administered into the stomach through a feeding tube or percutaneous gastrostomy (PEG) tube.

**Others:** Although some drugs do not have a special formulation, they cannot be crushed for one of the following reasons: they 1) irritate the oral mucosa; 2) have a strong and bitter taste; 3) contain dyes that could stain the teeth or the oral mucosa; 4) are carcinogenic or teratogenic and require special handling to minimize the potential risks of exposure.<sup>1</sup>

Table 1 lists the oral dosage forms on The Ottawa Hospital (TOH) formulary that should not be crushed or should be crushed with special precautions. It also provides useful alternatives in difficult cases. Note that in some situations, a new order from the prescriber will be needed to proceed with the change to a new drug, another formulation or dosage frequency.

**TABLE 1: ORAL DOSAGE FORMS ON TOH FORMULARY THAT SHOULD NOT BE CRUSHED OR TO BE CRUSHED WITH SPECIAL PRECAUTIONS <sup>2-10</sup>**

| <b>DRUG</b>  | <b>SPECIAL PRECAUTIONS / COMMENTS</b>  |
|--|--|
| <b>ALENDRONATE</b>   | <u>Cannot</u> be crushed if patient has difficulty swallowing as it can cause irritation or ulceration of the oropharyngeal and esophageal mucosae. <u>Can</u> be crushed if administered through an enteral tube, as plastic tubing prevents any direct contact with the mucosa.  |
| <b>5-AMINOSALICYLIC ACID (5-ASA)</b>   | Formulations of 5-ASA tablets cannot be crushed, as they have an enteric coating. <u>Exception</u> : The Pentasa <sup>®</sup> 500 mg tablets can be dispersed in water, without affecting the release of the drug. These tablets can also be broken <i>by hand</i> along the score line for patients who have difficulty swallowing the whole tablet.  |
| <b>ANTINEOPLASTICS</b>   | Crushing tablets poses a risk to health care personnel. Contact TOH pharmacy for specific recommendations.   |
| <b>ASA ENTERIC COATED</b>  | Alternative dosage forms of the same drug available (regular tablet).  |
| <b>ASA + DIPYRIDAMOLE (Aggrenox<sup>®</sup>) (25 mg regular release ASA + 200 mg SR dipyridamole; usually prescribed as 1 cap bid)</b> | If difficulty swallowing: can open capsule and crush ASA tablet (regular release); sprinkle dipyridamole pellets (SR formulation) on applesauce. If administration through an enteral tube: discuss with prescriber to consider switching to regular release ASA 80 mg tablet once daily with regular release dipyridamole 50 mg tabs, 2 tabs qid (total 400 mg/day); (dipyridamole pellets are not very soluble in water; tendency to block the tube, according to TOH experience). |
| <b>AZATHIOPRINE</b>  | Crushing tablets poses a risk to health care personnel. Contact TOH pharmacy for specific recommendations.   |
| <b>BICALUTAMIDE</b>  | Teratogenic potential. Pregnant women or women of childbearing age should wear gloves and a mask when preparing and administering the suspension. Put the tablet in a 10 mL syringe; add 10 mL of water in the syringe when ready to administer the drug; shake well to prevent sedimentation; will make a suspension rather than a true solution.   |
| <b>BISACODYL</b>   | Alternative dosage forms of the same drug available (suppository).   |
| <b>BOSENTAN</b>  | Teratogenic potential. Pregnant women or women of childbearing age should wear gloves and a mask when preparing and administering the suspension. Put the tablet in a 10 mL syringe; add 10 mL of water in the syringe when ready to administer the drug; shake well to prevent sedimentation; will make a suspension rather than a true solution.   |
| <b>BUPROPION SR</b>  | Crushing the tablet destroys the SR formulation. However, the following procedure may be tried, although not recommended by the manufacturer. Split total daily SR dose in 3 doses, to be given q8h (e.g., 150 mg SR bid as 100 mg SR q8h); then crush dose into powder and administer down the enteral tube. Maximum single dose of 150 mg should not be exceeded; doses should be spaced by at least 6 hours to reduce risk of seizures.   |
| <b>CARBAMAZEPINE SR</b>  | The tablet can be cut in half. Alternative dosage forms of the same drug available (regular tablet, liquid)*.  |
| <b>CLARITHROMYCIN XL</b>   | Alternative dosage forms of the same drug are available (regular tablet, liquid)*.   |
| <b>CODEINE SR</b>  | Alternative dosage forms of the same drug available (regular tablet, liquid, injectable)*.   |
| <b>DICLOFENAC</b>  | Alternative dosage forms of the same drug available (suppository).   |
| <b>DILTIAZEM SR, CD</b>  | May suspend contents of the capsule in water (or sprinkle on applesauce if not to be administered through an enteral tube); do not crush beads. Alternative dosage forms of the same drug available (regular tablet)*.   |

| DRUG  | SPECIAL PRECAUTIONS / COMMENTS   |
|---|--|
| <b>DOXYLAMINE/<br/>PYRIDOXINE</b><br>(Diclectin <sup>®</sup> )                        | Antiemetic action is delayed by a special coating. If tablet is crushed, can expect quicker onset of action.   |
| <b>FELODIPINE</b>   | Best to switch to amlodipine tablets as these can be crushed; do not switch to regular release nifedipine capsules due to the potential of serious cardiovascular effects.   |
| <b>FINASTERIDE</b>  | Teratogenic potential. Pregnant women or women of childbearing age should wear gloves and a mask when preparing and administering the suspension. Put the tablet in a 10 mL syringe; add 10 mL of water in the syringe when ready to administer the drug; shake well to prevent sedimentation; will make a suspension rather than a true solution.   |
| <b>GALANTAMINE ER</b>   | May open the capsule and sprinkle pellets on yogurt or applesauce in patients having difficulty swallowing the capsule for a maximum contact time of 10 minutes. No data on enteral tube administration.   |
| <b>GANCICLOVIR</b>  | Crushing the tablets poses a risk to health care personnel. Contact TOH pharmacy for specific recommendations.   |
| <b>GLICAZIDE MR</b>   | Alternative dosage forms of the same drug available (regular tablet)*.   |
| <b>HYDROMORPHONE SR</b>   | May suspend contents of the capsule in water (or sprinkle on soft food if not to be administered through an enteral tube); do not crush beads. Alternative dosage forms of the same drug available (regular tablet, injectable)*.  |
| <b>KETOPROFEN</b><br>(enteric-coated tablet)  | Alternative dosage forms of the same drug available (oral capsule).  |
| <b>LANSOPRAZOLE</b><br>oral disintegrating tablet<br>(Prevacid Fas Tab <sup>®</sup> ) | For oral administration in patients who cannot swallow:<br>Place the tablet on the tongue and allow to disintegrate (about 1 minute) and swallow. Water is not necessary, but may be used to accelerate dissolution. Patient should not chew the granules.<br>Patients with enteral tubes $\geq$ 8 French:<br>1. Place a 15 mg tablet in a syringe and draw up 4 mL of water; for a 30 mg tablet draw up 10 mL of water.<br>2. Shake gently to allow the tablet to disperse.<br>3. Inject through feeding tube within 15 minutes.<br>Refill the syringe with 5 mL of water, shake gently and flush the tube. |
| <b>LEVODOPA/<br/>CARBIDOPA CR</b>   | Alternative dosage forms of the same drug available (regular tablet)*.   |
| <b>LITHIUM SR</b>   | Alternative dosage forms of the same drug available (regular capsule, liquid)*.  |
| <b>MORPHINE SR</b><br>(M-Eslon <sup>®</sup> )   | May suspend contents of the capsule in water (or sprinkle on soft food if not to be administered through an enteral tube); do not crush beads. Alternative dosage forms of the same drug available (regular tablet, injectable)*.  |
| <b>MYCOPHENOLATE</b>  | Crushing tablets poses a risk to health care personnel. Alternative dosage forms of the same drug available (mycophenolate liquid).  |
| <b>NIFEDIPINE PA, XL</b>  | Best to switch to amlodipine tablets as these can be crushed; do not switch to regular release nifedipine capsules due to the potential of serious cardiovascular effects.   |
| <b>OMEPRAZOLE</b>   | Automatic substitution to lansoprazole oral disintegrating tablet (Fas Tab) to facilitate enteral tube administration; (from omeprazole 20 mg to lansoprazole 30 mg).  |
| <b>OXYCODONE SR</b>   | Alternative dosage forms of the same drug available (regular tablet)*.   |
| <b>PANCRELIPASE</b><br>(Cotazym ECS <sup>®</sup> )                                    | May suspend contents of the capsule in water (or sprinkle on soft food if not to be administered through an enteral tube); do not crush beads. Alternative dosage forms of the same drug available (regular tablet).   |

| DRUG  | SPECIAL PRECAUTIONS / COMMENTS   |
|---|--|
| <b>PANTOPRAZOLE</b>   | Automatic substitution to lansoprazole oral disintegrating tablet (Fas Tab) to facilitate enteral tube administration; (from pantoprazole 40 mg to lansoprazole 30 mg).  |
| <b>PENTOXIFYLLINE</b>   | Only SR formulation available.   |
| <b>POTASSIUM CHLORIDE SR</b><br>(Slow K <sup>®</sup> , K-Dur <sup>®</sup> ) | Alternative dosage forms of the same drug available (liquid; if liquid is used, dilute with 10-30 mL of water as solution is hyperosmolar). The "K-Dur 20" brand tablet may be dissolved in 115 mL of water; allow 2-3 minutes to disintegrate the tablet; stir for 30 seconds; administer immediately.  |
| <b>PROCAINAMIDE SR</b>  | Crushing the tablet destroys the SR formulation. However, the following procedure may be tried, although not recommended by the manufacturer. Split each full SR dose to be given q6h to ½ SR dose to be given q3h (e.g., change procainamide SR 500 mg q6h to procainamide SR 250 mg q3h), then crush the dose into powder and administer down the tube.  |
| <b>RABEPRAZOLE</b>  | Automatic substitution to lansoprazole oral disintegrating tablet (Fas Tab) to facilitate enteral tube administration; (from rabeprazole 20 mg to lansoprazole 30 mg).   |
| <b>RISEDRONATE</b>  | <u>Cannot</u> be crushed if patient has difficulty swallowing as can cause irritation or ulceration of the oropharyngeal and esophageal mucosas. <u>Can</u> be crushed if administered through an enteral tube as plastic tubing prevents any direct contact with the mucosa. Before administration, flush enteral tube with 30 mL of water. Disperse tablet in 60 mL of water. After 2 minutes, stir solution for 30 seconds. Pour down the tube. Flush again with 30 mL of water. Flush again with an additional 60 mL of water. |
| <b>SUCRALFATE</b>   | <u>Do not</u> use the liquid formulation; risk of clogging the tube. The tablet can be crushed, but only if administered in the stomach. Do not give through an enteral tube placed beyond the pylorus.  |
| <b>SULFASALAZINE En-Tabs (Salazopyrin<sup>®</sup>)</b>                      | Alternative dosage forms of the same drug available (regular tablet) *.  |
| <b>TAMSULOSIN</b>   | SR formulation; switch to an alternative alpha-blocker (e.g., terazosin).  |
| <b>THEOPHYLLINE SR</b>  | Alternative dosage forms of the same drug available (liquid; if liquid is used, dilute with 10-30 mL of water as solution is hyperosmolar)*.   |
| <b>VALPROIC ACID</b><br>(enteric-coated tablet)                             | Alternative dosage forms of the same drug available (liquid).  |
| <b>VALGANCICLOVIR</b>   | Crushing tablets poses a risk to health care personnel. Alternative dosage forms of the same drug available (a liquid can be manufactured by TOH pharmacy).  |
| <b>VENLAFAXINE XR</b>   | The gelatin capsule contains SR beads. Open the capsule and sprinkle on applesauce (if not to be administered through an enteral tube). If to be administered through an enteral tube, liquid form manufactured by TOH pharmacy is available. However, in the manufactured liquid, the SR formulation is destroyed; a suggestion is to split the once daily dose of XR in 2 doses given bid or 3 doses given tid (e.g., 75 mg XR daily to give as 37.5 mg bid)   |
| <b>VERAPAMIL SR</b>   | Alternative dosage forms of the same drug available (regular tablet)*.   |

\* When switching from a sustained-release preparation to a regular-release preparation, the same total daily dose should be split evenly throughout the day.

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DAN/158