

Guidelines for the administration of drugs via enteral feeding tubes

Enteral Parenteral Nutrition
Support Committee

Midlands Regional Hospital
at Tullamore (2009)

Purpose

This guideline aims to improve pharmaceutical care of patients receiving nutrition through enteral feeding tubes (nasogastric, nasoduodenal, nasojejunal, gastrostomy/PEG, jejunostomy) by ensuring that drugs are administered in the safest and most effective manner.

Scope

This guideline applies to all nursing and medical staff caring for patients who are to receive drugs via enteral feeding tubes. It also applies to pharmacists and dieticians who may be advising the above staff.

Cautionary Notice

PLEASE NOTE THAT THE CORRECT ADMINISTRATION OF DRUGS VIA ENTERAL FEEDING TUBES MAY INCLUDE A SIGNIFICANT VOLUME OF WATER. IF PATIENTS RECEIVING ENTERAL FEEDING ARE FLUID RESTRICTED OR ARE AT RISK OF COMPLICATIONS FROM EXCESSIVE FLUID INTAKE PLEASE REFER TO THE MEDICAL/SURGICAL TEAM BEFORE FOLLOWING THE PROCEDURES OUTLINED IN THIS GUIDE.

Disclaimer

The information in this book is intended as a guide to the administration of medication via enteral feeding tubes. Such administration is usually outside the product licence. No liability is accepted for any injury, loss or damage, however caused.

Definitions and Abbreviations

- Tablet:** A compressed solid oral dosage form.
- Capsule:** A gelatin shell which may contain the active drug inside as a dry powder, dissolved in a liquid or as microscopic pellets.
- Modified release:** Tablets or capsules where the drug is specially formulated to be released over an extended time period. Product names will normally have one of the following suffixes: CR (controlled release), LA (long acting), SR (slow release), XL (extra long), Retard, Slow, DUO, Once Weekly, MR (modified release), Chrono, or similar abbreviation.
- Incompatibility:** When two drugs are mixed together in solution, one may affect the dissolution of another and possibly form a complex.
- Enteral tube feeding:** The delivery of nutrients via a feeding tube in patients who cannot receive adequate nutrition by oral means.

Guideline

For patients on fluid restriction please see the cautionary notice before proceeding.

Choice of Drug

The medical team should review the drug therapy of every patient who is commencing on enteral feeding. Drugs, which are considered not to be essential in the short-term, can be withheld if appropriate.

Choice of Route of Administration

An alternative route to the enteral feeding route should be used to give the drug if appropriate. This may require a change to a different drug.

Choice of Drug Formulation

(a) Drugs that are in a Liquid Form:

If available, these are preferable for administration via enteral tubes. These include syrups, 'linctus', elixirs, suspensions, solutions and dispersible, effervescent or soluble tablets.

(b) Drugs that are in a Solid Form:

(1) Uncoated Tablets:

These may be crushed with care at the bedside and administered immediately (see section on "Precautions Before and After Administering" below). Do not mix powders. Always wear gloves.

(2) Coated Tablets:

Do not crush enteric coated (EC), sugar coated (hard shiny appearance) or modified release (MR) tablets. Certain drugs, listed in Table 1 of this guideline require special attention. Consult a pharmacist for advice and advise the prescribing team.

(3) Capsules:

Hard gelatin capsules can be opened and the contents given via NG tube, provided that they are not modified release capsules (see section on "Precautions Before and After Administering" below). Soft gelatin capsules can be punctured with a wide bore needle and the liquid withdrawn and given by syringe into the enteral tube.

(4) Cytotoxic drugs and hormones should never be crushed

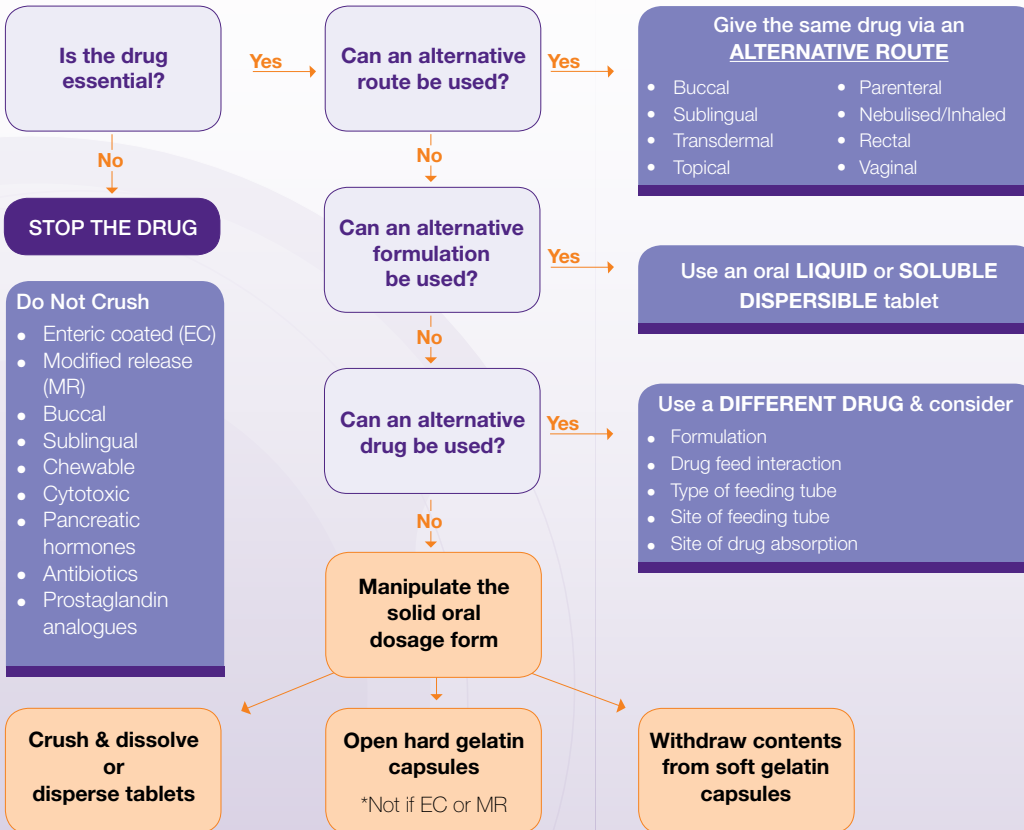
Drug-Feed Interactions

As a general rule of thumb, drugs which should be given on an empty stomach should not be given at the same time as enteral feed. Feed should be stopped for 1-2 hours before and 1-2 hours after such drugs are administered. Certain drugs, listed in Table 3 of this guideline require special attention.

Precautions Before and After Administering

- Each drug should be dissolved or dispersed in 20-30mls of sterile water.
- To prevent blockage of the enteral feeding tube:
 - 20-30mls of sterile water (or more if recommended by the dietitian on the enteral feeding regime) should be administered before any drugs are given.
 - 5-10mls should be given between each drug.
 - 20-30mls of sterile water (or more if recommended by dietitian on enteral feeding regime) should be given after administration of the drugs.
- Requests to pharmacy for "clog zappers" may indicate the need for a member of the pharmacy team to review the patient's medications.
- This fluid should be taken into account in any fluid balance calculations for patients on restricted fluid intake or at risk of complications from excessive fluid intake. Consult the medical or surgical team.

Flow chart for oral drug therapy in patients being fed enterally



Technique:

- Flush line before & after administration of drugs with 20-30mls of sterile water (or more if recommended by dietitian on enteral feeding regime).
- Give each drug in 20-30mls of sterile water.
- Flush tube after each drug with 5-10mls of water.
- Certain drugs need special care.

ALWAYS CONSULT THE MEDICAL TEAM/PHARMACIST IF IN DOUBT

Specific drugs and guidelines for administration:

Please Note: Information listed in Table 1 is for guidance only and may be subject to review. Always check the most recent BNF or SPC for a product. This list is not exhaustive.

Guidelines for Specific Drugs – Table 1

DRUG	INFORMATION FOR USE VIA ENTERAL FEEDING TUBE
ACICLOVIR (Zovirax®)	200mg & 800mg dispersible tablets available.
AMINOPHYLLINE (Phyllocontin continus®)	DO NOT CRUSH. Consider changing to THEOPHYLLINE (see information on THEOPHYLLINE).
AMIODARONE (Cordarone®)	Crush tablets and mix with water for administration via enteral feeding tube.
ANTACIDS (Gaviscon®, Maalox®)	For antacids containing aluminium, magnesium or calcium, stop feed for 1 hr before and 1 hr after administration as antacids may bind to components of the feed and impair absorption.
ASPIRIN (Nu-Seals®, Disprin®)	75mg dispersible tablets available. DO NOT USE Caprin® or Nu-Seals®.
ASPIRIN + DIPYRIDAMOLE (Asasantan Retard®)	Open capsule, discard mini aspirin tablet & give micro-granules via tube without crushing them. The aspirin may be replaced an additional 75mg dispersible tablet once daily.
BACLOFEN (Lioresal®)	Lioresal® liquid 5mg/5ml available.
BISOCODYL (Dulco-Lax®)	5mg and 10mg suppositories available. DO NOT CRUSH tablets as they are enteric coated.
BISPHOSPHONATES: e.g. Alendronate Na+ (Fosamax®) Risedronate Na+ (Actonel®)	Use once weekly preparations. Crush tablets. Stop feed before administration and for 30 minutes after administration. Patients should remain sitting upright or standing for 30 minutes after administration. If the patient is on an overnight feed, dose can be given in the evening. Caution in patients with delayed gastric emptying at risk of oesophageal reflux or unable to stand or sit upright.

Guidelines for Specific Drugs – Table 1 cont...

CARBAMAZEPINE (Tegretol®)	Tegretol® liquid 100mg/5ml available. Dilute in an equal volume of water before administration. Contains sorbitol. If changing from retard formulation to liquid preparation, give an equal total daily dose but increase the frequency of administration: e.g. MR tabs 400mg BD = Liquid 200mg QID or 125mg & 250mg suppositories available. Licensed for short term use only: max 7 days. NOTE: 100mg PO = 125mg PR. Stop feed for 2 hrs before and 2 hrs after administration to avoid impaired absorption. Monitor carbamazepine levels.
CEFUROXIME (Zinnat®)	DO NOT USE ZINNAT® SUSPENSION as it may be too viscous to administer via fine bore tubes. If enteral tube ends in stomach, disperse tablets in water and administer immediately via tube. Do not administer via enteral feeding tubes ending in jejunum as absorption is reduced.
CHLORPHENIRAMINE (Piriton®)	Can crush tablets or Promethazine (phenergan®) 5mg/5ml elixir available.
CHLORPROMAZINE (Clonactil®)	25mg/5ml elixir available.
CITALOPRAM (Cipramil®)	Can crush tablet or Cipramil® drops 40mg/ml available (20mg = 10 drops).
CLARITHROMYCIN (Klacid®)	Change Klacid LA® 500mg tablets to Klacid® suspension 250mg/5ml BD. Flush tube with WARM water after administration to prevent clogging.

Guidelines for Specific Drugs – *Table 1 cont...*

CO-AMOXICLAV (Augmentin® & Augmentin Duo®)	Change Augmentin Duo® 625mg BD to Augmentin Duo suspension® 10mls BD and dilute each dose with a further 10mls of water.
DIAZEPAM (Valium®, Anxicalm®)	Use 5mg rectal tubes if possible. Doses administered rectally and orally are equivalent. DO NOT USE oral liquid via enteral feeding tubes due to absorption into plastic tubing. Tablets can be crushed and flushed through the enteral feeding tube.
DIGOXIN (Lanoxin PG®)	Lanoxin® 50 microgram/ml elixir available. DO NOT DILUTE. Dose adjustments may be necessary due to different bioavailabilities of various formulations. Monitor plasma digoxin levels. Absorption may be affected by fibre containing feeds (e.g. Nutrison Multi Fibre). Avoid such feeds for 2 hrs before and after administration of digoxin.
DILTIAZEM (Tildiem®, Dilzem®, Adizem®)	Convert to non modified release formulation (Tildiem®), crush tablets, give total daily dose IN THREE DIVIDED DOSES or Consider changing to a different calcium channel blocker, or another agent. DO NOT CRUSH modified release preparations.
DOMPERIDONE (Motilium®, Domerid®)	Motilium® 1mg/ml suspension or 10mg, 30mg & 60mg suppositories available.
DOXAZOSIN (Cardura®, Cardura XL®)	Disperse standard release Cardura® 1mg & 2mg tablets in STERILE WATER. DO NOT USE TAP WATER. DO NOT CRUSH CARDURA 4mg & 8mg XL® TABLET.
DOXYCYCLINE	Use dispersible tablets or open capsules. Stop feed for 1 hr before and 2 hrs after administration.
ERYTHROMYCIN (Erymax®, Erythroped®)	250mg/5ml liquid available.

Guidelines for Specific Drugs – *Table 1 cont...*

ESOMEPRAZOLE (Nexium®)	Nexium® tablets can be dispersed in water for administration via enteral feeding tubes. Pellets remain after dispersion – DO NOT CRUSH.
FERROUS SULPHATE (Ferrograd®)	Galfer® (Ferrous Fumarate) liquid iron preparation available.
FERROUS FUMARATE (Galfer®)	5ml Galfer® = 45mg elemental iron.
FLUCLOXACILLIN (Floxapen®)	Floxapen® syrup 125mg/5ml or 250mg/ 5ml available. Feed should be stopped for 2 hrs before and 1hr after each administration as food affects bioavailability. If this is not possible, prescribe parenterally or prescribe an alternative antimicrobial to which the infection is sensitive. Seek pharmacy or microbiology advice if necessary.
FLUOXETINE (Prozac®)	Prozac® liquid 20mg/5ml available.
FOLIC ACID	Tablets can be crushed and mixed with water for administration via enteral feeding tube. 2.5mg/5ml liquid unlicensed but available from the pharmacy.
FUROSEMIDE (Lasix®, Fruside®)	Can crush tablet or use 20mg/5ml liquid unlicensed but available from the pharmacy.
FUSIDIC ACID (Fucidin®)	250mg/5ml suspension available. Increase dose by 50%.
GABAPENTIN (Neurontin®)	Open capsule, dissolve contents in a small amount of water and use immediately due to limited stability in water.
GLICLAZIDE (Diamicon® and Diamicon® MR)	Crush standard release tablets and mix with water for administration via enteral feeding tube. DO NOT CRUSH Diamicon® MR tablets.

Guidelines for Specific Drugs – *Table 1 cont...*

HYDROCORTISONE (Hydrocortone®)	Crush tablets and mix with water for administration via enteral feeding tube. DO NOT CRUSH CORLAN PELLETS.
HYOSCINE BUTYL BROMIDE (Buscopan®)	20mg/ml injection available to be given via NG tube. DO NOT CRUSH tablets.
HYOSCINE HYDROBROMIDE (Kwells®)	Transdermal patch (Scopoderm®) unlicensed but available from pharmacy.
ISONIAZID	50mg/5ml liquid available. Stop feed 2 hrs before and after administration.
ISOSORBIDE MONONITRATE (Elantan®, Imdur®)	10mg & 15mg GTN patches available. Standard release tablets can be crushed and dispersed in water for administration via enteral feeding tube. DO NOT CRUSH modified release formulations.
LACTULOSE (Duphalac®)	Diluted with water for administration via enteral feeding tube. If dose is administered via NJ or PEJ tube dilute lactulose with 3 times its volume of sterile water.
LANSOPRAZOLE (Zoton®)	Give orally where appropriate and allow to dissolve on the tongue. or Disperse Zoton fastabs® in water for administration via enteral feeding tube. Gastro-resistant pellets remain after dispersion – DO NOT CRUSH . Repeated shaking of the syringe is required to suspend the micro-pellets and it may be necessary to draw extra fluid into the syringe to ensure all pellets have been administered. Stop feed for 1 hr before and 1 hr after administration.

Guidelines for Specific Drugs – *Table 1 cont...*

LEVODOPA (Madopar®)	62.5mg & 125mg Madopar® dispersible tablets available. Dosage adjustment may be necessary. Seek pharmacy advice if necessary.
LEVO-THYROXINE (Eltroxin®)	Crush tablets and mix with water for administration via enteral feeding tube. Avoid feed formulas containing soybeans due to increased faecal elimination. Monitor thyroid function tests if clinically indicated.
LITHIUM (Camcolit®, Priadel®)	Priadel® (lithium citrate) 520mg/5ml liquid available. 200mg lithium carbonate = 509mg lithium citrate. Different preparations may vary widely in bioavailability. Seek pharmacy advice if necessary. Monitor plasma lithium levels.
LOPERAMIDE (Imodium®)	Imodium® syrup 0.2mg/ml available. DO NOT DILUTE.
METOCLOPRAMIDE (Maxolon®)	Maxolon® syrup 1mg/ml available.
METRONIDAZOLE (Flagyl®)	Crush tablets for administration via enteral feeding tube. DO NOT USE Flagyl® suspension as it causes diarrhoea.
MISOPROSTOL (Arthrotec®, Cytotec®)	Dangerous to crush tablet as this may be hazardous. Tablets can be dispersed in water for immediate administration via enteral feeding tube. Consider switching to alternative drug available in liquid or parenteral formulation (e.g. Ranitidine 150mg/10ml).

Guidelines for Specific Drugs – *Table 1 cont...*

MORPHINE (MST continus®)	MST continus® suspension available as sachets of granules (20mg, 30mg, 60mg, 100mg & 200mg) to be mixed with water for administration via enteral feeding tube. DO NOT CRUSH MST tablets.
MORPHINE (Sevredol®)	Oramorph liquid 10mg/5ml & 20mg/1ml available.
NIFEDIPINE (Adalat®, Adalat LA®, Adalat Retard®)	Sustained release preparations e.g. Adalat Retard®, Adalat LA® must NEVER be crushed. <u>Adalat® capsules:</u> Flush line with normal saline. Remove liquid from Adalat® capsule via a syringe and give immediately via the enteral feeding tube. Flush line once again with normal saline. Nifedipine is poorly soluble in water. Nifedipine is very short acting; if long acting preparation is substituted with short acting preparation side-effects (e.g. hypotension) may occur. Tablets are light sensitive and should be given immediately via enteral feeding tube as tablets degrade rapidly once crushed. Consider changing to a long acting calcium antagonist (e.g. amlodipine) if clinically appropriate.
NIMODIPINE (Nimotop®)	Crush tablets down to a fine powder and mix with water. Tablets are light sensitive and should be given immediately via enteral feeding tube as tablets degrade rapidly once crushed.
OLANZAPINE (Zyprexa®)	Orodispersible tablet (Velotab®) may be placed under the tongue and allowed to dissolve, if appropriate, otherwise consider alternative agent.
OMEPRAZOLE (Losec®)	MUPS (dispersible tablets) may be dispersed in water but may block tubes or switch to ESOMEPRAZOLE (Nexium®) or LANSOPRAZOLE (Zoton®). See above.

Guidelines for Specific Drugs – *Table 1 cont...*

OXYBUTININ (Cystrin®, Ditropan®)	Ditropan® elixir 2.5mg/5ml available. Kentera® patch available. DO NOT CRUSH modified release tablets.
PANTOPRAZOLE (Protium®)	Switch to ESOMEPRAZOLE (Nexium®) or LANSOPRAZOLE (Zoton®). See above.
PARACETAMOL (Panadol®, Maxilief®)	500mg soluble tablets available. May contain high levels of sodium. 500mg & 180mg suppositories available. DO NOT USE oral liquids as they are hyperosmolar & may cause diarrhoea.
PAROXETINE (Seroxat®)	Seroxat® 2mg/ml liquid available. Dilute with an equal volume of water before administration.
PHENOXYMETHYL PENICILLIN/PENICILLIN V (Calvepen®, Kopen®)	KOPEN® & CALVEPEN® 250mg suspensions available. Absorption is unpredictable 30-80%. Stop feed for 1 hr before and 2 hrs after dose or consider higher dose or consider alternative antibiotic where sensitivities or clinical indications exist (e.g. amoxicillin). Seek pharmacy or microbiology advice if necessary.
PHENYTOIN (Epanutin®)	Epanutin® 30mg/5ml oral suspension is available. Mix with an equal volume of distilled water to minimise adsorption to tube and to improve tolerance. Flush tube with 30ml of distilled water before and after administration. Phenytoin suspension and tablets are not equivalent: 90mg/15ml Epanutin® suspension (phenytoin base) = 100mg tabs/capsules (phenytoin sodium). Phenytoin absorption may decrease by up to 75% when administered with enteral feed. The feed should be stopped for 2 hrs before and after administration of phenytoin. To achieve maximal feeding, it may be better to give the full dosage at night and have one 4 hr feeding break daily. Monitor phenytoin levels.

Guidelines for Specific Drugs – *Table 1 cont...*

POTASSIUM CHLORIDE [KCL] (Slow-K [®])	Sando-K [®] effervescent tablets (12mmol K ⁺ /tab) or Kay-Cee-L [®] syrup (1mmol K ⁺ /ml) available.
PREDNISOLONE (Prednesol [®])	Prednesol [®] 5mg soluble tablets available.
PREGABALIN (Lyrica [®])	Capsules can be opened and the contents dissolved in water for administration via enteral feeding tube.
PROCHLORPERAZINE (Stemetil [®])	5mg & 25mg suppositories available.
PROPRANOLOL (Inderal LA [®])	Inderal LA [®] capsules can be opened and granules flushed down the enteral feeding tube.
QUINOLONE ANTIBIOTICS: CIPROFLOXACIN (Ciproxin [®] , Trooxin [®]) OFLOXACIN (Tarivid [®]) LEVOFLOXACIN (Tavanic [®])	Note: The information provided below is relevant for ALL quinolone antibiotics (i.e. it is a "class effect"). Consider alternative antibiotic. Seek pharmacy or microbiology advice if necessary. Tablets may be dissolved with STERILE WATER for administration via enteral feeding tube. Enteral Feed DELAYS but does not decrease absorption. Feed should be stopped for 1 hr before and 2 hrs after administration to avoid delayed absorption.
RABEPRAZOLE (Pariet [®])	Switch to ESOMEPRAZOLE (Nexium [®]) or LANSOPRAZOLE (Zoton [®]). See above.
RANITIDINE (Zantac [®])	150mg/10ml syrup available and effervescent 150mg tablets available.
RIFAMPICIN (Rifadin [®])	100mg/5ml liquid available. Stop feed for 2 hrs before and ½ hr after administration.
SALBUTAMOL (Ventolin [®])	Give by inhalation route if possible. 2mg/5ml liquid available.
SENNA (Senokot [®])	Senokot [®] syrup 7.5mg/5ml available.

Guidelines for Specific Drugs – *Table 1 cont...*

SODIUM VALPROATE (Epilim [®])	Epilim [®] liquid 200mg/5ml available. Epilim [®] tablets (crushable) 100mg can be crushed. Do not crush enteric-coated, "CR" or chrono tablets.
SOTALOL (Sotacor [®])	Tablets can be crushed and mixed with water for immediate administration via enteral feeding tube. Food decreases absorption by 20%.
STRONTIUM RANELATE (Protelos [®])	2g sachets available. Stop feed for 2 hrs before and 2 hrs after administration to avoid impaired absorption.
SUCRALFATE (Antepsin [®])	Not suitable for administration via enteral feeding tubes. May bind to protein in feed and has been associated with oesophageal bezoar formation. Consider alternative drug (e.g. proton pump inhibitor such as lansoprazole (Zoton [®])).
TEMAZEPAM (Nortem [®])	10mg/5ml liquid available.
THEOPHYLLINE (Nuelin [®] , Slo-Phyllin [®] , Uniphyllin [®])	Calculate the daily dose of theophylline. Administer the total daily dose in THREE DIVIDED DOSES. Theolair [®] liquid 80mg/15ml is available but unlicensed. Ideally the feed should be stopped for 2 hrs pre and 1 hr post administration. Patients should have symptoms and theophylline levels monitored. Theophylline formulations are not interchangeable.
VENLAFAXINE (Efexor [®] , Efexor [®] XL)	Efexor [®] 75mg & 150mg XL CAPSULES can be opened; mix the powder with water and give via the enteral feeding tube. Efexor [®] 37.5mg and 75mg TABLETS can be crushed, but must be given immediately via the enteral feeding tube.
WARFARIN	Tablets can be crushed and mixed with water for administration via enteral feeding tube. Adjust warfarin dose in response to INR (may vary depending on the vitamin K content of an enteral feed).

Drugs which should NEVER be crushed for administration

Please Note: This list is for guidance only and may be subject to review. Always check the most recent BNF or SPC for a product. This list is not exhaustive.

Tablets or capsules where the drug is specially formulated to be released over an extended time period should NEVER be crushed. These products generally have brand names which include CR (controlled release), LA (long acting), SR (slow release), XL (extra long), Retard, Slow, DUO, Once Weekly, MR (modified release), Chrono, or similar abbreviation. See Table 1 of this guideline for more detailed information on administration of these drugs.

Drugs that should never be crushed – Table 2

Drug	Brand names
AMINOPHYLLINE	Phyllocontin Continus®
ASPIRIN	Caprin® Nu-Seals®
ASPIRIN + DIPYRIDAMOLE	Asasantan Retard®
BISOCODYL	Dulco-Lax®
BISPHOSPHONATES: e.g. Alendronate Na+ Risedronate Na+	Fosamax® Actonel®
DILTIAZEM	Adizem XL® Adizem SR® Dilzem XL® Adizem SR® Tildiem LA® Tildiem Retard®

Drugs that should never be crushed – Table 2 cont...

Drug	Brand names
DOXAZOSIN	Cardura XL®
GLICLAZIDE	Diamicron MR®
HYDROCORTISONE	Corlan pellets®
HYOSCINE BUTYLBROMIDE	Buscopan®
ISOSORBIDE MONONITRATE	Elantan LA®
LANSOPRAZOLE	Zoton®
MISOPROSTOL	Arthrotec® Cytotec®
MORPHINE	MST Continus®
NIFEDIPINE	Adalat LA® Adalat Retard®
OXYBUTININ	Lyrinel XL®
SODIUM VALPROATE	Epilim® enteric coated tablets Epilim Chrono®
THEOPHYLLINE	Neulin SA® Slo-Phyllin® Uniphyllin Continus®
VENLAFAXINE	Efexor XL®

Drugs which require enteral feed to be stopped for administration

Please Note: This list is for guidance only and may be subject to review. Always check the most recent BNF or SPC for a product. This list is not exhaustive.

Feed should be stopped for 1-2 hours before and 1-2 hours after administration of the following drugs. See Table 1 of this guideline for more detailed information on administration of these drugs.

Drug-feed interactions – Table 3

Therapeutic Class	Drug	Brand names
Antibiotic	Ciprofloxacin	Ciproxin® Truoxin®
	Doxycycline	Mycin® Vibramycin®
	Flucloxacillin	Floxapen®
	Isoniazid	N/A
	Levofloxacin	Tavanic®
	Ofloxacin	Tarivid®
	Phenoxymethyl penicillin/Penicillin V	Calvepen®
	Rifampicin	Rifadin®
Anti-epileptic	Phenytoin	Epanutin®
	Carbamazepine	Tegretol®
Antacid	Any antacid containing aluminium, magnesium or calcium	Gaviscon® Maalox®
Bronchodilator	Theophylline	Nuelin® Slo-Phyllin® Uniphyllin®
Drugs affecting bone metabolism	Strontium Ranelate	Protelos®

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Guideline compiled by:

Deirdre Holland (*Pharmacist*)

Éilis Crimmins (*Senior Clinical Pharmacist*) (*Editor*)

Anita Hade (*Dietitian Manager*) (*Editor*)

Oisín Ó hAlmhain (*Chief II Pharmacist*)

Joan Peppard (*Chief I Pharmacist*)

Other members of Enteral Parenteral Nutrition Support Committee, Midlands Regional Hospital at Tullamore are: Theresa Rennick, Catherine Conlon, Michelle Bergin, Sinead Boyd, Mary Dunne, Anne Guinan, Brigid Grogan, Teresa Lally and Dr. Murphy.

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