

County Durham and Darlington



Acute Hospitals NHS Trust

GUIDELINES FOR THE ADMINISTRATION OF DRUGS THROUGH ENTERAL FEEDING TUBES

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Disclaimer

Representations in this guide are believed to be true and accurate. The Primary Care Trusts, NHS Trusts, and their employees, or agents accept no liability for loss of any nature to persons, organisations, or institutions which may arise as a result of errors.

Users of this guide are reminded that crushing medication or opening a capsule to aid administration results **in unlicensed administration**.

It is recommended that unlicensed administration methods are authorised by the prescriber and documented in writing.

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UNLICENSED ADMINISTRATION

Although nurses, midwives and health visitors are advised not to crush medication there will be occasions where the patient is unable to swallow solid oral dosage forms, or medication is required to be administered via enteral tube.

In many cases an alternative route of administration or suitable liquid formulation is available and should be used in the first instance.

If alternative formulations or methods of administration are unavailable and the medication is still indicated then it may be necessary to crush tablets or open capsules. The practitioner involved should bring this to the attention of the prescriber (and the pharmacist).

Authorisation for this unlicensed administration together with the reasons why must be documented in the patients medical record by the prescriber.

Crushing medication or opening capsules prior to administration usually results in unlicensed administration. Under the Medicines Act 1968 only Medical and Dental practitioners can authorise the administration of unlicensed medicines. It may therefore be illegal to open a capsule or crush a tablet before administration without the authorisation of the prescriber.

Where such administration results in harm to the patient then the manufacturer has no liability for any harm that ensues and if the unlicensed administration is unauthorised by the prescribing doctor then liability may lie solely with the administering nurse.

Where unlicensed administration is authorised by a prescriber then the liability is shared between the prescriber and the administering nurse. If this is on the advice of a pharmacist then the liability is shared between all three professionals. The balance of this liability would be assessed in a court of law on an individual case basis.

In practice providing the prescriber has authorised the administration and advice has been taken from a pharmacist regarding the suitability of a preparation for unlicensed administration then the nurse would usually be seen as having acted in an appropriate and professional manner. Providing these steps have been taken any adverse effects resulting from the unlicensed administration are unlikely to occur.

It should be borne in mind that usually it is in the best interests of the patient to administer the drug even if this is in an unlicensed manner. The consequences of not giving the medication usually outweigh any risk associated with unlicensed administration.

Nursing staff should take reasonable steps to ensure that unlicensed administration does not cause harm to the patient even if this is at the request of a prescriber.

Advice from a pharmacist or referral to these guidelines should be the absolute minimum action undertaken. Within the acute Trust pharmacy advice is available 24 hours a day via the on call pharmacist.

Any adverse effects, including problems with feeding tubes, should be reported to the prescriber and pharmacist immediately.

GENERAL PRINCIPLES

When administering medication via enteral tube consideration needs to be taken regarding drug formulation, interactions with feed, type of tube, site of placement, and site of drug absorption. Usually drugs are not licensed for enteral administration and there is little information available in the literature on any aspects of enteral drug administration. Most recommendations are therefore theoretical.

CHOICE OF ROUTE

Where a drug is needed but the oral route is unavailable or available by tube only, consideration should first be given to alternative methods of administration. Intravenous administration is often an option but requires trained staff to administer, is associated with increased risk to the patient from complications and is usually more expensive. Other routes for consideration include transdermal, rectal, buccal or sublingual, nebulisation, vaginal, as well as alternative parenteral routes – im, iv, sc.

THE NEED FOR MEDICATION SHOULD BE REVIEWED BEFORE SEARCHING FOR AN ALTERNATIVE ROUTE

In patients who are very unwell previous medication may no longer be necessary both in the short and long term and prescribed items should be reviewed and stopped if no longer indicated or of benefit to the patient.

Patients undergoing surgery who are nil by mouth can often have medication discontinued temporarily without harm e.g. statins or replaced by an alternative agent e.g. sc low molecular weight heparin in place of warfarin.

Sometimes an alternative preparation from the same or even a different therapeutic group may be more suitable e.g. calcium antagonists for hypertension are not available as liquid formulation but diuretics or beta blockers are.

Where drugs need to be continued and no other route is available then enteral administration may need to be considered.

Pharmacists should identify patients receiving medication via the enteral route and be proactive in reviewing their medication and in advising nursing staff / medical staff to facilitate drug administration. Equally nursing staff should request pharmacy advice in patients where drug administration via the enteral route is deemed necessary and refer to current policies and guidelines where available.

Sometimes in patients where the enteral route is not available e.g. after surgery where there is free drainage or suction where aspirates may be large it may be feasible (after consultation with medical staff) to suspend drainage or suction for long enough to facilitate administration and absorption. It should be understood that in such circumstances absorption may be at best be variable and drug effects should be closely monitored. Prokinetic agents may be used to encourage the restoration of normal gut function e.g. metoclopramide, erythromycin, or domperidone.

POTENTIAL PROBLEMS

May include: unavailability of suitable formulation, blocking of tubes, diarrhoea due to hyperosmolar formulation, and drug interactions (between different drugs, between drug and feeds, between drug and tube)

Tube types

Fine bore tubes are unsuitable for some thick liquid formulations eg lansoprazole suspension sachets, cholestyramine. Granules may also block fine bore tubes.

Tube Placement

There are more likely to be problems with drug absorption where the tube is placed beyond the stomach e.g. percutaneous endoscopic jejunostomy (PEJ) tubes. Staff should be aware of situations in which the drug may be administered beyond the drug's main site of absorption eg digoxin, cephalexin, ketoconazole, phenytoin and other anticonvulsants. In such circumstances it is important to monitor for signs of reduced drug efficacy. Therapeutic drug monitoring may be necessary. When a tube is placed beyond the stomach sterile water must be used for flushing and drug administration.

FORMULATIONS

Liquid formulations

Drugs for administration via enteral feeding tubes should ideally be liquids or dispersible/soluble formulations. Not all drugs are commercially available as liquids but pharmacy may be able to organise certain liquid preparations on request if feeding is likely to be long term.

In addition to proprietary products listed in the BNF liquid medicines may also be available as a 'special' from other hospitals or manufacturers.

In exceptional circumstances extemporaneously dispensed liquid formulations may be manufactured 'in house' by the hospital pharmacy. It should be noted that whilst the use of specials may be suitable to solve a short term problem in the acute setting this may not always be the most appropriate or cost effective method for long term use especially where patients are to be transferred to primary care.

Even when a medicine is available as a liquid formulation several other factors may need to be considered. E.g. lansoprazole suspension is too viscous for administration via fine bore tube. Some manufacturers advise dilution of suspension prior to administration through tubes. Augmentin suspension should be diluted to half strength to avoid 'caking'. The administration of sucralfate suspension has been associated with 'bezoar' formation in patients with impaired gastric emptying. Diazepam suspension is not recommended for enteral tube administration as it is absorbed onto plastic tubing.

When transferring a patient to a liquid formulation the use of a different salt may require dosage adjustment due to differing bioavailabilities e.g. phenytoin, mebeverine, and chlormethiazole.

Liquid formulations of high osmolality particularly those containing sorbitol can be associated with osmotic diarrhoea, bloating, stomach cramps, and delayed gastric emptying. This is more likely to be a problem when a lot of medicines are given as liquid formulations in high volumes.

Many liquids have an osmolality as high as 1000 mOsm/kg compared with the normal osmolality of GI secretions which is 100-400 mOsm/kg. This is not usually a problem where small volumes are administered e.g. digoxin elixir, but may be avoided by dilution with water immediately prior to administration.

The sorbitol content of most liquid medicines is not readily available but can be obtained where necessary from individual manufacturers. Cumulative sorbitol doses above 20g may cause particularly severe adverse effects. Administration of hyperosmolar solutions may be particularly problematical when administered through a jejunostomy tube.

Generally elixirs or suspensions should be used rather than syrups. Syrups because of their low pH are prone to clumping in contact with GI feeds.

Where a liquid preparation is unavailable or unsuitable soluble or dispersible tablets may be available. Often tablets not specifically marketed as dispersible will disperse in water. Again advice should be sought from pharmacy.

Solid Dosage Forms – tablets and capsules

Sometimes it may be necessary to crush tablets or open capsules prior to flushing down enteral tubes. Not all solid dosage forms are suitable for crushing. Generally plain uncoated tablets will either disperse in water or can be crushed to a fine powder for dispersal in water.

Film coated or sugar coated tablets can usually be crushed as the coating is designed to improve appearance and to mask taste. These obviously do not matter if being administered via enteral tube.

The following formulations should not be administered through enteral feeding tubes without pharmacy advice

Enteric or other coated tablets

Enteric coatings are designed to protect drugs from attack by stomach acid or to protect the stomach from irritation by the drug. Beyond the stomach the coating breaks down to allow drug absorption. Enteric coated tablets should not be crushed as this destroys the coating resulting in inactivation of drug or increased risk of adverse effect.

Controlled, slow, or extended release products

These products are formulated to allow a gradual release of drug as the preparation passes down the GI tract. This may enable less frequent dosing or minimise side effects due to peak concentrations of drug in the body. Crushing controlled release formulations may destroy their controlled release properties resulting in adverse effects and shortening duration of action.

Deaths have been reported as a result of crushing controlled release morphine preparations.

These types of preparation must never be crushed.

Some controlled release products are formulated as granules inside a capsule. Similarly these granules must not be crushed but may be suitable for administration via enteral tube.

Buccal/ Sublingual tablets should not be crushed and administered via an enteral tube as this can result in reduced effectiveness due to increased first pass metabolism at the liver.

Hard gelatin capsules may often be opened and the contents mixed with water prior to tube administration. Some capsules contain enteric coated granules eg lansoprasole, or granules with a slow release coating eg Slophylline and should not be crushed prior to administration. The administration of such granules intact may block fine bore tubes.

The contents of some soft gelatin capsules may be withdrawn and administered via tube eg nifedipine.

Doxycycline capsules contain an irritant salt and should not be opened to facilitate administration. Dispersible tablets should be used instead.

Injections

Occasionally parenteral formulations may be given orally e.g. vancomycin injection but this is usually an expensive option and not all injectable formulations are suitable for this route. eg gentamicin is not absorbed, amiodarone injection is not suitable because of its high polyethylene glycol content. Advice should be sought from pharmacy.

Cytotoxics

Advice must be sought from pharmacy regarding the administration of cytotoxic drugs via enteral tube. The document 'Guidelines for the Handling and Administration of Cytotoxic Drugs' should also be referred to.

Oral Syringes

Where possible oral syringes should be used to draw up and administer medicines. **Fatalities have been reported when medicines intended for oral administration have accidentally been given intravenously because they were drawn up in IV syringes.** Ideally oral syringes should be incapable of attachment to IV lines or needles by virtue of their design.

Practical Aspects of Administration

- 1) Medications should not be added directly to nutrition formulations.
- 2) Liquid dosage forms should be used where available (Check with pharmacy re liquid availability.) Most liquid formulations should be diluted with 30ml sterile water to reduce their osmolarity prior to administration. Some liquid medicines however should not be diluted. Please refer to list of preparations.
- 3) If tablets must be used the nurse should first check to see whether the tablet can be crushed. If so the tablet should be crushed into a fine powder and mixed with 10 to 15ml of water.
Generally sustained release or enteric coated medication should not be crushed. If in doubt advice should be sought from pharmacy.
- 4) If capsules can be opened then they should be opened and the powder mixed with 10 to 15ml of sterile water.
- 5) In certain circumstances medication formulated for injection may be administered orally (unlicensed use). **Advice on suitability should be sought from pharmacy.**
- 6) The tube should be flushed with 30ml of sterile water prior to administration of the drug.
- 7) The medication should be remixed immediately prior to administration by swirling the medication in the cup. In the case of liquid formulations these should be shaken prior to withdrawal from the bottle.
- 8) The medication should be drawn up into a needleless **oral** or catheter tipped syringe.
- 9) When more than one medication is administered then 5ml of sterile water should be administered between drugs to avoid drug interactions. Medications should never be mixed together in a syringe. Smaller volumes may be necessary in babies and children.
- 10) After administration the tube should be flushed with 30ml of sterile water and clamped.
- 11) The amount of water used should be documented on fluid balance sheets.

Medicines for which there are documented interactions with enteral nutrition

Where there is doubt about compatibility further information should be obtained from pharmacy.

Medication	Problem	Recommendation
Carbamazepine	Decreased absorption.	Hold enteral nutrition 2hr before and 2hrs after dose. May adhere to tubing. Monitor levels. Suppositories are available. If used the dose will need to be adjusted
Ciprofloxacin	Absorption decreased by 25-50% due to chelation with divalent cations in feed	Hold enteral nutrition 1hr before and 2 hrs after dose or administer higher dose. Consider IV therapy
Flucloxacillin	Absorption decreased by presence of feed	Hold enteral nutrition 1 hr before and 2 hr after dose or administer higher dose
Hydralazine	Decreased absorption	Adjust dose. Monitor BP
Penicillin V	Unpredictable absorption May be reduced by 30-80%	Stop feed 1 hr prior to and 2 hours after administration, or use higher doses, or use amoxicillin.
Phenytoin sodium	May form phenytoin-calcium or phenytoin-protein complexes with feed Absorption may be reduced by 75%	Usually given once daily so administer during feeding break or stop feed 2 hours before and after dose
Sucralfate	Binds to protein in the feed	Use alternative agent e.g. H2 antagonist, or PPI.
Tetracyclines	Absorption reduced by calcium in feed	Consider alternative antibiotic or feeding regimen. Discuss with medical staff and pharmacy.
Theophylline	Absorption decreased may be reduced by 60-70%	Stop feed 1 hr before and 2 hrs after administration. This may be impractical due to frequency of administration of non SR liquid preparation. Monitor levels.
Thyroxine	Reduced absorption. Particularly with soya based products.	Monitor thyroid function. Avoid soya based products.
Warfarin	May interact with Vit K and soya proteins in feed.	Monitor INR closely including when changing from or back to normal diet. In problem patients consider non soya based feed.

Holding enteral nutrition in order to administer medications may become problematic. For products that require enteral nutrition to be held for one hour before and one or two hours after drug administration then the following procedure should be adopted.

- 1) If enteral nutrition is administered in bolus doses then the drug should be scheduled during the off periods.
- 2) If enteral nutrition is administered continuously and the drug is available in an alternative dosage form (eg suppository, injection) the oral dosage form should be switched to a therapeutically equivalent dosage form and the patients clinical response to therapy monitored.
- 3) If enteral nutrition is administered continuously and the drug is not available in an alternative dosage form, or the patient does not have intravenous access, enteral nutrition should be withheld for 1 hour before and 1 hour after drug administration. Drug levels should be monitored where appropriate and the patient's clinical response to therapy monitored.

If it is not feasible to hold enteral feeding then the oral dosage should be increased by the amount expected to be lost as a result of the interaction. e.g. phenytoin 300mg daily may be changed to 400mg- 500mg daily because of an expected 70-80% reduction in absorption when combined with enteral nutrition and phenytoin levels should be monitored. Advice on dosage adjustments can be obtained from pharmacy. Clinical response and/or drug serum levels should be monitored where appropriate.

Administration of drugs via jejunostomy tube

There are no drugs licensed for intrajejunal administration in the UK and little data on absorption of drugs via this route. Other routes or alternative methods of treatment should therefore be sought wherever possible. Clinical response and drug levels should be monitored as a guide to treatment success.

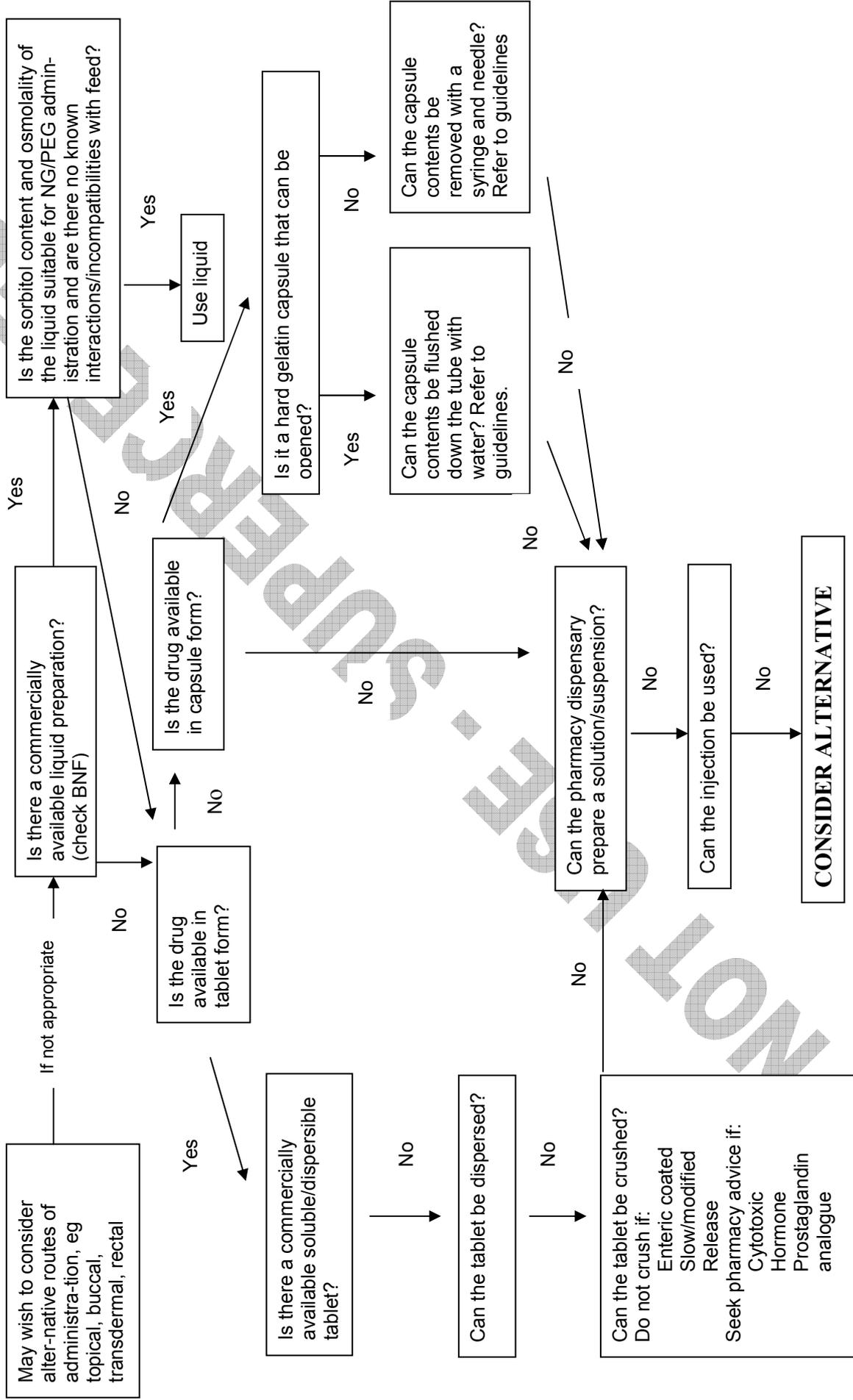
The normal secretions in the jejunum has an osmolality of 285 ± 10 mOsm/kg. When a hypertonic solution is rapidly infused via a jejunostomy tube there is an influx of water and electrolytes into the small intestine leading to an osmotic diarrhoea. Many liquid drug formulations have osmolalities exceeding 1000 mOsm/kg particularly those sugar free preparations containing sorbitol. In circumstances where this is likely to be a problem the following may be considered.

- 1) Sterile water should be used to flush jejunostomy tubes and disperse tablets
- 2) Use disperible tablets or finely crushed tablets dispersed in water as an alternative to liquid formulations
- 3) If the parenteral form is isotonic or hypotonic this may be used as an alternative to liquid formulations. Check with pharmacy re suitability. Not all injections can be given in this manner.
- 4) Only where a drug has been shown to be compatible with enteral feed may a liquid preparation be mixed with feeding solution to reduce osmolality. In practice there is little data regarding compatibility with feeds and most feed manufacturers do not recommend this.

Drugs for which there is documented advice for administration via jejunostomy tube.

Medication	Comments
Amoxicillin	Administer reconstituted injection as suspension has high osmolality
Aspirin	Use dispersible tablets
Cephalexin	Administration by this route may result in decreased plasma concentrations.
Cimetidine	Company data suggests sufficient absorption via this route.
Ciprofloxacin	Use crushed tablets dispersed in water. Absorption may be less than conventional oral administration. Do not administer at same time as feed. Monitor clinical response or use IV route. Liquid formulation is hypertonic. Injection may be given via tube
Digoxin	Elixir and injection have high osmolalities. Use crushed tablets dispersed in water. Monitor levels and adjust dose as necessary
Flucloxacillin	Use reconstituted injection (as amoxicillin). Absorption decreased by food so stop feed at time of administration
Frusemide	Possibly reduced absorption when given by this route. Monitor clinical effect and adjust dose as necessary.
Ketoconazole	Not recommended as a low pH is required for absorption
Loperamide	Loperamide is thought to act locally in the colon so should be suitable for JEJ tube administration. The commercial liquid formulation should be suitable for JEJ tube administration.
Nifedipine	Absorption thought to occur in small intestine. Administer contents of capsule immediately as liquid is very sensitive to light. Monitor clinical effect eg Blood pressure
Omeprazole	Use omeprazole MUPS tabs
Paracetamol	Good absorption when administered by this route.
Phenytoin	Do not mix with enteral feed. Monitor levels.
Ranitidine	Use injection rather than liquid preparation

Is the drug prescribed via the NG/PEG route?



Remember to confirm unlicensed administration with prescriber

List of Preparations

This list is intended to be used as a guide to the range of medicines which are available as liquid preparations and which solid dosage forms can be successfully given via tube. This may be useful when prescribing for patients with swallowing difficulties as well as tube administration. Inclusion in this list does not always mean that liquids are suitable for enteral administration. A minority of medicines although formulated as liquids may **not** be suitable for tube administration e.g. lansoprazole suspension.

Many tablets not marketed as soluble or dispersible may disperse in water to form a suspension which is suitable for administration via enteral tube or to patients with swallowing difficulties. Tablets should only be dispersed immediately prior to, or shortly before administration.

Some hard gelatin capsules may be pulled apart and the contents dispersed in water prior to administration.

Drug	Strength	Comments
Acetazolamide		Disperses in water with fine powder sediment. Injection may be given orally.
Aciclovir	Suspension 200mg/5ml Dispersible tablets	
Aledronate		No liquid formulation available. Ask Pharmacy for advice.
Alfacalcidol	2 microgram/ml Approx 100 nanograms per drop	
Alfuzosin		Crush tablets and disperse in water
Allopurinol		Disperses in water
Aluminium Hydroxide	Mixture 4% w/w	May interact with feed to form protein-albumin complexes
Amantadine	50mg/5ml	Sugar free. Contains sorbitol.
Amiloride	5mg/5ml	Sugar free.
Aminophylline		Phyllocontin tabs should not be crushed. Transfer patient to theophylline (See below) or contact pharmacy for advice.
Amiodarone		Disperses in water. Injection is not suitable for oral administration because of high polyethylene glycol content.
Amitriptyline	Oral Soln 25mg/5ml 50mg/5ml	Sugar free.
Amlodipine		Disperses in water. Give immediately as light sensitive
Amoxapine		Crush tablets and disperse in water.
Amoxicillin	Suspension 125mg/5ml 250mg/5ml	Powder for reconstitution with water. Capsules may be opened and contents dispersed in water.
Anastrozole		Crush tablet in water. Give immediately.
Asasantin		Open capsules. Administer granules and dispersible aspirin. Granules must not be crushed. May block fine bore ng tubes
Ascorbic acid		Crush tablets and disperse in water Effervescent tablets available
Aspirin		Dispersible tablets available. Enteric coated tablets should not be crushed. Suppositories may also be available.
Atenolol	Syrup 25mg/5ml	Sugar free
Atorvastatin		Crush and disperse in water. Poorly soluble slurry may block tube.
Augmentin	Dispersible tabs 250/125mg Suspension 125/31/5ml 250/62/5ml	Sugar free. Dilute to half strength with water prior to administration via enteral tube.
Azathioprine		Disperses in water. Take cytotoxic precautions if crushing tablets. If oral route not feasible injection may be available. Contact pharmacy for advice.

Baclofen	Liquid 5mg/5ml	Sugar free
Balsalazide		Open capsule and disperse contents in water. May block fine bore tubes.
Bendrofluazide		Tablets disperse in water.
Benzhexol		Liquid formulation may be available. Contact pharmacy for advice.
Benztropine		Injection can be used orally Contact pharmacy for advice.
Bezafibrate		Crush tablets and disperse in water. Do not crush Belazip mono. Contact pharmacy for advice.
Bisoprolol		Crush tablets and disperse in water.
Bisacodyl		Suppositories available.
Bromocriptine		Crush tablets and disperse in water
Bumetanide	1mg/5ml	Sugar free.
Buspirone		Crush tablets and disperse in water.
Calcichew		Crush tabs and disperse in water.
Calcichew D3		Change to alternative preparation eg. Calcium Sandoz syrup.
Calcichew D3 Forte		Cacit D3 sachets may be available. Ask pharmacy for advice.
Calcium Sandoz	Syrup 8.1mmol/15ml	Contains sucrose
Calcium Resonium		Contact pharmacy for advice. Suspension may be available.
Caffeine citrate	Mixture 10mg/ml	
Captopril		Disperses in water with fine powder sediment
Carbamazepine	Suspension. 100mg/5ml	Shake well before use. Contains sorbitol. Dilute before use with equal volume of water. Use suppositories as an alternative. Suppositories only licensed for 7 days use. 100mg orally is approximately equivalent to 125mg suppository. Retard formulation should not be crushed.
Carbimazole		Crush tablets and disperse in water.
Carvediol		Crush and disperse in water
Cephalexin	125mg/5ml	Powder for reconstitution with water.
Cetirizine	Oral Solution 5mg/5ml	Sugar Free
Chloral Hydrate	Elixir 143mg/5ml Syrup 500mg/5ml	
Chlordiazepoxide		Open capsules and mix powder with water.
Chlormethiazole	250mg/5ml	Store in fridge. 250mg of edisylate salt is equivalent to one capsule.
Chlorothiazide	Suspension 250mg/5ml	
Chlorthalidone		Disperses with fine powder sediment. Suspension may be available.
Chlorpheniramine	Syrup 2mg/5ml	
Chlorpromazine	Syrup 25mg/5ml Suspension 100mg/5ml	
Cimetidine	Syrup 200mg/5ml	
Cinnarizine		Crush tablets and disperse in water.
Ciclosporin	Oral solution. (Neoral)100mg/ 5ml	Sugar free. Must not be administered with grapefruit or grapefruit juice. Solution may be mixed with orange juice or apple juice to improve taste. Administer immediately. Monitor ciclosporin level when changing between preparations
Ciclosporin (Sandimmun)	Oral soln 100mg/5ml	Sugar free. Must not be administered with grapefruit or grapefruit juice. To mask taste solution may be mixed with cold milk, cold chocolate drink, cola, or orange juice immediately before taking. Do not use plastic cup. Available on a named patient basis only

Ciprofibrate		Oral drops may be available. Contact pharmacy. Crush and disperse tablets in water.
Ciprofloxacin		Disperses in water. Suspension may be available. Absorbed in the duodenum. When administered via the jejunum absorption may be incomplete. Interacts with feed, see above.
Citalopram		Oral drops are available but are not directly bioequivalent to the tablets. 8mg (4 drops) of liquid may be considered to be therapeutically equivalent to a 10mg citalopram tablet. Tablets may be crushed and dispersed in water.
Clarithromycin	Suspension 125mg/5ml	Granules for reconstitution
Clindamycin		Disperse contents of capsule in water prior to administration.
Clobazam		Open capsule and mix contents with water. Special suspension may be available. Please ask pharmacy for advice.
Clonazepam		Disperses in water. Suspension may be available
Clomipramine		Syrup may be available. Contact pharmacy for advice. Open capsules and mix contents with water.
Clonidine		Catapres injection may be given orally. Please contact pharmacy for advice.
Clopidogrel		Plavix tablets may be crushed and dispersed in water.
Clozapine		Special suspension may be available. Contact pharmacy for advice.
Co-beneldopa (Madopar)	Dispersible Tablet 62.5mg, 125mg	Faster onset of action compared to plain tablets. Dose and dosage frequency may need adjustment when changing from other forms. Give at same time each day in relation to feeding. Madopar capsules should not be opened
Co-careldopa	(Sinemet)	Tablets disperse in water. CR formulations should not be crushed. Dose and dosage frequency may need adjustment when changing from other forms. Give at same time each day in relation to feeding
Co-codamol	8mg/500mg	Available as effervescent tablets. Note high sodium content. Paracetamol available as suppositories or liquid.
Co-danthramer	Suspension, Suspension Strong	
Co-danthrusate		Change to Co-danthramer suspension
Codeine phosphate	Linctus 15mg/5ml Syrup 25mg/5ml	
Colchicine		Crush tablets and disperse in water
Co-trimoxazole	Suspension 240mg/5ml Suspension 480mg/5ml	Contains sorbitol Contains sucrose
Creon		Contents of capsules may be administered in liquid without crushing. For patients with swallowing difficulties mix with fluid or soft food. Sachets may be available. Contact pharmacy for advice.
Cyclizine		Crush tablets and disperse in water. Give immediately as light sensitive.
Cyproterone		Disperses in water
Dantrolene		Open capsules and mix with fruit juice.
Dapsone		Crush and disperse tablets in water
Demeclocycline		Open capsules and flush contents with water.
Dexamethasone	Oral Soln. 2mg/5ml	Sugar free
Desmopressin		Tablets may be crushed. Consider nasal spray or sc injection

Diazepam	Oral solution. 2mg/5ml 5mg/5ml	Some preparations contain sorbitol. Drug binds to PVC tubing so efficacy may be reduced. Rectal dosage form available.
Diclofenac	Dispersible tabs 50mg	Suppositories also available.
Digoxin	50microgram in 1ml	When changing from tablets patients on larger oral doses may need dose adjustment. Monitor plasma levels. Bioavailability of the liquid is 80% and the tablets 70%. A 62.5microgram tablet is equivalent to 50 microgram (1ml) of elixir) Do not dilute. May be given IV as an alternative. If so the dose must be reduced by 20-30% Monitor plasma levels
Dihydrocodeine	Elixir 10mg/5ml	Martindale brand contains sucrose.
Diltiazem	Capsules Tablets Various strengths	Capsules may be opened and granules administered without crushing. Modified release tablets should not be crushed.
Dipyridamole	Oral Suspension 50mg/5ml	Sugar free. Intact granules from a modified release capsule may be given but may block fine bore tubes. Granules must not be crushed.
Docusate sodium	Oral Solution 50mg/5ml	Sugar free
Domperidone	1mg/ml	Contains sorbitol. Suppositories also available
Donepezil		Crush tablet and disperse in water.
Dothiepin	Oral solution 25mg/5ml	Sugar free. Contains sorbitol. Capsules may be opened and contents dispersed in water.
Doxazosin		Crush and disperse tablet in sterile water. Do not use tap water. Do not crush Doxazosin XL
Doxepin		Open capsules and mix contents with water
Doxycycline	Dispersible tab 100mg	Do not open capsules. Use dispersible tablet.
Enalapril		Disperses slowly in water with stirring
Entacapone		Crush and disperse tablet in water. May stain the tube orange so flush with plenty of water. For oral administration it may be given in jam, honey or orange juice.
Erythromycin	Suspension 125mg/5ml 250mg/5ml	Powder for reconstitution Sugar free
Ethambutol		Crush tablet and disperse in water. Suspension may be available contact pharmacy for advice.
Ethamsylate		Dicyclic tablets may be crushed and dispersed in water.
Ethosuximide	Syrup 250mg/5ml	
Etidronate		Tablet disperses freely in water. Feed should be stopped 2 hours before and after administration.
Felodipine		Do not crush as will lose sustained release properties.
Fenofibrate		Lipantil Micro capsules may be opened and the contents dispersed in water.
Ferrous sulphate		Use sodium feredetate (ironedetate) elixir. 190mg/5ml equivalent to 27.5mg iron/5ml
Flucloxacillin	Syrup 125mg/5ml 250mg/5ml	Powder for reconstitution.
Flecainide		Crush tablets or use injection orally. Do not mix with alkali solutions, sulphate, phosphate or chloride ions. Use sterile water, not tap water. Suspension may be available from Penn pharmaceuticals.
Fluconazole	Suspension 50mg/5ml 200mg/5ml	Powder for reconstitution with water.
Fludrocortisone		Disperses in water

Fluoxetine	Liquid 20mg/5ml	Does not contain sorbitol. Fluoxetine is a severe eye irritant. Administer with care.
Flupenthixol		Crush tablets in fruit juice and give immediately
Folic acid	2.5mg/5ml	
Frusemide	Oral solution 20mg/5ml 40mg/5ml Paediatric liq 5mg/5ml	Sugar free Sugar Free
Fusidic Acid	Suspension 250mg/5ml	Fucidic acid suspension is incompletely absorbed and doses recommended for suspension are proportionately higher than for sodium fusidate tablets.
Gabapentin		Open capsules and disperse contents in water. Contents of capsules can be sprinkled on food for patients with swallowing difficulties. Use immediately as drug is rapidly hydrolysed. If given orally fruit juice may be used to mask unpleasant taste.
Galantamine		Crush and disperse tablet in water.
Glibenclamide		Crush tablets and mix with water. Monitor blood glucose. Consider insulin.
Gliclazide		Disperses in water. May be a risk of increased absorption. Monitor blood glucose. Consider insulin as above.
Glipemiride		Not recommended. Crushing may effect bioavailability.
Glipizide		As for gliclazide.
Griseofulvin	Oral suspension 125mg/5ml	
Haloperidol	Liquid 2mg/ml	Sugar Free
Hydralazine		Crush and disperse in water. May be increased rate of absorption so monitor blood glucose.
Hydrocortisone		Disperses in water.
Hydroxychloroquine		Crush and disperse tablet in water.
Hydroxyzine	Syrup 10mg/5ml	
Hyoscine butylbromide		Tablets may be crushed and dispersed in water.
Hyoscine hydrobromide		Injection can be given orally. Consider Patches.
Ibuprofen	Suspension 100mg/5ml	Sugar free also available.
Imipramine	Syrup 25mg/5ml	Tofranil syrup now discontinued. Alternative liquid preparation may be available. Contact pharmacy for advice.
Indapamide		Crush and disperse tablets in water. Do not crush Natrilix SR.
Indomethacin	Suspension 25mg/5ml	Suspension may not be available. Use suppositories as alternative management option. Use alternative NSAID e.g. Diclofenac, ibuprofen.
Irbesartan		Crush and disperse tablet in water.
Isoniazid	Elixir 50mg/5ml	
Isosorbide mononitrate		Disperses in water. Increased rate of absorption may lead to increased side effects.
Itraconazole	Oral liquid 50mg/5ml	Do not take with food
Ketoconazole		Crush tablet and disperse in water.
Lamotrigine	Dispersible tabs 5mg,25mg, 100mg	
Lansoprazole		The use of lansoprazole suspension via enteral feeding tube is not recommended due to its high viscosity and adherence to tubing. Use lansoprazole fast tabs or consider changing to omeprazole MUPS tabs.
Leflunomide		Crush and disperse in water.
Levetiracetam		Kepra tablets may be crushed and dispersed in water. Manufacturers recommend half a glass.

Levomepromazine		Injection may be given orally. Contact pharmacy for advice. A special suspension may be available from Boots specials unit.
Lithium	Oral solution Lithium citrate 509mg/5ml	Modified release tablets should not be crushed. Lithium carbonate 200mg is broadly equivalent to lithium citrate 509mg. Plasma levels should be monitored when changing between preparations. Adjustment of dose and frequency may be necessary.
Lisinopril		Tablets slowly disperse in water
Lofepramine	Suspension 70mg/5ml	Sugar Free
Loperamide	Syrup 1mg/5ml	Does not contain sorbitol. Should not be diluted as this may reduce efficacy.
Loratadine	Syrup 5mg/5ml	
Lorazepam		Crush and disperse in water. Sublingual tablet may be available. Please ask pharmacy for advice.
Lormetazepam		Crush tablets and mix with water. Consider alternative benzodiazepine.
Madopar		See Co-beneldopa
Mebendazole	Suspension 100mg/5ml	
Mebeverine	Liquid 50mg/5ml	15ml mebeverine pamoate 50mg/5ml is broadly equivalent to 135mg mebeverine hydrochloride.
Medroxyprogesterone		Provera tablets may be crushed and dispersed in water.
Mefenamic Acid	Suspension 50mg/5ml	
Megestrol		Crush and disperse tablets in water.
Menadiol sodium phosphate		Crush and disperse in water.
Metformin	Suspension 500mg/5ml	Suspension is unlicensed.
Methyldopa		Suspension may be available. Contact pharmacy for advice. Consider alternative anti-hypertensive.
Mesalazine		Suppositories available or change to alternative product eg sulphasalazine.
Metoclopramide	Oral soln. 5mg/5ml	Sugar free
Metolozone		Crush and disperse in water. Increased bioavailability may cause postural hypotension. Monitor patient carefully.
Metoprolol		Disperses very slowly in water. Consider change to atenolol which is available as a liquid.
Metronidazole	Suspension 200mg/5ml	Requires activation by stomach acid. Do not administer via nasojejunal or jejunostomy tube. Presence of enteral feed may interfere with activation. Use tablets dispersed in water instead or suppositories or administer 1 hour before or 2 hours after feed.
Mirtazapine		Crush tablet and disperse in water. Liquid preparation may be available. Contact pharmacy for advice.
Misoprostol		Tablets may be crushed and mixed with water.
Moclobamide		Tablets may be crushed and mixed with water.
Morphine Sulphate	Oral solution 10mg/5ml 100mg/5ml	Morphine sulphate controlled release products must never be crushed for administration via feeding tube as this destroys the modified release mechanism resulting in highly dangerous peak and trough levels. The granules from controlled release morphine capsules can be administered via PEG tube but extreme care must be taken to avoid inadvertent crushing or damage to the coating on the granules. For this reason more frequent administration of non controlled release morphine (Oramorph) is the preferred option. Administration of the granules from Zomorph capsules is licensed providing the tube has a diameter of more than 16 french gauge. If morphine is given via NJ or jejunostomy tube dose adjustment may be necessary because of reduced transit time and extent of absorption.

Nabilone		Open capsule and immediately flush contents with water.
Nicardipine		Liquid suspension may be available. Contact pharmacy for advice.
Naproxen	Suspension 125mg/5ml	Contains 1.7mmol sodium in 5ml
Nicorandil		Crush tablet and disperse in water. Give immediately.
Nifedipine		Controlled release Coracten capsules may be opened and the contents given. Do not crush the granules. Granules may block fine bore tubes. Change to a long acting calcium antagonist eg amlodipine. Give liquid contents of nifedipine capsules using 1ml syringe and needle. Pull back plunger while squeezing capsule. May need more than one capsule to obtain required dose. 5mg = 0.17ml, 10mg = 0.34ml. Monitor for side effects. Eg Hypotension. Flush liquid down tube using saline not water. Must be given as a tds dosing schedule. This is extremely light sensitive and must be given immediately.
Nimodipine	Tablets 30mg	Crush tablets and administer immediately or give IV. IV infusion is not suitable for oral administration as it contains ethanol and polyethylene glycol.
Nitrazepam	Suspension 2.5mg/5ml	
Nitrofurantoin		Open and disperse Macrochantin capsules.
Norethisterone		Disperses slowly in water.
Omeprazole	MUPS tablets 10mg, 20mg	Place tablet in syringe. Fill with 10ml water and 5ml air. Shake for 2 minutes to disperse tablet. Granules may block tubes smaller than 7F. For alternative management options please contact pharmacy for advice. MUPS tablets must not be crushed.
Olanzapine		Use Zyprexa Velotabs
Olsalazine		Open capsule disperse contents in water.
Ondansetron	Syrup 4mg/5ml	Melt tablets may also be available. Suppositories may also be available.
Orphenadrine	Oral Soln 50mg/5ml	Sugar free
Oxybutynin	Elixir 2.5mg/5ml	
Oxycodone		Warning: Do not crush controlled release formulations. Contact pharmacy for advice.
Oxytetracycline		Use alternative tetracycline if possible eg. doxycycline dispersible tabs. Capsules of tetracycline may be available. Contact pharmacy for advice.
Pancreatic enzymes		Seek advice from pharmacy.
Paracetamol	Dispersible tablets Suspension Suppositories All various strengths	Soluble tablets are preferable to suspension. Suspension is hyperosmolar and may cause diarrhoea when administered via the NJ or J routes. Soluble tabs contain 388mg sodium per tablet. Suppositories are an alternative management option.
Paroxetine	Liquid 10mg/5ml	Sugar free
Penicillin V	Oral solution 125mg/5ml 250mg/5ml	Powder for reconstitution with water.
Pergolide		Disperse tablet in water. May take up to 15 minutes for disintegration.
Perindopril		Crush and disperse tablet in water.
Phenelzine		Crush and disperse in water.
Phenobarbitone	Elixir 15mg/5ml	Contains alcohol 38% Special alcohol free suspension may be available. Please ask pharmacy for advice.

Phenytoin	Suspension 30mg/5ml 90mg/5ml	Phenytoin suspension and capsules are not equivalent. 90mg suspension is approximately equivalent to 100mg tablets or capsules. Diluting suspension decreases its viscosity and aids administration. Suspension is hyper-osmolar and may cause diarrhoea when administered via the NJ and J routes. Phenytoin interacts with feeds. See above.
Phytomenandione		Konakion MM injection may be given orally.
Piroxicam		Consider alternative NSAID available as a liquid.
Pizotifen	Elixir 250 mcg/5ml	
Pramipexole		Crush and disperse in water.
Pravastatin		Crush and disperse in water.
Prazosin		Crush tablets and mix with water.
Prednisolone		Use soluble tabs
Prochlorperazine	Syrup 5mg/5ml	Suppositories also available.
Procyclidine	Syrup 2.5mg/5ml	Sugar free
Proguanil		Crush and disperse in water.
Primidone	Suspension 250mg/5ml	May not be available. Contact pharmacy for advice.
Promazine	Suspension 50mg/5ml	
Promethazine	Elixir 5mg/5ml	Sugar free
Propafenone		Crush tablets and administer orally in 5% glucose.
Propylthiouracil		Crush and disperse tablet in water.
Propranolol		Liquid may be available from pharmacy. Do not crush modified release preparations. Contact pharmacy for advice on conversion to liquid formulation. Consider alternative beta blocker.
Pseudoephedrine	Elixir 30mg/5ml	
Pyrazinamide		Crush tablets and administer with water. Stop feed half an hour before and after administration.
Pyridoxine		Crush tablets and flush with water.
Pyridostigmine		Disperses slowly in water.
Quetiapine		Crush and disperse in water.
Quinine Sulphate		Crush and disperse in larger volume of water. Sugar coating should dissolve.
Ramapril		Open capsules and flush contents with water.
Ranitidine	Syrup 150mg/10ml Effervescent tabs 150mg	Sugar free. Ranitidine syrup contains sorbitol and may cause diarrhoea.
Reboxetine		Crush and disperse tablet in water.
Rifampicin	Syrup 100mg/5ml	Stop feed 30 minutes before and after administration.
Riluzole		Crush and disperse in water.
Rivastigmine		Open Exelon capsules and disperse contents in water.
Risperidone	Liquid 1mg/ml	May be diluted with mineral water, orange juice or black coffee.
Rofecoxib		Liquid formulation may be available. Contact pharmacy for advice.
Salbutamol	Syrup 2mg/5ml	Do not crush modified release tablets. If changing from modified release to liquid dosage frequency will need to be increased.
Selegiline		Liquid or oral lyophilisates may be available. Contact pharmacy for advice.
Senna	Syrup 7.5mg/5ml	
Sertraline		Crush and disperse in water.
Sinemet		See Co-careldopa
Simvastatin		Crush tablets and administer in water immediately.
Sodium ferredetate (ironedetate)	Elixir 190mg/5ml	Sugar Free Equivalent to 27.5mg iron/5ml

Sodium fusidate		See Fusidic acid above
Sodium clodronate		Open capsules and administer with water. Stop feeds for 2 hours before and after administration.
Sodium picosulphate	Elixir 5mg/5ml	
Sodium valproate	Oral liquid 200mg/5ml	Sugar free. Contains sorbitol. If patient on Epilim chrono will need to adjust dosage frequency. Ask pharmacy for advice.
Sotalol		Crush tablets and administer with water.
Spiroonolactone	Oral suspension 25mg/5ml	Sugar free
Sucralfate	Dispersible Tablets Suspension 1g/5ml	Interacts with enteral feeds. Forms insoluble complexes with protein in enteral feeds. May block tubes or cause intestinal obstruction (bezoar formation). Avoid combined administration with enteral feed. Use alternative agent.
Sulfasalazine	Suspension 250mg/5ml	
Sulpiride	Oral soln 200mg/5ml	Sugar free
Tacrolimus		Contact pharmacy for advice.
Tamoxifen	Oral Soln 10mg/5ml	
Tamsulosin		Open capsule and administer granules with water. Do not crush the granules.
Temazepam	Oral Soln 10mg/5ml	
Tetrabenazine		Crush tablets and disperse in water.
Tetracycline		Consider alternative antibiotic. If tetracycline in indicated doxycycline dispersible tablets are available.
Theophylline	Nuelin Syrup 60mg/5ml	Increase in dosage frequency is required if transferring from a SR formulation to a short acting formulation. Sustained release theophylline tablets must not be crushed. Slophylline capsules may be opened and the granules administered without crushing (granules may block the tube). Nuelin tablets are dispersible in water and may be used as an alternative to Nuelin liquid. Theophylline doses may need to be adjusted when changing between preparations. Monitor theophylline levels. Theophylline interacts with feeds. See above.
Thiamine		Crush tablets and administer with water.
Thioridazine	Syrup 25mg/5ml	
Thyroxine		Disperses in water after crushing.
Tiagabine		Crush and disperse in water.
Tizanidine		Crush and disperse in water.
Tolbutamide		Crush and disperse in water. Monitor blood glucose. Consider alternative sulphonylurea which can be more easily crushed.
Tolterodine		Crush and disperse in water. Do not crush Detrusitol XL
Topiramate		Crush tablets and administer with water.
Tramadol		Open capsule and administer contents with water.
Tranexamic acid		Injection may be given orally after dilution, or suspension made by pharmacy. Contact pharmacy for advice
Trazodone	50mg/5ml	Sugar free.
Trifluorperazine		Liquid formulation may be available. Contact pharmacy for advice.
Trimeprazine	Syrup 7.5mg/5ml 30mg/5ml	Does not contain sorbitol.
Trimethoprim	Suspension 50mg/5ml	Contains sorbitol.
Ursodeoxycholic acid		Ursosfalk suspension may be available. Contact pharmacy for advice.
Valsartan		Open capsules and give contents in water immediately as it is not very stable.

Vancomycin		Use injection orally for administration via enteral tube. NB for treatment of antibiotic associated colitis only. Oral vancomycin is not suitable for the treatment of systemic infections since it is not significantly absorbed.
Venlafaxine		Efexor tablets can be crushed and dispersed in water. Efexor XL capsules can be opened and the contents administered with water. Do not crush the granules.
Verapamil	Oral soln 40mg/5ml	Sugar free. If patient taking modified release verapamil. contact pharmacy for advice on dose and dosage frequency adjustment.
Vigabatrin	Sachet 500mg	
Vitamin B Preparations		Contact pharmacy for advice.
Vitamin E (Ephynal)	Suspension 500mg/5ml	
Warfarin	Disperses in water.	Effects of warfarin can be reduced by vitamin K in enteral feeds. Monitor INR and adjust dose as necessary.
Zolpidem		Crush and disperse tablet in water.
Zuclopenthixol		Clopixol tablets may be crushed and dispersed in water. Consider depot injection.

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