

Dysphagia and crushing medications

Crushing medications in Aged Care Facilities is very common in a high care environment but crushing medications is becoming more common in the community, with pharmacists not being aware that this practice is happening. Many patients are unable to swallow tablets whole and either cut them in half or smaller or crush them, or have them crushed by carers, in order to ingest them.

Learning objectives

After completing this activity, pharmacists should be able to:

- Determine if a person can swallow prescribed medications
- Provide strategies to assist swallowing
- Research accurate information to assist decision making as to safety to crush or not
- Identify those products which should not be crushed or chewed
- Suggest alternative dose forms or products to prescribers, nursing staff and patients where appropriate.

The 2010 Competency Standards addressed by this activity include (but may not be limited to): 1.3, 2.1, 2.2, 2.3, 4.1, 4.2, 7.1, 7.2, 7.3.

Successful completion of this activity is demonstrated by answering eight of the ten multiple choice questions correctly.

This activity has been accredited for 1.5 hours of Group One CPD (1 CPD Credit) that may be converted to 3 Group Two CPD Credits upon successful completion of the corresponding assessment for inclusion on an individual pharmacist's CPD Record.

Accreditation number: A1403AP0.



Under the auspices of the Australian Pharmacy Council, the Australian College of Pharmacy may accredit continuing professional development for pharmacists that is eligible to be used as supporting evidence of continuing competence.

The competency standards addressed by this activity include (but may not be limited to) 1.3, 2.1, 2.2, 2.3, 4.1, 4.2, 7.1, 7.3

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Jenny, a practicing pharmacist, is a Special Lecturer in the Faculty of Pharmacy and Pharmaceutical Sciences, Monash University and also an Advisory Group member for the Bachelor of Pharmacy course. She is an accredited consultant pharmacist, and conducts her own company focussing on medication reviews in domiciliary and Aged Care Homes, education, training, government and industry consultation. She was recently awarded the Sanofi-Aventis Gold Medal by the University of Sydney Pharmacy Practice Foundation for excellence in Pharmacy Practice.

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Introduction

Crushing medications in Aged Care Facilities is very common in a high care environment but crushing medications is becoming more common in the community, with pharmacists not being aware that this practice is happening. Many patients are unable to swallow tablets whole and either cut them in half or smaller or crush them, or have them crushed by carers, in order to ingest them.

All pharmacists when dispensing extended release oral dose forms to older persons should check whether the patient can swallow the medicines whole or not. This must be an essential question of medication counselling and every medication review. The ability to swallow impacts not only on medications but also on nutritional requirements.

Dysphagia (difficult swallowing)

Chewing, swallowing, tasting, and communicating require intact, coordinated neuromuscular function in the mouth, face, and neck. Oral motor function in particular declines measurably with aging, even in healthy people (1). Decline in function may have many manifestations:

- Reduction in masticatory muscle strength and coordination is common, especially in patients with partial or complete dentures, and may lead to a tendency to swallow larger food particles, which can increase the risk of choking or aspiration.
- Drooping of the lower face and lips caused by decreased muscle tone and reduced bone support, is an aesthetic concern and can lead to drooling, spilling of food and liquids, and difficulty closing the lips while eating, sleeping, or resting. Saliva leakage (sialorrhea) is often the first symptom.
- Swallowing difficulties increase with ageing. It takes longer to move food from mouth to oropharynx, which increases the likelihood of aspiration.

After age-related changes, the most common causes of oral motor disorders are neuromuscular disorders (e.g. cranial neuropathies from diabetes, stroke, Parkinson's disease, amyotrophic lateral sclerosis, multiple sclerosis). Iatrogenic causes also contribute. Drugs (e.g. anticholinergics, diuretics), radiation therapy to the head and neck, and chemotherapy can greatly impair saliva production. ***Hyposalivation is a major cause of delayed and impaired swallowing.*** (1)

Some of the signs and symptoms of dysphagia are: coughing, choking, drooling, repeated swallowing, gurgling voice and pocketing of food in the cheeks. It is usually associated with a sensation of hold-up of the swallowed bolus and is sometimes accompanied by pain (odynophagia) (2).

The origin of dysphagia results from either structural or neuromuscular disease of the pharynx or oesophagus.

Oropharyngeal dysphagia is usually related to neuromuscular dysfunction, is localised to the neck and is commonly caused by stroke. It may also be associated with postnasal regurgitation, cough, and a need to repeatedly swallow to clear the pharynx. A pharyngeal pouch usually causes regurgitation of undigested food and gurgling may be audible over the side of the neck. (2) A modified barium swallow is used to confirm diagnosis (3).

Oesophageal dysphagia is usually due to motor disorders, such as achalasia, a disorder of oesophageal motility, or diffuse oesophageal spasm where the muscle cannot relax, and to peptic oesophageal strictures often secondary to reflux (2). Diagnosis is by endoscopy (3). These patients report difficulty initiating swallowing, food 'sticking' and regurgitation. There may be a delayed (15- 30 seconds) sense of hold-up where patients attempt to wash the offending bolus down with fluids. This may result in regurgitation (3). Patients experience pain on swallowing solid foods especially meat, potatoes and bread and then eventually liquids. Oesophageal spasm can mimic the features of angina and may be relieved partially by sublingual nitrates,

Dysphagia should not be confused with globus sensation, which is the sensation of the constant 'lump in the throat' although there is no actual difficulty swallowing food. Other conditions can cause confusion and present

with dysphagia e.g. depression, diabetes, drug- induced causes, anaemia, thyroid disorders, spinal dysfunction and urinary tract infections.

Malignant oesophageal obstruction is usually evident when there is a short history of rapidly progressive dysphagia and significant weight loss. (2)

Common causes of dysphagia are listed in table 1. Table 2 lists some causes of drug-induced oesophageal ulceration. Insufficient fluid taken with tablets may cause irritation and is common in older persons. (2)

Table 1: Common causes of dysphagia⁽¹⁻³⁾

Oropharyngeal dysphagia		Oesophageal dysphagia	
CNS disorders	Stroke Head injury Parkinson's disease Motor neurone disease Multiple sclerosis Drugs e.g. phenothiazines Tumour Malformation	Structural disorders	Strictures – peptic or drug- induced Tumour Rings & webs Extrinsic compression e.g. goitre
Muscular disorders	Autoimmune myopathy e.g. Systemic lupus erythematosus (SLE) Thyrotoxic myopathy Guillain-Barre motor neuropathy Muscular dystrophies	Motor disorders	Achalasia Gastro-oesophageal reflux (GORD) Diffuse oesophageal spasm Connective tissues disease e.g. sclerodema
Neurological disorders	Motor neurone disease Myasthenia gravis Radiotherapy Stroke		
Structural disorders	Head & neck surgery Stricture Pharyngeal pouch Webs Tumour Radiotherapy Extrinsic factors	Infections	Infections e.g. candida albicans, <i>Herpes simplex</i> oesophagitis, Cytomegalovirus oesophagitis

Table 2: Some Drug-induced causes of oesophageal ulceration⁽¹⁻³⁾

Drug
<ul style="list-style-type: none"> • Antibiotics • Aspirin, 'NSAIDs' including COX-2 inhibitors • Bisphosphonates e.g. alendronate, risedronate • Doxycycline • Iron tablets • Potassium chloride (slow release) • Zidovudine

Treatment of dysphagia

Treatment of severe reflux disease causing strictures should be treated with proton pump inhibitors e.g. esomeprazole, lansoprazole, omeprazole, pantoprazole, rabeprazole.

Oesophageal achalasia (inability of muscle to relax) is treated with mechanical means. The effects of smooth muscle relaxants e.g. calcium channel blockers and nitrates whilst slightly reducing oesophageal sphincter pressure have minimal effect on the majority of patients with achalasia. Diffuse oesophageal spasm can be treated with smooth muscle relaxants such as oral nitrates (isosorbide dinitrate) 10mg four times a day before meals and calcium channel blockers e.g. nifedipine 10mg or diltiazem 30mg before meals. Prokinetic agents such as domperidone, and metoclopramide have no place in the treatment of dysphagia due to oesophageal dysmotility (4). They may be useful in some patients with dyspeptic symptoms (bloating or early satiety) as well as reflux, but older persons are more sensitive to the adverse effects of metoclopramide and long term use would be a concern.(5)

Pharyngeal dysphagia resulting from a cerebrovascular accident is difficult to treat but recovery may occur within three to six months of the stroke (3). **Referral to a speech pathologist can assist patients with special swallowing techniques, swallowing exercises and specific postures that will help the patient to swallow more effectively.** People with swallowing difficulties may have an increased risk of malnutrition and dehydration. People with dysphagia often have problems with food and/or liquids getting into the lungs, causing aspiration pneumonia. Thin liquids such as water and juices usually cause the most trouble. If aspiration is considered a risk enteral feeding by alternative means (nasogastric tube or percutaneous endoscopic gastrostomy [PEG]) may be necessary to optimise nutrition and deliver medication.

One treatment for swallowing problems is to change the consistency of the foods consumed to allow for easier, safer swallowing. Because solids and liquids are swallowed differently, a dysphagia diet consists of two separate recommendations—one for liquids and one for foods.

Liquid consistencies are categorised into

- Thin
- Nectar-like – beverage coats and drips off a spoon similar to unset gelatin.
- Honey-like – The liquid is thicker than nectar-like and flows off a spoon in a ribbon just like actual honey.
- Spoon-thick (pudding thick) – the liquid stays on the spoon in a soft mass and plops off the spoon like yoghurt

Note: All liquids, including foods that melt at body temperature, such as ice cream and gelatin (jelly), should be thickened to the recommended consistency. Thickening agents may alter the absorption of a medicine. Great care needs to be taken when administering medicines with a narrow therapeutic range. The medicines must be prepared with the same agent and the patient monitored for side effects or loss of efficacy. (8)

The diet for people with dysphagia will need to be modified from pureed to small easy to chew pieces depending on swallowing difficulty. Products are available for instant thickening from companies dealing with nutritional supplements.

Medication administration - to crush or not?

As well as nutrition, swallowing poses a challenge for medication administration.

Aged Care Facilities

Crushing tablets in Aged Care Facilities (ACF), particularly those with residents with a high care classification, is a common occurrence with protocols in place but there are still concerns about the practice (6, 7). The crushing or opening of medication results in unlicensed administration. Liability lies solely with the nurse if the action was unauthorised, but is shared with the prescriber and pharmacist offering advice if it has been authorised.

Liability can be minimised by :

- Clearly documenting the reason for altering the medicine
- Following evidence-based safe effective practice
- Obtaining written consent from the consumer or legal guardian where possible
- Ensuring any alterations to medicines on the patient's medication chart have clear instructions from the prescriber or pharmacist.(8)

A study of 31 Queensland Hospitals showed that 79 medications were crushed at the bedside, 8 were modified release preparations and 11 were medicines with narrow therapeutic indices. The authors recommended education of nurses to raise awareness of problems resulting from altering medication dosage forms. Education of prescribers is also required to raise awareness of prescribing alternative dosage forms that may either be commercially available or prepared by the pharmacy as an extemporaneous preparation (7).

The directions for medication administration are usually written on the front of a medication chart and must be reviewed as part of routine audits by nursing staff and pharmacists. There are many variations in medication administration and the same protocol should be used by all staff. Some cases for consideration include: are tablets swallowed all at once, or one by one, or are large tablets crushed e.g. calcium carbonate or paracetamol.

The use of thickened fluid to swallow medication with may be of use. Substances such as apricot puree, jam, honey, custard and yoghurt are used. Dentists visiting ACFs have concerns about the high use of jam or apricot puree used as vehicles and prefer the use of yoghurt or custard but there are a number of medicines which should not be given with calcium containing products. These are listed in Table 3 together with those that should not be crushed together or given within two hours of each other.

Table 3: Medications which should not be taken together with calcium or antacids or crushed together⁽⁹⁻¹¹⁾

Medications	Not to be taken with		
	calcium	antacids	iron
Alendronate	X	X	X
Calcitriol	X	X	X
Ciprofloxacin	X	X	X
Doxycycline	X (can be taken with dairy products)	X	X
Etidronate	X	X	X
Ferrous gluconate	X (can be taken with dairy products)	X	X
Itraconazole		X	
Ketoconazole		X	
Minocycline	X (can be taken with milk)	X	X
Moxifloxacin	X	X	X (and other multivitamins)
Norfloxacin	X	X	
Ofloxacin	X	X	
Risedronate	X	X	X
Strontium ranelate	X	X	
Tetracycline	X	X	X
Thyroxine	X	X	X
Tiludronate	X	X	X

Quality use of medicines (QUM) audit

A QUM audit should be carried out in all Aged Care homes with nursing staff identifying those residents with swallowing difficulties. After consensus which may involve discussions with the general practitioners, and the key medication administration staff a list should be prepared for the accredited pharmacist of all residents who have swallowing difficulties. The accredited pharmacist should then check which medications may be safely crushed, chewed or dispersed. Recommendations of changes to dose form may need to be discussed with the prescriber. This list should then be sent to the supply pharmacist so that they are aware of the residents that require crushed medications and intervention can occur at the point of supply when new medications are

ordered. It is recommended that supply pharmacists note crushed medications on the dispensing computer in a manner similar to allergies and adverse drug events (ADEs). The list should be audited at regular intervals and added to resident admissions or change of status of existing residents.

Consideration of a fixed field on dispensing programs where the pharmacist has to ask a consumer about allergies, ADEs or need to crush medications could assist in reduction of unwanted adverse medication events.

The alteration of solid dosage forms (e.g. crushing tablets or opening capsules) makes it easier to administer a medication to a patient with swallowing difficulties. In some cases the practice of altering the form of medication may result in reduced effectiveness, a greater risk of toxicity, or an unacceptable presentation in terms of taste or texture. **Pharmacists should note that, once a marketed product has been altered (e.g. crushed), it is no longer being used in accordance with the manufacturer's 'Product Information' and may be considered an 'off-label' product.**(11)

Sources of information

In Aged Care Homes a list of medications, which must not be crushed or chewed is usually provided by the pharmacist, often prepared by reputable companies specialising in (Dose Administration Aids). The APF22 offers very useful guidelines for modification of oral formulations with specific information included in the Clinical monographs. (11) Product monographs, available in eMIMs usually offer information as to products which should not be crushed (9). eMIMs also has a reference section 'Medicines which should not be crushed' where the products are named and the reason for not recommending crushing is given .(12) A very comprehensive practical guide, low cost and regularly updated, is available electronically from Marianne Vincent at Woollongong Hospital Pharmacy (Marianne.Vincent@sesiahs.health.nsw.gov.au) (10). This guide also has a comprehensive section on solid dose forms that are dispersible in water. (10) The SHPA publication 'Don't rush to crush' offers the most comprehensive handbook with detailed guidelines and options. This publication is essential for anyone involved in medication in ACF- supply pharmacists and consultant pharmacists. (8)

Table 4 offers some examples of common medications which should not be crushed with suggested reasons plus options. For patients with percutaneous endoscopic gastronomy (PEG) tubes taste or texture are not relevant.

Table 4: Medicines that should not be crushed - some examples and common brands only
(Adapted and sourced from ⁵⁻¹⁵)

Generic name (<i>some brand names</i>)	Category	Some options
Analgesics		
Fentanyl lozenges	4	
Hydromorphone (<i>Jurnista</i>)	1	Use IR form
Morphine sulfate (<i>Kapanol, MS Contin, MSMono</i>)	1	Use IR forms, liquid or open capsules and disperse pellets or IM/SC/IV inj
Oxycodone (<i>OxyContin, OxyNorm (is avail.as a liquid)</i>)	1	Use IR forms or inj
Oxycodone/ buprenorphine (<i>Targin CR</i>)	1	Use IR or liquid
Paracetamol (<i>Panadol Osteo</i>)	1	
Tapentadol (<i>Palexia SR</i>)	1	
Tramadol (<i>Tramahexal SR, Tramal SR, Zydol SR</i>)	1	Use IR
Antibiotics		
Cefaclor (<i>Ceclor CD, Karflor CD, Keflor CD</i>)	1	Use oral suspension

Doxycycline (<i>Doryx, Doxsig, Doxyhexal, Doxylin, Vibramycin</i>)	3	Capsules may be opened and pellets sprinkled
Erythromycin (<i>Mayne Pharma Erythromycin, Eryc</i>)	1	Capsules may be opened and pellets sprinkled or use liquid
Antidepressants		
Desvenlafaxine (<i>Pristiq</i>)	1	
Duloxetine (<i>Andepra, Cymbalta</i>)	2	
Venlafaxine (<i>Efexor XR</i>)	1	Use IR
Antiglycaemic agents		
Gliclazide (<i>Diamicron MR</i>)	1	Use IR form
Metformin (<i>Diabex XR, Diaformin XR, Metex XR</i>)	1	Use IR form
Antihistamines		
Fexofenadine/pseudoephedrine (<i>Telfast Decongestant</i>)	1	
Loratadine/pseudoephedrine (<i>Clarinase 24 hour relief SR</i>)	1	Use IR
Antineoplastic & Immunomodulating agents (cytotoxics)		
Altretamine (<i>Hexalen</i>), azathioprine (<i>Imuran</i>), busulphan (<i>Myleran</i>), capecitabine (<i>Xeloda</i>), chlorambucil (<i>Leukeran</i>), cyclophosphamide (<i>Cycloblastin</i>), levamisole (<i>Ergamisol</i>), etoposide (<i>Vepesid</i>), hydroxyurea (<i>Hydrea</i>), idarubicin (<i>Zavedos</i>), melphalan (<i>Alkeran</i>), mercaptopurine (<i>Purinethol</i>), methotrexate (<i>Ledertrexate, Methoblastin</i>), cyclosporin (<i>Neoral</i>), temozolomide (<i>Temodal</i>) and others	6 5	Use injectable forms OH & S hazard Do NOT crush. Obtain specialist advise from oncology units
Antiparkinson's Disease		
Levodopa controlled release (<i>Sinemet CR, Madopar HBS</i>)	1	Use IR
Antiplatelet and anticoagulant agents		
Aspirin enteric coated (<i>Astrix 100 capsules, Cartia</i>)	1	Use <i>Astrix</i> tabs, <i>Cardiprin</i> or soluble aspirin <i>Astrix</i> capsules can be opened - pellets not to be crushed or chewed
Dabigatran (<i>Pradaxa</i>)	7	
Dipyridamole SR (<i>Asasantin SR, Persantin SR</i>)	1 1	Open capsule, sprinkle pellets, crush aspirin

Antipsychotics Chlorpromazine (<i>Largactil</i>) Lithium SR (<i>Quilonium SR</i>) Olanzapine (<i>Zyprexa</i>) Paliperidone SR Quetiapine (<i>Seroquel XR</i>) Trifluoperazine (<i>Stelazine</i>)	3, 5 1 3 1 1 3	Use syrup, or injections Can be crushed but irritation to skin, eyes. Use wafers Use IR
Cardiovascular medications Alfuzosin SR (<i>Xatral SR</i>) Diltiazem ER Felodipine (<i>Felodur SR, Plendil ER, ; with ramipril - Triasyn</i>) Isosorbide mononitrate (<i>Imdur, Duride, Imtrate, Monodur</i>) <i>N.B. 120mg tablets must not be broken in half; 60mg are scored and slow release properties are not affected</i> Indapamide 1.5mg (<i>Natrilix SR</i>) (<i>Dapa-Tabs</i> can be dispersed) Metoprolol (<i>Toprol XL</i>) Nifedipine (<i>Adalat, Adalat Oros, Adefin, Adefin XR, Nifecard, Nifehexal, Nyefax</i>) Nimodipine (<i>Nimotop</i>) Verapamil (<i>Anpec SR, Cordilox SR, Isoptin SR,, Veracaps SR</i>) Glyceryl trinitrate sub lingual (<i>Anginine</i>)	1 1 1 1 1 1 1 2 2 1 4	Break tablets in half Use another CCB Break 60mg tablets in half, or use patches Use IR Use IR Use infusion Use IR Use GTN spray
Electrolyte Potassium chloride SR (<i>DuroK, Slow-K, Span-K</i>)	3	Use Chlorvescent or K Sol tabs
Endocrinology Alendronate (<i>Alendro, Fosamax, Fosamax Plus</i>), Risedronate (<i>Actonel EC, Actonel EC Combi, Actonel EC, Combi D</i>) [Suggest ceasing use alternative agent e.g. infusion or injection]	3 3	Alendronate may be dispersed but very irritant Risedronate (not EC form) may be dispersed but irritant
Gastrointestinal Docosate (<i>Coloxyl</i>), Docusate & senna <i>Coloxyl & senna</i>) <i>[frequently crushed if acceptable to patient]</i> Mesalazine EC (<i>Mesasal, Pentasa, Salofalk</i>), Sulfasalazine (<i>Salazopyrin EN</i>)	6 4 4	Use suppositories . enemas Use granules-disperse Use non EC form

Proton Pump Inhibitors (PPI) Omeprazole tablets (<i>Acimax, Losec, Omepral</i>) [capsules containing enteric coated pellets can be opened and pellets taken with fruit juice or yoghurt – pellets must not be crushed]	2	Disperse in ½ glass of water
Esomeprazole (<i>Nexium</i>) [N.B.: Granules available as 10mg form]	2	Disperse in water
Lansoprazole (<i>Zoton FasTabs</i>)	2	Place on tongue to disperse.
Pantoprazole (<i>Somac</i>) capsules. Granules available	2	Use granules
Rabeprazole (<i>Pariet</i>)	2	Change to another PPI“
Iron products Iron containing products (<i>Ferrogradumet, Fergon, FGF, Fefol, FerroF</i>)	3	Use elixir or iron injections
Non-steroidal anti-inflammatory agents (NSAIDs) Ketoprofen Sustained release (<i>Orudis SR, Oruvail SR</i>) Naproxen Sustained release (<i>Naprosyn SR, Proxen SR</i>) Diclofenac enteric coated (<i>Fenac, Voltaren</i>) Other NSAIDs may cause an irritant effect	1 1 3	Use IR form or a different NSAID if not available or suppositories.
Pancreatic supplements e.g. Creon	4	Some can be opened and taken with liquid with food
Respiratory Theophylline controlled release (<i>Nuelin SR, Theodur</i>)	1	Some can be opened and taken with liquid with food
Miscellaneous - many more Bupropion (<i>Zyban</i>) Finasteride (<i>Proscar</i>) Isotretinoin (<i>Roaccutane</i>) Methylphenidate (<i>Concerta, Ritalin LA</i>) Pseudoephedrine SR (<i>Sudafed Sinus 12 hour relief</i>) Tamsulosin (<i>Flomaxtra</i>)	1 5 3 & 5 1 6 1	Use another antismoking product Teratogenic Teratogenic Sprinkle on soft food Use IR form No alternative

Legend

1. Altered absorption characteristics
2. Medication instability
3. Local irritant effect
4. Failure to reach site of action
5. Occupation health and safety
6. Unacceptable/undisguisable taste
- 7 Product or consumer information leaflets

IR = immediate release

N.B. List of brands and medications is not exhaustive. Some tablets may be cut in half but not crushed. Check with Product/Consumer Medicines Information before recommending crushing, cutting or dispersing. Pharmacists should refer to Product Information to establish the equivalency of dose forms e.g. when changing from a solid dose form to a liquid, and also different bioavailability.^(9,11)

Controlled-release medications

Many medications are formulated to release drug in a controlled manner over a defined dosing period, usually 12 or 24 hours. Crushing these medications may result in an unintended large bolus dose. Medications labeled with terms such as 'controlled delivery' (CD), 'controlled release' (CR), 'enteric coated' (EC) 'extended release' (ER) 'modified release' (MR) 'sustained release' (SR), "are slow-release formulations. These medications cannot be crushed although some can be halved. Each case must be checked with product information. Opening capsules containing medication formulated into small pellets where the release properties are built into the pellet and not the capsule does not affect the properties of the medication, however the pellets should not be crushed. (8- 12)

Film coating

Tablets may be film coated to protect the medicine from exposure to light or moisture or to disguise bitter tasting medicine, Crushing of the tablet may be required to break the film coating. Product and consumer information should be checked and other considerations need to be taken into account e.g. taste, cytotoxic.

Considerations in altering medication forms

Guidelines for crushing medications in ACF have been developed (8,10,11,13-15). Equipment for crushing medications should conform to these principles:

- permits complete recovery of powdered material
- if shared among residents it should be washed and dried after use for each resident or liners such as patty pans used in the mortar and over the pestle
- cytotoxic or immunosuppressant medications should not be crushed in ACF, Obtain specialist advice from oncology units due to occupational health and safety implications.(8)

The use of plastic screw type crushers increases the possibility of different types of drugs being mixed together. There are many metal crushers available to reduce overuse injuries by nursing staff.

When tablets and capsules are to be given together, crush the tablets first, then open the capsule and add the powder or pellets contained therein to the crushed tablets to prevent crushing sustained release or enteric-coated pellets.

Mixing with a small amount of food that the resident likes (e.g. jams, fruit purees) disguises unpleasant taste and promotes compliance. Ensure that crushed tablets or capsule contents are given to the resident as soon as possible after altering and mixing with any food or liquid to avoid/reduce medication degradation and minimise risk of medication incidents. (8, 10,11) Similar protocols should be followed in the domiciliary setting.

Use of PEG tubes

The SHPA book 'Don't rush to crush' contains an excellent guide on enteral feeding tubes(8) as well as considerations for each medication to be administered via a PEG tube.

The following medication forms can be administered via the PEG tube:

Liquid medication: this is the best option as there is a decreased risk of tube occlusion and increased absorption of the medication. However, certain preparations may cause gastrointestinal distress, especially those with a high osmolarity or high levels of sorbitol. Complications can be minimised by diluting liquid medications in 30ml of water.

Immediate release oral tablets: tablets should be crushed finely and mixed with 10- 30ml water. Visually check the preparation to ensure the tablet particles are fully dissolved before administration.

Soft gelatin capsules: prick the capsule with a pinhole and squeeze out the contents for administration.

Enteric-coated, sustained release, or sublingual medications must not be administered via the gastrostomy tube.

To minimise complications the following principles are suggested for pharmacists to assist in this method of medication administration:

- Use liquid medications as a first priority
- Prepare medication forms as described above
- Consider the timing of medication administration in relation to enteral feeding (e.g. full or empty stomach)
- Do not suggest mixing medications with enteral feed formula
- Do not mix medications with other medications to avoid drug-drug incompatibilities
- Flush the gastrostomy tube with 30mls water before and after medication administration
- Flush the gastrostomy tube with 15mls water in between administration of different medications (8, 14)

The SHPA guide offers a medicine administration flow chart to follow with details as to when to recommend feeds.(8)

Occupational health & safety

Medicines that may be very potent, irritant or cause sensitisation and may require extra precautions include:

- hormones
- corticosteroids
- immunosuppressants
- phenothazines'
- antibiotics (8)

Where possible antibiotic mixtures are preferred instead of capsules e.g. amoxicillin, amoxicillin/clavulanic acid, flucloxacillin etc (8, 10, 13).

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Questions based on the above:

1. All the following statements are true, EXCEPT for:
 - a. Dysphagia is difficulty in swallowing
 - b. Reduced salivation is a common cause of dysphagia
 - c. Oesophageal dysphagia may be associated with reflux
 4. Oesophageal spasm may respond to sublingual nitrates
 5. Oesophageal dysphagia is commonly caused by stroke

2. All the following statements are true, EXCEPT for:
 - a. Depression may present with dysphagia
 - b. Dysphagia is common in patients with Parkinson's disease
 - c. Achalasia is the lack of hydrochloric acid in the stomach
 - d. Oesophageal spasm is characterised by the inability of the lower oesophageal sphincter to relax
 - e. Oesophageal spasm may result in regurgitation

3. All the following statements are true, EXCEPT for:
 - a. Low dose aspirin may cause oesophageal ulceration and gastric bleeds
 - b. Ferrous sulfate may cause oesophageal ulceration
 - c. Calcium channel blockers may reduce lower oesophageal sphincter pressure
 - d. Metoclopramide is the drug of choice in dysphagia due to oesophageal dysmotility
 - e. People with dysphagia have a risk of aspiration pneumonia

4. All the following statements are true, EXCEPT for:
 - a. Crushing a table may result in a greater risk of toxicity
 - b. It is easier to swallow thickened foods than thin fluids
 - c. PEG stands for polyethylene glycol feeding tubes
 - d. Antibiotics such as amoxicillin may pose a risk for nurses administering them by opening capsules
 - e. Equipment for residents requiring crushed medications must be cleaned prior to each use

5. All the following statements are true, EXCEPT for:
 - a. Some brands of morphine sulfate capsules can be opened and the pellets sprinkled on soft food
 - b. All PPIs can be dispersed in water, as long as the pellets are not chewed as per the Product Information
 - c. Pantoprazole is available in granule form
 - d. Calcium carbonate tablets can be crushed
 - e. Isosorbide mononitrate 60mg tablets may be cut in half without affecting sustained release properties

Indicate true or false for the following:

6. Methotrexate can be safely crushed by nursing staff
True/False
7. All sublingual medicines can be given via an enteral feeding tube as they dissolve easily.
True/False
8. A speech therapist may assist a person with swallowing difficulties
True/False
9. Absorption of some medicines is reduced when mixed with thickening agents
True/False
10. Medicines must not be added directly to enteral feeds
True/False