CONCERNS ABOUT POSTPYLORIC MEDICATION ADMINISTRATION AND ABSORPTION

Postpyloric enteral feeding tubes can be necessary in patients who are acutely or chronically ill due to problems such as gastrointestinal discomfort, gastroparesis, chronic nausea, and severe reflux or vomiting. This method allows food and medications to bypass the stomach and directly go into the small bowel. Alterations in absorptions can be problematic for reasons such as increased toxicity or treatment failure. Information is lacking in the primary literature due to difficulties in extrapolating animal studies in humans. This issue of Alabama Alliance Rx Notes briefly summarizes a review article that assessed absorption-site data for medications that are administered by postpyloric feeding tubes and to see the relevance of absorption site in clinical care. If you need further information, please contact the Samford University Drug Information Service at (205) 726-2659.


Introduction:
- Routes of administration for enteral feeding include nasogastric tubes and gastrostomy tubes. These tubes deliver food and medications directly into the stomach and may not be beneficial in patients who cannot tolerate gastric feeding. Some major concerns in the administration of post pyloric gastrointestinal feeding include the following:
  - Patients receive both food and medications from the same tubing which can lead to drug-food interactions.
  - The osmolalities of liquid formulations of medications are higher than that of the gastrointestinal tract and this can lead to additional adverse drug reactions such as diarrhea, cramping, abdominal distention and vomiting.
  - There is limited information about any absorption of medications distal to the gastrointestinal tract.

Objective:
- To determine the absorption site of drug products when administered in enteral feeding tubes.

Methods:
- This literature review was conducted at the Children’s Hospital of Philadelphia to identify any data that has existed for medications and their absorption sites.
- Information was obtained from: package insert; tertiary references (e.g., American Hospital Formulary System, Lexi-Comp, Clinical Pharmacology and Micromedex), a primary literature search conducted in PubMed, and information from drug manufacturer.
- The information collecting process was considered complete if any information was found regarding the medications in the above mentioned sources. However, the information gathered from the package insert was verified with the manufacturer to confirm and interpret the data.
- Although the gastrointestinal absorption site of the medication was considered to be the primary data point, other data was collected including: type of study conducted; medications that bind to tubing and should not be administered via a tube; requirement for gastric acid for absorption; and known alterations in drug absorption due to administration at alternative sites.
Results:

- The following table summarizes the acceptable administration routes specific to medications via postpyloric enteral feeding tubes.

<table>
<thead>
<tr>
<th>Duodenal and Jejunal routes</th>
<th>Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>Abacavir, acetazolamide, acetylcysteine, acyclovir, alendronate, amlodipine, atenolol, atomoxetine, baclofen (jejunal), betanechol, bumetanide (jejunal), bupropion, carvedilol, cefdinir, chlorambucil, cisapride, citalopram, clindamycin, clonazepam, cotrimoxazole, desloratadine, enalapril, escitalopram, ezogabine, fluoxetine, glycopyrrolate, guaifenesin, hydrocortisone, hydromorphone, hydroxychloroquine, lamivudine, lamotrigin, lansoprazole, linezolid, loperamide, lorazepam (jejunal), methadone, methylphenidate, metoclopramide, metolazone, metronidazole, mexiletine, morphine, nadolol, olanzapine, pentobarbital, phosphate, potassium, prednisone, rameleton, ramipril (jejunal), risperidone, sertraline, tizanidine, vigabatrin, voriconazole, zidovudine, zinc, zonisamide</td>
</tr>
<tr>
<td>Acceptable</td>
<td>Acarbose, acetaminophen, amoxicillin, ascorbic acid, allopurinol (duodenal), azithioprine, caffeine, calcium (duodenal), carnitine, chlorothiazide, ciprofloxacin, citric acid-sodium citrate, clarithromycin, dapsone, digoxin (duodenal), docusate, fluconazole, folic acid (duodenal), furosemide, gabapentin (duodenal), griseofulvin (duodenal), hydrochlorothiazide, lactobacillus, levetiracetam, levothyroxine, levofoxacin, lopinavir-ritonavir (duodenal), lorazepam (duodenal), magnesium, medium-chain triglyceride, mesalamine, metformin (duodenal), metoprolol, midazolam, mycophenolate (duodenal), neomycin, nystatin, omeprazole, oseltamivir, oxcarbazepine, paroxetine, phenobarbital, phenytoin (duodenal), pravastatin (duodenal), pregabalin, propranolol, ranitidine, rifampin, sevelamer, sildenafil, sirolimus (duodenal), spironolactone, tacrolimus, theophylline, tocopherol (duodenal), topiramate, ursodiol, warfarin</td>
</tr>
<tr>
<td>Not acceptable</td>
<td>Aspirin, cyclosporine, ferrous sulfate (jejunal), folic acid (jejunal) griseofulvin (jejunal), isotretinoin, metformin (jejunal), mycophenolate (jejunal), phenytoin (jejunal), pravastatin (jejunal), sucralfate, tocopherol (jejunal), valproic acid</td>
</tr>
<tr>
<td>Partial</td>
<td>Allopurinol (jejunal), calcium (jejunal), ferrous sulfate (duodenal), gabapentin (jejunal), lopinavir-ritonavir (jejunal), sirolimus (jejunal),</td>
</tr>
</tbody>
</table>

Discussion:

- The published information on medication absorption via postpyloric administration is scarce. A total of 43.5% of medications did not have any published information available.
- Increased adverse reactions are associated with medications administered via feeding tubes (e.g., jejunal administration of phenytoin can have decreased absorption leading to treatment failure (i.e., seizures).
- There is a possibility that alternative medications can be used for those medications that do not have any absorption-site information. For those medications that do not have any alternatives, patients should be closely monitored for efficacy or toxicity.

Conclusion:

- All medications should not be administered via a postpyloric feeding tube.
- Certain medications may bind to the tubing or have an incomplete absorption at the intestinal site that may alter the therapeutic effect.

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