

ISMP Canada Safety Bulletin

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Potentially Harmful Interaction between Polyethylene Glycol Laxative and Starch-Based Thickeners

- Addition of polyethylene glycol (PEG) laxative to a liquid that has been thickened with a starch-based thickener results in a mixture that is thin and watery, effectively undoing the intended act of thickening.
- Multiple strategies are available to prevent the occurrence of this interaction:
 - Establish an electronic interface to connect the order entries between medication, dietary and other health-related computer order entry systems within the healthcare facility.
 - Update health information systems to include an interaction alert when a PEG laxative and a starch-based thickener are prescribed for the same patient.
 - Before prescribing or recommending a PEG laxative for a patient with dysphagia, determine whether the patient is using any products thickened with a starch-based thickener.
 - Ensure that xanthan gum-based thickeners are available, to provide a safe option for patients with dysphagia who also require a PEG laxative to manage their constipation.

Patients with dysphagia, or difficulty swallowing, are often advised to avoid thin, watery liquids and to consume only liquids that have had their viscosity altered by thickeners (known as “thickened liquids” or “thickened fluids”). Swallowing a thickened liquid will improve bolus control and reduce the risk of aspiration. ISMP Canada received a medication incident about patient harm potentially associated with an under-recognized but important drug interaction between **polyethylene glycol (PEG) laxative** and a **starch-based thickener**. This incident is being shared to raise awareness of the interaction and to present system-based strategies to prevent its occurrence and mitigate the risk of patient harm, especially in long-term care homes where residents who may be on thickened fluids are often prescribed laxatives. The bulletin also highlights the ever-present need to report and learn from unexpected or novel treatment interactions.

INCIDENT DESCRIPTION

PEG 3350 laxative, to be dissolved in liquid, was prescribed to treat constipation in a hospital inpatient. The patient was switched to a thickened diet for dysphagia, therefore PEG 3350 was mixed in a starch-based prethickened juice. On the second day of administration, the patient was noted to be very

“gurgly”, a possible sign of aspiration, after swallowing the dose. The patient passed away a couple of hours later, following suspected aspiration during repositioning. As the patient had multiple comorbidities and a guarded prognosis, it is difficult to determine the cause of death, however, aspiration may have been a contributing factor.

BACKGROUND

Thickened liquids are commonly taken by patients with symptoms of dysphagia. Some ready-to-use thickened products are available for purchase (i.e., prethickened by the manufacturer, usually by the addition of a starch-based thickener). Alternatively, liquids can be thickened just before consumption by adding a thickening powder.¹ Such powders may be either starch-based¹ (e.g., with cornstarch) or gum-based (e.g., with xanthan gum).² The first commercially available thickeners were starch-based, and these products are effective and economical. Xanthan gum-based products were introduced later to address the cloudy appearance and caloric content of starch-thickened liquids, but they are more expensive.³

PEG laxative products are available as powders that must be dissolved in a liquid before administration. Addition of PEG laxative to a liquid that has been thickened with a starch-based thickener will result in a mixture that is thin and watery, effectively undoing the intended act of thickening. Patients with dysphagia who swallow the thinner-than-expected liquid are potentially at increased risk of aspiration. In a previously published case report, addition of PEG laxative powder to starch-thickened liquids resulted in a loss of viscosity, however when the powder was added to a liquid thickened with a xanthan gum-based product, no loss of viscosity occurred.⁴

DISCUSSION

Analysis of this incident identified several potential contributing factors:

- There was no on-screen alert about the interaction between the prescribed PEG laxative and the

ordered thickener product when these orders were entered in the hospital’s computerized order entry system, for one of the following reasons:

- the interaction could not be electronically recognized because the medication order system was separate from (i.e., did not communicate with) the systems used for dietary/speech language pathology orders;
 - the departmental systems were connected, but the interaction between PEG laxative and starch-based thickeners is novel and had not been added as an alert.
- The healthcare provider preparing and administering the mixture was unfamiliar with the appearance of different types of thickened liquids. In particular, the change in consistency after the PEG laxative was added, from thickened to thin and watery, went unnoticed.

RECOMMENDATIONS

Manufacturers

- Add information about the interaction between PEG and starch-based thickeners to PEG laxative product monographs.
- Add a cautionary statement to the labels for starch-based prethickened products to indicate that PEG laxatives must not be added.
- Label starch-based thickening powders to indicate that these cannot be used to thicken PEG-containing mixtures.

Healthcare Facilities

- Where possible, establish an electronic interface to connect the order entries in all medication and health-related computer order systems.
- Update the computerized alert system to include the interaction between PEG laxatives and starch-based thickeners. This interaction alert should be visible to the following personnel:
 - prescribers and other healthcare providers that input orders at the point of order entry
 - pharmacists at the point of order verification and dispensing
 - nurses and other healthcare providers at the point of preparation and administration

- For patients who are taking thickened liquids and who require a PEG laxative, consider supplying the PEG powder and the xanthan gum–based thickener together as a “kit” or combo-pack. Ensure that the patient-specific kit label includes directions such as “Use only the provided xanthan gum-based thickener”.
- Advise healthcare providers (including prescribers, dietitians and speech language pathologists) to consider and warn about this interaction when making recommendations about texture of diet or use of thickeners.
- Consider labelling PEG powders to caution that the beverage into which the product is mixed must not contain a starch-based thickener. For example, include wording such as “for patients with dysphagia, PEG laxative may be added only to liquids thickened with xanthan gum–based thickener.”
- Request that the purchasing department order and maintain an adequate stock of xanthan gum–based thickeners to meet the needs of patients with dysphagia. These products should be clearly labelled and stored separately from starch-based thickeners.
- Educate front-line staff and patients/families about the potential for harm if a patient with dysphagia receives PEG laxative dissolved in a liquid thickened with a starch-based thickener. Highlight the importance of conducting a visual check of the thickened product’s texture before administering it to a patient with dysphagia.

Community-Based Healthcare Providers

- Before prescribing or recommending non-prescription PEG laxatives, determine whether the patient has dysphagia and uses starch-based

thickeners. Specifically ask the patient (or caregiver) about the use of thickened liquids and counsel about avoiding the interaction between PEG laxatives and starch-based thickeners.

- If thickening agents are stocked in the pharmacy, keep a supply of both xanthan gum-based and starch-based thickeners, to provide a safe option for patients who are using thickened liquids and who also require a PEG laxative to manage their constipation.

CONCLUSION

Although the use of either PEG laxative powder or starch-thickened liquid is relatively safe, co-administration of these two products can be harmful for patients with dysphagia. Constipation and dysphagia are more common in elderly patients, and awareness of this interaction can thus reduce the potential risk of harm in this vulnerable population. Manufacturers, healthcare facilities, and community-based healthcare providers must be made aware of this novel interaction and take steps to reduce its occurrence.

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Independent Double Checks – Are Your Checks Truly Independent?

An independent double check continues to be one strategy to help detect and prevent medication errors.^{1,2} Independent double checks must be implemented judiciously to minimize additional workload for practitioners, and they must be carried out properly to be effective.¹ A review of several incidents reported to ISMP Canada raised concerns about practitioners' understanding of the differences between "double checks" and independent double checks, as well as concerns about how these are performed. Practitioners may overlook the bias that can occur with double checks that are not independent, or they may believe that double checking their own work is enough to prevent medication errors.¹

Incident Example: A nurse drew up insulin into a syringe for administration to a patient. A second nurse was asked to verify the "10-unit dose". The second nurse looked at the syringe and agreed it was a 10-unit dose, although the dose drawn up was in fact double the intended dose.

ISMP Canada defines an independent double check as "a process in which a second practitioner conducts a verification" such that "the first practitioner does not communicate what he or she *expects* the second practitioner to see".³ The goal is to limit any influence that the first practitioner might have on the second practitioner and to eliminate confirmation bias which can occur when the second practitioner is told by the first practitioner what to expect and goes on to make the expected observation. Although the process can be carried out in the presence or absence of the first practitioner, it is crucial that it remain independent and asynchronous (i.e., the practitioners take on the task separately or alone).^{1,3} Here is an example of how the process might work:

1. The first practitioner asks a second practitioner for a check and begins by explaining the verification needs (e.g., drug name and dose).
2. The second practitioner performs the task required (e.g., checks drug name and dose), but only after the first practitioner has completed the same task and without any further input from the first practitioner.
3. The results of the independent double check performed by the second practitioner are then compared with the results obtained by the first practitioner to determine any discrepancies.

Organizations can further support quality independent double checks in the following ways:

- Reserve for select high-risk situations or select high-alert medications (e.g., insulins, opioids). Since the quality may vary depending on the individuals involved, independent double checks should not be the only safeguard in place.¹
- Create a workplace environment conducive for the performance of independent double checks (e.g., ensure availability of distraction-free areas).¹
- Develop standard independent double check processes that practitioners can follow and provide training to ensure a common understanding among staff members.¹
- Bar coding, when integrated with other advanced technologies, can serve as an automated independent double check.⁴

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