The use of phosphate enemas in the treatment of constipation

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Phosphate enemas are commonly used by community nurses in the treatment of constipation. This article reports on a literature review of evidence relating to their use. No evidence was found to support the use of these enemas conclusively, although a number of articles reported risks, contraindications, and complications. Phosphate enemas should therefore be used with caution and nurses should be aware of the contraindications associated with their use.

Phosphate enemas have been used in the community for over 30 years to relieve constipation. However, like all enemas, their insertion is invasive, embarrassing, and often uncomfortable for the patient, while the amount of fluid involved means they have a tendency to be messy. Phosphate enemas contain sodium acid phosphate and sodium phosphate. The osmotic activity of the former increases the water content of the stool so that rectal distension follows and it is thought that this induces defecation by stimulating rectal motility (Roe, 1994; Barrett, 1993). The enemas are usually effective within 5–10 minutes, which limits the risk of phosphate toxicity as the enema fluid is evacuated with the stool. However, if evacuation does not take place, pooling of the fluid in the bowel can result in large amounts of water moving into the gut, causing dehydration. This has the potential to lead to hypovolaemic shock, oliguric renal failure, and neuromuscular irritability due to hypocalcaemia. If phosphate is absorbed, sudden and severe hypernatraemia and hyperphosphataemia can result (Lambert and Herman, 1996).

Following anecdotal suggestions that the use of phosphate enemas is not based on evidence, a literature review was undertaken to investigate whether their use is supported. This article reports on the review.

**Information provided by manufacturers**

As part of the investigation into an evidence base for the use of phosphate enemas the two leading manufacturers of the enemas were asked to supply the evidence base for the use of their products. One company sent three papers – two concerned bowel preparation and one compared different enemas. The first article, an unreferenced US study from 1965, compares a phosphate enema, a microenema, and a suppository for bowel preparation prior to proctosigmoidoscopy. The outcome of this study was that phosphate enemas were preferred as the bowel was prepared in only six-and-a-half minutes, which was thought to be useful in busy clinics with many people waiting for investigation.

The second article reports on a Jamaican study (Lee, 1993), which compared the same three types of lower bowel preparations with no bowel preparation prior to sigmoidoscopy. Clarity of view during sigmoidoscopy was good in 71 per cent of patients who underwent phosphate enema, 68 per cent of those who received a microenema, 36 per cent in the suppository group, and 16 per cent in the group who had no preparation.

The paper concludes that the use of phosphate enemas or microenemas is effective in preparing the bowel for sigmoidoscopy. However, while it states that their use is simple and safe, it also says that certain patients should not have enemas, including those with severe diarrhoea, rectal bleeding, and active ulcerative colitis. These are the patients who often require investigation such as sigmoidoscopy.

The third article reports on a comparison of the cleansing effect of four enemas, which was assessed by the use of a sigmoidoscope (Page et al, 1995). The enemas were phosphate, sodium chloride, soap suds, and tap water, and the participants were medical students. This evidence was not considered relevant as it is almost 50 years old, the medical students were likely to be young, healthy people with no bowel problems who would not be usual candidates for sigmoidoscopy, and two of the three types of enema described are no longer in use.

The evidence on which the company indicates practitioners should base their practice for bowel preparation therefore consists of a 49-year-old and a 39-year-old study, and an 11-year-old article in which a microenema and a phosphate enema were equally favourable.

The company also supplied two articles on constipation. One is from the American Journal of Proctology (Weiss, 1960), which only mentions phosphate enemas to say that they are highly effective in cleansing the colon quickly and with ‘little fuss’. The second article looks at the management of constipation in adults (Gattuso and Kannm, 1993), and offers a treatment plan. It states that if a patient is severely constipated, and it has been established by barium enema that there is no gut dilatation, then a bisacodyl suppository or a phosphate enema is the treatment of choice. This implies that it is unsafe to administer a phosphate enema unless a barium enema has been carried out. These enemas are not administered in the community setting.
enemas and conclude that any form of enema could cause injury to the recto-sigmoid colon, and that the hypertonic solution of the enema can exacerbate mucosal necrosis. It also recognises that hyperphosphataemia and hypocalcaemia secondary to phosphate enema have been reported in the literature. Although rare, often seen in children with Hirschsprung’s disease or renal failure, the paper notes that Davis et al (1977) reported these conditions in two otherwise healthy children with acute constipation after a single phosphate enema.

The paper discusses stimulant laxatives, stating that bisacodyl suppositories are an effective and acceptable alternative to phosphate enemas. Since these suppositories are not thought to cause trauma, hyperphosphataemia or hypocalcaemia, this information is crucial to nurse prescribers. On reflection, it seems surprising that a manufacturer of phosphate enemas uses this article to promote the use of its product.

The second company’s evidence

After two requests for evidence the second company sent two studies and a ‘nurse’s guide’ on the use of enemas. The first study (Atkin et al, 2000) is a single blind randomised trial into the efficacy and acceptability of an oral laxative versus a self-administered phosphate enema in bowel preparation for a sigmoidoscopy. This study concludes that a self-administered phosphate enema is more acceptable and a more effective bowel preparation than the oral preparation.

The second paper (Goldman, 1993) contains two case reports. The first describes a young male with a spinal cord injury who suffered blistering on the buttock and rectal changes consistent with a burn from the enema solution. The second case was of a young male with quadriplegia due to a variety of variables. It could be argued that 24 reports of adverse reactions in 40 years constitute a low incidence. However, it is usually nurses who administer the enemas, and they have only been allowed to report reactions independently, as they may have arisen due to a variety of variables. It could be argued that 24 reports of adverse reactions in 40 years constitute a low incidence. However, it is usually nurses who administer the enemas, and they have only been allowed to report reactions since 1992. Before this, only doctors and pharmacists could do so. Nurses may also have been reluctant to report reactions in case they were blamed.

It is also possible that there may be a delay between administration of the enema and the onset of complications such as rectal bleeding, so that a connection is not

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<th>BOX 1. CIRCUMSTANCES SUGGESTED AS INAPPROPRIATE FOR PHOSPHATE ENEMAS</th>
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<tr>
<td>● Constipation above the splenic flexure</td>
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<tr>
<td>● Paralytic ileus</td>
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<td>● Colonic obstruction</td>
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<td>● Frail patients</td>
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<td>● Patients with an electrolyte imbalance or severe cardiac arrhythmias</td>
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<td>● Patients who have undergone recent surgery to the rectum or adjacent structures</td>
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that the damage can be minimised by use of steroids and antibiotics. However, it can be argued that it would be preferable not to risk damage from hypertonic phosphate solution in the first instance, rather than prescribe steroids and antibiotics to address any damage caused.

Goldman (1993) claims that the fact that over two million phosphate enemas are manufactured each year confirms their ‘continuing popularity’. This claim is referenced as data on file at the company supplying the article. The company’s name also appears at the foot of the paper indicating possible sponsorship. This suggests the company is aware of the problems attributed to phosphate enemas but takes the opportunity to offer solutions in this paper.

The nurse’s guide extols the virtues of phosphate enemas but adds a few words of caution and states that no enema may not be appropriate in certain circumstances (Box 1). However, these circumstances present problems for nurses. For example, nurses do not know whether constipation is above the splenic flexure without an X-ray, which is unlikely to happen prior to every phosphate enema administered.

Faecal impaction could be described as a form of colonic obstruction, and phosphate enemas are often used to treat this. Most patients to whom community nurses administer enemas are elderly, many are frail and often dehydrated. The dehydration may have caused the constipation but if severe enough could also result in an electrolyte imbalance. Therefore, three of the five circumstances listed in Box 1 are common situations in which nurses may administer a phosphate enema.

**Adverse reactions**

All drugs have the potential to induce adverse reactions, which clinicians are urged to report to the Medicines and Healthcare products Regulator Agency (MHRA), formerly the Medicines Control Agency (MCA). This information is an important means of monitoring drug safety and can be used to assess causal relationships between drugs and possible risk factors such as age or underlying disease and concomitant medication.

The MCA was approached for data on reported adverse reactions to phosphate enemas, and sent data covering the period from July 1963 to November 2002. This revealed a total of 24 suspected reactions, including neurological, cardiovascular, gastrointestinal, immune system and skin reactions, as well as two fatalities. It does not follow that phosphate enemas caused these reactions independently, as they may have arisen due to a variety of variables. It could be argued that 24 reports of adverse reactions in 40 years constitute a low incidence. However, it is usually nurses who administer the enemas, and they have only been allowed to report reactions since 1992. Before this, only doctors and pharmacists could do so. Nurses may also have been reluctant to report reactions in case they were blamed.

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**REFERENCES**


made between the symptoms and the enema. In a case study by Bell (1990) it was 16 hours from enema administration to the onset of generalised peritonitis.

Use of phosphate enemas in adults

Lambert and Herman (1996) reviewed the literature on cases of poisoning due to hypertonic sodium phosphate enemas dating from 1966 to 1996. They found only 23 reported cases but only searched literature published in English on one database (MEDLINE Express). They may have missed other relevant studies as they did not follow up studies from the reference lists, contact experts or search for unpublished literature.

Lambert and Herman (1996) state that if an enema is retained for longer than 30 minutes in vulnerable patients such as children or those with renal impairment it should be recovered immediately, even if this means digital disimpaction. This may also be the case for older patients as they have reduced renal clearance and can be sensitive to nephrotoxic drugs (Department of Health, 2001).

Lambert and Herman (1996) state that out of the 23 cases reviewed only two resulted in death and one in irreversible brain damage, and that in these cases toxicity was well advanced by the time of diagnosis. They suggest that the solution lies in education on the appropriate use of these enemas, recognition of symptoms, and prompt treatment. It could be argued that the solution should lie in finding an alternative treatment that does not carry the associated risks.

They conclude that laxatives and enemas have a limited role in the treatment of constipation but have the potential for abuse and toxicity. They state that patients must be informed of the risks associated with phosphate enemas prior to administration.

In a case report and literature review, Thiele and Zander (2002) discuss prompt and appropriate treatment of enema-induced injuries. They offer two case reports, one in which a phosphate enema administered by a health care assistant resulted in pain at the time of administration, followed by rectal bleeding, rectal necrosis, debridement, and eventually a colostomy. In the second report a patient with haemorrhoids was given a phosphate enema after which rectal bleeding was attributed wrongly to the haemorrhoids.

The literature review is said to include all cases of enema-induced rectal injury from 1956 and offers 16 papers, nine of which are over 30 years old. It discusses the use of enema syringes and rubber tubing, a practice that is not used today in enema administration. Thiele and Zander (2002) do not state how the 16 papers were obtained or assess their quality.

In the 16 reported cases of enema-induced rectal injury, 45 per cent of patients experienced rectal bleeding and 68 per noted pain during administration. Thiele and Zander suggest that patients who did not feel discomfort suffered injuries above the dentate line, where there is no sensation. This is supported by Saltzstein et al (1988), who suggest that pain is experienced only after local tissue necrosis and peritoneal inflammation occur.

causes damage the problem is exacerbated by the phosphate solution, whereas water or soap sud enemas are more benign. This is supported by Sweeney et al (1986) who present three case reports of rectal gangrene and claim that the problem seems to be related to phosphate enemas and is rarely seen with other enemas.

An alternative to phosphate enemas could be macrogols (polyethylene glycol osmotic laxatives). These are metabolically inert (Schiller, 2001), have few side-effects, and can be used with patients who have pre-existing renal failure. However, although these are effective in relieving constipation, they do not solve the problem of patients needing to have their bowels open at a particular time when carers are available. They may therefore need to be used in conjunction with a bisacodyl suppository or digital stimulation.

Samadian (1990) reports a case in which an 84-year-old man was given a phosphate enema with a standard-length tube on two successive days. Both enemas produced a large stool, so pooling of the enema was not an issue. However, eight hours after the second enema the patient became pyrexial, shocked, and had abdominal pain. Septicaemia was diagnosed, and eight days later his rectal and perianal tissues were ulcerated and

## BOX 2. GUIDELINES ON THE USE OF PHOSPHATE ENEMAS

- Informed consent must be obtained before a phosphate enema (PE) is administered
- Practitioners administering PEs must be aware of the normal anatomy of the anus and rectum
- Ideally PEs should only be available over the counter with advice from a pharmacist
- PEs should not be used in patients with anal pathology such as haemorrhoids, colonic disease, recent surgery, radiotherapy or renal impairment
- A PE must not be retained and if no result is forthcoming it should be retrieved by digital disimpaction
- If a PE is unsuccessful it should not be repeated
- PEs must be used with caution in cases of suspected faecal impaction due to obstruction
- PEs should not be used in patients with hyperphosphataemia
- PEs should be used with caution in children under 12 or frail older people
- Digital stimulation or suppositories should be used with patients who have spinal cord injuries
- For patients who have had PEs as a long-standing treatment, ensure consent is informed and that alternative treatments have been considered

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sloughed, there was destruction of the anterior rectal wall, and a deep cavity extending into the perineum. The damage was probably due to the enema nozzle causing a mucosal laceration which, when combined with the hypertonic enema, resulted in necrosis (Bell, 1990).

Samadian (1990) refers to a study by Turrell (1960) in which the anorectum of 15 patients with no intestinal symptoms were examined prior to and following the insertion of lubricated thermometers or enema tips. In every case streaks of erythema or lacerations were found along the anterior surface of the anorectum. Turrell suggested that the phosphate enema solution could have a profound chemical effect on a lacerated area, compound ing the injury. This view is supported by Pietsch et al (1977) who believe necrosis begins by a perforating injury caused by the tip of the enema. The enema solution then causes an inflammatory response, which is exacerbated by bacterial invasion. However, this claim should be treated with caution as their study involved rabbits receiving an injection of hypertonic phosphate solution in their ears. Samadian (1990) concludes that in all cases enemas should be given by a nurse who understands the possible hazards.

Only nurses with an interest in bowel care are likely to be aware of the complications associated with phosphate enemas, as few have been reported in the literature. For example, Mallett and Dougherty (2000) highlight the dangers associated with green soap enemas but do not mention the problems attributed to phosphate enemas.

Kenrick and Luker (1996) advocate that manual evacuation may be necessary initially in cases of impaction, followed by daily enemas, while the National Prescribing Centre (1999) advises that enemas may need to be repeated several times to clear impacted faeces. Neither source specifies the type of enema to be used, and if this is interpreted as phosphate enemas there is the potential to cause harm to patients.

In a case reported by Knobel and Petchenko (1996) an elderly woman experienced deep hyperphosphataemic hypocalcaemic coma, hypernatraemia, hypokalaemia, metabolic acidosis, pancytopenia, and respiratory and circulatory failure secondary to phosphate intoxication after having received four phosphate enemas in 48 hours in her nursing home. She was admitted with abdominal pain and vomiting and was known to have had chronic constipation, recurrent faecal impaction, and megacolon. An abdominal X-ray showed faecal impaction.

Knobel and Petchenko (1996) claim that only a few factors led to the severe toxicity: overdose of the enema, colonic retention of the enema solution without defecation resulting in increased absorption, the existence of megacolon, dehydration, and renal insufficiency. Dehydration and retention of the enema are common in patients who require phosphate enemas, while the existence of renal insufficiency would not necessarily be checked prior to administration. Knobel and Petchenko claim that their case demonstrates:

- Their use should be restricted not only in children but also in adults with renal failure;
- Alternative laxative drugs should be considered to prevent unnecessary complications.

After this paper was published the vice-president of the Fleet enema company defended the product (Post, 1997). It was claimed that as Knobel and Petchenko’s case had taken place in Israel, the product used was a phosphate enema manufactured in Israel, which was double the dose of the US product. This meant the four enemas the patient received was the equivalent of eight US Fleet enemas.

Nir-Paz et al (1999) report a case in which a patient with known renal failure suffered rectal bleeding and acute hyperphosphataemia after being given two phosphate enemas, and died 12 days later. The hyperphosphataemia occurred because the patient’s ability to excrete phosphate was impaired due to renal failure.

Nir-Paz et al (1999) conclude that the use of sodium phosphate preparations is widespread and results in few complications, but that their use in patients with impaired renal function is a potential hazard. It has been suggested, however, that the low incidence of complications may be due to under-reporting (Martin et al, 1987).

**Summary**

The risks associated with the use of phosphate enemas for treating constipation appear to be:

- Rectal injury caused by the enema tip and the damage exacerbated by the phosphate solution;
- Phosphate absorption from pooling of the enema due to lack of evacuation of the enema and stool or altered bowel anatomy in the patient;
- Hyperphosphataemia in patients who are unable to excrete phosphate adequately, such as those with a degree of renal impairment or reduced renal clearance.

There are several alternatives to phosphate enemas, all of which are associated with fewer side-effects and have the potential to act within 15 minutes:

- Glycerin suppositories;
- Bisacodyl suppositories;
- Microenemas;
- Digital stimulation.

For the treatment of faecal impaction, macrogols (polyethylene glycol osmotic laxatives) may be used to prevent non-evacuation of the phosphate solution.

**Conclusion**

Nurses are expected to deliver care that is based on current evidence (NMC, 2002), yet this literature review has found no evidence to support the use of phosphate enemas. However, some precautionary guidelines on the use of phosphate enemas can be offered (Box 2).

It has not been possible to fulfil the aim of the review to establish an evidence base for district nurses in their use of phosphate enemas. However, it may lead to them questioning their practice and choosing an alternative treatment that does have an evidence base, thereby protecting both the patient and the nurse.

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