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Ritualistic preoperative fasting: is it still occurring and what can we do about it?

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Abstract

A literature review indicates that patients continue to fast for prolonged periods from both food and fluids before surgery. Research findings on preoperative fasting for elective surgery are not being applied in the clinical setting. Developing evidence-based preoperative fasting policies alone will not assist in bringing change to the traditional practice of routine *nil per os* (NPO) after midnight. Health care organisations should educate patients and staff on evidence-based preoperative fasting guidelines and implement change management processes to change preoperative fasting practices.

Introduction

Preoperative fasting is a mandatory prerequisite for surgery to minimise the risk of regurgitation and vomiting, and the severity of pneumonitis should gastric fluid aspiration occur during an anaesthetic[1]. Since Mendelson[2] reported in 1946 that 0.15% of patients developed a pulmonary aspiration of stomach contents during obstetric anaesthesia, many anaesthetists have assumed a conservative stance of *nil per os* (NPO) from midnight for maximum safety. During anaesthesia induction, the patient's cough and swallowing reflex is inhibited and the presence of food in the stomach poses a risk for gastric aspiration. The gastric contents are highly acidic[3]. Regurgitation of as little as 50 ml of acidic gastric contents can cause irritation and inflammation in the lungs that interferes with gas exchange resulting in death[4]. Long fasts were implemented to ensure that the stomach is empty during induction of anaesthesia, although the stomach is never truly empty as adults secrete about 1500 ml of gastric juice daily[3].

In fact, ingestion of clear fluid two to three hours prior to surgery can actually decrease gastric volumes[5]. In addition, prolonged preoperative fasting can lead to dehydration, insulin resistance, electrolyte imbalance, nausea, vomiting, irritability and confusion[1,6,7], and ingestion of a carbohydrate-rich beverage two hours prior to surgery can improve the body's response to trauma[1]. As aspiration pneumonia from modern anaesthesia is rare[8], and excessive fasting delays recovery and discharge from hospital[9], the American Society of Anesthesiologists (ASA) developed guidelines in 1999 that support more liberal preoperative fasting[10]. Healthy, non-pregnant patients should fast preoperatively for six hours from solids and two hours from clear fluids, which include water, fruit juice without pulp, carbonated beverages, clear tea and black coffee[10]. As fatty foods prolong gastric emptying times, patients should fast for longer than six hours if a fatty meal has been consumed; therefore a light meal is preferred to reduce fasting times[11]. An example of a light meal includes dry toast and clear liquid[10]. This approach has been adopted by multiple anaesthesia societies[12-15] (Table 1), and is supported by a systematic review of randomised controlled trials on preoperative fasting in adults, which found that a shortened fluid fast in healthy patients did not correlate with an increased risk of aspiration[5].

The aim of this literature review was to:

- Identify and summarise published studies on the preoperative fasting times of healthy adults undergoing elective surgery since the release of the 1999 ASA[10] guidelines on preoperative fasting.
- Determine whether the introduction of liberalised fasting guidelines has reduced the length of time patients fast for elective surgery.
- Discuss barriers to the implementation of evidence-based fasting guidelines in the clinical setting and make recommendations to improve clinical practice.

Methods

The search was conducted using electronic databases for journal articles and reference lists. Edited textbooks and government websites were also accessed. The electronic databases included CINAHL, MEDLINE, Informit and Cochrane. The search terms were preoperative fasting, anaesthesia, surgery, adults, and best practice guidelines. Primary research studies in English describing preoperative fasting studies conducted on adult patients between January 2000 and January 2010 were included. The year 2000 was chosen as the cut-off date as the ASA guidelines were introduced in 1999. Studies conducted on animals, paediatric patients, obstetric patients and on patients with high risk for regurgitation such as those with diabetes, hiatus hernia, obesity and gastro-oesophageal reflux were excluded. The ASA recommends that fasting guidelines be modified for any

Table 1. Overview of current recommendations by anaesthesia societies on fasting for elective surgery.

Societies	Clear fluids	Solids	Individual modifications required
American Society of Anesthesiologists[11]	2 hours	6 hours	Conditions affecting gastric emptying and patients with airway problems
Australian & New Zealand College of Anaesthetists[13]	2 hours	6 hours for 'healthy' patients	
Scandinavian Society of Anaesthesiology & Intensive Care[14]	2 hours	6 hours; adults may take 150 ml water with pre-medication 1 hour prior to induction of anaesthesia. Applies to elective caesarean sections also	Patients with known or suspected delay in gastric emptying
Canadian Anesthesiologists Society[15]	2 hours	6–8 hours	Fasting policies should take into account age and pre-existing medical conditions
The Association of Anaesthetists of Great Britain & Ireland[16]	2 hours	Minimum preoperative fasting time of 6 hours for food including solids, milk and milk-containing drinks	

patient with a condition that affects gastric emptying or airway management[4].

Findings

Crenshaw and Winslow conducted two studies[16,17] to determine whether publication of the revised ASA guidelines had changed preoperative fasting practices in an American facility (Table 2). In 2000[16], on average patients fasted from liquids and solids for 12 and 14 hours respectively. Ninety-one per cent were instructed to fast from midnight regardless of whether they were scheduled for morning or afternoon surgery. These fasting times are much higher than recommended; however, the data collection process may have affected the accuracy of the results. All patients were interviewed postoperatively and the length of time after surgery was not specified. Anaesthetics and other medications used during surgery and in the postoperative period may affect the patient's memory for several hours[18]. Several patients declined to participate due to drowsiness, suggesting that some participants could have been drowsy and the information collected from them could be unreliable.

Despite in the interim initiating an evidence-based fasting policy for clear fluids in the hospital supported by an education campaign for staff, a subsequent study conducted in 2004 did not show a major reduction in fasting times[17]. Overall, there was a mean reduction of 0.9 hour in fasting times following liquids, and 0.3 hour following solids. However, 81% of the patients included in the study were classified as ASA physical status 1 (P1) or P2. Patients classified as PI are healthy and those classified as P2 have mild systemic disease. Ideally, only patients classified as P1 should have been included[19], because the liberalised guidelines are applicable to healthy patients only[10]. However, the researchers argued that ASA status should not affect fasting instructions as long as patients who are obese, have diabetes mellitus, a hiatus hernia, or gastro-oesophageal reflux disease, or have other contraindications are excluded from the study. While overall there was little improvement in fasting times, there was a significant decrease in the percentage of patients who were advised to remain NPO after midnight for afternoon surgery, from 81% in 2000 to 69% in 2004, suggesting that education on the fasting guidelines can be effective.

A study conducted in Boston also concluded that patients had excessive fasting times (Table 2)[20]. The average fasting time was 11.7 hours. These participants were also classified as either ASA P1 or P2. The data were collected by interviewing patients pre- or postoperatively. The authors did not specify how long after the surgery the patients were interviewed, or whether the patients were fully awake. Confusion may occur during recovery from anaesthesia. Delayed recovery may occur if an intravenous anaesthetic or analgesic drug has been given towards the end of the procedure, or if the volatile anaesthetic agents have been continued until the end of surgery[21]. If any of the patients were drowsy or confused then the information obtained may have been inaccurate.

An audit of preoperative fasting times conducted at a general hospital in the United Kingdom (UK)[22] showed that 93% of patients fasted for more than eight hours both from solids and fluids. However, it is not possible to generalise from these results because the data were collected from two different sources: patient care plans and interviews. Fasting times were calculated from the information in patients' care plans for patients who were premedicated or confused, as pre-medication affects the ability to recall information[18]. Those patients who could not be interviewed should have been excluded because only 35% of patients had their last fluid intake recorded accurately and 41% had the time they had last eaten recorded accurately, which suggests that the fasting times may have been underestimated. Moreover, patients who underwent emergency surgery should have been excluded because liberalised fasting policies are aimed at elective surgery patients.

Seymour[23] examined preoperative fluid restrictions and the influence of the hospital's NPO policy on clinical practice in the UK. Although the hospital policy advised a two-hour fluid fast for elective surgical patients, the period of fluid fasting ranged from 3.5 to 17.75 hours, possibly because all patients on the same operating list were required to refrain from drinking fluids at the same time[20], highlighting the necessity of individualised fasting times related to the proposed time of surgery. Studies conducted by Tudor[10] (Australia) and Wachtel and Dexter[24] (USA) also indicated that fasting practices had not changed fundamentally since the introduction of more liberal guidelines (Table 2). Similarly, the Shimo *et al*.[26] survey of 432 Japanese anaesthetists revealed that the median fasting time for liquids was

Table 2. Summary of quantitative studies on preoperative fasting.

Author (date)	Data collection method and aim	Sample size and location	Fasting times (hours) (mean ± SD)
Seymour (2000)[24]	Descriptive study; information obtained from documentation in patients' charts	**90** patients for elective surgery Ashford, Kent, UK	Fluids: 3.5–17.75 ($\bar{x}$ =10.4 ± 4.7)
Crenshaw & Winslow (2002)[17]	Descriptive study using a semi-structured instrument. Patients interviewed to determine whether preoperative fasting practices had changed	**155** postoperative patients who had elective non-obstetric, non-gastrointestinal surgery; south-western USA	Fluids: 3–20 ($\bar{x}$ = 11.9 ± 3) Solids: 6–37 ($\bar{x}$ = 14.5 ± 4)
Bothamley & Mardell (2005)[23]	Data collected by patient interview and from documentation in patient's care plan. To measure whether patients fasted appropriately	**144** orthopaedic patients both patients for elective surgery and emergency cases; general hospital in Sheffield, UK.	93% and 94% of the patients fasted > eight hours from liquids and solids respectively
Tudor (2006)[10]	Patient interview to establish actual fasting times	**200** healthy patients for elective surgery in Como Private Hospital, Victoria, Australia.	Fluids: $\bar{x}$ = 9.4 Solids: $\bar{x}$ = 10.1
Baril & Portman (2007)[21]	Semi-structured interviews to explore fasting times and the knowledge and beliefs of patients, nurses and anaesthesia care providers regarding the practice of preoperative fasting	**34** patients scheduled for elective surgery with an ASA status P1 or P2; community hospital, Boston, USA	5–23 ($\bar{x}$ =11.7); no distinction made between liquids and solids
Crenshaw & Winslow (2008)[18]	Descriptive study; used a structured interview tool to compare preoperative fasting practices before and after widespread educational efforts and implementation of evidence-based preoperative fasting policy for clear liquids	**275** postoperative patients who had elective non-obstetric, non-gastrointestinal surgery; south-western USA	Fluids: 2–21 ($\bar{x}$ = 11 ± 3) Solids: 6–24 ($\bar{x}$ = 14.3 ± 4)
Wachtel & Dexter (2009)[25]	Method not explained	**382** (April 2006); Iowa City, USA	Fluids: $\bar{x}$ = 7.1 (± 0.2) Solids: $\bar{x}$ = 12.2 (± 0.2)
		281 (October, 2006)	Fluids: $\bar{x}$ = 6.2 (± 0.3) Solids: $\bar{x}$ = 11.9 (± 0.2)

6–9 hours, and 12–13 hours for solids. Interestingly, the incidence of aspiration in patients at institutions that had adopted the ASA fasting guidelines was approximately half the incidence in those that had not adopted them (4.8 cases per 100,000 versus 9.1 per 100,000).

A number of factors may contribute to lengthy preoperative fasting practices. One such factor is the absence of specific evidence-based preoperative fasting policies in health care facilities[20,27-30]. Another is health care professionals' inadequate knowledge of the revised fasting guidelines and policies[16,23,25,29,30]. For example, at one facility only 30% of nurses were aware of the hospital policy[23]. As nurses instruct patients on preoperative fasting it is vital that they are aware of the revised fasting guidelines.

Cancellations of surgeries and schedule changes also impact on the willingness of nurses and anaesthetists to prescribe shorter fasts[20,22,26]. Anaesthetists and nurses may see traditional fasts as more convenient for the hospital, as "the routine," or fear that patients may have not adequately fasted if the surgery time changes and therefore feel longer fasts are safer[20,22,26,31]. However, Crenshaw and Winslow[16,17] showed that only 5–9% of cases started earlier than scheduled (mean 33–56 minutes), and Baril and Portman[20] found that the rate of cancellations due to insufficient fasting was only 0.11%, although another study[24] reported that 54% of procedures started early by an average of 1.25 hours. Wachtel and Dexter[24] suggest that data collected in a hospital over three months on scheduled and actual starting times of surgery can be used to determine specific NPO orders that result in 95% of patients being ready for surgery despite operating schedule changes.

Perceptions that patients will not understand and comply with their fasting instructions can lead to longer fasting times[32]. One study found that anaesthesiologists and surgeons believed that patients might also consume solids if they were told they could ingest clear liquids[32]. However, it is difficult to see how a patient can get confused about simply worded instructions that they may not eat solid food after midnight but can have a cup of water anytime up to 7 am[33]. Unclear instructions given by the health care personnel, however, will result in misinterpretation. For example, in one instance[16] a patient was told to fast "after 2400 hours" and fasted for nearly 24 hours. Many patients do not understand the rationale for fasting[16]. Consequently, patients should be given comprehensive written and oral instructions on the purpose of fasting, that define clear liquids and light meals and designate times of fasting from both[16,32].

Health professionals also may consider that prolonged fasting is uncomfortable for the patient rather than unsafe[34]. Adverse effects may not be evident immediately and thus not linked to prolonged fasting[26], while complaints such as headache or thirst may be considered trivial and, therefore, may not be documented. Through this lack of documentation, a case is not built up for the adverse effects of prolonged fasting[34]. Therefore, nurses need to be educated on the importance of documenting these findings on the patients' charts to highlight these adverse effects, which may then encourage health care professionals to adhere to liberalised fasting guidelines.

Some authors suggest implementing evidence-based fasting guidelines requires more time and staff[19]; however, Winslow *et al.*[33] argue that patients who are allowed to drink clear liquids will be more comfortable and less likely to require nurses' attention, and postoperatively they are less likely to be nauseated and require anti-emetics[6].

A seminal study on facilitating change in education demonstrated that "it is exceedingly difficult for policy to change practice"[35]. Policy often disappears into "the 'black box' of local practices, beliefs, and traditions"[35]. Key factors needed for successful adoption of policy include active support from institutional leaders, specific training for staff, and locally selected implementation strategies or ownership of change. Ownership of change involves facilitating participation of staff in regular meetings that consider practical implementation issues, and encouraging staff to be involved in decisions about the project and in the development of project materials, for example signage, posters and flyers.

Anderson and Comrie[34] suggest that Rogers' Theory of Diffusion of Innovation may be used to facilitate changes to ritualistic preoperative fasting practices, allowing a systematic analysis of the benefits and disadvantages of the proposed change in practice and encouraging further research[5]. The five stages of the theory include knowledge, persuasion, decision, implementation and confirmation. In the knowledge stage, inventors (those creating, or taking up the new idea) educate users and providers on the new idea. It is best to introduce the information to innovators and early adopters who are the least resistant to change, who can then help to educate and persuade others (the late adopters and laggards who tend to stick rigidly to traditional practice). In the persuasion stage, facilities may trial shortened fasting times, allowing staff to assess the relative benefits and weaknesses of the new idea. A decision is then made and the innovation may be implemented, possibly in a modified form to suit the needs of the institution. Finally the outcomes should be evaluated and the innovation may be embedded or discarded.

Implications for research

Whilst a number of studies have been conducted on fasting times, there is limited literature on the implementation of evidence-based fasting guidelines. The reasons given for prolonged preoperative fasting practices outlined in this paper are the opinions of a small number of anaesthesia care providers and perioperative nurses. Further qualitative studies will shed light on the issues that impact on the implementation of evidence-based fasting policies and may also help to identify strategies to implement those fasting policies in the clinical setting. Further research should also be conducted to find the correlation between the amount of time surgical patients fast prior to surgery and their postoperative symptoms. Through this anaesthesia care workers may gain an awareness of the implications of prolonged fasting, and its direct negative impact on the recovery of the patient in the postoperative period.

Conclusion

Although evidence-based liberalised fasting guidelines were published over a decade ago, patients are still fasting for prolonged periods prior to surgery and current clinical practice is ritualistic rather than evidence-based. Hiller[36] causes every person involved in the

care of surgical patients to reflect on their professional practice and responsibility:

> *"If a patient is presented to theatre malnourished, hypothermic, fatigued, irritable or with challenging behavior accompanied with the risks of increased mortality and morbidity, as practitioners are we really providing effective nursing care?" and "if consent for treatment is obtained from a patient while [s]he is in this stage of confusion or altered level of consciousness (as a result of fasting) is the consent valid?"*

It is time that health care organisations strive towards evidence-based fasting practices. Every operating facility should audit patient fasting times, ensure that their policies are evidence-based, educate their staff on those policies, determine the barriers to policy implementation and devise strategies to overcome those barriers in order to ensure the best surgical outcome for the patients. Physicians, nurses and administrators must collaborate to ensure that evidence-based preoperative fasting practices are implemented and enforced in the clinical setting.

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