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Master thesis | Original study

Preoperative fasting: an online survey in Belgian anesthetists

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Abstract

Background: **For many decades, preoperative fasting is an established precaution to avoid pulmonary aspiration at induction and emergence from anesthesia. Initially, described by John Snow in 1858, it only became common practice since the 1960's of the previous century. In recent years, the risks of prolonged preoperative fasting have been described. Patients have a higher chance of discomfort, hypovolemia, ketogenesis and lipolysis. This is especially important in the pediatric population. The European society of anesthesia and intensive care (ESAIC) has updated the preoperative fasting guidelines in 2022 introducing a further liberalization of the preoperative fasting guidelines for the pediatric population. .**

Objective: **The main objective of this online survey is to establish whether the European society of anesthesia and intensive care guidelines for preoperative fasting are correctly implemented by the anesthetic department in Belgian hospitals.**

Methods: **An online survey to evaluate the adherence to the fasting guidelines was designed using Qualtrics. The survey was sent to 1437 anesthesiologists with an address, known to the department of anesthesiology UZLeuven, and working in Belgian hospitals during September 7th until November 13th of 2022. The questionnaire contained 29 questions evaluating preoperative fasting guidelines and obstetrics that are used in their respective hospitals and the adherence to the guidelines by themselves (Appendix 1).**

Results: **The survey was completed by 218 anesthesiologists which is a response rate of 15,17%. Knowledge of the ESAIC guidelines for preoperative fasting was generally adequate to good. However, their local hospital guidelines were commonly not in line with the ESAIC guidelines. Especially the preoperative fasting guidelines for pediatrics and obstetrics were not followed in 68.5% and 61.5% respectively. In general, adherence to guidelines was higher in university teaching centers than in other hospitals.**

Conclusion: **Despite adequate knowledge of the new guidelines for preoperative fasting, implementation is far from acceptable. Inadequate knowledge of the guidelines by physicians and nursing staff, together with changes in operating room schedule and practical barriers to implement the guidelines are reasons for the slow uptake.**

Keywords: **Preoperative fasting, guidelines, aspiration, survey.**

Introduction

Before planned surgery, patients are routinely asked to fast. The most important reason to fast is to reduce the risk of aspiration of gastric content[1]. Studies have already confirmed that aspiration with particles, high volume aspiration or particularly acid aspiration, is associated with a higher incidence of morbidity and mortality[2]. In emergency surgery the preoperative fasting period cannot be respected resulting in a higher chance of regurgitation and aspiration[1]. The incidence of aspiration is quoted to be 1 in 3,000 to 7,100 cases with a mortality rate of 1 in 72,000 to 100,000 surgical interventions[3].

Fasting guidelines underwent significant transformation throughout the last two centuries. In 1858 John Snow first described that preoperative fasting would be helpful against nausea and vomiting and thus reducing the chance of pulmonary aspiration of gastric content[4]. By the end of the 19th century, fasting was proposed to decrease the risk of potential aspiration during surgery[4]. In the second

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halve of the 20th century, there was a tendency of no intake (including solid food and clear fluids) after midnight before surgery[5]. Since the early 1980's evidence emerged that intake of clear fluids was less problematic since clear fluids could be emptied from the stomach within 2 to 3 hours[6].
Additionally, there is a growing body of evidence that preoperative fasting is associated with important patient risks such as patient discomfort, hypovolemia, hypoglycemia, ketogenesis and lipolysis[7]. Internationally, many fasting guidelines have been developed. These were summarized in Table I.

In 2022, the most recent European Society of Anesthesiology and Intensive Care (ESAIC) guidelines were published for pediatrics. The most recent ESAIC guidelines for adults and patients in labor were published in 2011. The goal of the present online survey is to evaluate the uptake of the most recent ESAIC guidelines by Belgian anesthesiologists and to determine the reasons for non-compliance of the new ESAIC guidelines. In summary, adults can drink clear fluids until 2 hours before induction whilst milk and solid food should be stopped at least 6 hours before surgery. Fat-rich meals should be stopped even more than 8 hours before surgery. Chewing gum can be used until induction of anesthesia.

For pediatric patients these guidelines state that clear liquids can be ingested until 1 hour before induction of anesthesia. Breast milk can last be digested 3 hours before induction of anesthesia. The fasting interval for formula milk or non-human milk is 4 hours whilst that of solid foods is 6 hours.

Methods

Approval of the Ethical Committee UZ/KU Leuven was received on August 29th 2022 (reference number: MP020631).

We designed an online survey to question the hospital use of guidelines for preoperative fasting in Belgium and evaluate adherence to the guidelines by the individual anesthetist. These questions were based upon the newly published pediatric guidelines from the ESAIC in 2022 and the older guidelines for adults and patients in labor which were published in 2011. The survey was sent to 1437 anesthesiologists with an address, known to the department of anesthesiology UZLeuven, and working in Belgian hospitals during September 1st and November 30th of 2022.

The survey was made with the online platform Qualtrics. The questionnaire was 29 questions long evaluating different aspects of the preoperative period of fasting in a diverse population (Appendix 1).

The survey was distributed through the secretariat of anesthesiology of the university hospital Leuven to all the secretariats of the different anesthesia departments in Belgium. Locally, the secretariats were asked to send out the questionnaire to the individual anesthetists in the department. All questionnaires were handled in complete anonymity. We sent an initial recruitment mail and 2 reminder mails after 3 weeks and 6 weeks respectively. The data recruitment started at September 7th and ended on November 13th. In total, 1,437 anesthetists were contacted for participation in the survey.

For the data collection and analysis, we used Qualtrics with an UZ Leuven account. All the input was gained anonymous and with informed consent of the participants. All responses to all questions were used, even if the person did not complete every question of the survey. Microsoft excel was also used to perform data analysis.

Results

Sample size calculation was outsourced to a statistician, employed at HIRUZ (Health, innovation and research institute). The study was originally designed as a two-center trial including one university hospital and one community hospital. Power analysis was done prior to the start of the study for a multicentric study design . In the literature IV PCA devices have a success rate of 75% and nurse controlled oral opioid have a success rate of 67%[13]. Based on the literature, we used the 95% Wilson Score Confidence Interval to evaluate the efficacy of SSTS in this trial. As lower limit we took 65% and a half-width of 10%. Targeting a success rate of 75%, 80 patients (or 40 patients in each center) is sufficient to achieve a 95% confidence interval with a confidence interval half-width less than 10% and a probability of 90%. After the statistical correction for center effect, a sample size of 68 patients was obtained for each center. The different parameters were registered and stored in REDCap (Research Electronic Data Capture), hosted by University Hospital of Ghent. REDCap is a secure, web-based software platform designed to support data capture for research-based studies[8]. Statistical processing was carried out on IBM® SPSS® statistics (Statistical Package for the Social Science). A total of 375 variables from 69 patients were analyzed. The software R, version 3.4.3 (R Core Team, 2017) was used to calculate the Wilson score Confidence interval. Variables were subjected to normality conformity assessment. Differences between groups were assessed using Student's T or Wilcoxon-Mann-Whitney tests.

Table I. — International fasting guidelines.

Country, year	Fasting requirements at time of induction	Comments
American Society of Anesthesiologists, 2017.[9,10]	▪ 2 hours clear liquids, excluding alcohol ▪ 4 hours breast milk ▪ 6 hours nonhuman milk, formula, light meal ▪ 8 hours or more for fatty meal, fried food, meat	▪ Healthy patients, not in labor, elective surgery ▪ Light meal defined as toast or cereal with clear liquid
European Society of Anesthesiology and Intensive Care: Guidelines for adults, 2011.[11]	Adults: ▪ 2 hours clear liquids ▪ 6 hours milk, solid food ▪ Chewing gum and sucking hard candy allowed up until induction	▪ Encourage oral fluid up to 2 hours
European Society of Anesthesiology and Intensive Care: Guidelines for pediatrics, 2022.[12]	Children: ▪ 1 hour clear liquids ▪ 3 hours breast milk ▪ 4 hours formula or nonhuman milk, light breakfast (weak recommendations) ▪ 6 hours other solid food	▪ Encourage oral fluid up until fasting time
Australian and New Zealand College of Anaesthetists, 2022.[13]	▪ 1 hour clear fluid (≤3 mL/kg/hour) for infants and children ▪ 2 hours clear liquids for adults ▪ 3 hours breast milk for infants <6 months ▪ 4 hours formula for infants <6 months ▪ 4 hours breast milk for infants >6 months ▪ 6 hours for solid foods in adults	▪ Up to 400 mL of clear liquid up to 2 hours prior to induction for adults is likely safe
Association of Anaesthetists in Great Britain and Ireland, 2010.[14]	▪ 2 hours clear liquids ▪ 4 hours breast milk ▪ 6 hours solid food, formula and cow's milk	▪ Gum chewing treated as clear
Canadian Anesthesiologists' Society, 2022.[15]	▪ 1 hour clear liquids for children ▪ 2 hours clear liquids for adults ▪ 4 hours breast milk ▪ 6 hours for solid food, infant formula, nonhuman milk, expressed breast milk fortified with additions	▪ Encourage oral clear liquids up until fasting time
Scandinavian Society of Anaesthesiology and Intensive Care Medicine, 2005.[16]	▪ 2 hours clear liquids ▪ 4 hours breast milk and infant formula ▪ 6 hours solid food and cows milk ▪ 2 hours chewing gum and any tobacco product ▪ Up to 1 hour prior to induction, 150 mL of water	▪ 2 hours for preoperative carbohydrate drinks intended for preoperative nutrition

German Society of Anesthesiology and Intensive Care, 2004.[17]	▪ 2 hours clear liquids ▪ 4 hours breast milk and infant formula ▪ 6 hours meal	
Joint statement from Association of Paediatric Anaesthetists of Great Britain and Ireland, European Society for Paediatric Anaesthesiology, L'Association Des Anesthésistes-Réanimateurs Pédiatriques d'Expression Française, 2018.[18]	▪ 1 hour clear liquids for children up to 16 years of age	▪ Encourage intake of clear liquids
Canadian Pediatric Anesthesia Society, 2019.[19]	▪ 1 hour clear liquids for children ▪ 4 hours for breast milk ▪ 6 hours for infant formula or light meal	▪ Encourage intake of clear liquids
The Society for Paediatric Anaesthesia of New Zealand and Australia, 2022.[20]	▪ 1 hour clear liquids for children ▪ The same fasting guidelines for pediatrics as Australian and New Zealand College of Anaesthetists.	▪ Encourage intake of clear liquids

Results

In 2021, according to the RIZIV, the number of anesthesiologists in Belgium was at 2,253 (https://www.inami.fgov.be/nl/statistieken/geneesk-verzorging/2021/Paginas/aantal-individuele-zorgverleners.aspx).

We contacted 1,437 anesthesiologists and 218 participated. This gives a response rate of 15.17%.

Forty-four percent of participants were working in a University hospital, 22% were employed in a district general hospital with university characteristics and 34% of participants were from a district general hospital. Seventy percent confirmed they had knowledge of the most recent ESAIC guidelines for adults whilst 30% did not.

We refer to Appendix 1 to evaluate operating room planning issues which include postponement of surgery or changes in the operating room list.

The ESAIC guidelines for pediatrics were changed in 2021 and only a minority (31.5%) answered positively on the question if the guidelines in their hospital follow the ESAIC guidelines. The new ESAIC guidelines on fasting after breastfeeding were not known. Furthermore, the new guidance to allow clear liquids up to 1 hour before surgery has not yet penetrated into the knowledge of the anesthetist (56% of respondents still used 2 hours).

In only 58% of respondents, the liberal ESAIC policy of continued, unrestricted use of clear liquids throughout labor was followed. However more than 40% therefore did not follow the ESAIC guidance related to obstetrics.

Most anesthetists (89%) correctly followed the same guidelines no matter the type of anesthesia being used (general or locoregional anesthesia).

Forty-four percent of respondents stated that they had encountered a complication at least once due to the lack of preoperative fasting. One third of respondents who indicated they had seen a complication, claimed their patients were following the ESAIC guidelines.

If we look at the knowledge of the ESAICS guidelines, anesthetists employed in a university teaching hospital had a higher percentage (78.5%) compared to those employed in a district general hospital with university characteristics (75%) or a district general hospital (56.3%).

Discussion

As with many other surveys, a response rate of 15% is low. Therefore, analysis of the results needs to be done with caution. Seventy percent of anesthetists claim to know the most recent ESAIC guidelines and in almost 80% of hospitals the guidelines of ESAIC are followed. However, based on the responses to many questions, it can be concluded that the guidelines and especially the most recent guidelines on pediatrics, are not yet known or followed.

The ESAIC guidelines for pediatrics, published in 2022, are more recent than the adult and obstetrics

guidelines, published in 2011. This may also be one of the reasons why the preoperative fasting guidelines for pediatrics in our Belgian hospitals are poorly implemented. We also noted that the uptake of the ESAIC guidelines was higher in University hospitals then compared to non-university hospitals.

An important reason not to follow the preoperative fasting guidelines, was the changing operating room schedule[4,8]. In the present survey, it was also noted that operating room schedule changes do occur frequently in 50% or more of the hospitals. It is therefore safe to assume that this negatively impacts the adequate implementation of the preoperative ESAIC fasting guidelines. A simple solution to this problem could be to allow patients to have clear liquids up until arrival in the operating preoperative holding area. This is usually 30-60 minutes before the actual start of the surgery and would make the protocols simple to follow.

It is also important to train the full nursing staff in relation to the fasting guidelines. The nursing staff needs to actually execute the guidelines and therefore need to be updated on regular occasions. Inadequate knowledge of nursing staff is a potential additional reason why guidelines may be poorly implemented.

In other literature we found, much like in our survey, the main reasons not to follow the newly updated guidelines were a high variety in the operating room schedule, fear of safety issues surrounding the implementation of guidelines and poor knowledge of the new guidelines from ward nurses, surgeons and staff[4,8]. We recognize that the population in these articles are more geographically spread out and thus also use different guidelines according to their society.

Limitations

As with any survey, the response rate is crucial to the interpretation of the results. A respons rate of 15% is not bad but is clearly suboptimal. Additionally, we have no certainty that the actual hospital protocols are in line with the responses given since we did not ask to upload any protocol into our survey.

Conclusion

Preoperative fasting guidelines are becoming more and more liberal especially in relationship to clear liquids. Unfortunately, the uptake of new guidelines is rather slow, despite the many advantages of prolonged fluid intake. Inadequate knowledge of the guidelines by physicians and nursing staff, together with changes in operating room schedule and practical barriers to implement the guidelines are reasons for the slow uptake. According to the literature at hand, this seems to be a worldwide problem not only situated in the Belgian hospitals.

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