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Preoperative fasting: knowledge, attitude, and practice of postgraduate trainees at a tertiary care hospital—an observational study

Nipun Gupta[1*], Subhasish Patnaik[2], Lahareesh B. Lakkegowda[3], Alok Jaiswal[4] and Deepak Dwivedi[5]

Abstract

Background: Limiting the preoperative fasting period positively impact surgical patient outcome. In tertiary care hospitals, preoperative fasting instructions are mostly implemented by postgraduates. This study was conducted to evaluate the knowledge, attitude, and practice of postgraduate trainees of surgical specialties and anesthesiology regarding preoperative fasting. This observational study was conducted at a tertiary care hospital in May 2020. Consenting 166 postgraduate trainees of anesthesiology and surgical specialties was asked to respond to a questionnaire consisting of nine questions. The primary outcome was the knowledge status of postgraduate trainees regarding preoperative fasting guidelines and secondary outcomes being their attitude and practice of the same. Categorical data were presented as numbers and percentages.

Results: Out of 166 respondents, 149 (89.8%) and 94 (56.6%) respondents could not correctly describe the practice guidelines published by the American Society of Anaesthesiology pertaining to preoperative fasting in adult and pediatric patients respectively. Of the total respondents, 146 (87.9%) and 108 (65.1%) gave incorrect preoperative fasting instructions to adult and pediatric patients, respectively. The source of information regarding fasting guidelines was seniors amongst 89 (53.6%) respondents. Fifty-one (30.7%) respondents were unaware of the benefits of limiting preoperative fasting.

Conclusions: There is an imminent need for change in the knowledge, attitude, and practices of residents with regards to preoperative fasting practices. A holistic approach with formal teaching and development of SOP can achieve the change of practice of "NPO after midnight."

Keywords: Preoperative fasting, NPO, Postgraduate trainees, Anesthesiology, Surgeon, Curriculum

Key messages

Scope of improvement exists regarding knowledge of postgraduate trainees with respect to preoperative fasting, which can be brought through focused training of postgraduate trainees. The existing knowledge-practice gap regarding preoperative fasting principles can be overcome via the development of an institutional standard operating procedures for preoperative fasting and a team approach towards surgical patient care.

Background

The concept of pre-operative fasting originated around 1883, when Lister said, "While it is desirable that there should be no solid matter in the stomach when chloroform is administered, it will be found very salutary to give a cup of tea or beef-tea about two hours previously" (Lister, 1979). More than half a century later in 1946, it was discovered that pulmonary aspiration of gastric

* Correspondence: captainnipun@gmail.com
[1]Military Hospital, Dinjan, India
Full list of author information is available at the end of the article

hydrochloric acid due to vomiting associated with labor anesthesia led to respiratory distress (Mendelson, 1946). Prolonged preoperative fasting became a norm following this highly publicized discovery. Perceived benefits including ease of administering, minimal questions by patients, and allowing for flexibility in the order of the operative list encouraged the surgeons and anesthesiologists to follow the so-called NPO (nil per os) after midnight.

A paradigm shift occurred with respect to the practice of prolonged preoperative fasting during the latter half of the twentieth century when it was demonstrated that giving patients a drink of water up to 3 h before surgery did not increase the gastric volume or acidity of gastric contents (Maltby et al., 1986). The American Society of Anaesthesiologists (ASA) first published in 1999 and later updated in 2017, shortened pre-operative fasting guidelines in which they recommended that all healthy patients posted for elective surgery be allowed to have a heavy solid meal 8 h prior, a light meal (toast and clear tea) 6 h prior, and unlimited clear fluids (water, fruit juices without pulp, clear tea, black coffee, and any liquid through which a newspaper can be read easily) up to 2 h prior to surgery (Practice Guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration, 2017).

With the emergence of the concept of ERAS (Enhanced Recovery After Surgery), prolonged preoperative fasting practice was further challenged as it adversely affected the overall outcome of the patient after surgery (Ljungqvist et al., 2017; Abebe et al., 2016). Longer preoperative fasting was found to be associated with postoperative accelerated protein catabolism and increased insulin resistance as markers for stress reactions. Moreover, prolonged preoperative fasting is not only distressing for patients but also for their families without any positive impact on clinical outcomes.

In a tertiary care teaching hospital, the surgical patients are primarily managed by postgraduate trainees (PGT) of various surgical specialties including anesthesiology. Therefore, preoperative fasting guidelines are implemented on the ground by PGT only. A lot of studies have been conducted to assess the knowledge of practicing surgeons and anesthesiologists regarding preoperative fasting. However, no such study has been conducted on PGT of surgical specialties including anesthesiology, who are primarily responsible for its implementation in context to Indian medical step up.

In this study, we tried to evaluate the knowledge, attitude, and practice of PGT of all surgical specialties including anesthesiology regarding preoperative fasting.

Methods

This observational cross-sectional study was carried out at a tertiary care medical college and hospital in May 2020. Ethical clearance was obtained prior to the commencement of data collection. The study was conducted in accordance with the Helsinki Declaration 2013. All the PGT of anesthesiology and surgical specialties including general surgery, orthopedics, obstetrics and gynecology, otorhinolaryngology, oral and maxillofacial surgery, and ophthalmology in a tertiary care medical college and hospital were included in the study. A nine question-based questionnaire was prepared online on Google Forms, and a printout of the same was used for our paper-based survey. Details of the questions are given in Table 1.

Each PGT was personally contacted by the investigator physically or telephonically via video conferencing, and after obtaining his verbal consent, was asked to fill the questionnaire. The anonymity of the PGT was maintained throughout the process of data collection and interpretation. The data was entered in Microsoft Office Excel 2007 for analysis and interpretation.

Statistical analysis was done using Microsoft Office Excel 2007. Details of the PGT were presented as numbers and percentages. Categorical data were presented as numbers and percentages.

Results

There was a total of 166 PGT in the subject of anesthesia and various surgical specialties at the center where the study was conducted. All 166 PGT consented to the survey and were enrolled. All questionnaires were included for the final analysis. 166 PGT respondents were equally distributed over 3 years of postgraduate training years and belonged to various basic surgical specialties. Details of residents are given in Table 2.

Of the respondents, only 10.2% (17) described the ASA published practice guidelines pertaining to preoperative fasting in non-laboring adult individuals undergoing elective procedures for solids being 06 h or 08 h of preoperative fasting and clear fluids being 02 h of preoperative fasting. However, 43.4% (72) respondents were able to correctly describe the ASA published practice guidelines pertaining to preoperative fasting in infant/pediatric patients undergoing elective procedures for solids (06 h of preoperative fasting), breastfeed (04 h of preoperative fasting), and clear fluids (02 h of preoperative fasting).

With respect to questions regarding actual preoperative fasting instructions for adult patients listed for surgery under anesthesia, only 12% (20) respondents reported giving instructions stating 06 h or 08 h of preoperative fasting for solids and 02 h of preoperative fasting for clear fluids. Out of 166, 34.9% (58) respondents reported giving instructions stating 06 h of preoperative fasting for solids, 04 h of preoperative fasting for breastfeed, and 02 h of preoperative fasting for clear fluids for

Table 1 Questionnaire with list of questions

Question								Point of study investigated
Q 1	**Year of Junior Residency**							Profile of PG trainees
Reply 1	First year		Second year		Third year			
Q 2	**Department**							Profile of PG trainees
Reply 2	Anesthesiology	General surgery	Otorhinolaryngology	Ophthalmology	Obstetrics & gynecology	Orthopedics	OMFS	
Q 3	**Describe the ASA published practice guidelines pertaining to preoperative fasting in non-laboring adult individuals undergoing elective procedures in each category**							Knowledge of PG Trainees regarding preoperative fasting guidelines in non-laboring adults
Q 3A	Solids							
Reply 3A	12 h		10 h	08 h	06 h	04 h	02 h	
Q 3B	Clear fluids							
Reply 3B	12 h			10 h	08 h	06 h	04 h	02 h
Q 4	**Describe the ASA published practice guidelines pertaining to preoperative fasting in infant/ pediatric patient undergoing elective procedures in each category**							Knowledge of PG trainees regarding preoperative fasting guidelines in infants/pediatric patients
Q 4A	Solids							
Reply 4A	12 h		10 h		08 h	06 h	04 h	02 h
Q 4B	Breast Milk							
Reply 4B	12 h		10 h		08 h	06 h	04 h	02 h
Q 4C	Clear fluids							
Reply 4C	12 h		10 h		08 h	06 h	04 h	02 h
Q 5	**What actual preoperative fasting instructions do you give to your adult patients listed for surgery under anesthesia**							Practice of PG trainees regarding preoperative fasting instructions in non-laboring adults
Q 5A	Solids							
Reply 5A	12 h/overnight		10 h		08 h	06 h	04 h	02 h
Q 5B	Clear fluids							
Reply 5B	12 h/overnight		10 h		08 h	06 h	04 h	02 h
Q 6	**What actual preoperative fasting instructions do you give for infant/pediatric patients listed for surgery under anesthesia**							Practice of PG trainees regarding preoperative fasting instructions in infants/pediatric patients
Q 6A	Solids							
Reply 6A	12 h		10 h		08 h	06 h	04 h	02 h
Q 6B	Breast milk							
Reply 6B	12 h		10 h		08 h	06 h	04 h	02 h
Q 6C	Clear fluids							
Reply 6C	12 h		10 h		08 h	06 h	04 h	02 h
Q 7	**What is the source of information regarding fasting guidelines**							Knowledge source of Practice of PG trainees regarding preoperative fasting
Reply 7	Seniors	Text books	Articles/practice guidelines	Others: (please specify)				
Q 8	**Is there any benefit of limiting preoperative fasting on patient outcome/morbidity**							Knowledge and attitude of PG trainees regarding preoperative fasting
Reply 8	Yes		No		Maybe			

Table 1 Questionnaire with list of questions *(Continued)*

Question				Point of study investigated
Q9	**What according to you is/are limiting factor(s) with respect to implementation of ASA published practice guidelines pertaining to preoperative fasting in your institute**			Limiting factors impeding the implementation of preoperative fasting guidelines in actual clinical practice by PG Trainees
Q 9A	You think that fasting time according to guidelines inadequate for Indian patients.			
Reply 9A	Yes	No	Maybe	
Q 9B	Will lose the flexibility of altering the listing of case.			
Reply 9B	Yes	No	Maybe	
Q 9C	High workload in your institution.			
Reply 9C	Yes	No	Maybe	
Q 9D	You think patients will not understand instructions properly.			
Reply 9D	Yes	No	Maybe	
Q 9E	Differing fasting instructions by surgical specialty resident and anesthesiology resident.			
Reply 9E	Yes	No	Maybe	
Q 9F	Lack of standard Hospital policy regarding the preoperative policy.			
Reply 9F	Yes	No	Maybe	
Q 9G	Lack of formal lectures/classes/symposium to impart information regarding current ASA published practice guidelines.			
Reply 9G	Yes	No	Maybe	

infant/pediatric patients listed for surgery under anesthesia. Knowledge and actual practice of preoperative fasting by PGT is summarized in Fig. 1.

The majority of PGT respondents' source of information regarding fasting guidelines was from their seniors, as responded by more than half of the respondents (Fig. 2). The source of information was not significantly different statistically (p = 0.24) when compared amongst the year of residency. Out of 166 respondents, one third of the trainees were not sure or aware of the benefits of limiting preoperative fasting (Fig. 3). The awareness was not significantly different statistically (i = 0.04) when compared amongst the year of residency.

As per the PGT respondents, the most important limiting factors in the implementation of ASA published practice guidelines pertaining to preoperative fasting were the lack of formal lectures/classes/symposium to impart information to them regarding current ASA published practice guidelines, differing fasting instructions by surgical specialty resident and anesthesiology resident, loss of flexibility of altering the listing of cases, and lack of standard operating procedure (SOP) of the institute regarding preoperative fasting. Summary of

Table 2 Summary of year wise and subject wise distribution of postgraduate trainee respondents

Speciality	Year wise number of PG Trainee [*n*(%)]			Total trainees [*n*(%)]
	1st	2nd	3rd	
Anaesthesiology	15 (9.0)	12 (7.2)	10 (6.0)	37 (22.3)
General surgery	21 (12.7)	17 (10.2)	17 (10.2)	55 (33.1)
Oral and maxillofacial surgery	2 (1.2)	2 (1.2)	2 (1.2)	06 (3.6)
Ophthalmology	8 (4.8)	6 (3.6)	5 (3.0)	19 (11.5)
Otorhinolaryngology	6 (3.6)	5 (3.0)	5 (3.0)	16 (9.6)
Orthopaedics	3 (1.8)	3 (1.8)	3 (1.8)	09 (5.4)
Obstetrics and gynecology	8 (4.8)	8 (4.8)	8 (4.8)	24 (14.5)

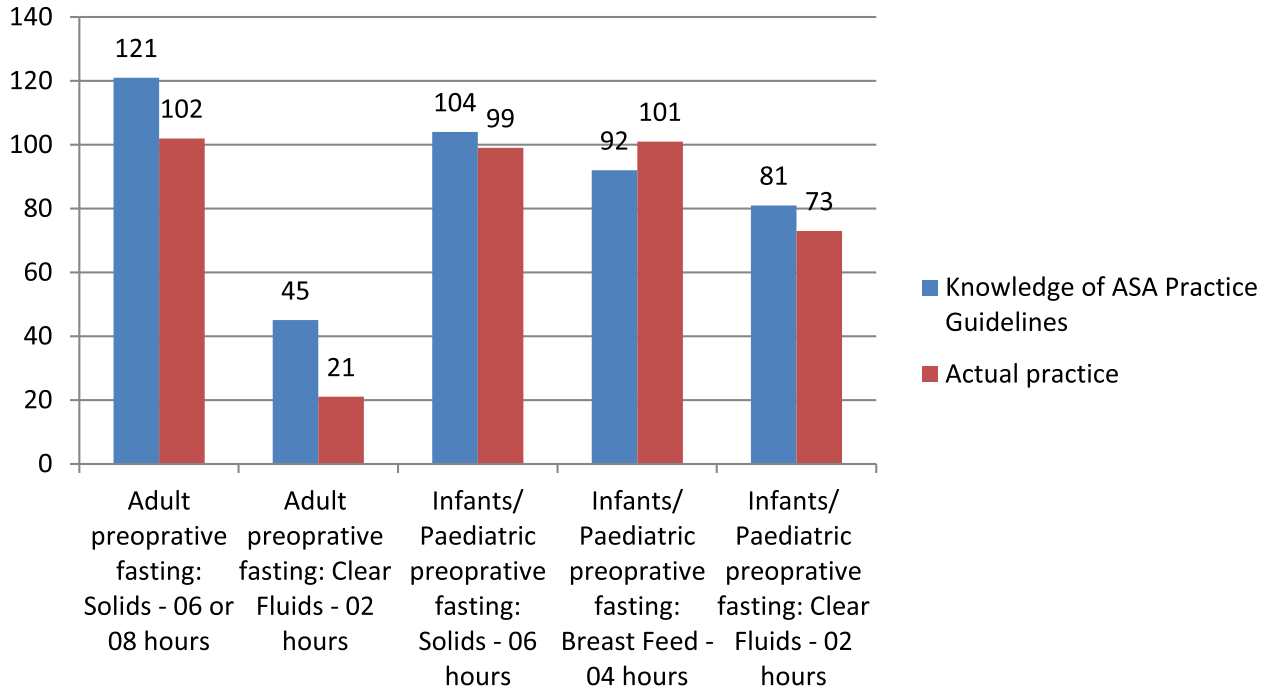

Fig. 1 Knowledge and actual practice of preoperative fasting by postgraduate trainee respondents

perceived limiting factors by PGT with respect to the implementation of ASA published guidelines pertaining to preoperative fasting are presented as Fig. 4.

Discussion

The international guidelines on preoperative fasting have been officially issued by ASA in 1999 and were revised recently in 2017 (Practice Guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration, 2017). According to it, the minimum fasting period for solid is 06 h and clear fluid is 02 h. Most of the international guidelines have recognized the adverse effect of prolonged fasting and embraced liberal preoperative fasting guidelines whose benefits include reducing insulin resistance, improved well-being, and faster postoperative recovery (Ljungqvist et al., 2017). Despite the various guidelines, the practice of overnight fasting,

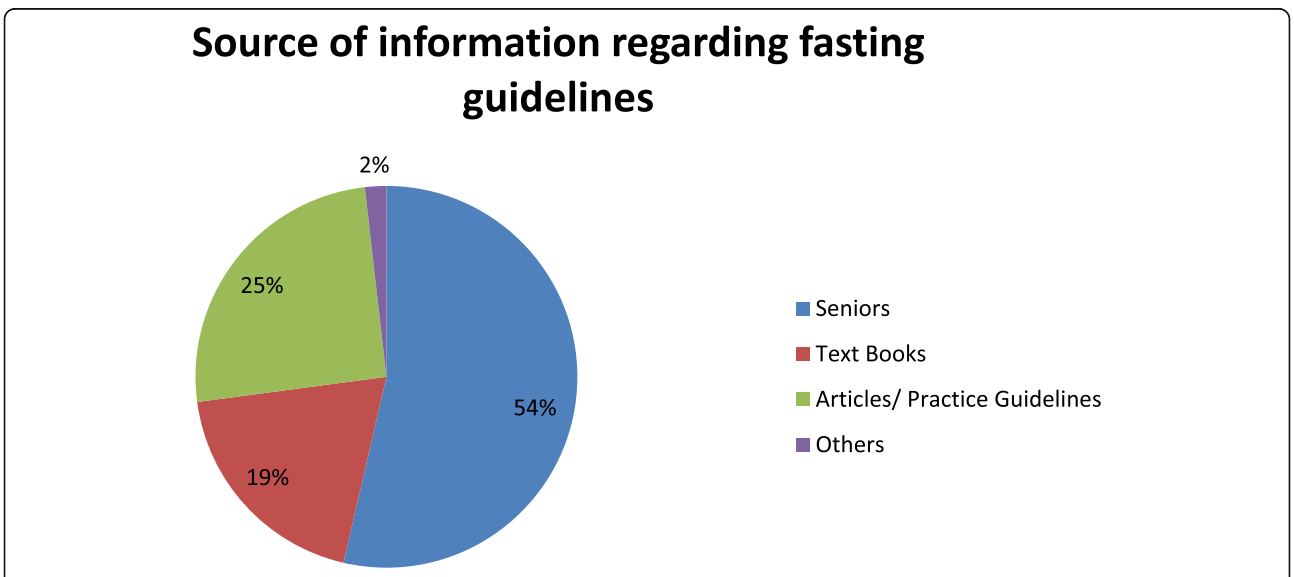

Fig. 2 Summary of source of information regarding fasting guidelines of postgraduate trainee respondents

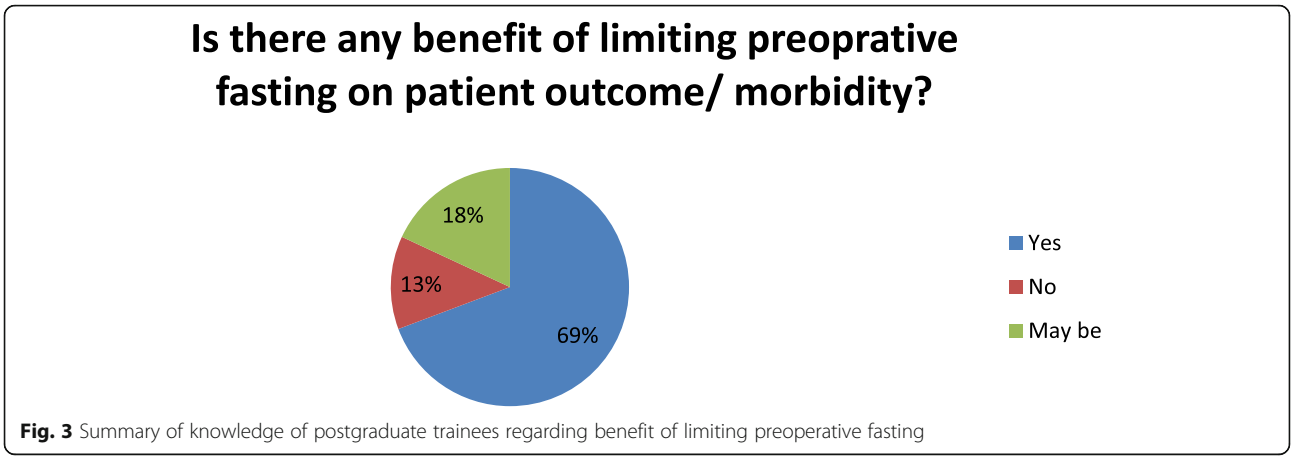

Fig. 3 Summary of knowledge of postgraduate trainees regarding benefit of limiting preoperative fasting

popularly known as "NPO after midnight," is the norm in most of the hospitals.

Previously a national wide study regarding the knowledge, attitude, and practice of preoperative fasting guidelines was carried out amongst anesthesiologists (Panjiar et al., 2019). However, this is the first study to assess amongst the PGT of various surgical specialties, including anesthesiology. The rationale behind this study is that in various hospitals especially the training institutes the perioperative patient management is a team-based approach comprising the consultants and the PGT. However, it is the PGT who primarily executes the instructions of consultants which are then practically followed by the patients in the ward.

Our study found that 89 (54%) of the PGT participants gained knowledge about the fasting guidelines from their seniors, that is verbal knowledge, 42 (25%) read about the guidelines from standard textbooks, 32 (19%) read from the articles, and 03 (2%) from other sources with no statistically significant difference between the response based on year of residency of PGT. This analysis revealed that as in the medical education system, the

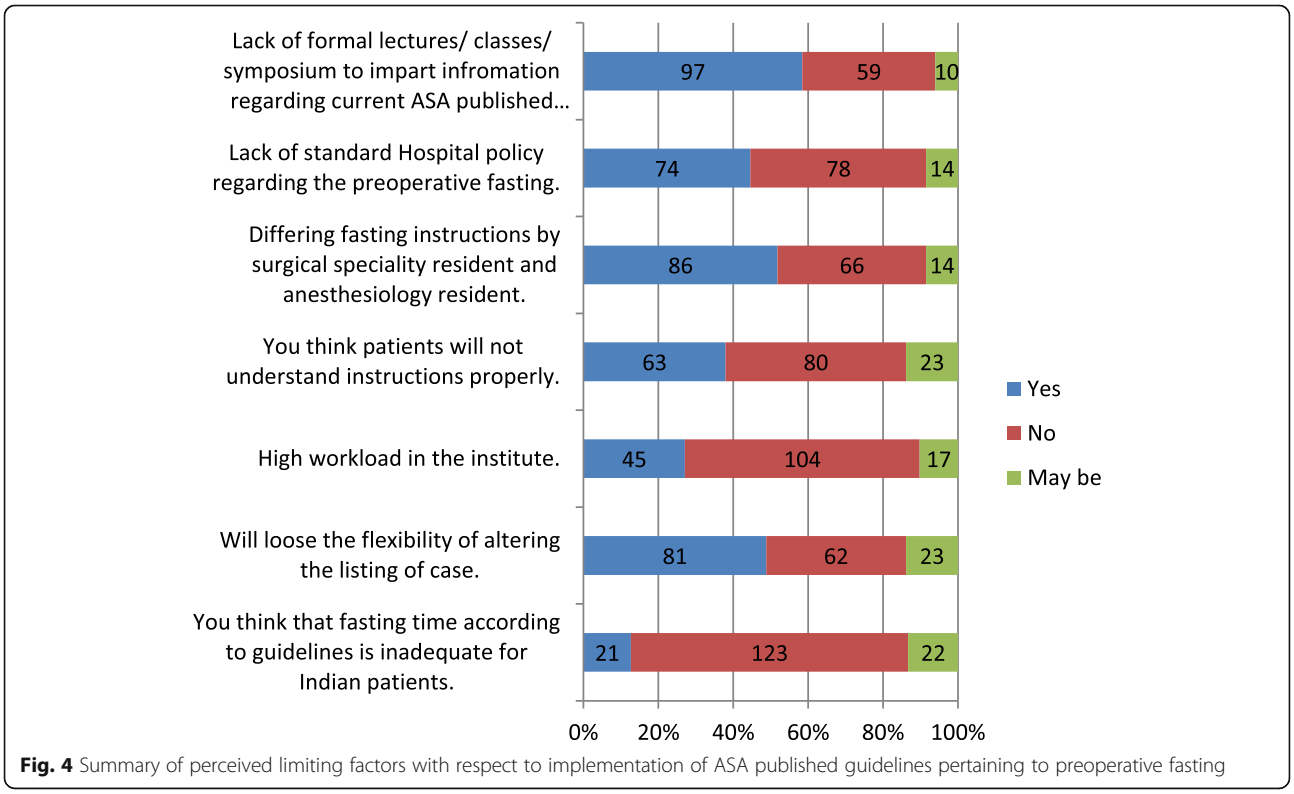

Fig. 4 Summary of perceived limiting factors with respect to implementation of ASA published guidelines pertaining to preoperative fasting

commonest source of practical knowledge is always the seniors the so called "the first teachers" and this remained so in all years of residency. Such a source of information is easily accessible and fast to acquire but does carry an element of risk of incomplete concepts and could lead to malpractices. The most accurate source of information comes from the textbooks and the standard guidelines/articles published in indexed high-impact journals. The study shows that only 74 (44%) of PGT gained the knowledge from such sources. This finding unmasks a gap in postgraduate training in which there is a lack of exposure and a habit of referring to books and the standard guidelines/articles for clinical problems and practices amongst PGT. This can be overcome by sensitizing the PGT in the initial months of training regarding the benefits of the same and correct technique of doing the same, given a plethora of medical literature available as open source.

This study revealed that although 115 (69%) of PGT were aware of the various benefits of limiting the fasting period; however, there is a wide discrepancy in the implementation of correct fasting guidelines in clinical practice with respect to clear fluids in adults. Similar results were shown by surveys amongst Lebanese anesthesiologists (Dagher et al., 2019) and Srilankan healthcare workers (Gunawardhana, 2012) that even though the residents were aware of the current guidelines, only a few implemented them in clinical practice. 45 (27%) of PGT respondents correctly described the fasting requirement for clear fluids in adults but only 21 (12%) instructed the same to the patients. According to our study, the major reason for the inability to practice the guidelines was the lack of formal teaching of the PGT to acquaint them with the latest guidelines as 97 (58%) responses are in its favor. This points out strongly towards the lack of teaching and training curriculum and opens scope for huge improvement. Implementing guidelines in clinical practice through formulations of SOP is a well-proven tool in the world of medicine. The response to lack of SOP, regarding preoperative fasting, contributing to non-implementation of the fasting guidelines in the clinical practice got an equivocal response as 74 (45%) PGT considered it to be the contributing factor. This indicates that formulation of SOP and acquitting the PGT to the SOP will improve the implementation of the guidelines in clinical practice as 45% is a substantial subset of the study population.

Another major factor as responded by 81 (49%) for non-implementation of the guidelines is the fear amongst respondent PGT of losing the flexibility of listing of cases. This brings to focus, a very important aspect that there is a need to lay emphasis on the benefits of limiting the fasting period in the perioperative period and its positive impact on the patient outcome amongst the PGT. This will leave a positive impression amongst PGT which will help the team overcome the fear of losing the flexibility of listing of cases. The authors also strongly believe a meticulous team-based planning of operation theatre lists will also help achieve the targets of correct practice of guidelines without negatively affecting the operation theatre lists.

Our study also revealed that 86 (52%) PGT believed that discrepancy amongst the anesthesiologists and the surgeons in giving the NPO instruction leads to ineffective implementation of fasting guidelines in the clinical practice. This can very well be overcome by effective team dynamics and approaches to achieve the singular goal of better patient outcomes. Surprisingly 104 (63%) of the PGT felt high workload is not the reason for the lack of implementation of fasting guidelines, as in daily medical practice high workload is commonly attributed to non-implementation of appropriate fasting guidelines. Effective implementation of the fasting guidelines requires individualized instructions for all patients thus increasing the preoperative workload of PGT. This response in the study speaks volumes of the perioperative team efforts and further strengthens the belief of the authors that few steps can bring major perioperative positive outcomes.

Based on the study, we suggest a few recommendations for effective implementation of the preoperative fasting guidelines in clinical practice. Formal training of the PGT through interactive discussions and symposiums should be incorporated in the teaching curriculum especially in the first 6 months of the course with lateral integration of the PGT of various surgical specialties to achieve a uniform platform of knowledge and attitude towards the perioperative fasting. Formulation of institutional SOP on the subject should be ensured keeping in view the individual institution's peculiarities and limitations and simultaneously incorporation of correct guidelines. Regular inter-departmental interactive sessions should be conducted to lay emphasis on perioperative benefits of the guidelines, its implementation and to make workable solutions to any practical challenges posing difficulties in policy implementations.

To bring about a change in the common clinical practice is a complex process, various stakeholders like anesthesia team, surgical team, nursing staff, and the patient must participate in a positive manner towards this direction to achieve the goals. The abovementioned recommendations are based on the results of the survey; however, there would be various other methods to substantially achieve the targets.

This study is an observational study has limitations inherent to the design of the study. This study could have included other stakeholders including patients and

nursing staff to find out the exact lacunae in the system leading to ineffective implementation of fasting guidelines.

Conclusions

Our study suggests an imminent need for change in the knowledge, attitude, and practices of residents with regard to preoperative fasting practices. A holistic approach including the surgeons, anesthesiologist, nursing staff, and patients with formal teaching and hospital SOP can achieve the change in longstanding practice of "NPO after midnight."

Abbreviations

NPO: Nil per os; ASA: American Society of Anaesthesiologists; ERAS: Enhanced Recovery after Surgery; PGT: Postgraduate trainees; SOP: Standard operating procedure

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Authors' contributions

NG was the major contributor in formulation of the study concept, study design, defining the intellectual content and performing the literature search, and was instrumental in manuscript preparation and review. **SP** was the major contributor in formulation of the study concept, study design, performing literature search, manuscript preparation, and manuscript review. **LBL** was the major contributor in the data acquisition, data analysis, statistically analysis of data, and manuscript editing. **AJ** contributed to the literature search, data acquisition, and manuscript preparation and its editing. **DD** contributed to the data analysis, statistical analysis of data, manuscript editing, and manuscript review. The authors read and approved the final manuscript.

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Availability of data and materials

The datasets analyzed during the current study available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the ethics committee of AFMC, Pune, Maharashtra, India, with approval number IEC/2020/08 dated on May 5, 2020. The subject participant provided verbal consent which was approved by the ethics committee.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

[1]Military Hospital, Dinjan, India. [2]Air Force Hospital, Jorhat, India. [3]Military Hospital, Agra, India. [4]Military Hospital, Rajouri, India. [5]Command Hospital (Eastern Command), Kolkata, India.

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