

## Breaking the midnight fast: An observational cross-sectional audit of preoperative fasting policies and practices at a Tertiary Care Hospital

### INTRODUCTION

The origins of pre-operative fasting guidelines can be traced back to 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'.<sup>[1]</sup> In 1946, Mendelson discovered that vomiting during labour and obstetric anaesthesia led to respiratory distress due to pulmonary aspiration of gastric hydrochloric acid.<sup>[2]</sup> Following this highly publicized discovery, it became common practice to keep patients fasted from midnight before surgery. The nil by mouth (NBM) from midnight pre-operative fasting policy is easy to administer, isn't questioned by staff or patients and allows for alterations in the order of the operative list.<sup>[3]</sup>

In 1986, Maltby *et al.* showed that giving patients a drink of water up to 3 h before surgery did not increase the gastric volume or acidity of gastric contents.<sup>[4]</sup> The American Society of Anaesthesiologists (ASA) first published in 1999 and later updated in 2011, 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.<sup>[5]</sup>

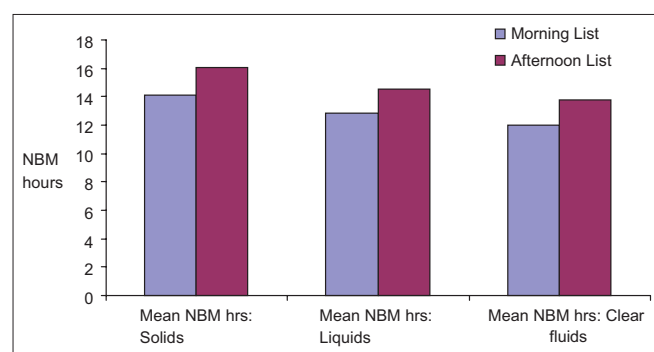
It is found that patients are still being fasted for

inappropriately long periods pre-operatively.<sup>[6,7]</sup> We audited the prevailing pre-operative fasting protocols followed in the surgical departments at our institute and made practical recommendations to replace the NBM from midnight pre-operative order with a shortened fasting protocol based on current evidence.

## METHODS

Approval from the research and Ethics Committee was obtained for this observational cross-sectional study. Over 1 month period, healthy ASA grade I patients of all ages posted for elective non-obstetric surgery at our institute were included in the study. Patients posted for emergency surgeries and abdominal surgeries that required bowel preparation were excluded. Patients with co-morbid conditions, which can delay gastric emptying such as diabetes, pregnancy, gastro-oesophageal reflux disease, obesity, ileus or bowel obstruction, enteral tube feeding were also excluded from the study.

Residents in anaesthesiology were trained to interview all pre-operative patients and fill out an audit form that included patient's particulars, medical diagnosis, surgical procedure, ASA grade and hours of fasting for solids, liquids and clear fluids. The time at which the patients were induced for surgery was recorded later and any perioperative adverse events such as aspiration/regurgitation were noted. Patients were started on intravenous fluids after being shifted into the operating room.



**Figure 1:** Co-relation between induction time and fasting time

All statistics were carried out using Graph Pad Instat version 3.10 for Windows 95, Graph Pad Software, San Diego California USA, ([www.graphpad.com](http://www.graphpad.com)). Sample size calculation was carried out *a priori* with statistical power level of 80%, alpha level of 0.05 and effect size (Cohen's d) of 0.5. Minimum total sample size was calculated to be 128. Since, the data did not follow Gaussian distribution, non-parametric tests were used for the statistical analysis.

$P < 0.05$  were considered significant.

## RESULTS

A total of 152 patients were included in the study. The mean age of sample population was 32.4 years, ranging from 4 months to 60 years, and standard deviation was 15.5 years. There were 21 paediatric patients aged 16 or below. 83 patients were male and 69 were female.

The pre-operative fasting times for solids, liquids and clear fluids in the sample population is shown in Table 1. Wilcoxin signed rank test was used to compare the mean fasting times for solids and clear fluids against the shortened fasting guidelines of 6 h for light meal and 2 h for clear fluids. The difference was found to be extremely significant ( $P < 0.0001$ ). The mean pre-operative fasting times for paediatric patients were comparable to those for adult patients.

To study the co-relation between induction time and pre-operative fasting time, the patients in the study were divided into two lists based on whether they were induced for surgery before or after noon. Mann-Whitney test was used to compare the mean fasting times between the morning and afternoon lists. The difference was found to be extremely significant ( $P < 0.0001$ ), suggesting that patients taken in the afternoon list are being fasted for much longer periods compared to patients taken in the morning list. Figure 1 shows the co-relation between induction time and pre-operative fasting time.

There was no incidence of aspiration/regurgitation or related morbidity during the study.

**Table 1:** Pre-operative fasting times for solids, liquids and clear fluids

Pre-operative fasting times	Mean hours (adult/paediatric)	Standard deviation (h)	Range (h)	95% confidence interval (h)
NBM hours: Solids	14.7/14.7	3.4	6-37	14.1-15.2
NBM hours: Liquids	13.3/12.0	3.0	3-26	12.8-13.8
NBM hours: Clear fluids	12.4/11.8	2.7	3-19	12-12.9
NBM – Nil by mouth				

## DISCUSSION

It was found that 152 healthy patients that were posted for elective non-obstetric surgery at our institute over 1 month were all being fasted for inappropriately long periods. The mean pre-operative fasting times for solids, liquids and clear fluids were all over 12 h. Patients operated in the afternoon had been fasting for even longer periods.

These findings are similar to those reported by Crenshaw and Winslow, who interviewed 155 patients posted for elective surgery in a hospital in North America in 2002.<sup>[6]</sup> Gunawardhana performed an audit of 235 patients posted for elective surgery in June and July 2010 at the National Hospital of Sri Lanka, and found that mean pre-operative fasting times for solids and clear fluids were 13.8 and 12.8 h respectively.<sup>[7]</sup>

A Cochrane intervention review of pre-operative fasting concluded that keeping patients on a shortened pre-operative fast as opposed to fasting from midnight, does not have a significant effect on gastric fluid volume or pH and thus doesn't increase the risk of pulmonary aspiration.<sup>[3]</sup> Allowing patients to have clear fluids 2 h before surgery has the added benefits of increasing patient comfort and decreasing the incidence of perioperative dehydration, hypoglycaemia and vomiting. Though intravenous fluids given during the fasting period can correct the deficit, it doesn't relieve the patient's dry mouth and feeling of thirst. Overnight fasting has been shown to cause post-operative insulin resistance and immuno-depression, which can be avoided by following a shortened fasting protocol.<sup>[8]</sup>

Health-care professionals all over the world who have been trying to implement evidence-based pre-operative fasting guidelines in their health centres are defeated by three myths, believed by patients, nurses and doctors:<sup>[9,10]</sup>

Firstly, that fasting from midnight is the best way to reduce the risk of vomiting and pulmonary aspiration during anaesthesia. Secondly, that the gastric emptying time of clear fluids is same as other liquids such as milk and coffee and clear fluids ingested 2 h before surgery can increase the risk of vomiting and pulmonary aspiration. Thirdly, that there is no harm in keeping patients fasted from midnight and changing the fasting guidelines will cause confusion among patients and lead to cancellation of scheduled operations.

<b>Pre-operative fasting order sheet</b>			
<b>To be filled by the surgical resident:</b>			
When is the patient intended to be taken up for surgery (tick): before noon ( ) or afternoon ( )			
Does the patient have the following co-morbid conditions associated with delayed gastric emptying?			
Diabetes (Y/N)	Obesity (Y/N)	Gastro-oesophageal reflux disease (Y/N)	
Bowel obstruction (Y/N)	Pregnancy (Y/N)	Enteral tube feeding (Y/N)	
<i>If the answer for the above is NO, the patient can be allowed to follow a shortened pre-operative fasting protocol.</i>			
Shortened pre-operative fasting order: (tick)			
This patient may have: ( ) A solid meal up to 10 PM			
( ) A light meal (toast and tea) up to 2 AM			
( ) A drink of water at 7 AM			
<b>To be filled by the nursing staff in the ward:</b>			
Has the patient been given a glass of water at 7 AM? (Y/N)			
<b>To be filled by the nursing staff in the pre-operative room:</b>			
Has the patient been given a glass of water in the ward? (Y/N)			
Is the patient intended for surgery in the afternoon? (Y/N)			
<i>If the patient is intended for surgery in the afternoon, the Anaesthesiology resident in the pre-operative room is to be informed.</i>			
<b>To be filled by the Anaesthesiology resident in the pre-operative room:</b>			
This patient, who will be taken to the operating room in the afternoon, may be offered a glass of water (Y/N)			
<b>To be filled in by the Anaesthesiology resident in the operating room:</b>			
Was the patient given a glass of water in the ward at 7 AM? (Y/N)			
If received in the operating room in the afternoon, was the patient offered a glass of water in the pre-operative room? (Y/N)			
When did the patient last consume:	Solid meal:	Liquids:	Clear fluids:

**Figure 2:** Sample preoperative fasting order sheet

A sample pre-operative fasting order sheet has been created [see Figure 2] which will be distributed to all the surgical departments at our institute. The order sheet is designed to provide a series of checks at various levels to prevent inappropriately long pre-operative fasting in healthy patients posted for elective surgery. The surgical residents and nursing staff in surgical wards have been made aware of current evidence-based fasting guidelines and on the use of this pre-operative fasting order sheet.

## CONCLUSION

An audit conducted at our institute revealed that patients are being subjected to prolonged pre-operative fasting. This information has been communicated to the concerned surgical departments, and with their cooperation, definitive measures are being taken to prevent this. We will conduct an audit after 3 months to determine whether there has been any change in the pre-operative fasting protocols at our institute. Through education and evidence and eternal vigilance, we may one day not find an order of NBM from midnight in pre-operative order sheets.

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