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ORIGINAL RESEARCH

An audit investigating the practice of preoperative fasting and the administration of medication to patients during the nil per mouth period in Metro East district hospitals

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Background: Fasting before anaesthesia is an important practice aimed at preventing the aspiration of gastric contents. However, extended fasting periods have been associated with adverse effects. Despite international guidelines, evidence suggests that patients often experience extended fasting times beyond these recommendations. This study evaluated preoperative fasting durations and medication administration practices within the Metro East Health District of Cape Town.

Methods: This descriptive study was conducted across four hospitals in the Cape Metro East Health District: Eerste River, Helderberg, Karl Bremer, and Khayelitsha. A total of 162 patients were enrolled. Eligible participants were aged 18 years or older, undergoing elective or urgent surgical procedures, and admitted more than six hours before surgery. Data on fasting duration, alignment with international fasting guidelines, and medication administration were collected using structured questionnaires. Statistical analysis included one-way ANOVA for fasting times and chi-square tests for categorical variables.

Results: The average fasting durations observed were 14.25 hours for solid foods and 13.10 hours for fluids, which significantly exceeded the recommended guidelines. There were no statistically significant differences in fasting durations between hospitals. Only 17.90% of patients' fasting instructions conformed to the international guidelines. Correct fasting instructions correlated with a significant reduction in fasting time for solids. However, no decrease was observed for fluids. The reduced fasting time for solids still exceeded acceptable practice. Adherence to medication protocols during the nil per mouth (NPM) period was notably poor.

Conclusion: Metro East Health District patients experience prolonged fasting durations that exceed recommendations. Contributing factors include inaccurate fasting instructions by doctors and suboptimal medication administration by nursing staff during the NPM period. Research is needed to develop interventions to improve NPM fasting times and medication administration.

Keywords: nil per mouth, preoperative fasting, prolonged fasting, preoperative medication

Introduction

Fasting before anaesthesia to prevent the aspiration of gastric contents into the lungs is standard practice.[1] The recommended fasting time before elective procedures is eight hours for a meaty or fatty meal, six hours for a lighter meal, infant formula, or non-human milk, four hours for breast milk, and two hours for clear fluids.[2,3] Additionally, the ingestion of clear fluids such as water, juice, tea, coffee without milk, and pulp-free juice up to two hours before surgery is encouraged.[2,3]

Prolonged fasting can lead to complications such as headache, dehydration, hypotension, hypoglycaemia, ketonuria, insulin resistance, and psychological discomfort.[4-6] In vulnerable patients, such as those at extreme ages or with severe illness, prolonged fasting can result in more severe complications. These can include acute kidney injury and intraoperative haemodynamic instability.[7,8] Shorter preoperative fasting periods can prevent these complications and decrease postoperative nausea and vomiting, and insulin resistance.[4,9]

Three South African studies, each conducted at tertiary-level hospitals, evaluated preoperative fasting times. In a study of paediatric patients in Cape Town, Kouvarellis et al.[11] found that children were not offered clear fluid during the nil per mouth (NPM) period and frequently experienced prolonged fasting before elective procedures. In a study conducted at a tertiary hospital, Morgan et al.[6] reported prolonged fasting associated with significant hypoglycaemia and dehydration in obstetric patients awaiting caesarean section. Also, Lamacraft et al.[10] reported prolonged fasting times across various surgical disciplines at a tertiary hospital. No studies have yet investigated fasting periods in district hospitals in South Africa.

This study is the first to evaluate preoperative fasting practices within the district healthcare setting and the first multicentre study of its kind in South Africa. In a primary healthcare system such as South Africa's, understanding preoperative care at the district level is essential as surgical services continue to expand across this tier of the health system.

It is recommended that patients continue to receive chronic medication for common conditions during the NPM period.[2,12] The perioperative management of chronic medical conditions is outlined in various guidelines.[4,5,13,14] Administration of chronic medication during the perioperative period, including the NPM

period, is crucial in minimising adverse outcomes and ensuring perioperative patient safety.[12] Despite this, evidence suggests poor adherence to these guidelines.[15] An international review attributed the incorrect administration of chronic medication during the NPM period to unclear preoperative instructions.[16] A local study identified inadequate knowledge of NPM guidelines among nursing staff as a contributing factor to the lack of medication administration during the fasting period.[17] Preoperative care outside tertiary hospitals in South Africa remains poorly documented, with limited data on preoperative fasting times, doctors' fasting instructions, and medication administration during the NPM period.

Methods

This prospective, multicentre, observational study assessed district patients' preoperative fasting durations, doctors' instructions for fasting, and medication administration practices. Ethical approval was obtained from the Stellenbosch University Health Research Ethics Committee (reference number N22/10/122) and each facility's health research ethics committee or clinical manager, if applicable (reference numbers WC_202302_008, WC_202303_006, and WC_202301_008). This study was conducted following the 2013 Declaration of Helsinki (World Medical Association Declaration of Helsinki 2013:2191) and the South African Good Clinical Practice Guidelines (Department of Health, South African Good Clinical Practice 2020). Written, informed consent was obtained from all participants by the recruiting doctor. Consent forms were available in English, Afrikaans, and isiXhosa. Participants could withdraw from the study at any point. This study was conducted and reported per the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines, as recommended by the EQUATOR Network.

The study was conducted at Eerste River Hospital, Helderberg Hospital, Karl Bremer Hospital, and Khayelitsha District Hospital. These hospitals are part of the Metro East District Health Services in Cape Town and collectively handled around 16 000 theatre cases in 2021. The sample size was calculated to achieve the primary objective of describing preoperative patients' fasting times. A target of 150 patients was determined to ensure a precision (half-width) of ± 0.924 hours (i.e. 55 minutes and 44 seconds) for a 95% confidence interval (CI) around the population mean. This calculation was based on data from two local studies (Morgan et al.[6] and Kouvarellis et al.[11]), using the more conservative calculation from Morgan et al.[6] Recruitment at each hospital was proportional to its share of the total annual surgical caseload across all participating sites.

Convenience sampling was used. Medical doctors at the different hospitals identified and recruited patients who met the inclusion criteria. The patients were identified on arrival in the theatre waiting area or during the preoperative assessment. Informed consent for the study was obtained, and a questionnaire was completed. The questionnaire included two questions on fasting duration, two regarding fasting instructions, and twelve regarding medication prescription and administration. All questions were yes/no questions. Selection bias was minimised by utilising different doctors at each facility for data collection. Patients were recruited in consecutive order, where feasible.

Patients aged 18 years or older who were awaiting elective or urgent surgical procedures, had been in the ward for more than six hours before surgery, and required preoperative fasting were included. Patients undergoing emergency procedures that precluded fasting were excluded from the study.

Data were tabulated in Excel® and checked against physical source documents for errors or omissions. A one-way ANOVA was used to determine whether fasting times differed between hospitals. A chi-square test of independence was used for categorical data (e.g. whether the frequency by which hospitals issued written instructions differed). The significance level for all statistical tests was set at $p < 0.05$. Statistical testing was performed using the statistical program R. A biostatistician assisted with the statistical analysis.

Results

Questionnaires were analysed for 164 patients awaiting anaesthesia. Two questionnaires were excluded due to missing data (Figure 1).

Fasting time

On average, patients fasted for 14 hours and 15 minutes for solids, and 13 hours and 6 minutes for fluids. Tables I and II show

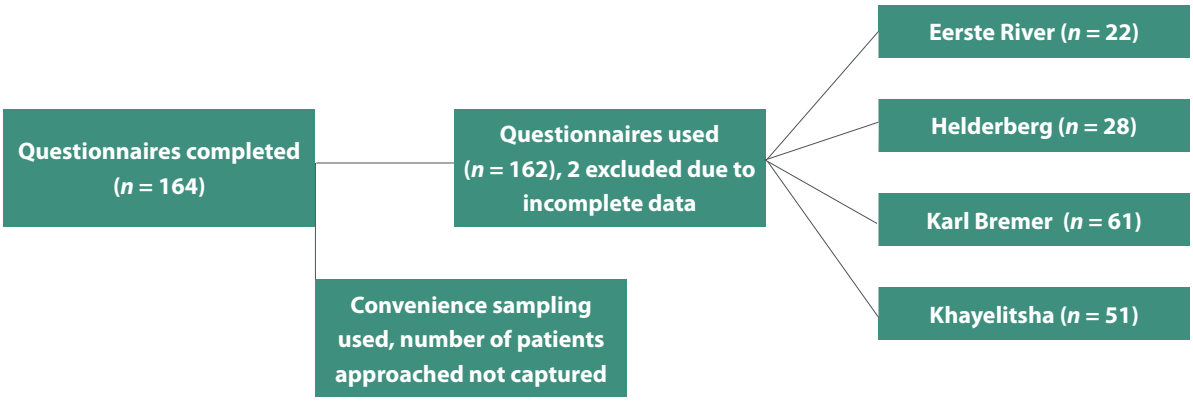

Figure 1: Study flow diagram

Table I: Descriptive statistics for hours fasted from solids (n = 162)

Hospital	*n*	Mean duration (hours)	SD	95% CI
Eerste River	22	14.76	2.56	13.62 to 15.89
Helderberg	28	13.74	2.48	12.78 to 14.70
Karl Bremer	61	14.91	4.20	13.83 to 15.99
Khayelitsha	51	13.52	2.38	12.85 to 14.18
Overall	162	14.25	3.26	13.74 to 14.75

CI – confidence interval, SD – standard deviation

Table II: Descriptive statistics for hours fasted from fluids (n = 162)

Hospital	*n*	Mean duration (hours)	SD	95% CI
Eerste River	22	13.23	3.20	11.81 to 14.65
Helderberg	28	12.83	3.41	11.51 to 14.16
Karl Bremer	61	13.08	4.55	11.92 to 14.25
Khayelitsha	51	13.23	2.39	12.55 to 13.90
Overall	162	13.10	3.58	12.55 to 13.66

CI – confidence interval, SD – standard deviation

each facility's independent fasting times for solids and fluids, respectively.

The descriptive statistics show that the variances between facilities are similar. A one-way unbalanced analysis of variance (ANOVA) test was applied to determine whether there were significant differences between hospitals. This showed no statistical difference between hospitals in fasting times for solids (p = 0.09) or fluids (p = 0.97). Table III further details the differences in fasting times between the various hospitals, none of which were statistically significant.

Fasting instructions

Of the patients included in the study, 71.16% (n = 116) had written instructions for fasting; however, only 17.90% (n = 29) had instructions that aligned with the local and international guidelines. An ANOVA test was used to assess whether having written fasting instructions (correct or incorrect) affected the fasting time. It was found that written instructions did not significantly affect the fasting time for solids (mean difference [MD] 0.19, 95% CI -0.89 to 1.28; p = 0.72) or fluids (MD -0.23, 95% CI -1.52 to 1.05; p = 0.72).

In contrast, instructions aligned with guidelines led to shorter fasting times for solids (MD -1.38, 95% CI -2.44 to -0.31; p < 0.05). The same was not true for the fasting time of fluids, which was only marginally shortened (MD -0.20, 95% CI -1.37 to 0.96; p = 0.7345). Although instructions aligned with international standards were associated with shortened fasting times for solids, the fasting time did not decrease enough to align with the prescribed fasting time of eight or six hours for a meal.

The Pearson chi-square test was used to determine whether there was a difference in the frequency of instructions for fasting among the hospitals. There was no significant difference between facilities regarding how often instructions for fasting were written (p = 0.19).

There was a significant difference between facilities' accuracy of instructions aligning with international standards (p < 0.001). Khayelitsha Hospital was the most accurate in prescription

Table III: Comparison of individual facilities' fasting times as MD and 95% CI

Hospital	Comparison hospital	Solids or fluids	MD	95% CI
Eerste River	Helderberg	Solids	1.01	-0.40 to 2.42
Eerste River	Karl Bremer	Solids	-0.15	-1.66 to 1.35
Eerste River	Khayelitsha	Solids	1.24	-0.01 to 2.49
Helderberg	Karl Bremer	Solids	-1.17	-2.57 to 0.23
Helderberg	Khayelitsha	Solids	0.23	-0.90 to 1.35
Karl Bremer	Khayelitsha	Solids	1.39	0.16 to 2.63
Eerste River	Helderberg	Fluids	0.40	-1.44 to 2.24
Eerste River	Karl Bremer	Fluids	0.15	-1.61 to 1.91
Eerste River	Khayelitsha	Fluids	0.01	-1.48 to 1.50
Helderberg	Karl Bremer	Fluids	-0.25	-1.95 to 1.45
Helderberg	Khayelitsha	Fluids	-0.39	-1.82 to 1.03
Karl Bremer	Khayelitsha	Fluids	-0.14	-1.46 to 1.17

CI – confidence interval, MD – mean difference

(31.37%), and Karl Bremer Hospital was the least accurate (4.92%). This may have contributed to Khayelitsha having the shortest fasting time for solids of the four facilities.

Medication administration

Chronic medication was prescribed in 66 cases and administered as prescribed in 30 cases (45.45%). There was no significant difference between facilities in the frequency of prescribing chronic medication ($p = 0.29$) or in the correctness of administering chronic medication as prescribed between the facilities ($p = 0.20$).

Oral pain medication was prescribed in 94 cases and given as prescribed in 40 cases (42.6%). There was significant variation between facilities in the frequency of pain medication prescriptions ($p < 0.001$). Karl Bremer Hospital proportionally prescribed more oral pain medication. There was a significant difference in the correct administration of oral pain medication between facilities ($p < 0.01$). Khayelitsha Hospital was most accurate in administering oral pain medication, with 72.41% of medication administered as prescribed. Intravenous or intramuscular analgesia was only prescribed in 11 cases and administered as prescribed in seven.

Intravenous antibiotics were prescribed in 24 cases, of which 20 received antibiotics as prescribed (83.3%). There was significant variation between facilities administering intravenous antibiotics ($p < 0.001$), likely due to the smaller sample size.

Intravenous fluids were prescribed in 24 cases and administered correctly in 16 cases (66.7%). There was no significant difference between hospitals regarding the prescription ($p = 0.18$) or administration ($p = 0.21$) of intravenous fluid.

Discussion

Prior to this study, limited data were available on preoperative fasting and medication administration during the NPM period outside tertiary hospitals in South Africa. This study provides a clear overview of current practices. As surgical and anaesthetic services expand within the district health system, these findings help inform strategies to optimise preoperative care and enhance patient satisfaction.

Fasting times

This study demonstrates that patients fast significantly longer than the recommended guidelines for solids and fluids. The fasting times observed in this district-level study are consistent with findings from previous studies conducted at South African tertiary-level hospitals.[6,10,11] A recent international review of paediatric patients identified three primary barriers to optimal fasting times: patient-related (consumer), staff-related, and organisational factors.[18] However, the factors contributing to prolonged fasting times in the local context remain poorly understood.

Interventions to obtain shorter fasting times have been the subject of various quality improvement projects. The use of carbohydrate drinks before surgery has been explored as an intervention and is shown to be safe.[19] However, a recent review from the National Institute for Health and Care Excellence (NICE) found no additional benefit from carbohydrate-containing drinks compared to water. The committee recommended water before surgery and glucose-containing drinks only in selected cases.[20]

A scoping review by Dulay et al.[18] reported 13 studies that investigated several interventions in the paediatric population. This included fasting policy changes, technology-based strategies, individualised fasting programmes, improved communication, and staff education. Some improvement in fasting times was demonstrated in 11 studies. Most studies showed a decrease in fasting time by at least two hours. However, the outcome measures were too diverse to allow direct comparison.[18]

The most notable study was by Nye et al.,[21] where the fasting time was decreased by six hours and 48 minutes by introducing a standardised, clear liquid diet on the morning of surgery. Wiles et al.[22] conducted a promising quality improvement project in the United Kingdom, trialling a "sip till send" policy. This approach increased adult patient satisfaction and reduced fluid fasting times during the NPM period.[22]

Interventions to shorten fasting times face numerous challenges. Wiles et al.[22] noted that a prior programme incorporating awareness campaigns, staff education, and posters did not effectively mitigate fasting times below 11 hours.[22] Nye et al.[21] reported an institutional adoption rate of only 17.6% in their study, further highlighting the difficulty of implementing effective strategies. Future research is needed to evaluate the drivers of prolonged fasting, and to test specific intervention strategies that will have high institutional adoption in the local context.

Fasting instructions

This study highlights that fasting instructions written by doctors on prescription charts often do not align with established guidelines. This finding aligns with Lamacraft et al.,[10] who reported that 86.7% of patients were instructed to fast from solids for at least two hours longer than recommended, with only 19% receiving correct instructions for fluid fasting. In this study, fasting instructions that adhered to guidelines reduced fasting times for solids by over an hour. However, this reduction fell short of aligning with the guidelines.

Incorrect fasting instructions are likely multifactorial. Fasting instructions are often written by junior surgical doctors who may have limited knowledge of the current fasting guidelines. The unpredictability of theatre lists may prompt doctors to apply more conservative fasting instructions. Additionally, the perceived burden of individualising fasting orders may contribute to non-adherence. Further research is required to explore doctors' perspectives and practices regarding fasting instructions.

Medication administration

This study found that 45.45% of patients received their chronic medications as prescribed, with consistent findings across the four facilities studied. These results align with King et al.,[17] who found that only 48.5% of nursing staff reported administering chronic medications during the NPM period.

The accuracy of oral pain medication administration was low (42.55%), with some variability between hospitals, likely due to differences in local practices. This finding aligns with King et al.,[17] who found that 44.1% of nursing staff reported administering oral pain medications during the NPM period.

The administration rate of intravenous antibiotics during the NPM period was higher in the current study (83%). King et al.[17] found that 97.1% of nursing staff reported administering intravenous antibiotics. This higher adherence rate may be due to the perception that intravenous antibiotics do not transgress fasting instructions, unlike oral medications.

The close correlation between the medication administration in this study and the nursing perspectives reported by King et al.[17] suggests a potential link between staff perspectives and adherence to medication administration protocols. As this study was powered to assess fasting times, the smaller sample for medication administration limits the interpretability of these results.

Systematic barriers and future policy

The study highlights several systematic barriers to standardised perioperative care in the district setting. Implementing a fasting policy is challenging in a culture with an engrained "NPM from midnight" mindset. Practically, it is difficult to plan theatre lists as cases often get cancelled or added. The responsibility of ensuring an optimised NPM fasting period is not delegated to a specific group or speciality, with junior doctors on the surgical team usually responsible for writing fasting instructions.

An effective intervention should minimise fasting times, achieve high institutional uptake, and impose minimal additional workload on an already overburdened health system. It would require a flexible policy that accommodates fluctuating theatre schedules, with clearly defined responsibility for implementation assigned to a specific team or discipline. The "sip till send" initiative seems to be the most promising intervention at this stage.[22] The longstanding practice of universal midnight fasting should be reconsidered in our setting in light of current evidence.

Conclusion

This study demonstrates that patients at district-level hospitals experience prolonged fasting durations exceeding the recommended guidelines, partly due to incorrect fasting instructions. Medication administration during the fasting period is also suboptimal. These findings highlight the need for local research to identify the contributing factors and inform the development of effective, context-appropriate interventions with a high institutional uptake.

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Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Ethical approval was obtained from the Stellenbosch University Health Research Ethics Council before study commencement (project ID 2667 and ethics reference number N22/10/122). Initial approval was extended by the HREC till 15 November 2024.

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