Is not fasting before cardiac catheterisation better than fasting? A systematic integrative literature review

Tristin L Kimpton, Kim Ward

ABSTRACT

AIM: To synthesise international evidence about not fasting before cardiac catheterisation.

METHODS: We used a systematic, integrative literature review and applied quality assessment criteria.

RESULTS: Nine of 1,535 articles met the inclusion criteria. Critique and analysis of the literature revealed three themes: (1) Fasting before coronary angiography and angioplasty is associated with perceived risk management, not actual risk management. (2) Not fasting before coronary angiography and angioplasty is considered safe and beneficial for the patient when compared to the risks of fasting. (3) Current practice, evidence and guidelines are inconsistent.

CONCLUSION: Ongoing concerns regarding not fasting before cardiac catheterisation are related to perceived risk, not actual risk. Indeed, this review indicates that not fasting may optimise patient experience. Further large-scale research is needed in this area to support policy and practice change to a patient-centric fasting protocol.

Coronary artery disease (CAD) is the leading cause of death internationally and the second leading cause of death in New Zealand.1,2 The disease carries a significant health burden and affects more than 170,000 individuals across New Zealand.3 Cardiac catheterisation is the gold standard test for diagnosis of coronary artery disease.4 This procedure is minimally invasive and usually completed under conscious sedation. In recent years, the risks associated with this procedure have decreased substantially due to the development of equipment, peri-procedural care and operator experience.5 Accordingly, diagnostic angiography is commonly completed as an outpatient procedure, with many elective angioplasties following the same trend.6

Historically, patients undergoing coronary angiography and angioplasty have been required to fast in preparation for this procedure.7,8 However, scholars have questioned the evidence base for this practice, with some centres changing guidelines to remove fasting altogether.9,10 Concerns regarding eating before procedures relate to the possible increased risk for pulmonary aspiration, a serious event that can lead to pneumonia, respiratory compromise and death.11,12 However, fasting patients for an extended period could put patients at higher risk of other complications, including hypotension, contrast-induced nephropathy and hypoglycaemia.5,13 Allowing patients to eat and drink before coronary angiography positively affects the individual’s experience, improves patient satisfaction and reduces anxiety.14,16 In this context, we aimed to synthesise current international evidence about not fasting before cardiac catheterisation.

Methods

We used an integrative review to synthesise current evidence about not fasting before coronary angiography and
angioplasty. The integrative method is the broadest type of review, allowing the inclusion of studies with diverse methodologies, including both empirical and theoretical publications. This systematic approach facilitates an in-depth analysis and captures varied perspectives on a topic without the focus on hierarchical evidence types.

Searches were carried out via title, subject and keyword using the following online databases: MEDLINE, Scopus, the Cumulative Index to Nursing and Allied Health Literature (CINAHL Plus), Cochrane and Web of Science. The search terms listed in Table 1 captured variations of the terms “non-fasted,” “fasted,” “before,” “coronary angiography” and “coronary angioplasty.” Terms were combined using Boolean operators. Inclusion and exclusion criteria are listed in Table 2.

The initial search yielded 1,531 papers. After the removal of duplicates and screening by title and abstract, seven studies remained and were screened by full text. Four papers were added through reference checking and screened. Of these 11, nine studies were included in the review (Figure 1).

Data extraction was completed using a standard pro forma and included: relevance to the research question, study design and limitations. Studies were then assessed for quality and methodological rigour (Table 3). For research reviews, no gold standard for quality scores exists; the diversity of methodologies means criteria for quality assessment are variable. We chose the quantitative assessment tool developed by Hawker et al to assess empirical studies and abstracts. This tool evaluates each section of the study, including abstract, research aims and background, methodology and sampling, data collection and analysis, ethics and bias and research findings. Overall, the quality of available evidence was low. The quality of evidence published by Hamid et al and Bacus et al were rated as fair. The abstracts from Mishra et al and Li et al were rated as poor as they did not provide sufficient information to accurately assess some article sections using the evaluation tool. The opinion pieces, study protocols and nursing guidelines were considered grey literature and were not formally scored for quality.

Table 1: Search terms.

<table>
<thead>
<tr>
<th>Non-fasted</th>
<th>Fasted</th>
<th>Before</th>
<th>Coronary angiography and angioplasty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfasted</td>
<td>Fasting</td>
<td>Prior</td>
<td>Coronary angiography*</td>
</tr>
<tr>
<td>Fed</td>
<td>Fast</td>
<td>Pre-procedur*</td>
<td>Cardiac angiography*</td>
</tr>
<tr>
<td>Starve</td>
<td>Preprocedur*</td>
<td></td>
<td>Coronary catheteris-*ation</td>
</tr>
<tr>
<td>Starved</td>
<td></td>
<td></td>
<td>Cardiac catheteris-*ation</td>
</tr>
<tr>
<td>Nil by mouth</td>
<td></td>
<td></td>
<td>Coronary arteriogra*</td>
</tr>
<tr>
<td>Nil-by-mouth</td>
<td></td>
<td></td>
<td>Cardiac arteriogra*</td>
</tr>
<tr>
<td>NBM</td>
<td></td>
<td></td>
<td>Angioplasty</td>
</tr>
<tr>
<td>Nil per o*</td>
<td></td>
<td></td>
<td>Percutaneous coronary intervention</td>
</tr>
<tr>
<td>Nil-per-o*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* different endings expanded during search; * different spelling applied during search.
Figure 1: Flowchart of literature selection process.

Articles identified through database searches (n=1531)
- Medline (n = 426)
- Scopus (n = 222)
- CINAHL Plus (n = 59)
- Cochrane (n = 118)
- Web of Science (n = 706)

Total articles identified (n = 1535)

Duplicate records removed (n = 527)

Articles screened (n = 1008)

Articles excluded
- By title (n = 819)
- By abstract (n = 178)
  - Participants younger than 18 years
  - Studies including computed tomography coronary angiography
  - Animal or cellular studies
  - Medication efficacy studies

Full text articles reviewed (n = 11)

Full text excluded (n = 2)
- Did not include fasting or non-fasting times for coronary angiography or angioplasty

Articles meeting criteria and included in review (n = 9)
The process of thematic data analysis followed the six-phase approach outlined by Braun and Clarke: familiarisation with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing the report. Data from all studies were extracted and coded. Codes were catalogued and grouped in Microsoft Excel to allow for identification of themes. This theme-based approach to data extraction allowed information from a variety of sources to be compared and combined.

Results

Of the nine studies included in this review, there was one retrospective observational analysis of a data registry, one prospective observational study and two abstracts of randomised controlled trials from conference proceedings. There were three opinion pieces (two of which provided commentary on other studies included in this review), one published clinical guideline and one record from a clinical trials register. Three studies discussed both coronary angiography and angioplasty and five studies discussed coronary angioplasty only. Three studies did not outline whether included participants underwent coronary angiography or angioplasty. Seven studies commented on the incidence of outcomes associated with fasting or not fasting. Of the four empirical studies, one was completed in the United Kingdom, one in New Zealand, one in Singapore and one in the United States of America. The planned study, found on the clinical trial registry, will be completed in the United Kingdom.

Two full-text empirical studies were identified, one with 1916 participants involved and the second with 1,030 participants. Abdelaziz has indicated an intention to complete a randomised controlled trial involving 600 participants. Their study outline hypothesises that there will be no difference in the incidence of procedural complications between non-fasted and fasted groups and that the non-fasted groups will have a lower incidence of hypoglycaemia and hypotension. This is similar to Hamid et al and Li et al, who aimed to show the safety of not fasting before coronary angiography and angioplasty. Three studies concluded that their results demonstrated the safety of this practice.

Thematic analysis identified the following three themes related to not fasting before cardiac catheterisation:

- Fasting before coronary angiography and angioplasty is associated with perceived risk management, not actual risk management.
- Not fasting before coronary angiography and angioplasty is considered safe and beneficial for the patient when compared to the risks of fasting.
- Current practice, evidence and guidelines are inconsistent and further study is required.

Table 2: Inclusion and exclusion criteria.

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papers published in English.</td>
<td>Papers not published in English.</td>
</tr>
<tr>
<td>Papers including participants aged &gt;18 years inclusive.</td>
<td>Papers including participants younger than 18 years.</td>
</tr>
<tr>
<td>Studies relating to coronary angiography or coronary angioplasty.</td>
<td>Computed tomography coronary angiography and magnetic resonance coronary angiography.</td>
</tr>
<tr>
<td>Meta-analysis, literature reviews, opinion pieces, letters, commentaries, conference proceedings, clinical trials, practice guidelines, policy statements.</td>
<td>Grey literature not captured in included online databases.</td>
</tr>
</tbody>
</table>
Table 3: Evidence on not fasting before cardiac catheterisation.

<table>
<thead>
<tr>
<th>Author, year, country, quality</th>
<th>Type of literature</th>
<th>Setting and sample</th>
<th>Focus and aims of each study</th>
<th>Data related to not fasting before cardiac catheterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdelaziz, 2018, United Kingdom, quality: poor</td>
<td>Registered protocol for a randomised control trial. Clinical trials registry.</td>
<td>Teaching hospital. Anticipated 350 participants. All patients 18 years and over undergoing elective coronary angiography or angioplasty. All elective patients at this hospital were given the opportunity to participate.</td>
<td>Aim is to show there is no difference in potential complications between fasting and non-fasting groups. The author hypotheses that there will be a lesser incidence of hypoglycaemia and hypotension and greater patient satisfaction, improved catheter lab efficiency and associated financial benefits in the non-fasting group. Outcomes measured will include the incidence of nausea, vomiting, abdominal pain, emergency intubation and aspiration within 8 hours. Secondary outcome measures will include hypoglycaemia, hypotension, patient satisfaction, and chest infection.</td>
<td>Current fasting practices before coronary angiography and angioplasty are not based on studies. Previously, fasting practices were based on guidelines for general anaesthesia. Emergency procedures carry the most risk and are done without fasting patients. There is no reported complication rate for emergency procedures, where patients are not fasted.</td>
</tr>
<tr>
<td>Aguilar-Nascimento and Ferri, 2015, Brazil, quality: poor</td>
<td>A commentary of Hamid et al. Published in a peer-reviewed journal.</td>
<td>N/A</td>
<td>Brief context provided and the findings of Hamid et al. are discussed, with some integration of references from other sources. Endorses the findings of Hamid et al. A strong recommendation is made for further research in this area.</td>
<td>Agreement that data suggests fasting is not necessary for angioplasty. Preoperative fasting increases insulin resistance and gluconeogenesis. Agreement that prolonged fasting causes dehydration and increased risk of acute renal failure. Highlights the necessity for a revision of fasting protocols for angioplasty.</td>
</tr>
<tr>
<td>Bacus et al, 2020, New Zealand, quality: fair</td>
<td>Prospective, observational study. Single-centre.</td>
<td>Public hospital. 1,030 consecutive patients over six months undergoing elective coronary angiography or angioplasty. 2017–2018.</td>
<td>Aimed to assess current practice and quantify duration of fasting and the rate of fasting related complications.</td>
<td>There was a wide variation in fasting practice within the single institution. The fasting duration was much longer than anticipated. Patients fasted up to 24 hours (mean=11.6 hours), and only 11% received pre-hydration. The rate of vomiting was low, and no aspiration events occurred. The author claims the data supports the need for further research in this area. Measured outcomes: hunger (47.1%), headache (11.6%), hypotension (6%), hypertension (4.1%) nausea (3.9%), arrhythmia (1.3%), hyperglycaemia (0.8%), vomiting (0.8%), vasovagal syncope (0.8%), hypoglycaemia (0.7%), aspiration (0%).</td>
</tr>
</tbody>
</table>
Table 3: Evidence on not fasting before cardiac catheterisation (continued).

<table>
<thead>
<tr>
<th>Author, year, country, quality</th>
<th>Type of literature</th>
<th>Setting and sample</th>
<th>Focus and aims of each study</th>
<th>Data related to not fasting before cardiac catheterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamid et al., 2014, United Kingdom, quality: fair</td>
<td>Retrospective observational analysis of a data registry.</td>
<td>Two district general hospitals. 1,016 consecutive patients undergoing angioplasty. 2010–2013.</td>
<td>To demonstrate that percutaneous cardiac catheterisation does not require prior fasting. No patients were required to fast before their procedure.</td>
<td>The incidence of intraprocedural endotracheal intubation, aspiration pneumonia and on table death was zero. Authors claim that their study shows that patients do not need to be fasted before coronary angioplasty procedures. Patients undergoing urgent angioplasty following acute myocardial infarction are not fasted and the need for emergency intubation or cardiac surgery for such patients is rare. Reducing fasting times could arguably reduce acute kidney injury in this patient cohort, avoiding associated extended hospital stays and economic and health implications.</td>
</tr>
<tr>
<td>Hamid et al., 2014, United Kingdom, quality: poor</td>
<td>An author’s reply to the commentary reported by Wijeyeratne, Wendt.</td>
<td>N/A</td>
<td>To raise awareness regarding not fasting before angiography and angioplasty.</td>
<td>There is a difference in fasting protocol between institutions, for the same procedure. Concerns for increased risk of pulmonary aspiration in non-fasted patients are most likely unfounded. Patients undergoing emergency angioplasty procedures do not fast and there is no reported excess of peri-procedural pulmonary aspiration on the British Cardiovascular Intervention Society national registry. When patients are not fasted, radial access for procedures may be easier and less sedation induced hypotension may occur.</td>
</tr>
<tr>
<td>Li et al, 2017, Singapore, quality: poor</td>
<td>Article abstract from conference proceedings. Randomised control trial.</td>
<td>General hospital. 515 patients. Randomisation to overnight fasting or limited-fasting group at referral for outpatient angiography.</td>
<td>To show that routine cardiac catheterization is safe in non-fasted patients.</td>
<td>More patients in the limited fasting group required sedation than the overnight fasting group due to anxiety or radial spasm. More patients required fluid bolus for hypotension in the overnight fasted group (4% vs 9.4% p=0.02). Two patients in the overnight fasting group reported nausea post procedure unrelated to sedation use. No incidence of vomiting or SaO2 &lt;92% in either group.</td>
</tr>
</tbody>
</table>
Table 3: Evidence on not fasting before cardiac catheterisation (continued).

<table>
<thead>
<tr>
<th>Author, year, country, quality</th>
<th>Type of literature</th>
<th>Setting and sample</th>
<th>Focus and aims of each study</th>
<th>Data related to not fasting before cardiac catheterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolley et al., 2011, Australia/New Zealand, quality: poor</td>
<td>Nursing clinical practice guidelines. Guidelines created following a literature review, a consensus development workshop and a modified Delphi technique. N/A</td>
<td>To present a set of nursing clinical practice guidelines for individuals undergoing angioplasty together with a summary of the evidence to support the recommendations.</td>
<td>Based on available evidence, it is not justifiable to routinely fast patients undergoing angioplasty. Fasting should be on a case-by-case basis and based on clinical judgement. The grade of this evidence is “N,” meaning no consensus was achieved regarding the recommendation. Fasting is widely implemented due to theoretical considerations and potential risk.</td>
<td></td>
</tr>
<tr>
<td>Mishra et al., 2019, United States of America, quality: poor</td>
<td>Article abstract from conference proceedings. A single centre, prospective, randomized study. Preliminary analysis 253 inpatients. Up to December 2018.</td>
<td>The fasting group and non-fasting group had similar rates of contrast induced nephropathy (3% vs 4%), peri-procedural hypotension (3% vs 0.8%), aspiration pneumonitis (0 vs 0.8%), nausea/vomiting (4% vs 8%), hyperglycaemia (7% vs 2%), hypoglycaemia (0.8% vs 2%) and 30-day mortality. For all outcomes p=not significant. The non-fasting group had higher patient satisfaction scores (4.3±0.08 vs 4.1±0.09, p=0.039). The non-fasting group had lower cost of index hospitalisation (9,693 USD±878 vs 13837 USD±1,470, p=0.016)</td>
<td>Not fasting is associated with improved patient satisfaction and reduced cost of care when compared to traditional fasting practices. The incidence of adverse outcomes were similar between fasting and non-fasting groups.</td>
<td></td>
</tr>
<tr>
<td>Wijeyeratne et al, 2014, United Kingdom, quality: poor</td>
<td>A commentary on Hamid et al.9 Commentary/letter to the editor. Internally peer-reviewed. N/A</td>
<td>The aim of this commentary is unclear.</td>
<td>There is no clear evidence to support the current practice of fasting before invasive cardiac procedures. The paper by Hamid et al9 serves to raise awareness. Wider applicability of research by Hamid et al9 may be limited due to study methods. Fasting before cardiac procedures appears to have come from fasting guidelines for general anaesthesia. The theoretical risk is that sedation may depress cough and swallow reflexes. There are no consensus guidelines in this area and the evidence base is poor. More robust evidence would, therefore, be crucial to establish best practice and promote consistency.</td>
<td></td>
</tr>
</tbody>
</table>
Theme 1: fasting before coronary angiography and angioplasty is associated with perceived risk management, not actual risk management

The benefits of fasting found in this literature search are centred around mitigating the possible risks associated with not fasting. Fasting is thought to reduce the risk of vomiting, bronchial aspiration and resulting pneumonia. However, Hamid et al suggest that the increased risk of aspiration in unfasted patients is unfounded. There is also a perceived benefit of fasting due to the possibility of proceeding to emergency surgery and the need for general anaesthesia. Hamid et al claim that the benefits of fasting before coronary angiography and angioplasty are not evidence-based, as little evidence exists. Hamid et al suggest that the risk associated with not fasting has been overstated and that those who fast may be at greater risk of complications. Interestingly, individuals presenting with an acute requirement for angioplasty did not fast before the procedure.

Further, there are limited reports of excess peri-procedural pulmonary aspiration or related complications during emergency coronary artery bypass grafting in the unfasted patient. Fasting-related procedural delay and cancellation is thought to significantly impact patients and optimal health resource allocation. These delays can be avoided, and hospital stays potentially shortened, if patients are allowed to eat pre-procedure. Scholars also predict that non-fasting patients may be less anxious before their procedure. Following preliminary analysis, Mishra et al compared patients who fasted solids from midnight and clear fluids from two hours before the procedure to patients who were allowed to eat and drink until the time of the procedure. There was no statistically significant difference between the two groups for incidence of adverse events, such as peri-procedural hypotension, contrast-induced nephropathy, hypoglycaemia, hyperglycaemia, nausea, episode of aspiration pneumonitis in the non-fasting group of 253 inpatients, and this did not represent a statistically significant difference between the non-fasting and fasting groups. The outcomes of small-scale studies demonstrate that reducing or eliminating fasting before coronary angiography and angioplasty may be safe. However, further studies are needed to explore this.

Theme 2: not fasting before coronary angiography and angioplasty is considered safe and beneficial for the patient when compared to the risks of fasting

Coronary angiography is considered a safe procedure, which brings into question the need for fasting in preparation. In one study involving 1,916 angioplasty patients over three years, only two patients (0.1%) required subsequent emergency coronary artery bypass grafting surgery. Also, none of the patients in this population fasted, and yet none required intubation during the angioplasty procedure and there were no episodes of aspiration pneumonias. Similarly, Bacus et al reported that, among 1,030 elective coronary angiography and angioplasty patients, there were no episodes of aspiration. Mishra et al compared patients who fasted solids from midnight and clear fluids from two hours before the procedure to patients who were allowed to eat and drink until the time of the procedure. There was no statistically significant difference between the two groups for incidence of adverse events, such as peri-procedural hypotension, contrast-induced nephropathy, hypoglycaemia, hyperglycaemia, nausea,
vomiting and 30-day mortality. In the study completed by Bacus et al\textsuperscript{14}, 47% of patients with a mean fasting time of 11.6 hours reported feeling hungry, and 11.6% reported headaches. Prolonged periods of fasting is thought to increase insulin resistance, potentially exacerbating the metabolic response following trauma.\textsuperscript{16} Additionally, patients who are fasting may be less likely to take their morning medication, including anti-hypertensives, leading to poorly controlled hypertension.\textsuperscript{9} Bacus et al\textsuperscript{14} reported eight episodes of hyperglycaemia and seven episodes of hypoglycaemia, suggesting that this may have been due to missed medications and prolonged fasting. Fasted individuals, particularly the older age group, are at risk of dehydration, hypoglycaemia and contrast-induced nephropathy.\textsuperscript{9,26} Such complications could lead to a prolonged hospital stay with economic and health implications.\textsuperscript{9}

**Theme 3: current practice, evidence and guidelines are inconsistent and further study is required**

Data available in this review indicate there is an inconsistency in practices between institutions. In New Zealand, one hospital guideline recommended fasting patients for four to six hours.\textsuperscript{13} The practice in two district general hospitals in the United Kingdom was that no patients were fasted in preparation for cardiac catheterisation.\textsuperscript{9} In Singapore, standard practice in one hospital was to fast patients from midnight for both elective and in-hospital cardiac catheterisation.\textsuperscript{21} The duration of fasting within a New Zealand institution was variable, with patients fasting anywhere between zero and 24 hours before their procedure.\textsuperscript{14} The mean fasting time of 11.6 hours was greater than anticipated considering the maximum recommended duration for fasting was six hours.\textsuperscript{14} In emergencies, however, angioplasty is performed urgently without any fasting restrictions.\textsuperscript{9,26} Current practice in this context is based on limited scientific evidence and may have developed from fasting guidelines for general anaesthesia.\textsuperscript{9,14,16,26-27} According to Wijeyeratne et al,\textsuperscript{27} the evidence base relating to this practice and the optimal period of fasting has been “exceedingly slow to develop.”

Authors of papers included in this review claim that there are no available fasting guidelines specific to coronary angiography and angioplasty.\textsuperscript{9,16,24} Instead, information and opinion identified in this review suggest that practice is based on local hospital and health board guidelines, which are considered inconsistent and unsubstantiated.\textsuperscript{9,25,27,28} Protocols and guidelines such as this require revision.\textsuperscript{26} Clinical nursing guidelines for angioplasty published in 2011 state that, given the available evidence, routine fasting for coronary angioplasty “is not justifiable; fasting should be based on clinical judgement on a case-by-case basis.”\textsuperscript{28} However, the grade of this recommendation was documented as low, and consensus among the panel of clinical experts had not been reached. Clinicians are encouraged to “follow local policy and procedures.”\textsuperscript{28}

Although both Hamid et al\textsuperscript{9} and Mishra et al\textsuperscript{15} suggest that their research demonstrates patients do not require fasting before coronary angioplasty, this review identified that there is consensus on the need for further study.\textsuperscript{9,16,21,26,27} Future research should involve larger cohorts and multiple centres in randomised controlled trials in order to support interventional cardiologists to change from their current practice.\textsuperscript{9,16,21,26,27} Studies currently underway aim to record the incidence of outcomes related to fasting and not fasting, such as contrast-induced nephropathy, hypotension, nausea, vomiting, emergency intubation, aspiration pneumonia, hyperglycaemia, hypoglycaemia and patient satisfaction.\textsuperscript{15,25}

**Discussion**

Overall, analysis of the nine papers in this review identified limited evidence about not fasting before cardiac catheterisation. Thematic synthesis revealed that, although not fasting in this context is generally considered to be safe, there is still concern with implementing this practice in a clinical setting. This review identified that the potential for vomiting and pulmonary aspiration are two significant concerns associated with not fasting before coronary angiography and angioplasty. Vomiting, nausea and allergic reactions were once common complications of angiography due to the hypertonic nature of first-generation angiographic contrast agents. However, with advances in pharmacology, first-generation angiography contrast agents are now formulating with a lower concentration of urea, leading to reduced nausea and vomiting.\textsuperscript{14}

Although the grade of this recommendation stated that practice is based on local hospital and guideline recommendations, it is important to note that the available evidence is limited and further research is required to develop evidence-based guidelines for fasting in the context of coronary angiography and angioplasty.
contrast dye. In some reports, reactions to contrast dye occurred in over 50% of cases. Such reactions could be why fasting was once a relevant choice for cardiac catheterisation. However, contrast dye used today is low-osmolality and non-ionic, and the reported rate of vomiting is low (0.8%). Similarly, the risk of requiring emergency surgery has reduced significantly in recent years and is reported at around 0.14% in the contemporary setting. These diminishing risks question the necessity of this practice.

Although there is limited recent evidence to support fasting in this context, this practice continues to be widely enforced and supported by healthcare professionals. The recommendation of fasting before cardiac catheterisation is based on perceived risk, and it does not acknowledge the potential risk associated with fasting. It may be that physicians are more concerned by rare events with potentially severe outcomes than the possibility of more common adverse events with lesser effects from not fasting. For example, the perceived risk of aspiration causing serious harm for a small number of individuals may be over-emphasised in the context of the general wellbeing and comfort of the majority of patients. Although this is understandable, it limits the opportunity to foster the potential safe and beneficial outcomes of not fasting in this context. Indeed, in the randomised controlled trial by Mishra et al., unfasted patients reported higher satisfaction scores following cardiac catheterisation compared to those who fasted.

Research in other fields does not show a connection between not fasting and vomiting or aspiration when patients receive conscious sedation. In a study of cerebral angiography by Kwon et al., there was no statistical difference in nausea and vomiting between fasting and non-fasting groups, and there were no cases of pulmonary aspiration among 2,554 patients. The overall incidence of nausea and vomiting was low, reported at 1.05%. Similarly, a systematic review of various procedures involving conscious sedation found no episodes of aspiration in unfasted patients undergoing procedures other than endoscopy. Research regarding procedural sedation in the emergency department has shown no association between fasting duration and the incidence of vomiting and other complications. Indeed, current recommendations for conscious sedation in the emergency department state that fasting is not required when verbal contact is maintained.

The overall quality of evidence included in the review was assessed as poor when compared to empirical evidence, as it is based predominantly on expert opinion. However, the quality of grey literature is variable, and its inclusion can be important in reducing publication bias and providing contextual factors. The low quality of evidence identified by this review limits understanding of the safety of not fasting and its future utility. Further, there is no consensus among experts for recommendations in this area and practice varies greatly between and within hospitals. Indeed, current guidelines and local practices may not be based on scientific evidence. We argue that further investigation into the risks and benefits of not fasting before cardiac catheterisation is warranted.

**Conclusion**

This is the first systematic review to synthesise evidence about not fasting before coronary angiography and angioplasty. It has revealed limited evidence regarding this practice. Thematic analysis of nine studies demonstrates that current fasting practices are based on managing perceived risk and that not fasting before angiography is generally considered safe and beneficial for the patient. Due to the gap in knowledge that exists regarding this topic, there is significant potential for future research, both locally and internationally. Future multi-centre randomised controlled trials will build a reliable and robust knowledge base on this topic. It appears that the ongoing concerns around not fasting are related to perceived risk, rather than actual risk. However, further research is needed in this area to support policy and practice change on a large scale.
Competing interests:
Nil.

Author information:
Tristin L Kimpton: BNursHons, Cardiology Nurse Educator, Cardiology, Auckland District Health Board, Auckland, New Zealand.
Kim Ward: PhD, Senior lecturer, Registered Nurse, School of Nursing, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand.

Corresponding author:
Tristin Kimpton, Cardiac Investigation Unit, Level 3, Auckland City Hospital, 2 Park Road, Grafton, Auckland, New Zealand, 0211279451
tristin.lily@gmail.com

URL:
www.nzma.org.nz/journal-articles/is-not-fasting-before-cardiac-catheterisation-better-than-fasting-a-systematic-integrative-literature-review

REFERENCES
11. American Society of Anesthesiologists Committee on Standards and Practice Parameters. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: Application to healthy patients undergoing elective procedures: An updated report by the American Society of Anesthesiologists Task Force on preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration. Anesthesiology. 2017;126:376-93.
org.nz/journal-articles/
fasting-prior-to-cardiac-
catheterisation-a-single-
centre-observational-study

have our patients eat with 
cardiac catheterization-nix or allow: The chow now 
study (preliminary analysis from inpatient population). Cathet Cardiovasc 

coronary interventions: Is it time to change practice? The authors’ reply [letter]. 


18. Hopia H, Latvala E, Liimatainen L. Reviewing the methodology of an 

life care of older adults and their families: An integrative review. J Adv 


22. Adams RJ, Smart P, Huff AS. Shades of grey: Guidelines for working with the grey literature in systematic reviews for management and organizational studies. Int J Manag 


24. Dixon-Woods M, Agarwal S, Jones D, et al. Synthesising qualitative and 
quantitative evidence: A review of possible methods. J Health Serv 

25. Abdelaziz H. Fasting or non fasting for cardiac 
catheterization. 2018. ClinicalTrials.gov registration number: NCT03555500

26. Aguilar-Nascimento JE, Feguri GR. Fasting may not be required before 

27. Wijeyeratne YD, Wendler R, Spray D, Bunce N. Preprocedural fasting for 

guidelines to improve care for people undergoing percutaneous coronary 

radiocontrast agents with ionic, high-osmolality agents during cardiac 

with high-osmolality contrast agents in cardiac angiography: Identification of criteria for selective use. 
Circ J. 1994;89:291-301.

bypass surgery in the contemporary percutaneous coronary intervention era. 


33. Green SM, Mason KP, Krauss BS. Pulmonary aspiration during procedural 

sedation-related events during procedural 

35. Wenzel-Smith G, Schweitzer B. Safety and efficacy of 
procedural sedation and analgesia (PSA) conducted 

36. The Royal College of 
Anaesthetists & The 
College of Emergency 
Medicine. Safe sedation of 
adults in the emergency 
department. 2012. Available 
from: https://www.rcem. 
ac.uk/docs/College%20 
Guidelines/5z7.%20 
Safe%20Sedation%20in%20 
the%20Emergency%20 
Department%20-%20 
Recommendations.pdf

j.1365-2702.2003.00662.x

38. Benzies KM, Premji S, Hayden KA, Serrett K. State-of-the-evidence reviews: 