



# An Investigation Exploring Patients Eating Patterns, Food, Drinking and Texture Preferences, and Appetite for in-between Meals during Hospitalization

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## Abstract

**Background:** Inadequate dietary intake is a common problem in hospital. The cause varies and both lacks of appetizing food as well as snacks tailored to patients at nutritional risk seem to be a barrier. The aims of this study were to gain insight into patient's eating patterns, food and drinking preferences and appetite for in-between meals.

**Methods:** A case study based on semi-structured interviews combined with visual image selection were used for collecting data on nutritional risk patients admitted to the department of pulmonary medicine and abdominal surgery. Data were collected during morning, afternoon and evening sessions. Furthermore, a numerical rating scale was used to evaluate appetite on the three given time points. Data were analyzed descriptively and statistically. Ranked descriptive analysis was performed of all selected images and between departments and gender and category food texture score related to appetite score were investigated.

**Results:** A total of fourteen patients participated with 38 interviews and 37 image selection sessions. Many of the participants only had in-between meals in the afternoon at home as well as in hospital. The findings from the image selection showed a broad selection of food items with some variety between departments and gender. The appetite was found moderately affected and a tendency towards association between low appetite and desire for softer food texture and liquids were seen.

**Keywords:** Energy-protein malnutrition; Hospital meals; Appetite; Protein and energy fortification; Food fortification; Malnutrition; Image selection

## Introduction

Everyday half a million meals are produced in public institutions in Denmark [1]. At Aalborg University Hospital, the kitchen prepares cooks, and serves approximately 1.650 meals daily, to be eaten by hospitalized patients. It is well known that hospitalized patients are at high risk of developing under nutrition with a prevalence ranging from 23% to 60% [2-6]. Under nutrition has been associated with poor clinical outcomes [6-8]. Therefore, many approaches have been sought to prevent and treat under nutrition. However, the lack of appetizing foods and in-between meals, sometimes referred to as snacks, and lack of special meal offers, seem to be a challenge [9]. This may in particular be essential, since loss of appetite has been shown to affect food intake at hospitals negatively [10-12]. Little emphasis has been given regarding menus tailored to patients with low appetite [13-15]. At Aalborg University Hospital, we find that drawing attention to appetizing energy and protein dense food, falls within the responsibility of the hospital food service. In daily practice, we attempt to have a good communication with the wards about patients' preferences for meals. The responsibility for this communication primarily lies in the hands of well educated food consultants. However, we find that the communication is based on the meals and snacks already served, and that communication regarding the development of new meals is more difficult to accomplish and demands a direct involvement of patients, to obtain the needed knowledge to produce more foods and meal offers desired by patients. According to the National Danish (ND) guidelines for hospital food, patients at risk of under nutrition are recommended in-between meals,

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equivalent to 30% to 50% of total daily nutritional requirements [1]. These recommendations are in line with the findings described in former studies [16,17]. In-between meals are in this study, defined as small meals and drinks served between the main meals.

The aims of this study were to gain insight into

- Patient's eating patterns regarding in-between meals at home as well as during hospitalization.
- Patients' food, drinking and texture preferences.
- Patient's appetite at in-between meals at serving times when hospitalized, for use in future development of menus tailored to patients at nutritional risk.

## Materials and Methods

### Participants and settings

The study was performed at Aalborg University Hospital at the departments of pulmonary medicine and abdominal surgery. Patients were selected for inclusion by a nutrition nurse specialist, in collaboration with the nursing staff at the wards. The inclusion criteria were: age  $\geq 18$  years and at risk of under nutrition according to NRS-2002 [18-20]. Furthermore, the included patients should be able to eat orally, speak Danish, and to give fully informed written consent. The exclusion criteria were: total tube feeding or parenteral nutrition. The sample size was based on feasibility as well as qualitative sampling, aiming only to involve patients who were willing and found suitable to give three interviews (10:00, 15:00 and 20:00) in one day, and to be articulate about their experiences and wishes regarding hospital meals [21].

### Study design

The study was designed as a case study, based on a feasibility sample, using a combination of qualitative and quantitative approaches, in order to explore patients eating patterns, preferences for in-between meals and appetite. All included patients were given the possibility to participate for one day, at 10:00, 15:00 and 20:00. At each time-point an interview and visual method session was performed consisting of a semi-structured interview, image selection (pre-selected food images) inspired by the field of visual ethnography and measurement of appetite [18,19]. All data were obtained at the participant's bedside. At each interview the patients were given the same questions and images. The time points reflected the common times for serving of in-between meals in daily practice at the hospital.

**Interview guide and interview format:** Patients were interviewed using a semi-structured interview guide in a face to face interview format. The interview guide was constructed with 11 interview questions based on the researchers previous experiences as well as experience from the literature [2,22-25]. Interview questions explored eating patterns and food preferences, related to in-between meals during hospitalization, and habitually at home. In the first interview at 10:00, participants were asked additional questions about their appetite and eating pattern during the past three month prior to hospitalization. Eating patterns are in this study defined as meal frequency and timing of the meals.

**Image selection:** The interviews were combined with a visual method including still images/photos of in-between meals. These were used in order to create dialogue and insight into the participants' food preferences at the certain time point [18,26]. Visual ethnography photographic material is known to enable the researcher and the

participant to connect on a new level where normally unspoken dimensions of experiences, meanings, liking and knowledge come forward [26]. The method was further more chosen since photos seem to evoke deeper elements of human consciousness than words [19]. The 59 images of in-between meals were selected from Google by the researcher, in order to achieve an everyday-like recognition. The selection was a mix based on the following criteria:

- All five basic tastes should be represented in the total selection of images of in-between meals (salt, sweet, sour, bitter, and umami)
- The consistency of the in-between meals should be a mix of hard and soft textures (ex. hard = cracker/buns and soft = brownie/gel)
- Mix of cold and hot meals
- Colorful and lightly colored
- Traditional and modern meals/food items
- Beverages/ liquid (hot and cold)

These criteria were selected based on recommendations from the National Danish (ND) guidelines for hospital food and a previous study carried out at Aalborg University Hospital regarding the efficacy of bedside serving of in-between meals [1,27]. The 59 images were printed in color having an average format of 10 cm  $\times$  7 cm and were given to the patients in an envelope. The patients were subsequently asked to pick the images of food items or meals that they would like to eat at the actual time point.

**Appetite measurement:** In connection to the interview, appetite was assessed using a numerical rating scale with fixed points from one to ten, ranking one as "no appetite" and ten as "best imaginable appetite".

### Data analyses

The interviews were audio recorded and subsequently transcribed verbatim. Data were analyzed using a qualitative content and constant comparative method, moving between closeness and distance, in order to deepen the understandings of meaning [28]. The quotations presented represent the most outspoken meanings within the themes, which we on analysis, found were predefined by the structure of the interviews. Quotations were translated into English by author and confirmed by co-authors. The images (in total 59) chosen by each participant at each interview were counted and analyzed descriptively and statistically. Ranked descriptive analysis was performed of all selected images and between departments and gender across time. Furthermore, the 59 images were divided in three categories: hard texture, soft texture and liquid. The texture assessment was done by the researcher, inspired by standard categories developed for use in hospital food production [1]. Each patient was assigned to a texture category (texture preferences) based on the highest category score. Category texture scores related to appetite score were investigated using a box plot. Appetite scores were reported as medians with Inter Quartile Range (IQR) for each time point in each patient. Differences in median appetite scores during the day (10:00, 15:00 and 20:00/average over time) for each patient were analyzed using non-parametric Friedman test. Statistically analysis was performed using a t-test (age and appetite score) and Fisher's exact test (setting and gender) on texture preferences in relation to age, gender, setting and appetite score. The texture categories were subsequently reduced

into two, hard and soft/liquid in order to obtain sufficient data for meaningful analysis. Statistical significance was predetermined as  $p < 0.05$ .

**Ethical considerations**

Participants were given oral and written information and written informed consent was obtained before the first interview. Patients were informed that they could withdraw from the study at any time. The study was not submitted to the local ethic committee, according to Danish law of ethical code of conduct § 14.2.

**Results**

**Characteristic of the participants**

A total of 38 interviews (10:00/13, 15:00/13, 20:00/12) and 37 visual (10:00/13, 15:00/13, 20:00/11) method sessions in 14 patients (8 women/6 men), seven patients from each of the two departments, formed the basis of the data. The age of the patients ranged from 23 to 92 years with a mean age of 67.5 years (Table 1). No patients declined participation, although not all patients were able to participate in all three interview visual method sessions. Ten patients completed all sessions, but all interviews were included in the total analysis, even though four did not complete all sessions. The reasons for not completing all session were that the patients felt too exhausted or were out of the wards due to examinations.

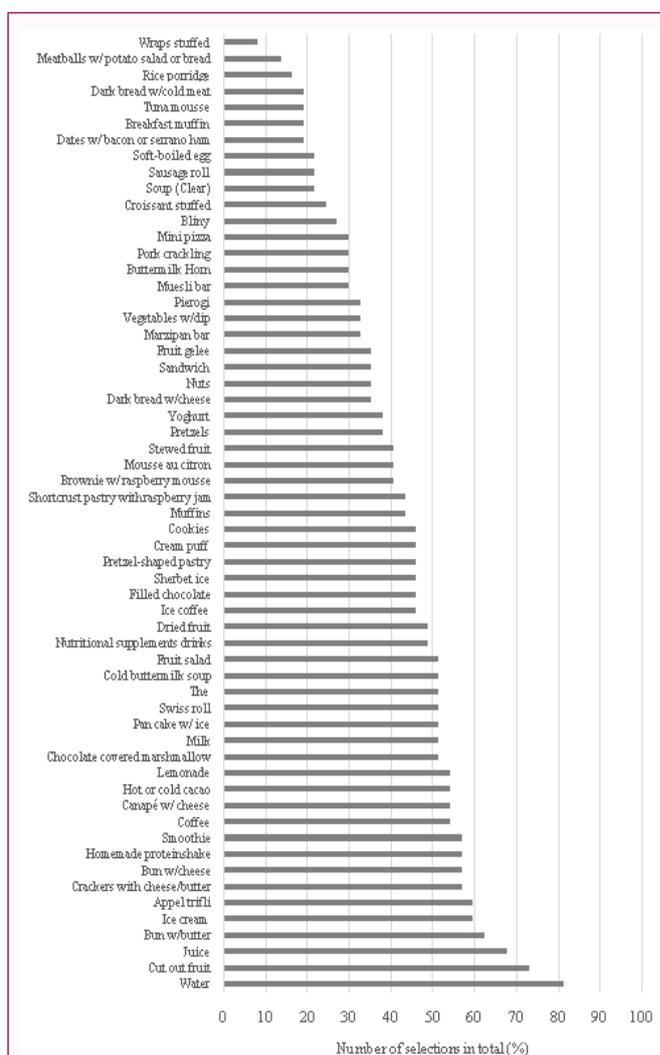
**Qualitative measures interviews**

**Eating pattern for in-between meals during hospital stay:** The participant’s eating pattern for in-between meals during hospital stay showed that over half of the participants did not have anything to eat between breakfast and lunch and some expressed that they did not expect to eat during this time period. A patient, aged 64 years said: “I don’t think that I have been offered anything.” In the afternoon, most participants experience that they were served an in-between meal and most of the participants expressed that they expected to have an in-between meal served or offered in the afternoon. One patient, aged 54 years said: “When I have all these tubes”, I expect to be offered something to eat. “All these tubes” reflected for him his physical state, which he found was so bad that he deserved to be served and cared for. During the late evening, about half of the participants stated that they had something to eat or expected to have. One patient, aged 38 years, expressed it this way: “I have been offered a cup of coffee, and sometimes they tell me that I can be served a piece of cake”. However, not all patients had that experience as a patient, aged 71 years old, said: “No, I do not expect to have anything because I have already had my teeth brushed.”

**Eating pattern for in-between meals at home:** Regarding eating pattern for in-between meals at home, the participants overall revealed, that they were not accustomed to eating in-between meals three times a day, especially not between breakfast and lunch. A patient, aged 54

**Table 1:** Demographic data.

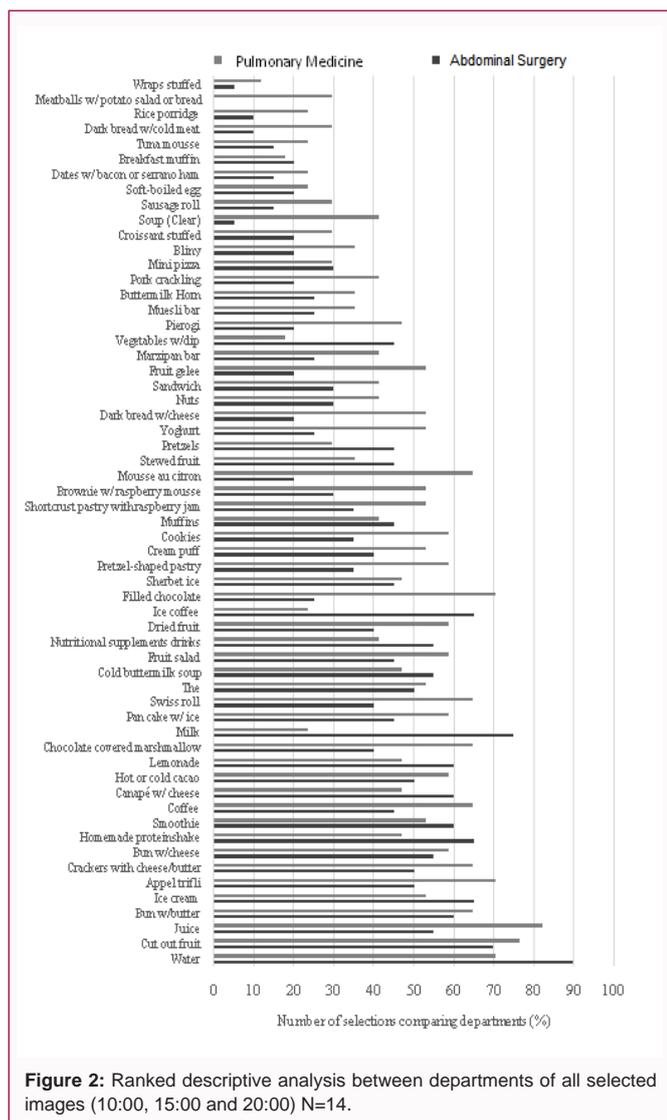
	Total	Pulmonary Medicine	Abdominal Surgery
Total participants	14	7	7
Women/Males	8/6	4/3	4/3
Mean age (in ranges)	67.5 (23-92)	78.7 (72-92)	56 (23-67)
Interview Completions			
10:00	13	6	7
15:00	13	6	7
20:00	12	5	7



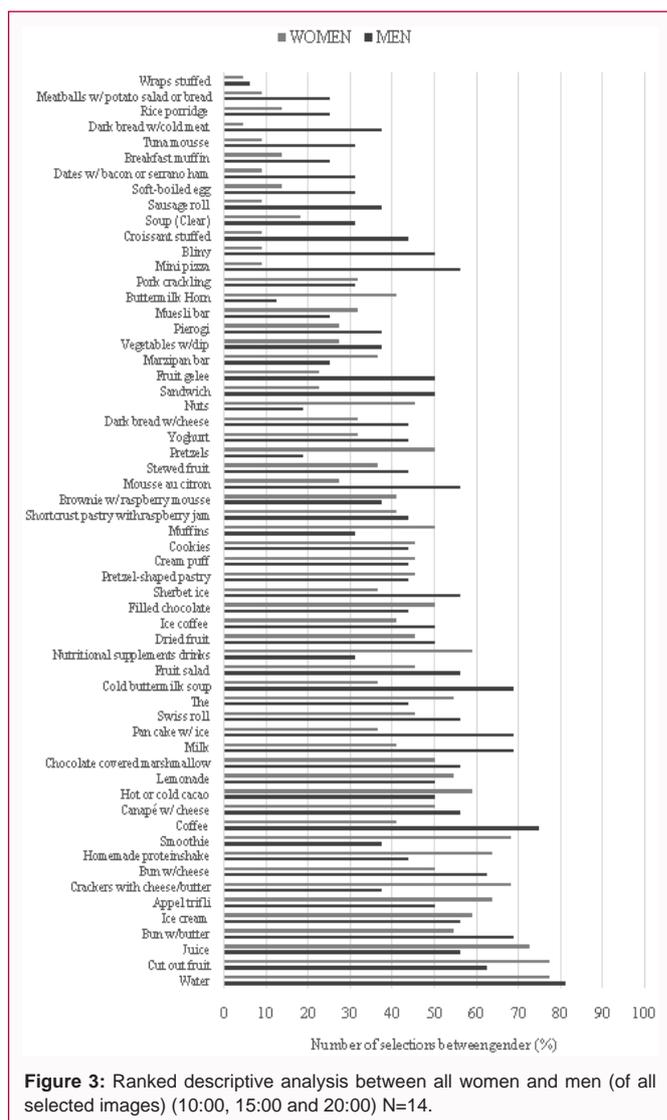
**Figure 1:** Ranked descriptive analysis of all selected images (10:00, 15:00 and 20:00) N=14.

years, commented: “Normally I eat my breakfast late, I am not that good at eating when I wake up.” Many of the participants reported that they were used to having an in-between meal in the afternoon as well as in the evening. About afternoon snacking, a patient aged 54 years said: “Normally I do, it also depends on what I am doing. If I am at work, I eat together with my colleagues”. Another patient, aged 79 years, expressed: “It varies a little bit, but normally I eat a snack such as nuts, potato chips or an apple late in the evening.” Some participants stated that they did not eat in the afternoon or in the evening, as they were not accustomed to eat between main meals at home.

**Preferences for specific in-between meals during hospitalization:** The analyses left the impression that when the participants were asked directly about specific wishes for in-between meals, it was difficult for them to give straight answers and only about half of the participants had specific wishes at any time point. A patient aged 38 said: “No, I have not wanted anything in particular... No?” (The interviewer said). Well maybe some whole-meal bread.” Further, a patient aged 92 expressed: “When you are not hungry, it is difficult to want something.” Fruit, apple pie, and bread in various forms were the most often mentioned in-between meals, while others as ice-lolly, open “fish and shrimp sandwich” (traditional Danish dish) and soft



**Figure 2:** Ranked descriptive analysis between departments of all selected images (10:00, 15:00 and 20:00) N=14.



**Figure 3:** Ranked descriptive analysis between all women and men (of all selected images) (10:00, 15:00 and 20:00) N=14.

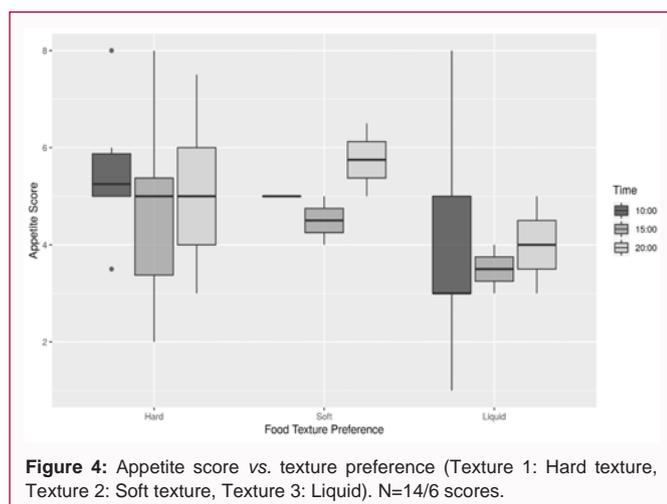
ice were only mentioned by a few participants.

**Overall appetite during the past three months:** During the interview, the participants were asked to evaluate their current appetite and eating patterns in relation to the last three months. Nearly half of the patients reported that their appetite and eating pattern had changed after becoming ill. Based on this response, the participants could be divided equally into two groups, one group who in general had no appetite and one group whose appetite was overall good. For the “no appetite” group, the participants’ general responses were “My appetite is poor” or “I am not hungry”. One patient, aged 70 years expressed it like this: “I eat less, yes much less. I do not feel like eating at all, and I have no appetite at all.” The general response for the “good appetite” group was “My appetite is normal” or “My appetite has not changed”. As one patient, aged 79 years, expressed “There has not been any difference regarding my appetite because I haven’t felt sick”.

**Quantitative measures-image selections**

**Preferences based on image selections of in-between meals:** All 59 possible images were found to be chosen at some point, and no overall tendency towards preferred in-between meals was seen (Figure 1). However all beverages are placed in top 25 of all 59 possibilities.

A majority of images were selected equally by patients from both departments, but differences were seen between the departments. The patients from pulmonary medicine had chosen a number of images that was not selected as often as by the patients from abdominal surgery. The images were meatballs with potato salad or bread, dark bread with cold meat or cheese, soup, pork crackling, pie, fruit gel, lemon mousse, brownie, cookies, pastry and chocolate covered marshmallows and Swiss roll, whereas patients from abdominal surgery more often selected vegetable with dip, pretzels, ice coffee, homemade protein shake, milk and water. In general, patients from pulmonary medicine chose more images than the patients from abdominal surgery (Figure 2). Differences in image selection between women and men were seen. In general, 33 of the images were chosen more often by men than by women. Other 23 images were chosen more often by women than by men. Six images were chosen nearly equally. The image most often selected by men were: dark bread with cold cuts, tuna mousse, dates with bacon, sausage roll, croissant stuffed, blini, mini pizza, fruit gel sandwich, lemon mousse, cold butter milk soup, pancake with ice, milk coffee. Women preferred: butter milk horn, nuts, pretzel, muffins, nutritional supplement drink, and smoothie, crackers with cheese or butter. The images equally selected by both gender were pork crackling, short pastry, cookies, cream puff,



and pretzel shaped pastry (Figure 3).

### Quantitative measures-appetite and texture preference

**Appetite score:** The appetite scores barely differed throughout the day. The results were morning median 5.0 [range 3.5 to 5.5], afternoon median 4.5 [3.3 to 5.0] and evening median 5.0 [3.0 to 6.0]: ( $p=0.65$ ). No statistical differences were found between appetite scores and time of the day (10:00, 15:00 and 20:00). The box plot in Figure 4 shows the distribution of appetite score in the three subgroups (texture) and time of day. A tendency towards an association between higher appetite score and desire for harder food texture, and lower appetite score and desire for softer food texture and liquids (beverages) are seen in Figure 4. Statistical analyses on texture (hard, soft/liquid) preferences in relation to age, gender, setting and appetite score for the three time settings (10:00, 15:00 and 20:00), showed a lack of sufficient data for meaningful analysis at the time points 15:00 and 20:00 and therefore these were excluded from further analysis. The analyses from the time setting 10:00 (N=13), did not show any significant differences in the comparison of texture preference (hard, soft/liquid texture) with age, gender, setting and appetite score.

## Discussion

With this study, we aimed to establish a basis for future work with development of specific in-between meal menus tailored to patients at nutritional risk. We wished to gain insight into patients' eating patterns, preferences and appetite related to in-between meals at home and in hospital. This was done in a feasibility sample of patients admitted to our hospital in two different departments. Based on our prior clinical experiences, we had the impression that patients' food preferences may not be the same between departments or between patients, and eating patterns and level of appetite may influence food choices.

### Eating pattern for in-between meals during hospital stay and at home

The participants didn't eat in-between meals neither at home nor at the hospital, especially before noon. However, eating in-between meals in the afternoon and sometimes in the evening was more common. This was surprising for hospital stay, given the fact that the participants were at nutritional risk and according to the Danish National Board of Health (DNBH), it is recommended that patients at nutritional risk should be served three energies and protein dense in-between meals a day, contributing to at least

30% of their daily energy and protein intakes [1]. Furthermore, the hospital kitchen prepares in-between meals for patients to be served at 10:00. Contrary to this, when patients reflected eating patterns at home, they might not be at nutritional risk, and therefore not within the scope of needing in-between meals in order to fulfill nutritional requirements. This might influence the responsiveness of the patient and lead to rejection of offered in-between meals. What we also found was that the participants were not aware about the hospital offers of in-between meals or were full from the previous meal. Dietary advice from professional dietitians or trained nursing staff may be considered as valuable to help the patients to deal with under nutrition in order to understand the importance of changing eating patterns when being sick and the importance of choosing the right types of in-between meals [29]. Inadequate focus on in-between meals, has also been reported in other studies and requires more attention from both the patients and the hospital staff [30,31]. In the interviews, the participants had difficulty in pointing out specific wishes for in-between meals. Despite these findings, the patients were able to express that they would like to have something served between main meals. The choice of using a semi-structured interview form was based on previous experience in interviewing patients and the fact that each participant was interviewed three times in a day. A more open interview form, might have delivered more nuanced data in order to understand reasons, however this was beyond the scope of this study and considering the extent of total amount of data each patients had to delivering this study.

### Image selections

By the use of image selection, the patients were able to demonstrate a much more varied selection of food and beverage preferences. Thus, we provided the patients with the opportunity to visualize the meals in different home like and non-strict manners. The use of food images has shown similarity to real food in order to activate gustatory taste responses and rewards in the brain and is therefore considered to be a relevant method in order to study patient's food preferences [32]. The varied selection of food and beverages might be explained by the age diversity from age 23 to 93 but also the mixed gender, however the sample size was too small to reveal any diversity regarding age [36,37]. Images of none-calorie beverages (such as water, tea or coffee) were included to obtain a broad insight into the patients' preferences in order to collect knowledge about which direction future liquid developments must go. However, we are aware that these liquids, as they are presented for the patients in this study, will not provide criteria for fulfilling of protein and energy intake, which is the specific aim of serving in-between meals to patients at nutritional risk. The result showed that beverages were highly preferred as in-between meals, and might reflect a desire for beverages in general. A study by Sorensen et al. [23] found similar tendencies between motivation to eat, low appetite and the choice of more soft texture and liquids in patients at nutritional risk. The findings in our study indicated a difference in preferences between participants at department of pulmonary medicine and department of abdominal surgery, but also between genders. We were not able to find other studies examining food preferences in a population similar to ours and these differences will not be discussed further due to the low number of participants. The findings (food selections) that were made from the image selection represented Danish eating habits. This must be taken in consideration, if adapting to other countries with other eating habits.

### Appetite vs. texture

The results of the appetite scores showed a median score between

4.5 and 5.0, which indicate a moderately affected appetite, with no difference throughout the day. A possible explanation to the lack of differences in median appetite scores during the day might be that our patients were served energy and protein dense main meals, where the fat and protein content may affect the desire for food at the next meal. The results from the appetite score fit well into the results from the interviews, where half of the patients reported that their appetite had changed during illness and hospitalization. This tendency regarding affected appetite or loss of appetite during hospitalization has also been seen in other studies. However, the methods used to measure appetite may vary [13,33,34]. Nevertheless, the use of an ordinal Likert scale for the evaluation of appetite was chosen based on a pragmatic point of view in order to simplify methods used in the data collection. A choice that can be considered as a weakness in the study. The most often used scale, for measuring appetite is the Visual Analogue Scale (VAS), with only two fixed endpoints. A literature review comparing different scales related to pain reported that the numerical rating scale with fixed points had a better compliance in elderly people, while the most often used Visual Analogue Scale (VAS), for measuring appetite was reported as more complicated for the patients to understand and had higher error rates [35]. In this study, the mean age was 67.5 and the highest age was 92 years. Thus, when choosing a scale for measurement of appetite it seems relevant to take into consideration the age of the participants. As an error in our study, we ended up setting "one" as the zero point in our scale for appetite. This must be taken into consideration regarding comparison with other studies: however, to our knowledge, no existing studies have investigated appetite in the same population.

### Strength and limitation

The chosen sample size in the present study is a limitation. However, as the aim was to interview patients three times a day, the sample size reflects what was feasible during the period of data collection. During a typical day, many interruptions occur for patients as well as for the ward staff making it difficult to recruit patients with the present inclusion criteria. Thus, inclusion of seven patients from each department was considered a reasonable number for this intervention, even though we saw the necessity to not exclude patients who were after all not able to give a full interview. Yet involving more patients would have strengthened the scientific value of the study. This study represents patients from the two very different wards, while most of the previously com-parable studies, are based on more homogeneous populations e.g. cancer patients [36,37]. We did not go into the patients specific diseases or co-morbidities, and selected our participants out of qualitative sampling purposes, thus we have no possibility to conclude if the patients are generalizable to other patients in these departments. The relatively low number of included participants resulted in large standard error, thus the results cannot be considered as a definitive answer to patients' in-between meal preferences but may be used as an indication that has relevance for the hospital food production and for further studies.

### Conclusion

The study revealed that there is a need for developing the full variety of tastes and textures to fulfill the varying preferences of patients at nutritional risk, in order to meet all patients' preferences. Appetite was in general low between main meals and especially fluids and soft textures should be considered in patients with lacking appetite, who tend to not wish anything for in-between meals. Patients were only to a very low degree served in-between meals between morning and

noon in hospital, and were not used to eat at that time at home. Also here energy and protein dense fluids may be more easily served and consumed. The method may be used in the future, however refined for appetite scores and images, in a larger sample.

### Acknowledgment

Mortensen MN, Skadhauge LH and Høgsted RH wrote the protocol and collected the data together with Beermann T, Larsen AK at the department of abdominal surgery and pulmonary medicine at Aalborg University Hospital. Mortensen MN and Larsen AK drafted the article with supervision from Holst M, Rasmussen HH and Mikkelsen BE. All authors revised the manuscript draft. The study was financial supported by an unrestricted grant from the hospital nutrition committee and the hospital central kitchen at Aalborg University Hospital.

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