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ORIGINAL ARTICLE OPEN ACCESS

Feasibility of a Finger Food Menu for Older Adults Post Stroke in Hospital

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ABSTRACT

Background: Many people in hospital after a stroke are at risk of reduced food intake, leading to less effective post-stroke recovery. Finger foods (foods that can be easily transferred from the plate to the mouth without cutlery) have the potential to increase food intake and enable mealtime independence. However, the components of a well-designed trial evaluating a finger food menu in a hospital are unclear, with little published evaluation of how to implement a finger food menu in hospitals. This study aimed to implement a finger food menu and to evaluate the feasibility of using it in a stroke rehabilitation ward.

Methods: The feasibility study was a prospective, before-and-after intervention study. Thirty-one hospital inpatients from a stroke ward in a National Health Service hospital in the United Kingdom were included. A finger food menu was offered over two lunchtime meals and compared with the standard lunchtime menu. Feasibility was assessed by evaluating recruitment and retention of patients to the study, feasibility of data collection methods, interrater reliability of plate waste estimations using digital photography and assessing change in food intake. Intervention costs were assessed to support a cost-consequence analysis. Barriers and facilitators to implementation were evaluated through qualitative observations.

Results: Thirty-one participants were recruited (mean age 80, SD 8.5). Retention to the study was low, with 40% of patient participants not completing the study. Attrition was due to participants moving from the study ward. Dietary intake measures were successful via plate waste photography with good interrater reliability $\kappa = 0.709$ (95% CI: 0.64–0.77). A cost-consequence analysis identified food costs and staff costs as key to delivering the finger food menu. The ward context and use of an internal facilitator to support the delivery of the intervention are important factors to consider.

Conclusion: Using finger foods in hospitals for older people after stroke is feasible and warrants a future cluster randomised control trial with minor adaptions to the protocol.

1 | Background

Adequate nutrition is fundamental in supporting post-stroke recovery and is considered one of the most important factors influencing the effectiveness of post-stroke rehabilitation [1]. Reduced nutritional intake is adversely associated with the impact on rehabilitation tasks. It can lead to a higher rate of infection, pressure injury, extended hospital stays [1] and can impact psychological and behavioural outcomes causing apathy, depression, introversion, self-neglect and deterioration in social interactions [2, 3].

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Summary

- In this prospective, before and after feasibility study, a finger food menu was developed and implemented in a stroke rehabilitation ward.
- The study showed promising results in increasing dietary intake at lunchtime meals for older adults after stroke.
- Recruitment was feasible and at the expected rate.
- The study reported a low participant retention rate due to frequent ward moves.
- Digital photographs captured plate waste with good interrater reliability.
- Developing the intervention with other hospital policies and engaging formal leaders to support implementation is essential for future trials.

Reasons for undernutrition in people after a stroke in a hospital can be multifactorial and include psychosocial or environmental factors. For example, poor quality or presentation of meals or lack of assistance with eating [4], eating, drinking and swallowing difficulties, challenges using cutlery or participating independently during a meal due to upper limb difficulties and cognitive changes [5]. People with eating difficulties associated with the oral preparatory phase of swallowing can become dependent on others, commonly associated with reduced intake and malnutrition [6]. For people after stroke who have a high prevalence of eating difficulties, there is a lack of evidence-based nutritional interventions to support food intake, with nutritional support not provided in a coordinated or recognised holistic approach in hospitals [7].

The National Health Service (NHS) in England's recent initiatives to improve nutrition and hydration care in healthcare considers the provision of quality, nutritional and sustainable food to be vital to prevent and treat malnutrition [8]. In the United Kingdom, healthcare menu planning guidance suggests that finger foods are suitable for people after a stroke and should be offered to meet patients' nutritional needs [4].

Finger foods are foods presented in a form that are easily picked up with the hands and transferred to the mouth; without the need for cutlery [9]. Finger food menus in the United Kingdom can include small sandwiches, pieces of quiche, vegetable sticks and cake slices or foods made in individual or bite-sized portions. For people after a stroke or with cognitive impairment, finger foods can be used to support participation at mealtimes [4, 10, 11], enable independence and to prevent loss of dignity and embarrassment when eating in front of others as spills are minimised [12]. They can be served variously at a table, for example, in place of a meal, as snacks for between meals or supplied in different locations to be accessed throughout the day [13].

Although some hospitals in the United Kingdom offer finger food menus, significant regional variation exists, with no robust evidence for the effectiveness or cost-effectiveness of using finger foods in hospital settings for people after stroke [14]. Previous studies evaluating the use of a finger food menu have focused on long-term care settings and people with dementia, and have not reported strategies to support implementation [14]. This makes it challenging for food service providers to understand if it is feasible to provide a finger food menu in hospitals and what factors will support implementation.

The aim of this study was to implement a finger food menu and to assess the feasibility of using it in a stroke rehabilitation ward. As part of this aim, we assessed the feasibility of recruitment and retention of patients to the study, the feasibility of data collection methods, inter-rater reliability of plate wate estimations using digital photography and change in food intake. Intervention costs were assessed to support a cost-consequence analysis. We also described contextual and environmental barriers and facilitators for implementing a finger food menu in a hospital ward to inform the development of a future implementation strategy.

2 | Methods

2.1 | Ethics

The Health Research Authority and Research ethics committee approved this study (number: 240341), and [Hospital Research and Development Team] authorised this study to begin on 11 December 2018. The study was registered on clinicaltrials. gov (NCT03835455). All participants deemed to have the mental capacity to make an informed decision about participating in the study provided written consent before data collection. Mental capacity during screening was supported by a healthcare provider decision-making tool. A registered speech and language therapist (SLT) adapted information about the study to support people with aphasia to make informed decisions. In line with Health Research Authority (HRA) ethics [15], personal consultees provided written consent for five participants who lacked the mental capacity to consent to the study.

2.2 | Study Design

This study was a prospective, before-and-after intervention study, which focused on feasibility. The study employed a pretest and posttest design with no comparison or control group. Participants acted as their own control receiving the standard ‘à -la carte’ menu offered at the hospital site at lunchtime on Day 1 of the study and offered the finger food menu over the two following lunchtime meals. Participants were included in the study for a maximum of 5 days. The researcher was on the ward during all lunchtime meals and observed all participant's eating episodes using an observation schedule recording the ward dining environment and interactions between staff, visitors and participants. Qualitative feedback to address the acceptability of the finger food intervention using semi-structured interviews with patients and staff were completed after the food menu trial and reported elsewhere (Heelan et al, unpublished data).

2.3 | Study Team

The researcher present on the ward during the study was a clinical academic SLT, working clinically as an SLT with adults in

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an acute hospital setting while holding a doctoral research fellowship. The researcher had working knowledge of the hospital catering system and the ward set up however was not working clinically on the study ward during data collection period.

2.4 | Patient and Public Involvement (PPI)

The finger food menu was developed with the catering team, nursing staff and dietetic team at the hospital, with input from a community stroke group (seven people aged 50–86 years) to understand what a finger food menu for people after stroke should comprise and how it should be delivered on the ward. The researcher and catering dietitian reviewed the current hospital menus and completed a tasting session to assess the suitability of food items. Items were included as finger foods if they could be picked up and transferred to the mouth without cutlery [4, 9]. Five anonymised adults from the National Health Service (NHS) Trust PPI database reviewed study information sheets to ensure they were easy to read and understand.

2.5 | Participants

2.5.1 | Sample Size

The primary aim of this study was to assess feasibility. The sample size of 31 participants was predetermined and considered sufficient to meet the objectives of collecting data on recruitment, retention and outcome measure variation. A sample size of 30 participants is used as a general rule within preliminary studies to ensure adequate data collection [16, 17].

2.5.2 | Recruitment

Consecutively admitted, eligible patients were recruited from a stroke rehabilitation ward in an NHS hospital on the south coast of England. Patients were eligible to participate irrespective of their nutritional status at admission, to encompass patients at risk of malnutrition or nutritional decline as well as those who were well nourished.

Participants were included if they were a patient on a stroke rehabilitation ward; 65 years or older; eating regular textured diet (regular foods, level seven as described by the International Dysphagia Diet Standards Initiative) [18]. Participants were excluded if they were on the end of life care pathway; receiving partial or full enteral feeding; in a side room on the ward; had significant food allergies, intolerances or other dietary restrictions that could not be catered for by the finger food menu; were eating a texture modified diet (levels three, four, five or six as described by the International Dysphagia Standards Initiative) [18].

2.6 | Contextual Considerations

An external catering company was contracted to provide hospital meals at the study site. The NHS hospital and catering team were required to abide by food and drink standards set by the UK Government [4]. These recommendations include menus that meet pre-defined nutrient standards, menus that are designed and structured for the population and including specific religious, cultural, vegan and gluten-free menus, menus appropriate for therapeutic and modified diets and the provision of two snacks per day [4].

The hospital site for this study used a 'cook freeze' method for delivering food to patients. Patients were served three meals a day (breakfast, lunch and supper) and provided with choices from an á la carte menu. Snacks were provided between meals and hot and cold beverages were provided throughout the day. Ward hosts employed by the external catering company were responsible for taking food orders for patients each morning. This was recorded on an electronic tablet and sent to the back-of-house freezer, where items required for each ward were picked and packed. The ward host was responsible for collecting the items and putting them in the oven to be heated and served on the ward. Serving on the ward was co-ordinated by a member of staff, typically a housekeeper or health care assistant.

2.7 | Intervention

The catering link dietitian employed at the hospital provided training to catering staff about the foods offered on the finger food menu, the time frame for the study period and information on how to cook and order finger food menu items. Foods provided on the finger food menu are displayed in Table 1. Supporting Information 1 describes the intervention using the Tidier reporting checklist [19].

2.8 | Standard Care

The baseline period was 'standard care' used to provide a comparison between the standard menu and finger food menu intervention and provided contextual information. Participants were offered food from the standard hospital food menu. The menu included a selection of hot and cold items as a main meal and dessert. Items were presented on a text-printed menu or a photo menu. Supporting Information 1 describes standard care using the Tidier reporting checklist [19].

2.9 | Assessing Change in Food Intake

Participants' food and nutritional intake (energy, protein, carbohydrate and fat) were recorded across three lunchtime meals. On the ward, the researcher used a smartphone to capture digital images of the food tray before the meal was served and after the meal was consumed. The researcher photographed the tray without flash from directly above to ensure the full tray could be seen. Digital photographs were saved according to the participant's study number and date.

Away from the ward, the researcher estimated food intake via plate waste measurements of each item of food from the digital image taken premeal delivery and postmeal consumption. The researcher used a six-point visual scale to estimate plate waste,

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TABLE 1 | List of finger foods offered as the finger food menu intervention during feasibility data collection.

Food type	Finger food
Hot foods	Sausage roll
	Chicken dippers
	Cheese toastie
	Fish fingers
	Pizza
Cold foods	Cheese sandwich
	Tuna mayonnaise sandwich
	Ham sandwich
	Egg mayonnaise sandwich
Side dishes	Soft roll with butter
	Carrot batons
	Broccoli florets
	Roast potatoes
	Chips
	Pasta spirals
Desserts	Cheese and crackers
	Fruit wedges
	Chocolate chip cake
	Madeira cake
	Ginger drizzle cake
	Sweet biscuits

based on a scale by Comstock [20]. The six-point visual scale used the following descriptors:

- 100%—Full food portion remains on the plate.
- 90%—Nearly full portion remains on the plate, but at least one bite has been taken.
- 75%—Three-quarters of the food portion remains on the plate.
- 50%—Half of the food portion remains on the plate.
- 25%—One-quarter of the food portion remains on the plate.
- 0%—None of the food portion remains on the plate.

The researcher calculated nutrient intake from the percentage of each food item consumed (inverse of plate waste), multiplied by its nutrient composition (energy, protein, fat and carbohydrate) and summed. The hospital caterer supplied an electronic spreadsheet containing the nutritional composition (energy, protein, fat and carbohydrate) of all foods supplied on the hospital standard menu and finger food menu. All food items were served using standard portion sizes.

2.10 | Participant Characteristic Data Collection

Participant characteristic data were collected from medical records. The information collected included gender, age, length of stay (from admission to consent to study), body max index on admission, malnutrition universal screen tool score on admission, evidence of input from a dietitian during the inpatient stay, NIH Stroke Scale score on admission [21] and any evidence of cognitive impairment.

2.11 | Recruitment and Retention Rate

Recruitment rates were defined as the number of participants recruited to the study per month, and the retention rate was based on the number of patients who consented to the study and the number with fully completed outcome measures. The nature and reason for withdrawal or non-consent explained these results.

2.12 | Feasibility of Dietary Intake Data Collection Methods

During the study, the researcher used a reflective diary in the form of 'Memo entries' to record the ease of using data collection tools and to document the number and reasons for any missing images. Memos were reviewed thematically to describe the process of data collection and whether this was suited to the ward environment.

2.13 | Interrater Reliability of Plate Waste Estimations

To assess inter-rater reliability of plate waste estimation, the researcher who collected the data and a student researcher not directly involved in the study independently estimated plate waste from each item of food (275 items) from the digital photographs. To reduce bias, the main aim of the study was not disclosed to the student researcher, and plate waste estimates were analysed independently. Cohen's Kappa was run to determine the level of agreement between the two researcher's judgement of meal item plate waste using 275 items.

2.14 | Intervention Costs

Direct and indirect costs were identified to outline the most relevant costs and outcomes for a future trial through a retrospective interview with the catering dietitian at the hospital site. During the interview, the catering dietitian discussed the direct and indirect costs associated with two scenarios. Scenario 1: Standard care, where the standard menus are provided only. Scenario 2: finger food menu intervention provided in addition to the standard menu. As part of this interview, the catering dietitian provided costs for individual food items served on the standard and the finger food menu. The results of the analysis were reported clearly in a table stating direct and indirect costs, as per NICE guidelines for a cost-consequence analysis [22], and with an indication as to where to obtain data for a future trial.

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2.15 | Assessing Intervention Delivery

Observations supported an understanding of how the intervention was delivered on the ward and therefore, what needed to be adapted to make it feasible to be used on different wards in a future larger study. Fieldnotes from observations were analysed to better understand factors that influenced implementation. Mealtime observations coincided with the usual timings of mealtimes on the ward, occurring between 12.00 and 14.30. During the observations, the researcher sat within the ward bay or at the door, with a clear view of the participants but out of sight, avoiding eye contact where possible and having minimal interaction. The researcher did not interact with the participant during the observation. Observations were overt, meaning participants and staff were aware of the researcher's presence and the research aims. The researcher observed lunchtime meals throughout the data collection period (January–August 2019) meaning staff became accustomed to the researcher's presence.

An observation schedule, developed and piloted for the study, prompted the recording of specific data including: timing of the meal (time meal tray served, time participant started eating, time participant stopped eating); number of patients in the bay; staffing levels; events occurring at mealtimes such as radio or television being on; nature of interactions with ward staff, relatives, visitors or other patients; contextual data, including a sketch of bay and position of participants and researcher. The sketch of the bay was used to support recall during analysis of field note data. The observation schedule used in this study is shown in Supporting Information 2.

2.16 | Approach to Analysis

Descriptive statistics were used to evaluate the feasibility outcomes. Participant demographics were recorded for each day of data collection and descriptively analysed. This helped to establish any patterns to attrition rates during the data collection period. Percentages were used to describe recruitment and retention rates. Median and range of energy (kcal), protein (g), fat (g) and carbohydrate (g) consumed across each mealtime were used to indicate the effect of the intervention on dietary intake. Because of the small sample size, non-parametric tests were used. Analysis took the form of Wilcoxon Signed-Rank test to determine the effect of finger foods on dietary intake compared with the standard foods offered and explored to inform sample size calculation of a larger trial.

Framework analysis, a matrix-based method for ordering and synthesising data, was used to analyse field notes recorded from observations on NVivo 12 [23]. A central component to this method includes the use of a 'thematic framework' to systematically organise data by key themes and concepts. The framework was developed based on pre-existing concepts described by Keller et al. [24], which includes hospital system, meal access, meal experience and meal quality; all components described to influence food intake.

The following steps to data analysis based on Ritchie, Spencer and O'Connor [23] were followed:

Familiarisation through immersion in the data: The researcher (M.H.) became familiar with the data by reading all field note data sets. This process allowed the researcher to immerse herself in detail recorded in field notes, an active phase where recurring themes or ideas were identified and documented. A second researcher (C.B.) read a random sample of 10 field notes and noted recurrent themes or concepts. Discussions between the two researchers allowed ideas to be developed.

Developing a framework by identifying recurrent and important themes: The themes documented were sorted and grouped under domains relating to '*how* finger foods were used' based on concepts described in the theoretical model by Keller et al. [24]; meal access; meal experience; meal quality and hospital system. The model by Keller et al. [24] was considered the most appropriate model to use as it encapsulated multiple inter-related and multi-level components that impact eating and was developed to guide the development and evaluation of complex mealtime interventions, which considered the multi-level components.

Labelling the data: Next, the data were systematically 'indexed' using the draft framework. This process involved rereading data sets and noting where the essence of the data related to a theme on the framework. 'Nodes' representing themes were created on NVivo, acting as a filing system. Whenever a theme or concept was identified within the raw data set, the raw data were highlighted and 'indexed' under the 'node.' This stage allowed the researcher to be more immersed in the data and refine themes. The draft framework was revised to accurately reflect the data.

Summarising and sorting the data: NVivo was then used to create a visual matrix with the key themes listed across the top of the chart and corresponding data from each participant observation listed below. The researcher reduced the data listed into understandable but brief summaries. The visual matrix allowed each theme to be systematically reviewed across cases.

Synthesising the data: The final step of the process involved synthesising the original data. This allowed for checking back from themes and subthemes against fieldnote data to ensure the essence of the raw data remained. No changes were made to the themes or sub-themes at this stage.

Categorising to concepts from the i-PARIHS framework: Findings from fieldnotes and researcher's memos recorded throughout the study duration were then categorised to concepts from the i -PARIHS (Integrated Promoting Action on Research Implementation in Health Services) framework [25] to identify key barriers and facilitators and create a table of recommended implementation strategies.

The i-PARIHS framework is a model designed to facilitate the implementation of evidence-based practices in healthcare settings. It argues that successful implementation is due to interplay between the key concepts of innovation, recipients and context and facilitation [25]. 'Innovation' refers to the specific evidence or practice being implemented, considering its clarity, evidence base and adaptability. 'Recipients' encompass individuals or groups affected by the innovation, including their attitudes, knowledge and readiness for change. 'Context'

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includes the setting where the implementation occurs, focusing on cultural, leadership and evaluative aspects. The framework also emphasises the role of facilitation, where facilitators actively support and guide the implementation process, adapting strategies to fit the specific context and needs of recipients. Concepts highlighted by the i-PARIHS framework allowed the research team to consider which characteristics of the innovation, context and facilitation proved to be a barrier for successful implementation and which tools facilitated the support of the intervention.

2.17 | Pre-Specified Feasibility Criteria

Findings from this feasibility study provided foundations for a future full evaluation of a finger food menu in hospitals. This study was viewed as feasible to proceed to a definitive trial if the following success criteria were met:

- Recruitment rate was acceptable, for this trial recruitment rate reaches an average of four patients a month.
- Data were collected for 75% of participants during day three of the trial.
- Food intake measurements via digital photographs were feasible to use on the ward and measures were consistent between raters (good interrater reliability (e.g., Kappa ≥ 0.60) and are therefore determined as suitable outcome measures.
- Costs to using the finger food menu were relevant to the consequences of increased dietary intake.

The above criteria are reviewed based upon results from the study and used to determine future steps.

3 | Results

3.1 | Participant Characteristics

Screening and enrolment occurred from January 2019 and August 2019. Thirty-one patients enroled in the study. The target recruitment sample was 30–32 participants. Recruitment was halted at 31 participants when the maximum recruitment time frame was reached. Table 2 shows characteristics of study participants across the days of data collection.

3.2 | Recruitment and Retention Rate

Figure 1 shows the participant flow diagram displaying data regarding participant flow through the study. Thirty-one participants were recruited within the 8-month recruitment period. Over half of the potential participants approached declined to participate in the study (33 of 64). Of these, 13 reported being satisfied with the current food options and declined to participate further. They had received information sheets, which stated that the study would involve trialling a new finger food menu and provided some examples of food; however, it did not provide a copy of the new menu. Two specifically declined to take part as they were not interested in being involved in research. There were high rates of attrition, particularly at Day 3, with full outcome measures completed for only 19 of the 31 participants recruited.

3.3 | Indication of Effect

Table 3 shows median dietary intake, range, and interquartile range for each day of data collection. Dietary intake measures are reported for key nutritional components, including energy (in Kcal), protein, fat and carbohydrates. Overall, median energy intake was higher during the finger food menu intervention and increased across the two mealtimes using the finger food menu intervention. However, there was a wide range across all 3 days of data collection. Median consumption of protein decreased over Day 2 and Day 3, suggesting the food items provided within the finger food intervention were not as high in protein as those food items consumed within the standard menu. Median consumption of fat increased over Day 2 and Day 3 of intake and so did carbohydrate consumption. Again, a wide range of results was seen across all days of data collection.

There was not a statistically significant increase in the energy, protein, fat or carbohydrate intake when participants ate finger foods compared with a standard meal. Nutrient intake consumption showed a trend toward finger foods providing increased amount of energy, fat and carbohydrate levels when compared with the standard meal. Median differences in intake were higher when comparing Day 1 versus Day 2, as opposed to Day 1 and Day 3. This might be explained by the initial increased interest in new menu options provided. The median difference between values were not statistically significant. This was to be expected in the feasibility study and does not specifically suggest that in a future larger trial, significant results would not be seen.

3.4 | Feasibility of Dietary Intake Data Collection

The researcher took 149 digital photographs of plates and stored all photos for data analysis away from the study ward. There was one occasion where the digital image of the plate before serving was not saved due to a software error. In this instance, the researcher recorded plate waste estimates in real time. Memos recorded by the researcher showed that communication with catering hosts was essential. Because ward mealtimes varied, the ward host needed to inform the researcher when meals were due to be served and when they would collect plates from the patients. Overall, the methods for collecting dietary intake data were appropriate for use on a hospital ward. Photos could easily be taken with a camera on a phone or tablet device and no specific training was required.

3.5 | Interrater Reliability of Plate Waste

Plate waste measures using the six-point scale [20], analysed away from the ward showed good inter-rater agreement between two independent researchers, with limited training. Plate waste estimations could be used alongside data from the catering team to

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TABLE 2 | Demographics of a cohort of 31 hospital inpatients after stroke participating in feasibility data collection of a finger food menu offered over two lunchtime meals.

Characteristic		Consent	Day 1	Day 2	Day 3
Participants (*n*)		31	29	27	19
Mean length of stay (days)		17	17	17	16
Sex	Male	15	13	13	9
	Female	16	16	14	10
Age (years)	65-80	14	12	13	10
	80+	17	17	14	9
Body mass index	< 18.5 (Underweight)	1	1	1	1
	18.5-24.9 (Healthy)	13	13	9	5
	25-29.9 (Overweight)	7	6	7	7
	30-39.9 (Obese)	8	7	8	4
Malnutrition Universal Screening Tool score on admission	Low risk	22	21	20	13
	Medium risk	1	0	1	0
	High risk	6	6	4	4
Input from dietitian during admission	Yes	11	10	10	7
	No	20	19	17	12
National Institute of Health Stroke Scale (NIHSS)	0 (No stroke)	2	2	1	0
	1-4 (Minor)	12	11	11	9
	5-15 (Moderate)	13	12	11	7
	16-20 (Mod. to severe)	4	4	4	3
	21-42 (Severe)	0	0	0	0
NIHSS motor arm on admission (right and left)	No drift	9	9	7	5
	Drift	10	10	9	7
	Some effort	5	3	5	3
	No effort	4	4	3	1
	No movement	2	2	2	2
Evidence of cognitive impairment	Yes	29	27	25	19
	No	2	2	2	0

Abbreviation: BMI, body max index.

estimate dietary intake. Absolute agreement between estimated proportional consumption of food items rated was 84.36% ($n = 232$). This was defined as both researchers providing the same plate waste estimations. There was 'good' agreement between the judgements, $\kappa = 0.709$ (95% CI: 0.64–0.77), $p < 0.001$ based on the guidelines set from Altman [26].

3.6 | Costs

Table 4 displays an overview of direct and indirect costs associated with the intervention from the catering perspective.

3.7 | Intervention Delivery

The mealtime observations enabled the research team to understand how participants and staff used the finger food intervention on the study ward and to derive barriers and facilitators to guide future intervention delivery. Data were organised using four overarching domains: meal access, meal quality, meal experience and hospital systems originating from the model by Keller et. al [24] and further described by Heelan [27]. The research team then mapped themes to concepts of the I-PARIHS framework to describe which contextual characteristics impeded or facilitated implementation and which tools and support facilitated dealing with identified barriers. These factors are relevant to implementation success in a follow-up trial and reported in Table 5.

The 'hospital system' theme encompassed external factors influencing how finger foods were served and used within the hospital, including the logistical challenges associated with the finger food menu, which deviated from standard hospital mealtime procedures. There was a paradox between the rigid, time-constrained structure of a hospital mealtime and the flexibility a finger food menu offers, for example, staff needing to collect plates at a set point which did not offer patients time

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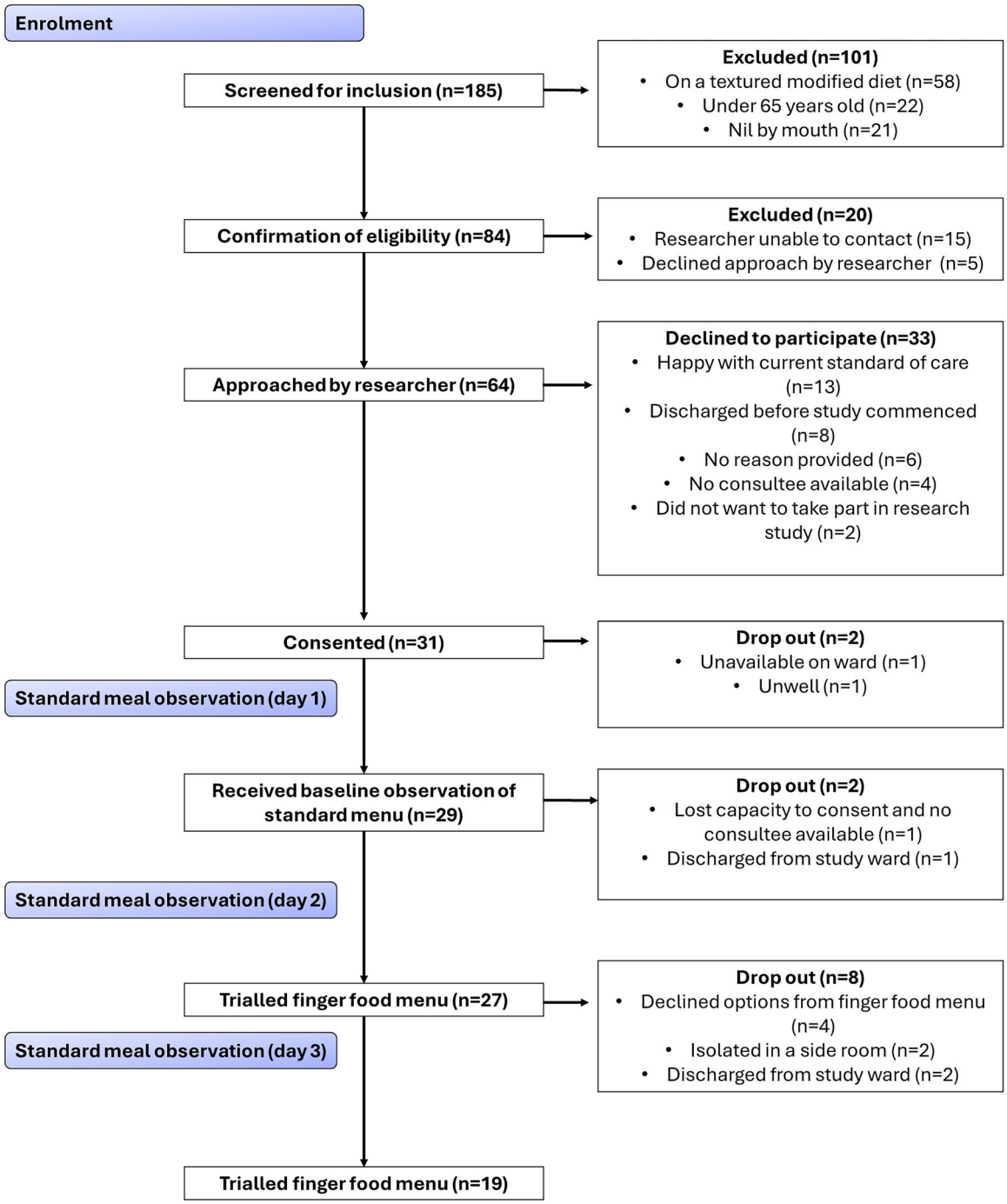

FIGURE 1 | The flow of participants from enrolment to data collection during the feasibility study.

to eat over a period and staff perceptions of ward policies during a mealtime, for example, encouraging patients to sit down during mealtimes and not allowing finger foods to be eaten on the go. These factors were considered part of the 'context' of the I-PARIHS framework, with suggestions to enhance implementation efforts that needed to be addressed as part of a higher-systems level approach rather than at the ward level.

The 'meal access' theme revealed that finger foods facilitated participant independence and control in eating, provided the foods were easy to consume and not too difficult to chew. The findings varied: some participants could access finger foods independently using their hands only or hands and a fork, while others still needed assistance from staff or relatives for meal setup, encouragement for eating and clearing up. The researchers mapped factors relating to meal access to the 'innovation' concept of the I-PARIHS framework, suggesting that future innovation of the finger foods offered needs to be tested with recipients of the menu as well as engaging clinical staff to support them in understanding the reasons behind using finger foods and their role in the meal experience on a hospital ward.

Themes of 'meal quality' are described as sensory appeal, nutrient density, variety and preference, presentation and food safety. Limited regard to meal quality was provided directly in field notes, however, reflective memos made by the researcher

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TABLE 3 | Dietary intake for standard meal and finger food meals during feasibility data collection.

		Standard meal (day 1)	Finger food meal (day 2)	Finger food meal (day 3)	Wilcoxon signed rank test Standard (Day 1) versus Finger food (Day 2)	Wilcoxon signed rank test Standard (Day 1) versus Finger food (Day 3)
Total number of meals		19	19	19		
Energy consumed (kcal)	Median	419.30	530.00	540.80	($Z = 1.449$, $p > 0.05$)	($Z = 0.724$, $p > 0.05$)
	Range	911.00	780.00	685.20		
	(min– max)	(124.00–1035.00)	(108.30–888.30)	(108.00–793.50)		
	IQR	406.0	237.5	415.5		
Protein consumed (g)[a]	Median	20.10	19.50	16.80	($Z = 1.127$, $p > 0.05$)	($Z = -0.020$, $p > 0.05$)
	Range	27.4	29.40	31.10		
	(min–max)	(4.80–32.20)	(4.30–33.70)	(4.30–35.40)		
	IQR	17.80	8.80	12.8		
Fat consumed (g)[a]	Median	14.70	18.80	16.40	($Z = 1.650$, $p > 0.05$)	($Z = 0.980$, $p > 0.05$)
	Range	38.00	40.70	41.90		
	(min–max)	(1.70–39.70)	(2.00–42.70)	(4.50–46.50)		
	IQR	13.70	19.70	12.10		
Carbohydrates consumed (g)[a]	Median	48.80	68.20	64.00	($Z = 1.650$, $p > 0.05$)	($Z = 0.805$, $p > 0.05$)
	Range	127.00	95.80	101.20		
	(min–max)	(8.50–135.50)	(12.30–108.10)	(12.30–101.20)		
	IQR	57.10	26.2	52.80		

Abbreviation: IQR, Inter-quartile range.
[a](g) grams consumed.

documented the researcher's role as the facilitator, ensuring consistency with delivering the finger food menu items on the ward and allowing participants to select foods that provided variety, for example, allowing participants to order items for finger food menu with items from the standard menu if desired. There were no adverse events or harm to patients or staff recorded during this study.

4 | Discussion

The aim of this study was to implement a finger food menu and to assess the feasibility of using it in a stroke rehabilitation ward.

4.1 | Feasibility of Study Design and Data Collection Methods

This feasibility study showed people with acute stroke in hospital were willing to take part in the study. Expected recruitment rates were met, but a high level of missing data was the main issue of concern. By Day 3, data were collected from only 19 participants who chose foods from the finger food menu. A short follow-up time of 3 days was initially expected to reduce high attrition rates, which have been reported elsewhere by hospital nutrition studies [28]. However, by implementing the menu on one ward in a large NHS hospital meant that participants were excluded if ward moves were indicated due to clinical need and the acute nature of the setting meant that becoming unwell and not able to participate in a mealtime was an ongoing risk.

Future research designs should limit the impact of attrition on data collection. It is recommended that the finger food menu is trialled over multiple mealtimes and implemented across multiple wards to limit attrition caused by ward moves and discharges. Future research should also provide flexibility for data collection periods to support maximal data collection points. Studies should employ qualitative data collection strands to allow recording of reasons for not collecting data at specific time points.

Using digital photographs as a method for estimating percentages of food waste was a reliable method of data collection for collecting plate waste. This is in line with similar studies, which showed digital photographs are a valid method to estimate energy and protein against plate weighing [29]. Promising

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clinical outcomes, relating to dietary intake suggests that an adequately powered randomised control trial (RCT) has a good chance of demonstrating clinical effectiveness. Findings from this feasibility study were unable to weigh the cost and consequences in monetary terms, however showed important cost considerations for a future economic evaluation.

4.2 | Intervention Content and Delivery

Mapping the findings from the mealtime observations to the i-PARIHS framework [25] highlighted the importance of the context and the researcher acting as a facilitator to support the successful implementation of the intervention. Engagement with clinical and catering teams when developing the finger food menu allowed the menu to be designed to fit the ward setting used for this study. However, there were ongoing challenges with staff not being aware of the reason for using finger foods and their own beliefs about eating with fingers impacting whether patients felt comfortable using their fingers. The presence of the researcher during the data collection period and open communication channels between the researcher and key leaders, including the ward manager and catering leaders, meant adaptations to the menu delivery could be overcome, such as menu items becoming unavailable or participants requesting standard menu items during the implementation phase.

Factors relating to the context and facilitator role merit attention in a future design of a study. The intervention needs to be refined to fit within the local context and organisational policies and should be implemented with full support and engagement from catering and clinical teams. The findings from this study reflect that support needs to be gained at an individual level, including staff working on the ward, but also at a team and organisation level to support the changes to be sustained. The findings point toward a number of organisational conditions that would support the implementation of the intervention in another context. A facilitator should be available throughout the implementation stage, acting as a role model for using the intervention and adapting the intervention to fit with the context.

4.3 | Informing a Future Evaluation

Pre-set criteria tested the success of the study based on the research objectives, including trial recruitment, protocol adherence and outcome data [30]. These criteria supported the study team to understand whether the study is possible, whether a future trial should proceed, and if so, how [31]. Of the criteria defined for the feasibility of a full-scale trial, the only target unmet was the retention to the study, in which the criteria stated that 'Data were collected for 75% of participants during day 3 of the trial'. All other outcomes met the pre-set criteria for success. These prespecified criteria for a future study provided confidence that the protocol components fit together well. There was an adequate, sizeable population to take part in the study. The success of delivering the intervention in this study was supported by a menu developed to fit the context and the availability of an internal facilitator to aid the food delivery

TABLE 4 | Direct and indirect costs of offering a finger food menu on a hospital ward from a catering and hospital perspective.

Perspective	Cost category	Types of cost	Description	Potential sources of data
Catering provider	Intervention cost	Direct	Production and printing of additional menu	Data from catering team
	Intervention cost	Direct	Food costs	Food cost data from catering team
	Intervention cost	Indirect	Time required for ward host to prepare finger food meal trays.	Interviews with catering team Ward observations
Hospital provider	Staff training	Direct	Staff training to support understanding of finger food and who to use it for	NHS costings for staff time to deliver training
	Staff support over mealtimes	Indirect	Staff costs relevant to time required to support patients over mealtimes.	Mealtime observations

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TABLE 5 | Facilitators and barriers of using a finger food menu on a stroke rehabilitation ward described in the feasibility study and suggestions to enhance implementation in a future study.

Integrated-Promoting Action on Research Implementation in Healthcare Sciences (I-PARIHS) determinant	Facilitator/barrier described in the feasibility study	Suggestions to enhance implementation efforts in a future study
Context	Hospital mealtimes are restricted by time constraints. Finger food meals can take an increased length of time to consume.	Ensure resources are available to account for longer eating durations, including flexible serving and collection times.
	The inflexibility of ward policies meant that finger foods were not always used as intended. For example, nursing staff encouraged participants to be seated while eating and did not allow participants to eat as they wandered around the ward.	Develop the intervention in line with other hospital policies. Provide training to staff to determine how the intervention fits with other policies.
	Staff members' beliefs about whether food should be eaten with their hands were based on their backgrounds and experiences. This influenced the behaviour of participants who were patients and whether they felt comfortable using their hands to eat.	Engage all staff early, particularly clinical and frontline staff, to understand and address concerns about using the menu in their ward.
	Provision of ward training for catering staff meant adding a new menu did not result in any added complications for meal ordering.	Engage key leaders to ensure that training can be provided so that the new menu fits within the current systems.
	Some participants chose not to order from the finger food menu because the menu was only offered over lunchtime meals. Offering the menu at only one mealtime has the potential to limit recruitment and impact data collection in a future trial.	Develop a menu with items that can be offered over multiple mealtimes to support participation.
Facilitation	Availability of the researcher on the ward meant that ward hosts could be reminded about the required presentation of the finger food, for example, to open the packaging and cut fruit into wedges. The availability of the researcher supported the staff to adopt change into practice. If new members of staff or agency staff were working on the ward, the researcher provided information about the new menu.	Train a formal leader to support the delivery of the food and to ensure they are available over mealtimes.
	The availability of the researcher, who was known to ward staff and had links with key leaders, supported the adoption and adaption of the menu to meet special requests. For example, allowing the finger food menu to be offered flexibly with other standard items at request of participants.	Ensure the formal leader works closely with staff and is available to understand the barriers to implementation. The formal leader requires problem-solving and leadership skills to be able to support adaptions of the menu.

(Continues)

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TABLE 5 | (Continued)

Integrated-Promoting Action on Research Implementation in Healthcare Sciences (I-PARIHS) determinant	Facilitator/barrier described in the feasibility study	Suggestions to enhance implementation efforts in a future study
Innovation	Participants reported that, theoretically, finger foods would give them more control over their eating and would reduce the amount of 'mess' made when eating. These views meant participants were interested in trying the finger food items. In practical terms, some participants required help from staff to clear up after eating finger food.	Incorporate patient and public involvement (PPI) in testing suitable items for the finger food menu. PPI will help ensure menu items are practical to use on the ward for the population of interest. Incorporate views of a diverse group of patients and the public to encapsulate a range of views. Incorporate views of PPI representatives in the design of the trial and information sheets to inform potential participants about how finger foods should be used.
	Staff showed awareness that the finger food was different but were not necessarily aware of the strength of evidence relating to the intervention of the evidence base or reason behind using the food.	Engage all staff early, including clinical staff, to understand the reason for using finger foods on the ward.

and make adaptions. A future study requires modification to the study design and data collection timings to mitigate issues with missing data.

4.4 | Strengths and Limitations

There are a number of strengths to this study including its pragmatic design, working in line with current hospital procedures. This supported the implementation and introduction of a new intervention into the ward environment. This feasibility study addressed an area of research not previously fully investigated. The mixed methods components of this study have provided additional insights into the provision of finger food and this methodology has important strengths for future research and the implementation strategy.

Limitations were identified. A high rate of missing data due to patient attrition impacted statistical analysis in this study. However, enough data were collected to determine the feasibility of a future study. Conducting this study at a single site with one stroke rehabilitation ward meant it was not possible or practical to conduct a separate control group alongside the intervention group or to randomise participants. Data were collected by a single researcher, which limited the number of participants who could be consented for the study and the time available for data collection. The study did not collect data on ethnicity or cultural views relating to food, thus impact of ethnicity or cultural beliefs on the findings was not addressed. The sample population for this study will limit the generalisability of the results but will nevertheless have collected valuable data for the future. A future study should ensure a variation in cultural background in relation to the study site is collected.

5 | Conclusions

This feasibility study utilised a pragmatic viewpoint to operationalise a finger food menu on the stroke rehabilitation ward, determine the feasibility of offering this alongside the standard menu, and outline associated costs. Recruitment to the study was feasible, with alterations to the study design required to support patient retention, which was the biggest challenge. This study provided important information about study design and intervention delivery to be refined before effectiveness testing.

Author Contributions

The first author Milly Heelan collected the data and wrote the first draft of the paper. All authors reviewed and commented on subsequent drafts of the manuscript.

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Ethics Statement

The Health Research Authority and Research Ethics Committee approved this study (IRAS number: 240341), and the hospital Research and Development team authorised this study to begin on 11/12/18. The study was registered on clinicaltrials.gov (NCT03835455).

Conflicts of Interest

The authors declare no conflicts of interest.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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