Appendix 1. Pilot Study – Checklist: Items to include when reporting a pilot study.

The checklist with items to include when reporting a pilot study (adopted from the CONSORT statement)[25]

Paper section	*No.*	*Descriptor*	*Where located*
Title and abstract	1.	• Does the title or abstract indicate that the study is a "pilot"?	Title, Abstract
Introduction			
Background	2.	• Scientific background for the main study and explanation of rationale for assessing feasibility through piloting	Introduction
Methods			
Participants and setting	3.	• Eligibility criteria for participants in the pilot study • The settings and locations where the data were collected	Methods – Participants and setting
Interventions	4.	• Provide precise details of the interventions intended for each group and how and when they were actually administered (if applicable) – state clearly if any aspects of the intervention are assessed for feasibility	Methods – The microlearning intervention
Objectives	5.	• Specific scientific objectives and hypotheses for the main study • Specific feasibility objectives	Introduction, Methods – Feasibility outcomes
Outcomes	6.	• Clearly defined primary and secondary outcome measures for the main study • Clearly define the feasibility outcomes and how they were operationalized – these should include key elements such as recruitment rates, consent rates, completion rates, variance estimates, etc	Methods – Feasibility outcomes
Sample size	7.	• Describe how sample size was determined • In general for a pilot of a phase III trial, there is no need for a formal sample size calculation. However, confidence interval approach may be used to calculate and justify the sample size based on key feasibility objective(s).	Methods – Feasibility outcomes
Feasibility criteria	8.	• Clearly describe the criteria for assessing success of feasibility – these should be based on the feasibility objectives	Methods – Feasibility criteria
Statistical methods	9.	• Describe the statistical methods for the analysis of primary and secondary feasibility outcomes	Methods – Data analysis
Ethical aspects	10.	• State whether the study received research ethics approval • State how informed consent was handled – given the feasibility nature of the study	Methods – Ethical aspects
Results			
Participant flow	11.	• Flow of participants through each stage (a flow-chart is strongly recommended). • Describe protocol deviations from pilot study as planned, together with reasons • State the number of exclusions at each stage and reasons for exclusions	Results – Participant flow and characteristics
Recruitment	12.	• Report the dates defining the periods of recruitment and follow-up	Methods – Participants and

			setting, The microlearning intervention
Baseline data	13.	• Report the baseline demographic and clinical characteristics of the participants	Results – Participant flow and characteristics, Feasibility outcome 2
Outcomes and estimation	14.	• For each primary and secondary feasibility outcome, report the point estimate of effect and its precision (e.g., 95% confidence interval [CI]) – if applicable	Results – Feasibility outcome 1, Feasibility outcome 2
Discussion			
Interpretation	15.	• Interpretation of the results should focus on feasibility, taking into account • the stated criteria for success of feasibility; • study hypotheses, sources of potential bias or imprecision – given the feasibility nature of the study • the dangers associated with multiplicity of analyses and outcomes	Discussion
Generalizability	16.	• Generalizability (external validity) of the feasibility. State clearly what modifications in the design of the main study (if any) would be necessary to make it feasible	Discussion – Strengths and limitations
Overall evidence of feasibility	17.	• General interpretation of the results in the context of current evidence of feasibility • Focus should be on feasibility	Discussion, Conclusion

Appendix 2. Statements about hospital and home care: Nurses and nursing assistants' nutritional care for older adults

No.	*Difficulty*[a]	*Statement in Dutch*[b]	*Statement in English*[b]
1.	Easy	Het is een belangrijke interventie om als verpleegkundige / verzorgende altijd te monitoren hoeveel en wat een kwetsbare oudere zorgvrager gegeten heeft	For a nurse / nursing assistant, an important intervention is always to monitor what and how much a frail older care recipient has eaten
2.	Easy	Screening op ondervoeding is meestal niet nodig, omdat ondervoeding goed zichtbaar is op basis van observatie door de verpleegkundige / verzorgende	Screening for malnutrition is usually not necessary, because malnutrition is clearly visible based on the observation of the nurse / nursing assistant
3.	Easy	Het is de taak van de verpleegkundige / verzorgende om de omgeving zo in te richten dat de oudere zorgvrager goed kan eten	It is the task of the nurse / nursing assistant to set up the environment in such a way that the older care recipient can eat well
4.	Easy	Verpleegkundigen / verzorgenden moeten bij opname / intake voorlichting geven aan oudere zorgvragers over het belang van eiwitinname via normale voeding	At admission / intake, nurses / nursing assistants must provide information to older care recipients about the importance of protein intake through normal food
5.	Easy	Als verpleegkundige / verzorgende heb je nauwelijks invloed op een veranderend eetpatroon door een vorm van dementie	As a nurse / nursing assistant, you barely have influence on changing eating patterns resulting from a form of dementia
6.	Moderate	Bij de anamnese / intake is het onwenselijk om door te vragen over persoonlijke eetgewoontes en voedselvoorkeur omdat dit de privacy van de oudere zorgvrager in het geding brengt	During the anamnesis / intake, it is undesirable to ask supplementary questions about personal eating habits and food preferences, because it compromises the older care recipient's privacy
7.	Moderate	De beste manier van screenen op ondervoeding blijft het navragen aan de oudere zorgvrager zelf of hij / zij is afgevallen in de afgelopen maand	The best way of screening for malnutrition is to keep checking with the older care recipient himself / herself if he / she has lost weight in the past month
8.	Moderate	Het is goed om een ondervoede oudere met een eiwitrijk dieet te adviseren om minder te bewegen om gewichtsverlies te voorkomen	It is good to advise a malnourished older adult on a protein-enriched diet to exercise less to prevent weight loss
9.	Moderate	Wanneer een oudere zorgvrager met obesitas depressief is, is het belangrijk om eerst de depressie te behandelen alvorens het voedingspatroon te bespreken	When an obese older care recipient is depressed, it is important to treat the depression prior to discussing the eating pattern
10.	Moderate	Het is hoofdzakelijk de taak van de diëtist om interventies voor te schrijven bij ondervoeding	It is primarily the dietitian's job to prescribe interventions for malnutrition
11.	Difficult	Het is de taak van de verpleegkundige om te faciliteren in dieetvoorkeuren (bijvoorbeeld halal, kosjer, veganistisch)	It is the task of the nurse to facilitate dietary preferences (e.g. halal, kosher, vegan)
12.	Difficult	Wanneer is vastgesteld dat een oudere ondervoed is, heeft het prioriteit om te starten met energie- en eiwitrijke drinkvoeding	When it has been determined that an older adult is malnourished, the first priority is to start with energy- and protein-enriched drinks
13.	Difficult	De oudere zorgvrager blijft zelf hoofdverantwoordelijk voor zijn / haar voeding	The older care recipient always carries prime responsibility for his / her nutrition
14.	Difficult	Ouderen kauwen slechter dan jongeren, waardoor zij eerder verzadiging voelen	Older people chew less well than younger people, causing them to feel saturation earlier
15.	Difficult	Het is belangrijk om oudere zorgvragers voor het eten medicijnen in te laten nemen met een glas water	It is important to let older care recipients take their medicines with a glass of water before meals
16.	Easy	Fysiek herstel na een behandeling in het ziekenhuis is belangrijker dan voldoende voedingsinname	Physical recovery following hospital treatment is more important than sufficient dietary intake
17.	Easy	Een oudere zorgvrager eet minder wanneer de verpleegkundige / verzorgende hierbij aanwezig is, omdat de oudere zorgvrager hierdoor gestoord wordt bij zijn / haar eetritueel	An older care recipient eats less when a nurse / nursing assistant is present at the scene, because this disturbs the older care recipient in his / her eating ritual
18.	Easy	Bij oudere zorgvragers van bijvoorbeeld Turkse of Marokkaanse afkomst is voorlichting geven over medicatie belangrijker dan over voeding omdat zij van nature aanleg hebben voor diabetes mellitus type II	In older care recipients of, for example, Turkish or Moroccan descent, providing information about medication is more important than about nutrition, because they are by nature susceptible to type 2 diabetes mellitus
19.	Easy	Alleen als er sprake is van gewichtsverlies kan er sprake	Only when there is weight loss can we speak of

		zijn van ondervoeding	malnutrition
20.	Easy	Het is de taak van de verpleegkundige / verzorgende om een alleenstaande oudere zorgvrager te stimuleren om samen te eten met bijvoorbeeld familie, vrienden of bij een vereniging	It is the task of the nurse / nursing assistant to stimulate a single older care recipient to eat together, for example, with family, friends or at an association
21.	Easy	In het ziekenhuis is het eten altijd gebalanceerd en gezond waardoor risico op ondervoeding kleiner is dan in de thuissituatie	In the hospital, the food is always balanced and healthy, which makes the risk for malnutrition smaller than in the home situation
22.	Moderate	Als een oudere zorgvrager ondervoed is, is het belangrijk om zoete tussendoortjes naar wens aan te bevelen zodat ze in ieder geval iets binnenkrijgen	When an older care recipient is malnourished, it is important to recommend sweet snacks, as desired, so that they at least consume something
23.	Moderate	Het meten van de bloedwaarde albumine is de meest betrouwbare methode om ondervoeding vast te stellen	Measuring the albumin blood level is the most reliable method to identify malnutrition
24.	Moderate	Het is bevorderlijk voor de algemene gezondheid van een oudere met een BMI > 25 kg/m^2 dat hij/zij door ziekte binnen korte tijd 5 kg afvalt	It is conducive to the general health of an older adult with a BMI > 25 kg/m^2 that he / she loses 5 kg of weight in a short period of time due to disease
25.	Moderate	De grootste oorzaak van ondervoeding is slechte mondgezondheid	The main cause of malnutrition is poor oral health
26.	Moderate	Bij oudere zorgvragers is het ook in de palliatieve fase belangrijk om bestaande voedingsrestricties te handhaven zodat de situatie niet verergert	Also in the palliative phase it is important for older care recipients to maintain current dietary restrictions to ensure that this situation will not be worsened
27.	Moderate	Het is belangrijk om altijd het protocol te volgen bij het nuchter houden van oudere zorgvragers voor een operatie	It is important always to follow the protocol to keep older care recipients fasting before surgery
28.	Moderate	Het is wenselijk dat de oudere zorgvrager drie keer per dag een volledige maaltijd opeet om onvoldoende voedingsinname te voorkomen	It is desirable for the older care recipient to eat a full meal three times a day to prevent insufficient dietary intake
29.	Difficult	Omdat de waarneming van geur en smaak vermindert bij ouderen kunnen zij minder genieten van eten	Because the sense of smell and taste diminishes in older adults, they can enjoy food less
30.	Difficult	Ouderen moeten meer drinken dan jongeren, onder andere omdat hiermee risico op obstipatie verkleind wordt	Older people should drink more than younger people, among other things, because it reduces the risk of obstipation

a Difficulty of statements was set at: easy (proportion well-answered statements ≥ 0.83), moderate (proportion well-answered statements between 0.5 and 0.83) and difficult (proportion well-answered statements ≤ 0.5).

b The original statements are written in the Dutch language. The statements were translated into English according to the back-translation procedure.[48,49]

Appendix 3. Questions from the standardised self-reported questionnaire for evaluation of the intervention from the online platform Redgrasp

Questions	*Total (n = 94), n (%)*	*Hospital (n = 57), n (%)*	*Home care (n = 37), n (%)*
1.How likely are you to recommend this knowledge game† to a colleague?			
Very unlikely	3 (3.2)	3 (5.3)	0 (0)
○	11 (11.7)	5 (8.8)	6 (16.2)
○	15 (16.0)	12 (21.1)	3 (8.1)
○	35 (37.2)	21 (36.8)	14 (37.8)
Very likely	30 (31.9)	16 (28.1)	14 (37.8)
2.How satisfied are you with this knowledge game†?			
Not satisfied	1 (1.1)	1 (1.8)	0 (0)
○	8 (8.5)	5 (8.8)	3 (8.1)
○	23 (24.5)	15 (26.3)	8 (21.6)
○	45 (47.9)	25 (43.9)	20 (54.1)
Very satisfied	17 (18.1)	11 (19.3)	6 (16.2)
3.I like this knowledge game† more than most e-learnings			
Totally disagree	3 (3.2)	1 (1.8)	2 (5.4)
○	3 (3.2)	2 (3.6)	1 (2.7)
○	18 (19.4)	8 (14.3)	10 (27.0)
○	33 (35.5)	23 (41.1)	10 (27.0)
Totally agree	36 (38.7)	22 (39.3)	14 (37.8)
4.How much time did you spend on the knowledge game† per day (in minutes)?			
Mean (s.d.)	3.1 (2.5)	2.2 (1.6)	4.5 (3.0)
5.I learned something new through the knowledge game†			
Totally disagree	2 (2.1)	2 (3.5)	0 (0)
○	9 (9.6)	7 (12.3)	2 (5.4)
○	18 (19.1)	8 (14.0)	10 (27.0)
○	52 (55.3)	34 (59.6)	18 (48.6)
Totally agree	13 (13.8)	6 (10.5)	7 (18.9)
6.I refreshed my knowledge through the knowledge game†			
Totally disagree	3 (3.2)	3 (5.3)	0 (0)
○	8 (8.5)	6 (10.5)	2 (5.4)
○	17 (18.1)	10 (17.5)	7 (18.9)
○	43 (45.7)	25 (43.9)	18 (48.6)
Totally agree	23 (24.5)	13 (22.8)	10 (27.0)
7.Literature that I did not know existed was discussed			
Never	7 (7.4)	4 (7.0)	3 (8.1)
○	21 (22.3)	12 (21.1)	9 (24.3)
○	41 (43.6)	25 (43.9)	16 (43.2)
○	24 (25.5)	16 (28.1)	8 (21.6)
Always	1 (1.1)	0 (0)	1 (2.7)
8.Literature that I had not yet read was discussed			
Never	2 (2.2)	2 (3.5)	0 (0)
○	16 (17.2)	6 (10.5)	10 (27.8)
○	34 (36.6)	22 (38.6)	12 (33.3)
○	34 (36.6)	22 (38.6)	12 (33.3)
Always	7 (7.5)	5 (8.8)	2 (5.6)
9. Did you read the explanation of the answer?			
Never	0 (0)	0 (0)	0 (0)
○	16 (17.0)	13 (22.8)	3 (8.1)
○	17 (18.1)	10 (17.5)	7 (18.9)
○	29 (30.9)	18 (31.6)	11 (29.7)
Always	32 (34.0)	16 (28.1)	16 (43.2)
10. I sometimes discussed an item with a colleague			
Never	14 (15.1)	8 (14.3)	6 (16.2)
○	14 (15.1)	8 (14.3)	6 (16.2)
○	23 (24.7)	14 (25.0)	9 (24.3)
○	39 (41.9)	24 (42.9)	15 (40.5)
Always	3 (3.2)	2 (3.6)	1 (2.7)

11. Items were sometimes discussed among ourselves			
Never	16 (17.4)	10 (17.5)	6 (17.1)
○	19 (20.7)	13 (22.8)	6 (17.1)
○	20 (21.7)	10 (17.5)	10 (28.6)
○	34 (37.0)	22 (38.6)	12 (34.3)
Always	3 (3.3)	2 (3.5)	1 (2.9)
12. There was a discussion between colleagues about the weekly email with the score update			
Never	27 (28.7)	17 (29.8)	10 (27.0)
○	13 (13.8)	8 (14.0)	5 (13.5)
○	29 (30.9)	15 (26.3)	14 (37.8)
○	21 (22.3)	15 (26.3)	6 (16.2)
Always	4 (4.3)	2 (3.5)	2 (5.4)
13. I think the knowledge game† can contribute to improve the quality of care			
Totally disagree	2 (2.2)	2 (3.6)	0 (0)
○	6 (6.5)	5 (8.9)	1 (2.7)
○	19 (20.4)	9 (16.1)	10 (27.0)
○	46 (49.5)	26 (46.4)	20 (54.1)
Totally agree	20 (21.5)	14 (25.0)	6(16.2)
14. I found it a pity that the knowledge game† was over			
Totally disagree	8 (8.5)	7 (12.3)	1 (2.7)
○	9 (9.6)	7 (12.3)	2 (5.4)
○	23 (24.5)	9 (15.8)	14 (37.8)
○	27 (28.7)	20 (35.1)	7 (18.9)
Totally agree	27 (28.7)	14 (24.6)	13 (35.1)
15. I would continue this knowledge game† if the items were asked daily			
Totally disagree	7 (7.6)	6 (10.7)	1 (2.8)
○	9 (9.8)	8 (14.3)	1 (2.8)
○	17 (18.5)	11 (19.6)	6 (16.7)
○	35 (38.0)	19 (33.9)	16 (44.4)
Totally agree	24 (26.1)	12 (21.4)	12 (33.3)
16. I would continue this knowledge game† if the items were asked three times a week			
Totally disagree	4 (4.3)	3 (5.4)	1 (2.7)
○	8 (8.6)	6 (10.7)	2 (5.4)
○	15 (16.1)	9 (16.1)	6 (16.2)
○	34 (36.6)	21 (37.5)	13 (35.1)
Totally agree	32 (34.4)	17 (30.4)	14 (40.5)
17. I would continue this knowledge game† if the items were asked twice a week			
Totally disagree	4 (4.3)	2 (3.5)	2 (5.4)
○	8 (8.5)	6 (10.5)	2 (5.4)
○	17 (18.1)	10 (17.5)	7 (18.9)
○	32 (34.0)	20 (35.1)	12 (32.4)
Totally agree	33 (35.1)	19 (33.3)	13 (37.8)
18. I would continue this knowledge game† if the items were asked once a week			
Totally disagree	5 (5.3)	3 (5.3)	2 (5.4)
○	6 (6.4)	5 (8.8)	1 (2.7)
○	17 (18.1)	9 (15.8)	8 (21.6)
○	26 (27.7)	14 (24.6)	12 (32.4)
Totally agree	40 (42.6)	26 (45.6)	14 (37.8)
19. What did you like about the knowledge game†?‡			
Reaction			
Fun way to gain knowledge	12 (12.8)	5 (8.8)	7 (18.9)
Informative	6 (6.4)	2 (3.5)	4 (10.8)
Took little time	5 (5.3)	3 (5.3)	2 (5.4)
Short item and immediate explanation	5 (5.3)	1 (1.8)	4 (10.8)
Practice-based items	3 (3.2)	1 (1.8)	2 (5.4)
Variety of items	3 (3.2)	1 (1.8)	2 (5.4)
Earn points	3 (3.2)	1 (1.8)	2 (5.4)
Knowledge			
Gained and/or refreshed knowledge	16 (17.0)	10 (17.5)	6 (16.2)
Good explanation that was given immediately	12 (12.8)	5 (8.8)	7 (18.9)
Awareness regarding the subject and own knowledge of the subject	7 (7.4)	2 (3.5)	5 (13.5)

Thought-provoking items	2 (2.1)	1 (1.8)	1 (2.7)
More awareness to provide care to older malnourished care recipients	2 (2.1)	1 (1.8)	1 (2.7)
20. What do you think could be better?‡			
Reaction			
Items were not always well formulated or unambiguous	21 (22.3)	9 (15.8)	12 (32.4)
Items were too much focused on the hospital setting	5 (5.3)	0 (0)	5 (13.5)
Total time frame of the intervention was too long and too many items	4 (4.3)	4 (7.0)	0 (0)
Knowledge			
Answers were not always absolutely true or false	8 (8.5)	1 (1.8)	7 (18.9)
Items were too simple	3 (3.2)	1 (1.8)	2 (5.4)
Answers did not leave much room for discussion	2 (2.1)	2 (3.5)	0 (0)

† In this study, our educational intervention was also referred to as 'the knowledge game'.

‡ Frequency values regarding these questions reflect the number of participants who reported positive aspects and points of improvement of the intervention. Each participant could report multiple positive aspects and points of improvement.

Appendix 4. Overview of the identified key themes and sub-themes from the focus group interviews

Key themes	***Sub-themes and explanation***
Theme 1: Reaction	
	Positive response:
	• Items were relevant, concrete, logical, diverse, important, educational and participants were encouraged to think about the items
	• Presence and reading of the corresponding explanations
	• Little (time) investment
	• Rewarding
	• Game element and competition
	• Safe through anonymity
	• Accessibility (free of charge, easily accessible, short link between items and corresponding explanations)
	• Autonomy when and how to engage in the intervention
	• Participation of several nursing care professionals
	• Discussions with colleagues about the nutritional care topics
	• The intervention was fun
	• Total time frame of the intervention was reasonable
	Constructive criticism:
	• Items were not always well formulated and did not always match with corresponding explanations
	• Answers were not always absolutely true or false
	• Insufficient support for easy access to the provided literature
	• The intervention caused too much strain
	• Non-rewarding cues
	• Failing intervention technology
	• Non-participation of all nursing care professionals
	• Total time frame of the intervention was too long
Theme 2: Learning	
	Way of learning:
	• Content and formulation of items, careful reading of items, difficulty level of items, relationship between certain items
	• Thoughtful answering items based on experience or knowledge
	• Two-answer option
	• Formulation corresponding explanations
	• Reading corresponding explanations and recommended literature (several times), particularly with a new topic or incorrect answered item
	• Overview of all items and corresponding explanations
	• Support of and kind of learning through the online platform
	• Taking time to learn from items and corresponding explanations
	• Through self-reflection
	• Engagement in the intervention at individual and team level
	• Together with the team by filling in items together, discussion and evaluation of items and corresponding explanations
	Acquired knowledge:
	• All themes included in the intervention
	• About specific topics regarding nutritional care provided to older adults
	• In what way improve quality care in nutritional care for older adults