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Research paper

Older patients' use of technology for a post-discharge nutritional intervention – A mixed-methods feasibility study

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ABSTRACT

Background: Malnutrition is frequent in older people and a precursor for morbidity and hospitalisation; furthermore low intake and weight loss during and after hospitalisation is well-described. Such patients are often excluded from technology projects on account of lack of skills. This is a barrier for their access to many current and future health care offers.
Objectives: To test the acceptability, feasibility and preliminary efficacy of technology-supported energy- and protein-enforced homedelivered meals for older patients discharged from hospital.
Design: Mixed method design including a quasi-experimental controlled feasibility trial and embedded qualitative interviews. Participants: Older medical patients (mean age 79.4 years; women 66.7%) at nutritional risk and discharged to own home were included consecutively to first the control group (n = 18) and later the intervention group (n = 18). Nine intervention and 16 control group patients completed the project.
Methods: Intervention: group received: 1) enriched meals delivered to participants' homes 12 weeks after discharge, and 2) a tablet computer combining goal setting for intake with self-monitoring and feedback. Control group were treated as usual. Data collection was done at baseline, and at six and 12 weeks follow-up. Feasibility evaluation focused on 1) inclusion and retention and 2) acceptability and functionality of the intervention. Efficacy primary endpoint: Muscle strength and BMI. Secondary: Health related quality of life (HRQoL), depression; readmissions, mortality.
Results: Technology challenges were related to immaturity of the out-of hospital app version; however, participants were motivated and capable of using the device. Inclusion and retention was challenged by the acceptability of the nutritional intervention and exhaustion among patients. Mortality was high. Although weaker at baseline the intervention group increased their muscle strength more consistently than did the control group: Handgrip strength with 2.5 kg vs 0.9 kg and chairto-stand-test with 3.3 vs. 1.8 times. They also improved their depression score and HRQoL more, and patients reported increased intake, appetite, and energy in the interviews. Relatives confirmed this and also reported positive impact on their level of worry and on the relationship with the older person.
Conclusion: The study provided valuable insight into appropriate methods and procedures as well as older people's preferences and views on barriers to successful intervention and use of technology in health care. This will guide the design of a future sufficiently powered study. Effect evaluation provided guidance for future sample size calculation.

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1. Introduction

Health technology is often proposed as the solution to the dilemma of increasing pressure on health services while work force is decreasing, but previous studies on older people's use of technology have focused on the relatively young-elderly and do not sufficiently represent frail and old people. This study tested the feasibility, acceptability and efficacy of a technology-supported intervention involving frail and older patients in their nutritional

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care after discharge from hospital. The hypothesis was that the technology use and home-delivered, enriched meals the first 12 weeks after discharge would increase appetite, intake, body mass index (BMI) and functional ability. The technology allowed the patients to choose and order from a menu, monitor their intake and receive feedback information of their protein and energy balance.

1.1. Background

Protein and energy malnutrition (PEM) is frequent in older people and is a precursor for morbidity and hospitalisation [1,2]. Furthermore, low intake and weight loss in older people during and after hospitalisation is well-described [3,4]. Lawson-Smith et al. (2015) found in their descriptive follow-up study among older inpatients (n = 90) that 71% were at nutritional risk at admission and 44% of those who were initially not at such risk reported weight loss at follow-up. Older patients with co-morbidities and reduced functional level are particularly vulnerable due to reduced residual capacity and often lose functional abilities while admitted. A frequent contributing factor is reduced nutritional intake [5–8]. The association between nutritional status in older people and functional deficiency, complications, morbidity and mortality is well-described [9,10]. Moreover, these patients are subject to early readmission, hence, from both a patient and a financial perspective, interventions seems called for [11–13]. While the effectiveness of protein and energy supplementation in older people has been widely studied [9], and some studies have tested the effect of in-hospital treatment with meals enriched with energy and protein (e.g. [14,15]), studies on post-discharge interventions with enriched meals are lacking. Since length of hospital stays has decreased in general, particularly for older patients [16], improvement of nutritional status during the brief stay is unlikely. Thus, post-discharge interventions targeting malnutrition in older people are needed.

Despite extensive knowledge and longstanding attention, physicians' and nurses' lack of awareness and initiatives deprives patients of nutritional care [10]. Hence, interventions aiming at behavioural change among health professionals may have limited success and, with increasing pressure on health services, there is an incentive to attempt a participation-oriented approach, particularly in areas such as nutrition which escape the attention of professionals. Patient participation and empowerment is today widely advocated in health care, and extensive literature presents successful patient-related, as well as economic, outcomes [17,18]. However, evidence is weak due to the applied research designs, and old and frail patients are usually excluded. Health technology is often proposed as the solution to the dilemma of increasing pressure on health services, but previous studies on older people's use of technology have focused on the relatively young-elderly and do not sufficiently represent frail and very old people [19–21]. Although technology assisting older people has showed promising results, several recent studies conclude that more studies are needed regarding the outcome and effectiveness of these interventions [22], and the barriers for acceptance and use of technology in this population group [23]. In conclusion, there is a need for knowledge, based on robust research, of older patients' abilities and wishes for participation in their own nutritional care and for using technology as a tool for this.

Due to the sparse knowledge of post-discharge nutritional support for older patients in terms of enforced meals and of older patients' participation in their own care by the use of technology, information is needed on procedural, methodological and clinical uncertainties, before entering into an expensive, full-scale, randomised controlled study (RCT). Hence, it was decided to carry out a feasibility study [24].

1.2. Aim

The aim was to test the feasibility, acceptability and preliminary efficacy of technology-supported home-delivered main and in-between meals enriched in energy and protein, for older patients, discharged from acute medical wards. This would include:

- Estimation of inclusion rate and identification of barriers for inclusion and retention
- Testing the intervention and the functioning of the technology, its acceptability and ease of use for the target group
- Estimation of outcome parameters for calculation of sample size for a future large scale RCT

2. Methods

The study applied a mixed methods design including a quasi-experimental, non-randomised, controlled feasibility trial and embedded qualitative interviews.

2.1. Sample

Older patients (n = 36) admitted to the 5 units of the Department of Internal Medicine in a large university hospital were included consecutively in first a control and later an intervention group, 18 in each. Patients were eligible if they were 65 years or older, identified with a nutritional risk score ≥ 3 according to NRS-2002 [25], discharged to their own home and were living within a radius of 20 km from the hospital. The latter limitation was for practical reasons as the research assistants used bicycles to visit the participants.

Patients with food allergies or intolerance, or who were vegetarians, terminally ill or unable to communicate and co-operate on the use of the tablet computer were excluded.

2.1.1. Control group

To avoid the Hawthorne effect, or control patients withdrawing if they did not receive the intervention, it was decided to assign initial patients to the control group. Eligible patients were identified in all units. They were approached consecutively by a research assistant and informed about the project focusing on nutritional status among patients in the time after discharge.

2.1.2. Intervention group

After inclusion of the control group patients, the intervention group patients were identified. A research assistant approached them consecutively and informed about the project. The patient received instruction on the use of the tablet and given a leaflet with user instructions. The research assistant helped the patient to post the first meal order before discharge. When at home the participants operated the tablet, but could phone the research assistants in case of doubt or technical problems. Research assistants monitored the participants' meal orders and phoned them in case of missing orders at deadline.

In both groups baseline data were collected at inclusion and follow-up measurements were carried out in participants' homes at 6 and 12 weeks after discharge.

2.2. Feasibility evaluation

2.2.1. Inclusion and retention

Identification of barriers for inclusion and retention was done by observations with registration of inclusion and reasons for decline and dropout.

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