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IMPROVING NUTRITIONAL STATUS OF OLDER PERSONS WITH DEMENTIA USING A NATIONAL PREVENTIVE CARE PROGRAM

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Abstract: *Objective:* The aim of the study was to investigate the outcome of change in body weight associated with use of a structured preventive care process among persons with dementia assessed as at risk of malnutrition or malnourished. The preventive care process is a pedagogical model used in the Senior Alert (SA) quality register, where nutrition is one of the prioritized areas and includes four steps: assessment, analysis of underlying causes, actions performed and outcome. *Design:* An analysis of data from SA with a pre-post design was performed. *Setting:* The participants were living in ordinary housing or special housing in Sweden. *Participants:* 1912 persons, 65 years and older, registered in both SA and the dementia quality register Svedem were included. *Intervention*: A national preventive care program including individualized actions. *Measurements:* The Mini Nutritional Assessment-Short Form was used to assess nutritional status at baseline. Body weight was measured during baseline and follow-up (7-106 days after baseline). *Results:* 74.3% persons were malnourished or at risk of malnutrition. Those at risk of malnutrition or malnourished who were registered in all four steps of the preventive care process, increased in body weight from baseline (Md 60.0 kg) to follow-up (Md 62.0 kg) (p=0.013). In those with incomplete registration no increase in body weight was found. *Conclusion:* Using all steps in the structured preventive care process seems to improve nutritional status of persons with dementia assessed as at risk of malnutrition or malnourished. This study contributes to the development of evidence-based practice regarding malnutrition and persons with dementia.

Key words: Nursing process, nutrition assessment, quality improvement, registers.

Introduction

Older persons have a high risk for developing malnutrition, which occurs when food and nutrient intake do not meet a person's nutrient requirements (1). Poor nutritional status leads to decreased functional status (2) and quality of life (3) as well as increased risk of morbidity (4) and mortality (4, 5). Cognitive impairments have been reported to negatively affect nutritional status among older persons (6-8), and dementia is one of the factors most consistently associated with poor nutrition (9). Among persons with dementia, approximately 15 percent have malnutrition and another 44 percent are at risk of malnutrition according to Guigoz's review (10). However, the proportion seems to depend on the severity of the disease (10, 11) and living conditions; for example, persons in special housing were more often categorized as malnourished than persons living in ordinary housing (10). There are several reasons that persons with dementia have difficulties maintaining a good nutritional status. These include loss of recognition of the need to eat, lack of appetite and inability to recognize food (12), as well as challenges in buying and cooking food (13, 14).

Improving nutritional status when malnutrition already exists is challenging, and not least among persons with dementia. A literature review including studies that focused on mealtime difficulties among persons with dementia found that various interventions were effective, and that a multi-intervention approach should be implemented to improve an individual's eating or feeding difficulties. However, some researchers have concluded that there is a lack of rigorous studies focusing on how to improve the nutritional status in this population (15), particularly when it comes to individuals living in ordinary housing (12, 15).

In 2010 the Government Offices of Sweden as well as the Swedish Association of Local Authorities and Regions (SALAR) emphasized the need for improving the quality of health and social care for the most frail elderly in the country, with preventive care being one prioritized area (16). This resulted in the development of a web-based quality register, known as Senior Alert (SA), the main focus of which was prevention, in line with the aim of quality registers in general to improve and develop the quality of care (17). Persons older than 65 years and in need of care were targeted for registration. Program users are healthcare staff usually registered nurses or nursing assistants. SA includes the following areas: malnutrition, falls, pressure ulcers and (more recently) oral health and incontinence. The register follows a preventive care process including four steps: 1) risk assessment, 2) analysis of underlying causes, 3) actions performed and 4) outcomes. Step 1, assessment, is obligatory for all persons registered in SA. For persons assessed as "at risk," the registration continues with Steps 2-4. However, it is not mandatory to register participants in Step 2, analysis of underlying causes, although users are encouraged to do so (18, 19).

Developing and implementing a quality register is costly for society and increases the workload for users, but if positive effects can be generated, these may actually lead to improved quality of care and cost savings. Therefore, the outcome

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of implementing quality registers such as SA needs to be evaluated carefully. In this study data from two national quality registers, SA and Svedem, were combined and used. Svedem is a Swedish dementia register that aims to improve the quality of diagnostics, treatment and care of patients with dementia disorders, and gathers data from specialist care, primary care, and municipal health and social care (20). Combining the two registers made it possible to study effects on nutritional status in persons with dementia when individualized preventive care is used. Consequently, the aim of the study was to investigate the outcome associated with use of a structured preventive care process prescribed by the national quality register SA, specifically among persons with dementia who were at risk of or already experiencing malnutrition.

Methods

Design

A pre-post analysis of data from SA was performed to evaluate effects on body weight among persons with dementia in the identified risk group.

Participants and data collection

Persons registered in Svedem during 2013 and also registered in SA within a 6-month period prior to or after the dementia diagnosis were included. Because a person could have several registrations in SA during the time period, it was decided that the registration that had documented actions and was closest in time to the date of dementia diagnosis should be used. Usually the closest registration to diagnosis was chosen (91.6%), but there was a range between the first and eighth registration. In SA nutritional status can be measured using any of three instruments: the Mini Nutritional Assessment-Short Form (MNA-SF), the Subjective Global Assessment (SGA) or assessment according to SALAR (18). The MNA-SF was the most commonly used instrument (85.8%). This study included persons assessed according to MNA-SF and 65 years or older. The data set included information from 1912 persons (Figure 1). According to Swedish legislation (21) persons registered in national quality registers should be informed about data collection and their right to deny participation or to have their data removed later. However, they are not informed about specific research projects. The Regional Ethical Review Board in Linköping approved the study (dnr 2014/321-31), and researchers received anonymized data from the quality registers.

Measurements

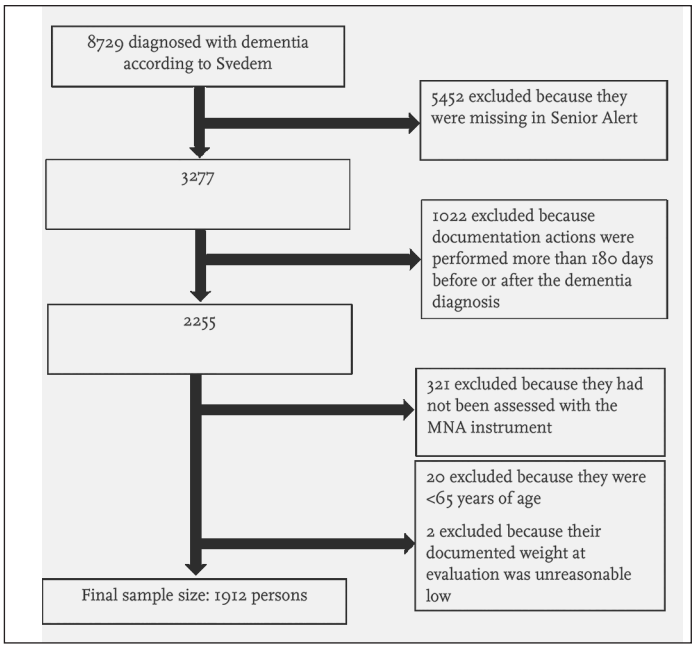
Senior Alert

Nutritional data, including risk assessment, underlying causes, actions and outcomes were collected from the SA as described below.

Assessment (Step 1)

Only cases in which the MNA-SF was used as the measure of nutritional status were included. The instrument was designed to measure nutritional status among frail elderly and is considered valid and reliable (22, 23). The measure includes six items assessing food intake, weight loss, mobility, psychological stress or acute disease, neuropsychological problems and Body Mass Index (BMI). The total score ranges between 0 and 14, where 7 points or less indicates malnutrition, 8-11 indicates risk of malnutrition and 12 or above indicates well-nourished status (22). Body weight was measured during the assessment step, and is used here as the baseline.

Figure 1
Flow chart of study population



Underlying causes (Step 2)

In SA it is possible to register physical and psychosocial factors with a probable effect on nutritional status. These underlying factors, 18 in number, have been established empirically. It is possible to choose several causes for one individual (19).

Actions (Step 3)

SA includes 28 predetermined actions that focus on improving nutritional status (18, 19). These evidence-based interventions are based on the Swedish classification model [KVÅ] (24). Staff are requested to register all actions that have been performed. It is also possible to document, in free text, other actions executed that are not prelisted. Consequently, each person will have an individualized care plan registered in SA, including different numbers of actions. For this study, the actions were grouped, based on their content, into 10 different categories: nutritional supplements (snacks, protein-energy supplements, nutritional drinks, and dietary supplements, adjustments for cultural and religious needs, customization of food texture, and decrease in night-time fasting); weight control

Table 1
Participant characteristics

Variable	WN	PAR	p-value	Total
Age (Mean±SD)	83.3±6.0	83.4±6.5	0.793	83.3±6.4
Living arrangements			0.464	
-ordinary housing	372(75.8)	1071(75.4)		1443(75.5)
-special housing (temporary)	34(6.9)	123(8.7)		157(8.2)
-special housing (permanent)	57(11.6)	164(11.5)		221(11.6)
-special housing for persons with dementia	28(5.7)	61(4.3)		89(4.7)
-unknown	0(0.0)	2(0.1)		2(0.1)
Living status			0.062	
-living alone	246(60.6)	745(62.3)		991(61.9)
-cohabiting	160(39.4)	437(36.5)		597(37.3)
Sex			0.921	
-women	306(62.3)	882(62.1)		1193(62.1)
-men	185(37.7)	539(37.9)		724(37.9)
BMI (Mean±SD)	26.6±4.3	23.4±4.6	<0.001*	24.2±4.8
Prescribed drugs (excl. PRN medication) (Md; (Q1; Q3))	6.0(4.0;9.0)	6.0(4.0;8.0)	0.056	6.0(4.0;9.0)
Dementia diagnosis			0.662	
-Alzheimer's	192(39.1)	553(38.9)		745(39.0)
-Vascular	103(21.0)	266(18.7)		369(19.3)
-Disease-related	22(4.5)	83(5.8)		105(5.5)
-Unspecified	170(34.6)	509(35.8)		679(35.5)
-Alcohol-related	4(0.8)	10(0.7)		14(0.7)
MMSE (Md; (Q1; Q3))	21.0(18.0;24.0)	19.0(16.0;23.0)	<0.001*	20.0(16.0;23.0)

WN=well-nourished. PAR=malnourished and persons at risk. Number of persons and percent are shown unless otherwise noted. P-values represent comparisons between WN and PAR. Non-parametric testing for type values (Chi-square) and median scores (Mann-Whitney). Parametric testing (t-test) only when mean is presented. *p<0.05

(weight measurements once a week or once every third month); eating support (individualize the environment according to needs, prescribe aids, create a good sitting position, guide and educate during meals or feed); medication review, oral health care (training or offering assistance to perform oral care); information and education about food; food and fluid registration (either for less than three days or more than three days); parenteral/enteral nutrition support; end-of-life care (complex nutritional treatment) and others not specified.

Evaluation (Step 4)

Body weight is the outcome variable used in SA to evaluate the effects of performed actions. However, there are no given timeframes within which outcomes should be measured; instead this is based on local protocols (18,19). Hence, the number of days between the risk assessment and the outcome measurement ranged between 0 and 702 among persons at risk or malnourished. For this study, the median and quartiles were used to represent a more suitable range of days. Hence, the 25 percent of participants with the lowest or highest number of days between assessment and outcome measures were excluded. Consequently, those with outcome measured 7-106 days after the risk assessment (n=526) were included when analyzing effects of the program.

Svedem

Background data such as age, gender, living conditions, Mini-Mental State Examination (MMSE) scores, dementia diagnoses, treatment, and community support were collected from Svedem. All registered individuals had been diagnosed with dementia (20).

Statistics

Frequencies, percentages, medians, interquartile ranges, means and standard deviations were used to construct descriptive data. Two persons were excluded from the effects analyses because their weight change was unreasonably high. Chi-square and Mann-Whitney tests were used for non-parametric comparisons and for non-normally distributed data. Wilcoxon signed rank tests were used for the pre-post testing.

T-tests were used only for parametric testing on variables that were normally distributed (25). Statistical significance was accepted at p<0.05. The SPSS version 21.0© were used for the statistical analysis.

Results

Assessment

At baseline there were no differences in nutritional status between those living in ordinary homes (n=1443) and those in special housing (n=467) (p=0.898). Among those living in ordinary housing, 4.6% reported going to a day care center; 51.3% had a home help service and 26.1% received home health care.

Malnutrition was found in 20.2% and risk of malnutrition in another 54.1%. Persons assessed as malnourished or at risk of malnutrition (n=1421) will hereafter be denoted persons at risk (PAR). Another 491 persons (25.7%) were assessed as well-nourished (WN). Statistically significant differences were found between those assessed as PAR and those as WN, both in MMSE scores (p<0.001) and BMI values (p<0.001). For other characteristics and comparisons, see Table 1.

Analysis of underlying causes

One hundred nine persons (7.7%) assessed as PAR had a registration in all four steps of the preventive care process (hereafter, PAR4). The three most common underlying causes were: Taking many (more than 3) prescribed drugs per day (83.8%), decreased vision/hearing (61.4%) and decreased mood (47.55%). No statistical significant differences were found when comparing PAR4 registrants with other PAR on participant characteristics, except for living arrangements (p=0.017), where the former were more likely to live in special housing (33.9% vs. 23.7%).

Actions

In PAR, about two-thirds (65.5%) had documented actions performed, with a median of 2.0 actions (Q1: 2.0, Q3: 4.0). There was a significant effect of housing (p<0.036), wherein those in special housing more often had documented actions (70.1% vs. 64.0%). Among those assessed as well-nourished, documented actions were seen less frequently (17.1%, p<0.001). The number of actions was also significantly lower for this group (Md: 1.0; Q1: 1.0, Q3: 1.75; p<0.001). The distribution of documented actions is presented in Table 2, showing that the most common actions performed with PAR were nutritional supplements, weight control and eating support. For WN, the most common action was medication review. Comparing PAR4 with other PAR revealed that the former had more documented actions (Md: 3.0; Q1: 2.0; Q3: 4.0; p<0.001), but the most common actions were the same as for other PAR (Table 2).

Table 2
Distribution in percent (%) of actions performed in WN, PAR and PAR4 groups

Actions	WN n=84	PAR4 n=109	PAR# n=824	p-value°
Nutritional supplement	4.9	86.3	82.0	0.278
Weight control	2.6	69.7	45.3	<0.001*
Eating support	2.9	57.8	45.5	0.16
Food and fluid registration	2.6	11.9	28.3	<0.001*
Medication review	10.4	42.2	22.3	<0.001*
Oral health care	1.6	25.7	16.1	0.013*
Information and education about food	0.8	11.9	12.0	0.979
Parenteral/enteral nutrition support	0.0	0.0	0.2	
End-of-life care	0.0	0.0	0.1	
Others, not specified	0.0	0.0	2.2	

WN=well-nourished, PAR=malnourished and persons at risk, PAR4=persons with registration in all four steps of the preventive care process. #PAR4 excluded. °Comparison between PAR4 and PAR using Chi-square tests. *p<0.05

Evaluation

Among all PAR, 526 persons had an outcome weight measured between 7 and 106 days after the assessment date. Body weight changes ranged between -13.0 kg and 12.0 kg (Md: 0.0; Q1: 0.0; Q3: 1.0). A Wilcoxon signed rank test revealed no significant improvement in body weight for PAR (excluding PAR4) (n=417, p=0.841). Similarly, no improvement was observed for PAR who were missing analysis of underlying causes but who had registrations in the other three steps of assessment, actions performed and evaluation (n=353, p=0.648). A statistically significant improvement in body weight was found, however, in the PAR4 group (p=0.013). The median score on body weight for PAR4 increased from baseline (Md 60.0 kg) to follow-up (Md 62.0 kg).

Discussion

An association between nutritional status and cognitive function (MMSE) was found in this study; i.e., decreased cognitive function increased the risk of malnutrition. This finding is in accordance with previous studies (6-8). According to MNA results, approximately 20% of the included persons with dementia were assessed as malnourished and another 54% as at risk for malnutrition. Persons included in this study were living either in special housing or in their ordinary homes. According to Guigoz's international review, approximately 15% of elderly people with dementia have malnutrition and another 44% are at risk of malnutrition; range 0–80%, depending mainly on differences in level of dependence, health status and living arrangements. Persons living in special housing tend to be assessed as at risk or malnourished to a

higher degree than do those in their ordinary places of residence (10); however, no such differences were found in this study. Perhaps the discrepancy is due to the stay-in-home policy in Sweden, wherein home help care is offered so that the older person can remain in the home as long as possible. Consequently, there has been a significant decrease in lengths of stay in institutional care (26). Hence, persons living in their ordinary homes also are more frail and perhaps malnourished to a higher degree. The discrepant figures might also reflect the fact that persons registered in SA are the very ones the staff believe are at risk of malnutrition. This argument is confirmed by results from another Swedish study (27), which showed that nurses considered the older person's condition, diagnosis, care/treatment and age before deciding whether to assess. Consequently, the sample may not be representative of the elderly population at large.

SA is designed to focus on PAR (18, 19); however, our results revealed that WN persons also had received interventions, even though this was less common. Perhaps this is a result of the focus on preventive care in SA and might reflect the purpose of the quality register, namely to serve as a pedagogic tool where areas such as nutritional status are recognized (19). It may also be that staff are noticing and addressing a risk, for instance a rapid weight loss, but the individual does not meet the criteria for being labeled at risk according to the MNA-SF. However, the MNA-SF is considered to have high sensitivity to risk of malnutrition (22). The most common action for WN was a medication review. Attention to polypharmacy among older persons and decreasing their use of unnecessary drugs are important actions, because negative consequences for the individual (28) can otherwise be severe. In Sweden this has been highlighted as one prioritized area for the most ill elderly (16). So, perhaps, for WN, this is more of a routine daily practice for staff rather than a specific action for retaining or improving the nutritional status of individuals.

The most common actions for PAR were provision of nutritional supplements, continuous weight controls and eating support. PAR4 had statistically more actions than did other PAR. This is probably a result of the former group having an analysis of underlying causes. The idea with this analysis is to identify possible reasons that a person is malnourished or at risk of malnutrition (29); this seems to have resulted in more effective and individually tailored actions. PAR4 more often lived in special housing than did other PAR ($p=0.017$). Usually intervention studies have been conducted in an institutional setting such as a nursing home or hospital (15), which is understandable given the greater experimental control that such settings offer. Giving support in the person's private home is more complex and, it is uncertain what actually happens when the person is left alone. However, one might argue that preventive care should be introduced as early as possible, which means in the home before malnutrition occurs.

The desired outcome of increase in weight was only found in the PAR4 group. This indicates that individualized care can improve the nutritional status of persons with dementia. Individually adjusted interventions have previously been found to improve the nutritional status of older persons living in nursing homes (30-32). To our knowledge, no such study has previously been conducted among persons with dementia, but one study has shown that use of multiple interventions seems to have positive effect on their nutritional status (15). Further, a Spanish cluster randomized multi-centre study (33, 34) revealed that a health and nutritional program including a standardized protocol for feeding and nutrition reduced the risk of malnutrition among home-living persons with dementia (34). The SA quality register was not developed to be used for persons with dementia in particular, but for older persons in need of care (18, 19). This study showed that when a four-step process was used, it improved nutritional status. If it is possible to improve nutritional status for persons with a condition as complex as dementia, the preventive care process model may also be a good strategy to use for other older persons at risk of malnutrition.

Limitations of the study

In Svedem, approximately one third of all persons diagnosed with dementia were included. Mostly registrations were done at specialized outpatient clinics and primary care settings (35), whereas fewer were conducted at inpatient units and in the municipal health care system (36). In SA, persons 65 years and older in need of care are targeted for inclusion (18), and during the time period of this study there were 3277 persons included in both SA and Svedem. All these factors could affect the generalizability of the results to other persons with dementia, because it is uncertain how representative our study participants were of the population. However, in Sweden approximately 14% of persons over 80 years lives in special housing (37). In this study, where all persons were diagnosed with dementia, approximately 25% were living in special housing which probably is comparable as persons with cognitive impairment more often lives in special housing compared to elderly in general.

Any of three different instruments can be used in SA to assess nutritional status, and local guidelines determine which instrument a particular unit will use (19); this affects the study's capacity to compare individuals. Because most persons were assessed with the MNA-SF, we choose to only include these individuals, because the instrument has demonstrated adequate reliability and validity (22, 23). The nutritional assessments were conducted by a large number of staff and there is a risk that the instructions for using the MNA were affected by knowledge and experience, which in turn may affect the reliability of the study (38).

Another limitation of the study has to do with the number of days between assessment and evaluation. The large range (0-702 days) is a result of local protocols; i.e., staff decide when the evaluation should be performed (19), which limits

the conclusions that can be drawn from the study. There is no consistency as to when outcomes should be measured to be able to detect effects (see, for instance, reference 15). The interquartile range was therefore used to decide which outcome measurement intervals to use in the present study, and persons with an outcome body weight measurement at 7-106 days after assessment were included. A week after actions are introduced is a rather short period, as it is difficult to improve nutritional status and see measurable differences in body weight in such a short time. Wikby, Ek and Christensson (31), for instance, found that in frail older persons assessed as malnourished, an individualized nutritional intervention programme had to continue for 3-4 months before the participant reached the status of "not malnourished." However, despite this drawback, an effect was detected in the PAR4 group. It would have been interesting to compare PAR4 individuals who had a low body weight at baseline with those who had a high weight to determine whether they differed in any way. The small sample size prevented this, as the results would have been highly susceptible to type I and type II errors (39).

Conclusion

About three-quarters of the persons with dementia were at risk of malnutrition or are malnourished, according to the MNA. Two-thirds of these persons had documented nutritional actions. However, it is largely unclear why they these particular actions were performed, as no analysis of underlying causes was documented, and for these persons no effects on body weight were found at evaluation. Improved body weight was only found among those persons with registration in all four steps in the preventive care process used in SA; i.e., when the actions were based on an analysis of underlying causes for the individual. Use of an individualized action plan appears to facilitate increases in nutritional status of persons with dementia. This study can therefore inform the development of evidence-based practice when it comes to malnutrition and persons with dementia.

As a next step, it would be interesting to include the different areas of the SA (falls, pressure ulcers, oral health and incontinence) to investigate whether or not staff were tending to on several risks at the same time and whether effects were influenced by this. SA is not exclusively developed for use with persons with dementia, therefore exploration of its effects for frail older persons irrespective of disease would be worthwhile.

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Ethical standards: The study protocol complies with current Swedish law.

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