THERE IS ALWAYS HOPE

NEW IN OLD
EVALUATION OF A MULTIDISCIPLINARY INTEGRATED CARE MODEL AND STUDIES IN RESIDENTIAL CARE HOMES

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VRIJE UNIVERSITEIT

"NEW IN OLD"

Evaluation of a multidisciplinary integrated care model and studies in residential care homes

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CHAPTER **1**

GENERAL INTRODUCTION

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The focus of this thesis is on the effects of introducing a multidisciplinary integrated care approach on quality of care and associated costs for residents in Dutch residential care homes and studies on incidences of mental dysfunctions. In this introduction we present the description of the problems faced in care for elderly people living in residential care homes. We describe the multidisciplinary integrated care approach introduced in this study and the relation of this approach to the Chronic Care Model. At last we present the studies on incidences of mental dysfunction for residents in Dutch residential care homes and nursing homes and list the main research questions addressed in this thesis.

DESCRIPTION OF THE PROBLEMS
The quality of care provided in residential care homes is under pressure worldwide. (7) Facilities are frequently understaffed, and the complexity of care needed by residents increases while expertise of staff does not necessarily keep pace.(8;50) Although most care organizations want to innovate and improve quality of care, many lack expertise or financial resources needed to do so.(11;12) Family physicians are responsible for medical care in residential care homes in the Netherlands. However, they do not regard themselves as suited for systematic management of chronic diseases and disabilities associated with frail health.(9) Family physicians routinely experience the tyranny of the urgent.(5;6;41) Cooperation with other professionals in the field as Elderly Care physicians is scarce.(47-49) Lack of attention for self management support for elderly people with multiple chronic diseases and their families and lack of optimal attention for their wishes results too often in unfavourable outcomes.(7)

RESIDENTIAL CARE HOMES AND THEIR RESIDENTS
In the Netherlands, around 10% of all the elderly aged 75 and over live in 1131 residential care homes (115,000) or in 479 nursing homes (60,000).(3) These homes were established to offer sheltered living for elderly people who are disabled but still relatively healthy. Because of the growing elderly population, the characteristics of elderly people living in residential care homes have become more comparable to those of people in nursing homes, who need complex care. Nowadays over 70% of the residents in residential care homes need professional care, such as assistance with activities of daily living, nursing care (e.g., medication, wound care) and housekeeping. They have multiple chronic diseases and associated disabilities.(21;22;42) Staff in residential care homes mostly include nurse-assistants and even lower educated personnel and a house manager.

ABOUT COSTS

Chronic disablement associated with aging is the main cost driver for national health care costs. Care facilities for elderly make up about one fifth of the costs of the Dutch health care system and are the second largest cost category after hospital car. Within these costs residential care homes are the largest cost category and absorb about 40% of this budget. (45;46)

CONCERNS ABOUT QUALITY OF CARE

Already in 1995 the National Health Council stressed the importance of improving the quality of care for chronic patients by a shared disease management plan of involved health professionals with emphasis on clearly defined medical responsibilities, and development of shared management protocols.(40;43) In a report, published in 2003, on the state of health care by the Dutch Healthcare Inspectorate alarming conclusions were drawn after rigorous investigations on the state of Transmural Integrated Care in the Netherlands.(30)The report stated that patients with chronic disorders are at risk because of the lack of shared management by health professionals and health institutes, and unclear demarcation of medical responsibilities. This was recognised by the minister of Welfare, Health and Culture Affairs in his answer to the parliament.(52)

A MULTIDISCIPLINARY CARE APPROACH

In order to change the present situation a multidisciplinary integrated care approach is strongly recommended.(30;40;43;52) Beneficial effects of such approaches were reported among stroke patients and among type 2 diabetes patients.(15;35;40;52) However, no studies were performed yet to evaluate the effects of a multidisciplinary integrated care approach on quality of care and costs for residents in residential care homes in the Netherlands.

THE STUDIED INTERVENTION

In this study we investigated the effects of a multidisciplinary integrated care approach
The approach we applied in this study consists of several elements.
First, structural and computerised multidimensional geriatric screening by trained staff. Second, patient tailored care plans made by staff together with residents and or relatives. Third, multidisciplinary meetings including nursing staff, family physicians, Elderly Care physicians(34), and psychologists. Fourth, the frailest residents with complex needs are offered a multidisciplinary consultation by a Elderly Care physician and psychologist.

RELATION TO THE CHRONIC CARE MODEL

The multidisciplinary integrated care approach presented in this study can be seen as a variation of the Chronic Care Model of Wagner and Bodenheimer.(6;54) Like the chronic care model it comprises the following key components: risk and care-need assessment of each resident; constructing a care plan together with the resident and / or the family; empowerment of the nurse- assistant and the resident and / or family by giving information and education; monitoring how the resident is doing over time by repeating the assessment at least every 6 months, and revising the care plan as needed. The Chronic Care Model is designed for primary care and deals with various care providers and health institutes. It is tailored on community dwelling chronically ill of all ages. Our approach is tailored on vulnerable elderly people living in residential care homes. The studied homes are under the umbrella of one single care organization. The residents are often hampered in self management by cognitive impairment. Therefore we wanted to empower the nurse- assistant in relation to monitoring and coordination of care. The individual interaction between the empowered nurse-assistant and informed resident and /or family in this setting can make the difference and may be the cue key for improved outcomes (figure 1)

Figure 1. Chronic care model as applied in this study (based on Wagner & Bodenheimer)
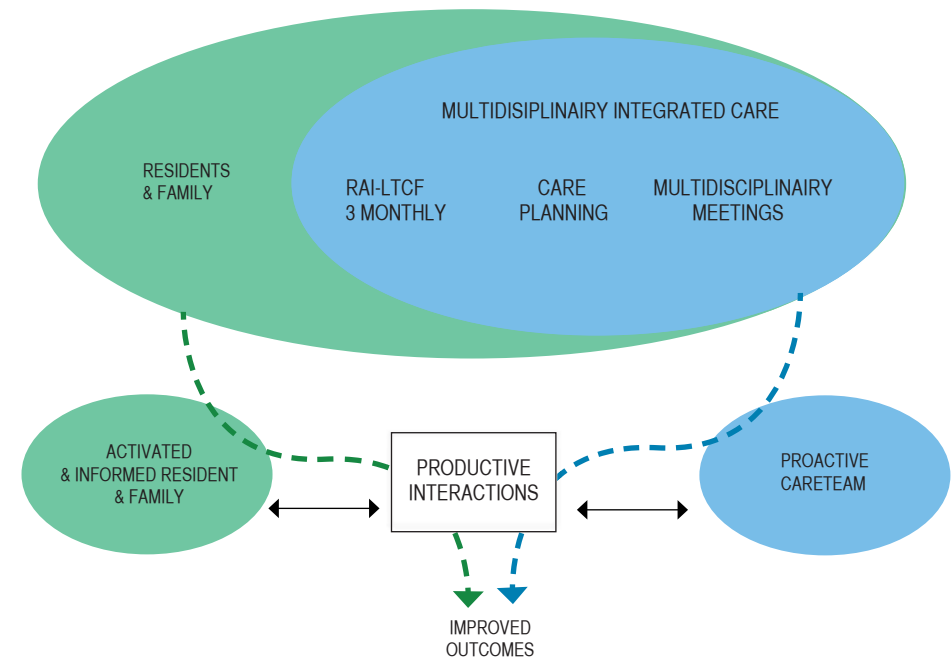
ABOUT THE GERIATRIC ASSESSMENT INSTRUMENT

For the structural and computerised multidimensional geriatric screening our choice was for the Resident Assessment Instrument (RAI), because it was found to be the most tested, evaluated and validated tool that presently exists. (28;29) RAI was developed in 1990 on the request of the United States Congress after years of concerns about the quality of care in nursing homes.(10;13;17;25;36;39;53) Achterberg reported significant improvements in case history, care planning, and coordination of care after the implementation of the Resident Assessment Instrument.(1;2) Since the development of RAI and the mandatory implementation in nursing homes in the United States it found its way to some 50 countries in all inhabited continents.(*www.interRAI.org*) Recently, the Dutch Health Department supported the development of a web application of the Long-Term care Facility version of the Resident Assessment Instrument (inter RAI-LTCF). This instrument has two main, and interconnected, parts: The Minimum Data Set (MDS) and a set of Client Assessment Protocols (CAPs). The MDS is a form with 120 items about 13 domains of health, wellbeing, and functioning of the client. (Appendix 1) The interconnected CAPs identify problems in 18 areas that may need specific care planning. (Appendix 2) The identified problems guide the design of an individualised care plan with the intention to improve or maintain the patient's functional health. The CAPs contain the state-of-the-art approach for the identified problem. In our study, we have applied this web application and showed that it has good applicability. The inter RAI-LTCF contains a number of validated scales: the Cognitive Performance Scale (CPS), the Activities of Daily Life Scale (ADL scale), the Depression Rating Scale (DRS), the Changes in Health End-stage disease and Symptoms and Signs Scale (CHESS), and the Revised Social Engagement Scale (RISE).(23;26;31;37;38) These scales present a direct overview of the health status of the client (Appendix 3) All the RAI versions come with a Manual (also digital) that provides extensive information, definitions, examples, and timeframes that help to complete reliable assessments. In addition, data from the web based inter RAI- LTCF is used to make a three monthly overview, for each facility that participates, of 32 risk adjusted indicators of quality of care. These indicators

are compared to a benchmark made out of all the residents of residential care homes in the Netherlands using the inter RAI LTCF.(4;18-20;24-26;27;31;34;44;54) Management can use this overview to improve specific areas of care. For example, if the number of fall incidents is substantially higher compared to the average (benchmark), management can decide on measures to improve safety in a particular home. (Appendix 4)

Our hypothesis is that introduction of a multidisciplinary care approach has positive effects on quality of care and is cost effective. The main research questions for this study are:

1. *Does the introduction of a multidisciplinary integrated care approach increase the quality of care for elderly people living in Dutch residential care homes? The study related to this question is described in CHAPTER 3*
2. *Is the introduction of a multidisciplinary care approach cost effective? The study related to this question is described in CHAPTER 4*
3. *What are the facilitating and impeding factors in the initial and maintenance phase of a geriatric assessment instrument as part of a multidisciplinary integrated care approach in Dutch residential care homes? The study related to this question is described in CHAPTER 5*

OTHER STUDIES PRESENTED IN THIS THESIS

Besides the main research questions also the incidences of mental dysfunctions like depression and delirium and their associated risk factors are studied in residents of Dutch nursing homes and residential care homes. (chapters 6,7 and 8) Mental dysfunction, such as depression or delirium play an important role in the vulnerability of elderly people, especially in long term care facilities like nursing homes and residential care homes.(14;16;32). Both conditions are not easy to recognise and especially difficult in elderly people who are cognitively impaired. The available inter RAI-LTCF data in the VU database enabled us to study the incidence and associated risk factors of both mental conditions for a total of 3,627 residents of 6 nursing homes and 23 residential care home.This cohort provides a strong external validity as residents are not excluded systematically and data collection does not depend on informed consent but on routine daily care.

Our hypothesis is that the incidence of mental dysfunctions like depression and delirium is substantial and the associated risk factors will be different between the two settings. The main research questions for these studies are:

1. *What is the incidence of depression for residents in Dutch nursing homes compared with the incidence for residents in Dutch residential care homes and what are the associated risk factors in both settings? The study related to this question is described in CHAPTER 6*
2. *Is there an under-diagnosing of depression in demented residents of Dutch residential care homes? The study related to this question is described in CHAPTER 7*
3. *What is the prevalence and incidence of delirium in the residents of Dutch residential care homes compared to the residents of Dutch nursing homes? What are the associated risk factors in both settings? The study related to this question is described in CHAPTER 8*

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CHAPTER 2

THE COST-EFFECTIVENESS OF A MULTIDISCI-PLINARY CARE MODEL FOR ELDERLY LIVING IN DUTCH RESIDENTIAL CARE HOMES, DESIGN OF A CLUSTER RANDOMIZED TRIAL

Marijke Boorsma, Hein PJ van Hout, Dinnus H Frijters, Miel W Ribbe and Giel Nijpels
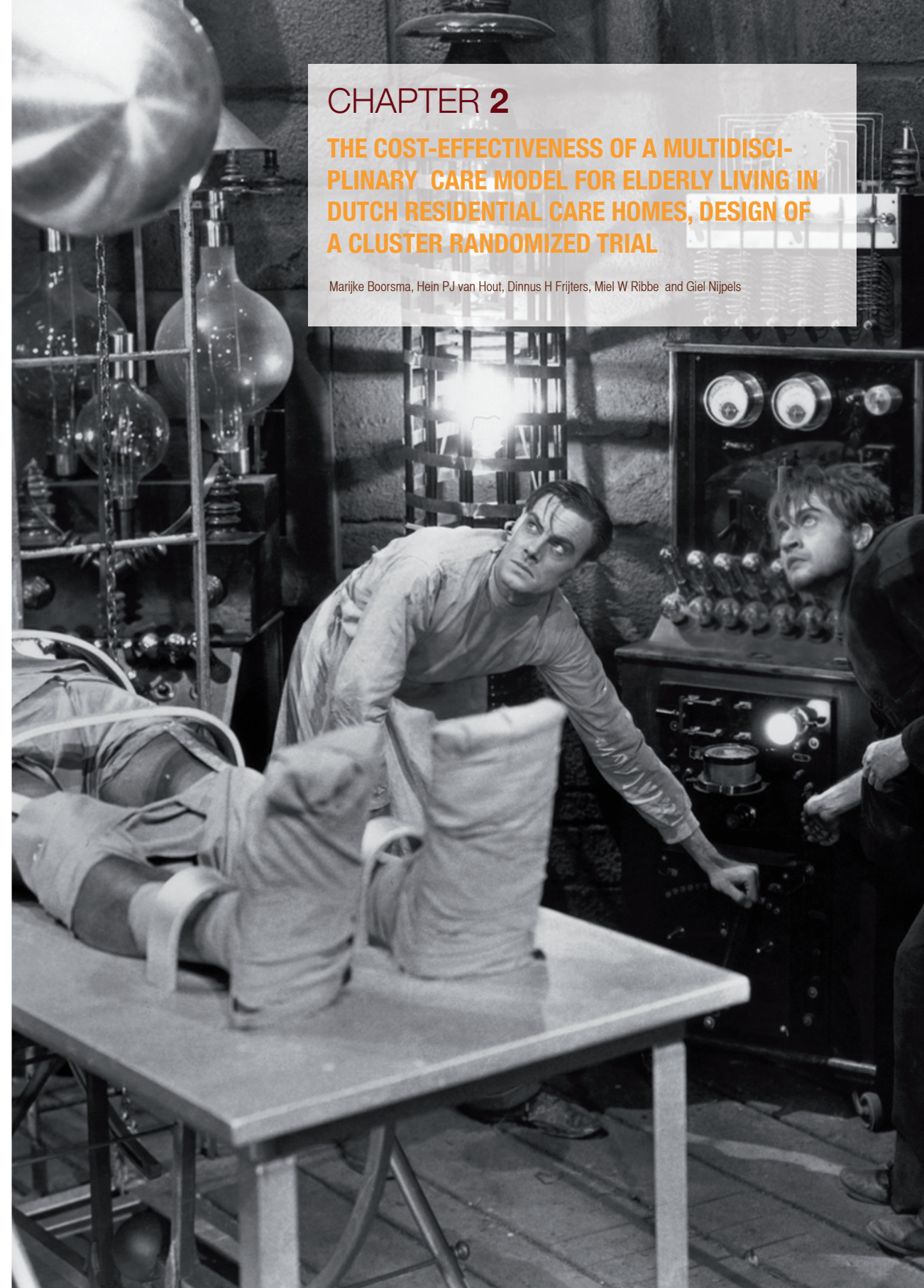
CHAPTER **2**

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ABSTRACT

BACKGROUND The objective of this article is to describe the design of a study to evaluate the clinical and economic effects of a multidisciplinary integrated care model on functional health, quality of care and quality of life of persons living in residential care homes.

METHODS This study concerns a cluster randomized controlled clinical trial among five intervention homes and five usual care homes in the North-West of the Netherlands with a total of over 500 residents. All persons who are not terminally ill, are able to be interviewed and sign informed consent are included. For cognitively impaired persons family proxies will be approached to provide outcome information. The Chronic care Model consists of several elements: (1) Trained staff carries out a multidimensional assessment of the patients functional health and care needs with the inter RAI Long Term Care Facilities instrument (LTCF). Computerization of the inter RAI-LTCF produces immediate identification of problem areas and thereby guides individualized care planning. (2) The assessment outcomes are discussed in a multidisciplinary meeting with the nurse-assistant, primary care physician, elderly care physician and Psychotherapist and if necessary other members of the care team. The multidisciplinary meeting presents individualized care plans to manage or treat modifiable disabilities and risk factors. (3) Consultation by an nursing home physician and psychotherapist is offered to the frailest residents at risk for nursing home admission (according to the inter RAI-LTCF). Outcome measures are Quality of Care indicators (LTCF based), Quality Adjusted Life Years (Euroqol), Functional health (SF12, COOP-WONCA), Disability (GARS), Patients care satisfaction (QUOTE), hospital and nursing home days and mortality, health care utilization and costs.

DISCUSSION This design is unique because no earlier studies were performed to evaluate the effects and costs of this multidisciplinary integrated care Model for disabled persons in residential care homes on functional health and quality of care.

Trail registration number: ISRCTN11076857

BACKGROUND

Publishing the design of a study and the results of the pilot is seen as useful by various publishers. There are several reasons mentioned in earlier publications, such as: the possibility to compare the originally intended and hypothesized objectives and the final outcomes. Some authors mention that publishing the design and pilot results of a study prevents not publishing the adverse or negative outcomes. (1,2) A positive effect of publishing a design article is prevention of bias (1) and publishing the pilot results provides a better insight in the choices for particular instruments and interventions. (1)

CARE NEEDS OF ELDERLY IN RESIDENTIAL CARE HOMES Persons in the residential care homes suffer greatly from (multiple) chronic diseases and associated disablement. (3) Over the last decades, Dutch residents of residential care homes have become older and more disabled and show more and more resemblance with nursing home patients. (4,5) Primary care physicians are responsible for the medical treatment of persons living in residential care homes. However, primary care physicians are often unable to handle the complex medical problems. (6,7) Many health problems go unnoticed by the primary care physicians. (8) Primary care physicians do not regard themselves to be suited for systematic management and long-term monitoring for chronic diseases and disabilities associated with frail health. (9)

A MULTIDISCIPLINARY INTEGRATED CARE APPROACH The Chronic care Model is based on 3 elements: coordination of care, guiding of the care process and empowerment of the patient. (10) This model is strongly recommended to improve the health and quality of life of the chronically ill. (11,12,13) Beneficial effects of chronic care were reported among stroke patients and among diabetes mellitus type 2 patients. (14,15,16) However no studies were performed yet to evaluate the effects on functional health, quality of care and the cost-effectiveness of chronic care for disabled persons in residential care homes. We use the concept of chronic care but not focused on the diseases level but on the disabilities and handicaps they cause and call it a multidisciplinary integrated care approach.
Already in 1995 the National health Council of the Netherlands stressed the importance of improving the quality of care for chronic patients by a shared chronic care of the health professionals involved, with clearly defined medical responsibilities, and the development of shared management protocols. (17)

CHRONIC DISORDERS AND DUTCH RESIDENTIAL CARE HOMES In our aging population the number of persons with a chronic disease is expected to increase from 1994-2015 with 25-60%. (18) In the Netherlands there are about 110.000 residents in residential care homes (4). Professional care is needed for 71% of the residents such as assistance with activities of daily living or mobility, nursing care (medication, wound care etc) and domestic help. Twelve percent of persons of 75 years and older live in a home for the elderly and 4% in a nursing home. (19) The quality of care in these homes is frequently discussed in national and international newspapers. The care organizations responsible for the quality of care given in residential care homes often do not have the tools to measure and improve quality of care. Scientific studies of quality of care for the elderly are rare.

COSTS Aging is costly for health care systems. About one third of the health care expenditures in industrialized countries involves persons of 70 years and older. Elderly are massive consumers of medication and occupy most of hospital beds. (3) Studies of comparable interventions and associated costs in residential care homes are absent. Nevertheless, we reanalyzed two meta-analyses of Stuck 2002 and Elkan 2000 on preventive effects of home

visits to community dwelling elderly and selected only studies that focused on frail elderly 12 of 27 trials. (20,21) Six of these studies that reported on costs, found that preventive visits or outreaching geriatric management reduced care costs. (22)
Objectives for this article were to describe the design of an evaluation study on the clinical and economical effects of a new chronic care model for residents in residential care homes.

METHODS

DESIGN A cluster randomized controlled clinical trial is carried out among five intervention homes and five usual care residential care homes in the north-west of the Netherlands that comprise over five hundred residents. There is a follow up of six months (Figure 1). The ethical committee of the VU medical center approved the study.

Figure 1: Flow chart of the design
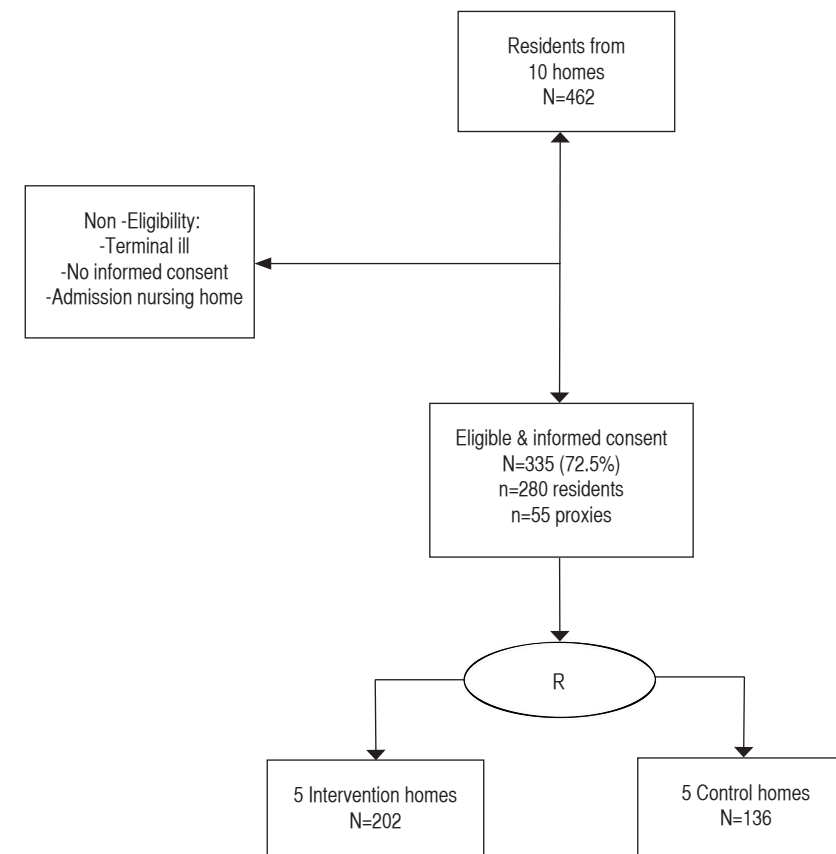
RANDOMIZATION The randomization is carried out on home matched by percentage of psycho geriatric (i.e. cognitive impaired) residents. The care services and type of disability in homes with a high percentage of psycho geriatric patients are likely to differ depending on how many residents need psycho geriatric care. So, the homes were first ranked on percentage of psycho geriatric patients. The two homes with the highest percentage of psycho geriatric patients were than matched, and so on. Next, we checked the risk of imbalance in numbers following Pocock's recommendations. (23) If the difference in number of intervention and control residents would be > 15% (75 or more) the randomization should be repeated until the imbalance was 15% or less. Homes were all ordered on the percentage psycho-geriatric patients and numbered from rank one to rank 10. In this way matched homes are ranked after each other, one having an even and the other an uneven number. Randomization was carried out using Pocock's first column in his random numbers table. (23) If the table's first number is even, the even number of first matched home is assigned the intervention. If the next table number is uneven, the uneven number of the next matched couple is assigned the intervention. And so on until all matched couples are assigned.

ELIGIBILITY OF RESIDENTS All residents were eligible except the terminally ill. Terminally ill is defined as death expected within six months. A family proxy of cognitive impaired persons was approached to provide outcome information.

PROCEDURE All residents from the usual care homes as well as from the intervention homes receive an invitation letter and an informed consent form two weeks before the start of the study. If the resident is not able to understand the information and/or to sign the informed consent papers a close family member will be invited to participate and provide proxy information on the outcomes. All eligible persons who sign an informed consent are going to be visited by an interviewer of the VU medical centre for an interview on their health and resource use. Table 1 provides an over-view of the measurements.

Table 1. Overview of outcomes and measurements in the study

Variable	Instrument	baseline	6 months
Primary outcome			
Quality of Care	RAI-LTCF criteria	X	X
Quality Adjusted Life Years	Euroqol & thermometer	X	X
Functional health	COOP-WONCA & SF12	X	X
Secondary outcome			
Patient care satisfaction	Brief Quote on residential care homes	X	X
Disability ADL-IADL	Groningen Activity Restriction Scale	X	X
Mood disorders	PRIME-MD	X	X
Hospital days	Checklist resource utilization Hospital records	X	X
Time to nursing home placement	Registration elderly home HIS		X
Time to mortality	Registration elderly home HIS		X
Economic outcomes			
Direct costs	Patient / family Interview Registration pharmacy Registration medical records		X
Process outcomes			
Adherence professionals to chronic care protocol	Checklist		X
Adherence of patients to specific chronic care recommendations	Checklist		X
Sociodemographics	Patient Interview	X	
Health status (morbidity, medication)	Patient Interview Patient records	X	X
House & personnel characteristics	Staff Interview	X	

INTERVENTION The Chronic care Model is based on 3 elements: coordination of care, guiding of the care process and empowerment of the patient. (10) A limitation of chronic care for patients with multi-morbidity is the single-disease oriented perspective. Therefore in this project among elderly with mostly multiple morbidity, we choose an expanded multidimensional or bio psychosocial perspective which corresponds to the International Classification of Functioning, Disability and Health. (24) For our target population we defined chronic care as improving or maintaining the functional health status by providing continuity of care, being patient oriented, generating multidimensional health data on residents, executed by appropriately trained professionals who design a shared chronic care plan and is ICT supported. In the intervention homes we will make multidisciplinary integrated care operational in the process of care in three sequential steps: Firstly a three-monthly in-home systematic and computerized multidimensional assessment of all residents by staff (nurse) who systematically identifies the functional health status and care needs. For this purpose, the inter RAI-LTCF instrument will be used. (25) The Resident Assessment Instrument (RAI) was originally designed as a minimum data set to assess the health needs of nursing home residents. For the residential care homes we use the inter RAI-LTCF (Long Term Care Facility) version. The inter RAI LTCF provides a comprehensive overview of the person's physical, psychological, behavioral and social status. Moreover it indicates a global level of care need which distinguishes persons who do not need care, from those who need personal care, home care, extramural home care or nursing home care. The web based inter RAI-LTCF produces an easy and direct overview of problems in 18 areas that may need specific care planning. The identified problem areas guide the design of an optimal individualized care plan. In a multidisciplinary team, all disciplines involved in care for the resident, will participate in regular meetings in order to evaluate the inter RAI LTCF findings and design and monitor the (tailor made) care-plan. The care plan aims to improve or maintain the functional health status and is focused at modifiable risk factors of the resident (Table 2). Secondly, the assessment outcomes are discussed in a multidisciplinary meeting (MM) in the homes with the primary care physician, nursing home physician, nurse, Psychotherapist and other involved disciplines. In the MM an individualized care plan is made to treat modifiable disabilities and identify and eliminate (when possible) risk factors. Thirdly, a multidisciplinary consultation is offered to the frailest residents with complex health care problems. They are identified by the level of expected resource utilization. (26) In addition, the computerized inter RAI LTCF also provides process-supporting information technology as well as indicators about the functioning and implementation of the care plans.

Table 2: Case example of a RAI-LTCF assessment: triggered modifiable health risks

Problems and risks	Observed	Action now?
Delirium		
Cognition impairment / dementia		
Visual impairment	x	
Communication	x	
ADL-revalidation potential	x	x
IADL-more formal care needed		
Urinal incontinence	x	
Psychosocial wellbeing	x	x
Depression	x	
Behavior		
Social activities	x	
Falls	x	x
Nutrition	x	
Artificial nutrition		
Dehydration		
Dental health		
Skin problems and wounds	x	x
Psychotropic medication-walking problems		
Psychotropic medication- cognitive and behavioral problems		
Psycho medicaments and feeling unwell		
Fixation		

OUTCOMES AND MEASUREMENTS *(TABLE 1)*

Primary outcomes
1. Quality of care as measured with the risk adjusted criteria (27),
2. Quality Adjusted Life Years using health utilities is measured with the Euroqol (28,29),
3. Functional health is measured by COOP-WONCA charts (30,31) (Nelson 1983, Van Weel 1995) and Short Form 12 item version. (32)

Secondary outcomes
4. Care satisfaction of residents is measured by the brief QUOTE, which wording was slightly adapted to fit the institutional setting (33).
5. ADL and IADL disability is measured by GARS (34).
6. (Days until) placement in a nursing home is surveyed and crosschecked at institutes.
7. (Acute) hospitalization is surveyed and cross-checked at the local hospital which covers 95% of all admissions in the region.
8. (Days until) mortality is checked in the administration of the homes.

Economic outcomes
9. Health care utilization data are collected by patient or proxy interview at baseline and patient records over 6 months.

SAMPLE SIZE CALCULATION are based on the expected effects of the intervention on the main outcome measures concerning quality of care and functional health. In the following sample size calculations we used an alpha of 0.05, power of 80% and inflation of 10% because of anticipated intra-cluster correlation in the residential care homes. Regarding health related quality of life, Cohen's D effect size ranged from 0.5 to 3.8 in our meta-analysis. (22) To detect a fair benefit, i.e. effect size = 0.5, a minimum of 64 persons is needed in each group (35). For functional health and disability we anticipate on a comparable effect-size and consequently identical sample size. Furthermore if we assume a dropout rate of 15% during the 6 months follow-up we need to include at least 100/85 x 64 x 110% = 82 persons in each group.

DATA ANALYSIS Effect analyses will be performed both on 'intention to treat' and per protocol principles. Differences between intervention and usual care patients at 6 months on the outcome measures (risk adjusted inter RAI LTCF based Quality indicators, Euro QoL, functional health and disability) will be compared between the intervention and control group by both univariate and multivariate techniques. We will use the multivariate technique to adjust for possible differences in baseline scores and background variables between the intervention and control groups. Dropout and loss to follow up will be described. Potential effect-modification will be explored.
Especially, possible differential effects of multidisciplinary integrated care will be explored across residents with complex and simple health problems.

PROCESS EVALUATION The process evaluation involves assessing the extent to which the intervention program is performed according to protocols, the nature of the recommendations made to the participants of the multidisciplinary meeting, compliance with these recommendations, physicians and therapists judgments about the intervention program and recommendations. Data on these topics are collected using structured registration forms during the intervention. Finally, semi-structured interviews will be held with the participating nurses, primary care physicians, and elderly care physicians at the end of the intervention period in order to record their experiences and opinions on the new multidisciplinary integrated care approach.

ECONOMIC EVALUATION Cost data are collected by resident interview at base line, and at 6 months from a societal perspective and supplemented with resource use as registered within the home for the elderly. In case residents are cognitively impaired or not able anymore to be interviewed, proxies will be sought, preferably close family members. Only direct healthcare costs will be considered, because all patients have retired. Included cost categories are costs of consultations with the general practitioner, the nursing home physician and medical specialists, hospitalizations and admissions to the medical department of the nursing home and use of medication and medical aid. Medication data are retrieved from the centralized pharmacy files in the research region. Care consumption will be valued according to guidelines for economic evaluation in health care in the Netherlands. (36, 37)
Cost analysis To compare costs between the two groups, confidence intervals for the difference in mean costs are calculated using bias-corrected and accelerated bootstrapping with 2000 replications. (38)
Cost effectiveness analysis For the cost-effectiveness analysis the difference in total costs between the intervention and usual care group are compared with the difference over 6 months in improvement of functional health and disability. In addition, a cost utility analysis will be done to assess the incremental costs per Quality Adjusted Life Years (QALY). QALY's are calculated by multiplying the utility based on EuroQol scores (29) with the

amount of time a patient spent in this particular health state. Transitions between health states are linearly interpolated. Uncertainty around the cost-effectiveness and cost-utility ratios is calculated using the bias-corrected percentile method (5000 replications) and presented in a cost-effectiveness plan (39). The bootstrapped cost and effect pairs will also be used to calculate cost-effectiveness acceptability curves. (40)

DISCUSSION

In this paper we described the design of a randomized cost-effective trial of the effect of a multidisciplinary integrated care approach on residents of residential care homes. This study holds several unique elements. The intervention concerns continuity of care and identification of care needs of the residents. The use of inter RAI LTCF enables nurses to accurately diagnose the problems addressed within the complex clinical status of a frail elderly person. As a consequence, primary care physicians will be better informed about the health problems of their patients. This may enable effective chronic care. Finally, to persons with complex problems a multidisciplinary consultation is offered by a elderly care physician. The randomization on level of the residential care homes may be a weak point of the design as specific cultural habits of the homes will not be equally distributed over the two groups. On the other hand, randomization of homes will prevent contamination of the intervention to usual care homes. The implementation of inter RAI LTCF demands a great effort on the part of the organization and outcomes are dependent on good use of the instrument.

ABBREVIATIONS

RAI- LTCF	Resident Assessment Instrument - Long Term Care Facility
MM	Multidisciplinary Meeting
SF12	Short Form 12 item version
QUOTE	Quality Of care Through the patient's Eyes
GARS	Groningen Activities Restriction Scale
ADL	Activities of Daily Living
ADL	Instrumental Activities of Daily Living
COOP WONCA	Functional status in the perception of the World Organization of General Practice

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CHAPTER **3**

EFFECTS OF MULTIDISCIPLINARY INTEGRATED CARE ON QUALITY OF CARE IN RESIDENTIAL CARE FACILITIES FOR ELDERLY PEOPLE: A CLUSTER RANDOMIZED TRIAL

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ABSTRACT

BACKGROUND Sophisticated approaches are needed to improve the quality of care for elderly in residential care homes. We determined the effects of multidisciplinary integrated care on quality of care and quality of life for elderly people in residential care homes.

METHODS We performed a cluster randomised controlled trial involving 10 residential care homes in the Netherlands that included 340 participating residents with physical or cognitive disabilities. Five of the residential care homes applied multidisciplinary integrated care, and five provided usual care. The intervention, inspired by the disease management model and consisted of: a geriatric assessment of functional health every three months. The assessment included use of the Long- Term Care Facility version of the Resident Assessment Instrument by trained nurse-assistants to guide the design of an individualized care plan; discussion of outcomes and care priorities with the family physician, the resident and his or her family and monthly multidisciplinary meetings with the nurse-assistant, family physician, psychologist and elderly care physician to discuss residents with complex needs.

RESULTS Compared with the homes that provided usual care, the intervention homes had a significantly favourable sum score of the 32 quality of care indicators (mean difference -6.7, p = 0.009; a medium effect size of 0.72). They had significantly favourable scores for 11 of the 32 indicators of good care in the areas of communication, delirium, behaviour, continence, pain and use of antipsychotic agents.

INTERPRETATION Multidisciplinary integrated care resulted in improved quality of care for elderly people in residential care homes compared with usual care.

TRIAL REGISTRATION: ISRCTN11076857
http://www.controlled-trials.com/ISRCTN11076857/

INTRODUCTION

Quality of care provided in residential care homes is under pressure worldwide.(9) Facilities are frequently understaffed, and the complexity of care needed by residents increases while expertise of staff does not necessarily keep pace.(10;54) Although most care organizations want to innovate and improve quality of care, many lack the expertise or financial resources to do so.(14;16) Family physicians are responsible for medical care in residential care homes in the Netherlands. However they do not regard themselves as suited for systematic management of chronic diseases and disabilities associated with frail health.(15) About 10% of elderly people aged 75 or older in the Netherlands live in residential care homes.(51;57) These homes were established to offer sheltered living for elderly people who are disabled but still relatively healthy.. Because of the growing elderly population the characteristics of elderly people living in residential care homes have become more comparable to those of people in nursing homes, who need complex care. Residential care homes in the Netherlands are comparable to residential care facilities in Canada, are publically funded and are subject to governmental inspection and approval. Over 70% of the residents need professional care such as assistance with activities of daily living, nursing care (e.g., medication, wound care) and housekeeping. They have multiple chronic diseases and associated disabilities.(24;53;55;56) Effective interventions for chronic illnesses generally rely on a multidisciplinary team approach. The elements of this approach include structured geriatric assessment, protocol-based regulation of medication, support for self reliance and intensive follow-up. The closely related. Disease management model comprises coordination of care, steering of the care process and patient empowerment. (6) This model is strongly recommended by Bodenheimer and colleagues to improve the health and quality of life of chronically ill patients.(8) However, no studies have as yet been undertaken to evaluate the effects of disease management on functional health and quality of care for elderly people in residential care homes, who have physical and cognitive disabilities. We developed an approach to multidisciplinary integrated care inspired by the disease management model. The objective of this study was to determine the effects of Multidisciplinary Integrated Care on quality of care and quality of life for elderly people.

METHODS

The study was approved by the ethics committee of the VU University Medical Center in Amsterdam the Netherlands. All participating residents or their proxies provided written informed consent. Figure 1 shows the flow of participants through the study.

Figure 1: Flow of completed interviews of participants through the trial.

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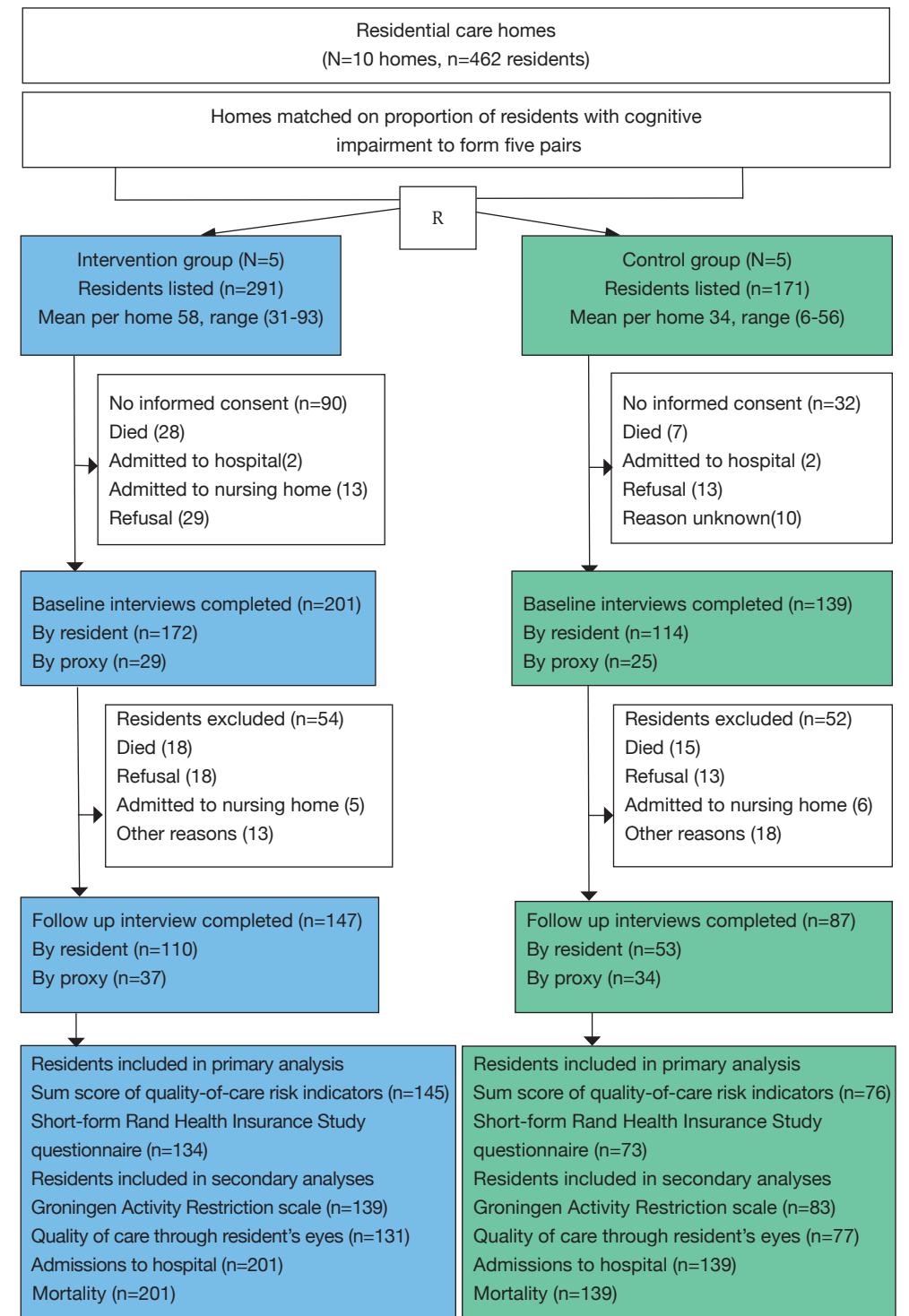
STUDY DESIGN AND PARTICIPANTS

After a pilot study in one residential care home, a cluster randomised controlled clinical trial was set up in 10 residential care homes belonging to the umbrella care organization Omring, a large home care and long term care provider in the Netherlands. The pilot home was excluded from the trial. Randomization was carried out at facility level; five homes were assigned to the intervention group and the other five to the usual care group. A total of 462 of the 10 homes were recruited from December 2006 until December 2007. The average number of residents in each home was 46 and staff included nurse-assistants and a house manager. All residents were listed in primary care practice, whose physician was responsible for their medical care. Residents who were terminally ill (as determined by staff or family physician) were excluded from the study. Participating residents in each home were visited by trained blinded interviewers at baseline and at six months. If the resident was unable to understand the questions a close family member was identified by staff and asked to act as proxy. The interview consisted of a computerized assessment of functional health, Activities of Daily Living, depression, cognition, satisfaction with care and use of medications. Proxies completed the interview except for the cognitive assessment which was replaced by a short form of the Informant Questionnaire on Cognitive Decline in the Elderly. The duration of the trial was relatively short because of a high risk for drop out owing to the extreme vulnerability of residents and because the umbrella care organisation intended to implement the care model in the control homes as well. A detailed description of the design was reported earlier.(14)

RANDOMIZATION Randomization was carried out on homes after matching for percentage of cognitively impaired residents, based on the assumption that a high percentage of such residents would affect care-related needs and services. In the matching procedure, the two homes with the highest percentage of cognitively impaired residents were matched, and so on. Randomization was carried out using the first column from Pocock's random numbers table. (15)

INTERVENTION By adapting the principles of disease management we introduced the concept of multidisciplinary integrated care. This concept focused on identification and monitoring of the functional disabilities caused by chronic diseases. Its three basic elements correspond to those of the disease management model: monitoring of disabilities, coordination of care, and empowerment.(6) The third element is normally applied to patients only. However we wanted to empower nurse-assistants in relation to monitoring and coordination of care, given that they provided all basic nursing care.
The model of multidisciplinary integrated care used in our study comprised five elements. First, a geriatric multidimensional assessment of all residents was conducted every three months. The web based Long Term Care Facility version 9.0 of the Resident Assessment Instrument was used for this purpose.(16) The identified problem areas guide the design of an individualized care plan that is intended to improve or maintain functional health status (see appendix 1).Second the care plan was discussed with the resident, the resident's family, and the family physician, and adapted to personal wishes. Third, residents with complex care needs were scheduled at least twice a year for a multidisciplinary meeting. Fourth, consultation by elderly care physician or psychologist was optional for the frailest residents with complex health care problems. Fifth. data from the web based Resident Assessment Instrument was used to provide an overview every three-month of 32 risk adjusted quality-of-care indicators. These indicators were compared with benchmark values derived from data on all residents of residential care homes in the Netherlands obtained using this instrument.(17,18) Further details of the model of multidisciplinary integrated

care are found in Appendix 1.

USUAL CARE For homes assigned to usual care the family physician was responsible for medical care and offered it on request. There was neither coordination nor structural planning of care. Multidisciplinary meetings were mostly not attended by the family physicians.

OUTCOME MEASURES

For the purpose of the evaluation, experienced, specially trained, blinded and supervised interviewers independently assessed the residents at baseline and six month later. The interviewers' assessments were supplemented by systematic observations of staff and extraction of data from residents' medical records (e.g. actual medication regimen).

PRIMARY OUTCOME MEASURES The first primary outcome was the sum score of the 32 risk-adjusted quality of care indicators, which were developed by Morris and showed good validity and reliability.(20) Appendix 5 shows the definitions of the quality-of-care indicators including their numerator and denominators. The quality-of-care indicators were originally based on observations recorded in the Long Term Care Facility assessment form. We incorporated the itemized observations needed to calculate these indicators in the assessments performed by our independently trained interviewers. Interrater reliability of the quality-of-care indicators between interviewers and nurse-assistants in the intervention homes was satisfactory (mean intra-cluster correlation single measure = 0.74). The sum score of the quality-of-care indicators was determined by he number of indicators per resident divided by the number of indicators applied to a resident. Indicators were calculated using mixed linear hierarchical models. Four of the 32 quality-of-care indicators (behaviour problem, bladder or bowel incontinence, pressure ulcer and use of antipsychotics) applied both to the group of residents as a whole and to high- and low- risk groups. We therefore calculated two sum scores, one for all 32 indicators and one for the 24 whole-group indicators after exclusion of the 8 that were broken down to apply to high- and low-risk groups. Of these 24 whole group indicators, on average 21 (standard deviation(SD) 6.6) applied to the residents. Of all 32 indicators, on average 22 (SD 6.1) applied to the residents.The relatively lower number of applicable indicators among all 32 indicators is due to the inclusion of the breakdown indicators which applied to a maximum of 50% of the residents. The Crohnbach's α of the sum score of the 24 whole-group indicators was 0.62. The lower the sum score the higher the quality of care. For the second primary outcome health related quality of life was measured using short-form12 item version of the Rand Health Insurance Study questionnaire. Its properties were satisfactory when used by proxies which was important in our study because of the percentage of cognitively impaired residents (58.2%).(6) We also calculated the number of quality-adjusted-life-Years using the algorithm of Hatoum and colleagues. (19,20)

SECONDARY OUTCOME MEASURES The secondary outcome measures comprised 32 individual risk-adjusted quality-of-care indicators (described in appendix 4); activities of daily living as measured by the Groningen Activity Restriction Scale designed for elderly respondents and validated by Kempen and coauthors.(21), quality of care from the resident's perspective as measured by a short (16- item) version of the QUOTE-Elderly instrument (Quality of Care from the perspective of the Elderly) (22), hospital admissions recorded at the (single) local hospital which covered more than 95% of all admissions. (23), and mortality as recorded by the interviewers or staff and cross-checked by the administration of the municipality.

PROCESS OUTCOMES Process outcomes comprised the percentage of residents with completed assessments; the number of multidisciplinary meetings held based on minutes of the meetings; the numbers of agreed on medical, nursing and social actions based on content analysis of care-plans; and opinions of participating professionals regarding the intervention protocol as obtained by interviews with staff and family physicians.

STATISTICAL ANALYSES

SAMPLE- SIZE CALCULATIONS Sample- size calculations were based on the expected effects of the intervention on quality of care and functional health using an alpha level of 0.05, a power of 80%, a drop out rate of 15% and an anticipated intra-cluster correlation of 0.05, based on Adams and colleagues, across the residential care homes.(24) To detect a fair benefit,(i.e. Cohen's d effect size = 0.5), we estimated that the sample should include at least 82 residents in each of the two study groups.(25)

EFFECT ANALYSES Effect analyses were performed according to both intention-to-treat and per protocol principles. We accepted that the protocol was adhered to when the first two (obligatory) steps of the intervention were performed. We compared differences in the outcome measures over six months between the intervention and control group using multivariable techniques. We applied mixed models for the continuous outcomes using an unstructured covariance matrix for the longitudinal data. For the dichotomous outcomes we applied generalized estimating equations using a logit link and an exchangeable working correlation. In all effect analyses we adjusted for baseline imbalance (e.g.,by age, sex, cognitive impairment, depression, disability, and interview by proxy). The analyses were done with multilevel specification if these variables showed significantly higher log-likelihood estimates. Because of our cluster randomised design (with randomization at the facility level), results of multilevel and "simple" analyses were compared for all outcomes. If higher-order clustering effects were present outcomes of the multilevel analyses were presented; if clustering was negligible, results of "simple" analyses were presented.
The intracluster coefficient across homes was estimated by exchangeable working correlation for all individual (dichotomous) quality-of-care indicators. In all outcomes with pre-post measurements, the effect of interest was the group x time (pre-post) interaction effect. A p-value of 0.05 or less was considered to be significant.

PROCESS ANALYSES We evaluated the extent to which the intervention program was performed according to protocol, the nature of the recommendations of the multidisciplinary meeting, and the judgments of family physicians and staff about the intervention programmed.

RESULTS

SAMPLE AND FACILITY CHARACTERISTICS
Baseline characteristics of the residents and facilities are described in Table 1. There was a small imbalance between the intervention group and the usual care group in the numbers of residents with cognitive impairment and in the numbers with clinical depression. The trial ended up unbalanced because one control home did not accept any new entries as result of an upcoming move to another location and because a second control home was in the middle of moving to a new building and could therefore recruit few residents for the study. Analyses without these homes did not change the results.

Table 1. Baseline characteristics of the 10 residential care homes and the 340 participating residents

Characteristic	Intervention group N=5	Control group N=5
facilities		
No. of participating residents, mean (SD)	39.8 (17.7)	27.2 (18.0)
No. of personnel, full time equivalent per resident, mean (SD)	0.33 (0.04)	0.44 (0.10)
Residents	n=201	n=139
Age, yr, mean (SD)	85.8 (6.2)	85.5 (8.0)
Sex,, male, no (%)	48 (23.9)	36 (25.9)
Marital status, no (%) 　Married 　Widowed 　Never married	n=199 42 (22.0) 130 (68.1) 19 (9.9)	n=135 27 (20.0) 93 (68.9) 15 (11.1)
Education, no (%) 　Primary school or less 　Lower Technical vocational training 　Average and higher vocational training	n=190 112 (58.9) 45 (23.7) 34 (17.9)	n=132 79 (58.8) 26 (19.7) 30 (22.1)
Clinical characteristics,no %	n=199	n=136
Asthma or COPD Myocardial infarction Cerebralvascular accident Diabetes Arthritis Cancer Hypertension Chronic somatic diseases, no, mean(SD)	29 (14.6) 61 (30.7) 33 (16.6) 39 (19.6) 73 (36.7) 12 (6.0) 35 (17.6) 1.54 (1.25)	13 (9.6) 30 (22.1) 29 (21.3) 27 (19.9) 47 (34.6) 11 (8.1) 32 (23.5) 1.49 (1.17)
Cognitive impairment*	101 (50.8)	90 (66.2)
Clinical depression †	10 (5.0)	16 (11.8)
Body mass index, mean (SD)	n=164 26.2 (4.98)	n=116 26.3 (4.67)
falls experienced in past 30 days, no (%) 　one fall 　two or more 　total Medications,no, mean (SD)	n=190 23 (12.2) 8 (4.2) 31 (16.3) 7.6 (3.4)	n=134 18 (13.4) 10 (7.5) 28 (20.9) 8.0 (3.6)
4 meter walking time sec, median (IQR) Not able to do walking test	4.0 (1.0-7.75) n=172	5.0 (1.0-8.0) n=114

*Note COPD = chronic obstructive pulmonary disease, IQR = interquartile range, SD = standard deviation. *Score of < 5 on the Memory Impairment Screen, or ≥ 3.6 on the short form of the Informant Questionnaire on Cognitive Deterioration. †Diagnosed by family physician or specialist*

PRIMARY OUTCOMES Compared with residential care homes that provided usual care the intervention homes had a significantly lower sum score of the 32 risk-adjusted quality-of-care indicators were (mean difference -6.7; 95% confidence interval (CI) -8.69 to -4.71, p = 0.009; Cohen d effect size 0.72)(Table 2). Self reported quality of life did not differ between residents of control and intervention homes (Table 3).

SECONDARY OUTCOMES The intervention homes had lower scores than the control homes for 30 of the 32 risk-adjusted indicators of quality of care; the scores for 11 of these 30 indicators had decreased significantly (Table 2). In the intention-to-treat analyses no differences in disability or quality of care as seen through residents' eyes were found between the two groups of homes (Table 3). In the per-protocol analysis, residents in the intervention homes tended to be more positive about the quality of care over time than residents in the usual care homes (difference 1.8 p = 0.072). The per-protocol analyses showed that fewer residents died in the intervention group (intervention 10/112, control 25/139 odds ratio 2.15,95%CI 1.06-4..38;p = 0.035).

PROCESS OF CARE The first step of the protocol, assessment with the Long Term Care Facility version of the Resident Assessment Instrument, was completed for 55.2% of the residents in the intervention homes. This proportion was less than we had aimed for and was partly a result of implementation delay. Forty multidisciplinary meetings were held in the intervention homes during the study period, and the outcomes of assessment of 93 residents included in the study were discussed (Table 4). The family physician was present in 90% of the multidisciplinary meetings and the elderly care physician at 75%. By contrast, only 25% of the multidisciplinary meetings in the control homes were visited by the family physician. The number of recommended actions per resident was 3.67 in the intervention home meetings and 2.26 in the control home meetings.The expertise of staff was felt by 52.9% of staff and 54.5% of the family physicians to have increased after introduction of the care model. The same percentage of staff and 63.6 % of family physicians felt that they had more knowledge about resident's health. In addition 58.8% of staff and 81.8% of family physicians felt that their cooperation had improved. About 55% of the family physicians considered quality of care to have improved; 73% acknowledged the need for a new care model.

ANCILLARY ANALYSES We did not find effect-modification of the outcomes by age, sex or baseline disability.

Table 2. Risk-adjusted indicators of quality of care for elderly people in intervention and control residential care homes during the six-month study period.

Indicator	IntraCluster coefficient	Intervention homes.	Control homes	OR(95% CI)*
Group; % of residents				
Worsening of activities of daily living	0.02	14.7	48.5	0.17(.07-.40)
Worsening of locomotion	<0.001	16.1	7.1	2.85(0.91-8.96)
increase in no. of falls	-0.03	17.6	9.6	2.00(0.69-5.64)
Decline in cognitive ability	0.03	18.4	24.1	0.84(0.51-1.38)
Decline in communication	0.01	17.5	46.9	0.25(0.13-0.49)
Delirium, new or persistent	0.06	28.2	56.3	0.27(0.10-0.69)
Behaviour problem high risk low risk	0.01 0.04 0.04	8.7 15.4 2.0	26.5 45.5 8.6	0.27(0.10-0.74) 0.24(0.07-0.89) 0.20(0.03-1.34)
Little or no social activity	-	0.0	0.0	-
New in-dwelling catheter	-0.03	1.0	4.6	0.04(0.006-0.29
In-dwelling catheter	0.01	2.0	0.0	-
Bladder or bowel incontinence high risk low risk	-0.04 -0.06 -0.06	33.3 62.5 19.4	46.2 71.1 34.1	0.78(0.66-0.91) 0.79 (0.28-2.28) 0.52 (0.40-0.67)
Decline of bowel continence	-0.03	6.9	23.4	0.25(0.15-0.45)
Decline of bladder continence decline	-0.02	14.6	45.9	0.17(0.07-0.38)
Urinary tract infection	0.01	1.9	4.5	0.79(0.25-2.49)
Use of feeding tube	<0.001	0.0	1.5	-
Low body mass indexI	<0.001	1.9	0.0	-
Weight loss	0.001	3.9	4.6	0.67(0.09-5.00)
Inadequate pain management	-0.01	21.4	13.2	1.81(0.91-3.57)
Worsening of pain	-0.03	12.9	40.9	0.20(0.07-0.52)
Presence of Pressure ulcers high risk low risk	-0.01 -0.17 0.02	4.9 16.0 1.3	7.5 19.0 2.1	0.63(0.21-1.91) 0.80(0.18-3.44) 0.51(0.06-4.04)
Worsening of Pressure ulcers	0.03	1.9	5.2	0.57(0.31-1.05)
Burns, skin tears or cuts	0.02	8.7	4.5	1.9(0.91-4.14)
Use of Physical restraints	-	0.0	1.5	
Use of antipsychotics agents high risk low risk	0.01 0.17 0.01	3.8 25.0 2.1	11.0 25.0 10.7	0.25(0.08-0.78) 0.89(0.03-36.1) 0.15(0.03-0.66)
Sum score				Mean difference (95% CI)
For all 32 quality-of-care indicators, range 0%–100% (SD)†#	0.01	11.5(9.0)	18.2(9.4)	-6.7(-8.69 to-4.71)**
For 24 whole-group quality-of-care indicators, range 0%–100% (SD)†‡	0.05	9.1(9.4)	15.7(11.2)	-6.6(-8.81 to-4.39)***

Odds ratios and total risk sum-scores were adjusted for gender, age, proxy interview, depression, and cognitive impairment at baseline, account-ing for within home clustering
ICC = Intra cluster coefficient across homes was estimated by exchangeable working correlation for all individual (dichotomous) risk indicators.
* Calculated by Generalized Linear Models (GEE), ** p = 0.009, *** p = 0.021
† Sum score by count of risks per resident divided by the number of risks a resident applied. Calculated by mixed linear hierarchical models
# Of the 32 risks a mean of 20.1 in controls and 23.1 in the intervention applied to the residents
‡ Of the 24 'mother' risks, a mean of 19.5 in controls and 21.7 in the intervention applied to the residents

Table 3. Health- related outcomes and residents' opinions of quality of care

Outcome measure	Intra cluster coefficient	Intervention group	Control group	Effect statistic	P value
Continuous (range)		mean (SD)		Group x time	
Short 12 item version of the Rand Health Insurance Study questionnaire (0-100)	0.02			1.02	0.35
Baseline		43.34 (5.96)	42.33 (6.86)		
6 months		42.31 (6.04)	42.56(6.35)		
Quality-adjusted life-years (0-1)	0.05				
6 months		0.28 (0.11)	0.27 (0.12)	0.87	
Groningen Activity Restriction scale (18-72)	0.13			-1.40	0.16
Baseline		43.70 (13.73)	39.90 (13.91)		
6 months		42.41 (13.37)	39.06 (13.70)		
Quality of care through residents' eyes (16-64)	0.07			1.56	0.12
Baseline		57.41 (5.46)	58.01 (6.69)		
6 months		56.32 (6.47)	56.10 (6.64)		
Dichotomous		no (%)	no (%)	OR (95% CI)	
Mortality	-0.02	28 /201(13.9)	25/139 (18.0)	1.09 (0.87-1.38)	0.44
Hospitalization ≥1	-0.02	22/142 (15.5)	12/85 (14.1)	1.32 (0.94-1.87)	0.11

Table 4: Characteristics and outcomes of multidisciplinary meetings held during the six-month study period

Characteristic or outcome	Intervention home meetings n=40	Control home Meetings n=28
No of residents discussed, total (per meeting)	93 (2.1)	68 (2.4)
Meetings at which family physician was present, no (%)	36 (90)	7 (25)
Meetings at which Elderly Care physician was present, no (%)	30 (75)	21 (75)
Meetings at which Psychologist present, no (%)	21 (53)	16 (57)
No of actions on care plan, total (per resident)		
Medical	92 (0.99)	60 (0.88)
Nurse care	124 (1.33)	27 (0.40)
Baseline		43.70 (13.73)
Referral to medical specialist	32 (0.34)	12 (0.18)
Paramedical referral	53 (0.57)	37 (0.41)
Medication change	40 (0.43)	18 (0.25)
All	341 (3.67)	154 (2.26)

INTERPRETATION Compared with usual care, our model of multidisciplinary integrated care resulted in substantially higher quality of care for elderly people in the involved residential care homes. Functional ability, hospital admission and health-related quality of life remained comparable between the two groups. According to the per-protocol analyses mortality was lower in the intervention homes and residents in the intervention homes were more positive about their quality of care. Owing to the short intervention period (six months), the full protocol was applied to less than half of the residents in the intervention homes. The training and empowerment of nurse-assistants, which was completed for all intervention homes, together with monitoring using the geriatric assessment instrument were likely to be the most important ingredients for improvement of the quality of care. Earlier studies have reflected elements of our intervention. For example positive health effects on residents have been reported as a result of interdisciplinary geriatric primary care in American facilities.(26) Integrated and home-based geriatric care management was reported to improve quality of care and reduce use of acute care services in a high-risk group of low income elderly people living at home.(27) Use of the Home Care version of the Resident Assessment Instrument in primary care health centers in Hong Kong resulted in improvement in two of 13 functional outcomes.(28) Modest positive effects on well-being and on deterioration of functional skills were found in a multidisciplinary program in vulnerable older people living at home.(29,30)

LIMITATIONS Our study was limited by the fact that our population was frail and comprised a high percentage of cognitively impaired residents. As a result a portion of the data was collected from interviews with proxies. The judgments of proxies may have differed from the residents´ judgments. Therefore, we adjusted for proxy interview and cognitive status in our analyses. The cluster randomization produced an imbalance between the intervention and control homes in the number of participating residents and in some of the functional characteristics of the residents at baseline. Although we adjusted for the

imbalance in functional characteristics, imbalance in the number of participating residents may have led to underpowered results. Variation across the intervention homes in the application of the complete protocol (3%-66%) was another limitation. This variation can be explained by financial and administrative issues during the study period. The financial obligations for residential care homes resulting from a new national funding system for residential care of elderly people caused uncertainty about job continuation, high turnover of managers, and new priorities of the homes in our study. Despite this limitation the improvement in quality of care at the homes in our study was substantial.

CONCLUSION

Our model of multidisciplinary integrated care resulted in improved quality of care for elderly people in residential care homes compared with usual care. The results of this study are applicable to elderly people in such settings as residential care homes and nursing homes and even elderly people living in the community. In primary care settings, it may be beneficial to have a model to monitor elderly people and those with chronic diseases, to prevent functional decline and admission to hospital for acute care. It is also important to have an instrument that not only delivers output on the patient level but also on the management level, to facilitate monitoring of quality of care by managers in a sector of health care that is under enormous societal pressure to improve its performance.

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CHAPTER **4**

IS IT TIME FOR A CHANGE? A COST-EFFECTIVE-NESS ANALYSIS COMPARING A MULTIDISCIPLI-NARY INTEGRATED CARE MODEL FOR RESIDEN-TIAL CARE HOMES TO USUAL CARE

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ABSTRACT

OBJECTIVES The objective of this study was to evaluate the cost-effectiveness of a Multidisciplinary Integrated Care approach compared to usual care in Dutch residential homes.

METHODS The economic evaluation was conducted from a societal perspective alongside a 6 month, clustered, randomized controlled trial involving 10 Dutch residential care homes. Outcome measures included a quality of care weighted sum score, functional health (COOP WONCA) and Quality Adjusted Life-Years (QALY). Missing cost and effect data were imputed using multiple imputation. Bootstrapping was used to analyze differences in costs and cost-effectiveness.

RESULTS The sum score on risk indicators of quality of care, in the multidisciplinary integrated care group, was significantly lower than in usual care, indicating higher quality of care. The other primary outcomes showed no significant differences between the two groups. The costs of providing multidisciplinary integrated care were approximately €225 per patient. Total costs were €2,061 in the multidisciplinary integrated care group and €1,656 for the usual care group (mean difference €405, 95% -13 ; 826). However the difference between the two groups was not statistically significant. The probability that the multidisciplinary integrated care approach was cost-effective in comparison with usual care was 0.95 or more for ceiling ratios larger than at most €129 regarding patient related quality of care. Cost-effectiveness planes showed that the multidisciplinary integrated care approach did no show cost-effectiveness in comparison to usual care for the other outcomes.

INTERPRETATION Clinical effect differences between the groups were small but quality of care was significantly improved in the multidisciplinary integrated care group. Short term costs for multidisciplinary integrated care were not significantly higher. Future studies should focus on longer term economic and clinical effects.

INTRODUCTION

In nearly every country around the world, the proportion of people aged over 60 years is growing faster than any other age group. (1) Long-term care costs are largely affected by this increase because long-term care expenses tend to increase markedly with old age. (2) As the aging population intensifies its demand and uptake of healthcare services, the contextual landscape is one of a decreasing labor market, higher demands for quality of care voiced by baby boomers, and uncertainty of incomes of older people. (3, 4) Approximately 10% of all Dutch elderly over the age of 75 live in residential care homes.(5, 6) Of this population, over 70% require professional assistance with activities of daily living, nursing care and housekeeping. (5, 6) There are approximately 100 residents per residential care home. (3) When senior citizens enter into a residential care home, they keep their family physician if possible. There is a trend to keep the elderly in their own homes for as long as possible to maximize their level of independence as well as it can be less expensive from a governmental perspective. (7, 8) As a consequence, the residential care home population resembles nursing home populations more and more. (9-12) Residential care homes were not designed to address these populations and family physicians are challenged by these complex patients. (9, 13, 14) Most care organizations want to innovate and improve their quality of care but lack expertise or financial resources. (9, 13, 15) The Multidisciplinary Integrated Care approach is inspired by the chronic care model (Bodenheimer et al (16), Wagner et al (17)) and may improve quality of care (Boorsma et al., 2008). The objective of this study was to determine the cost-effectiveness of the multidisciplinary care approach compared to usual care in a sample of 10 residential care homes in the Netherlands. In an earlier paper, it was found that this approach resulted in significantly higher quality of care. (18)

METHODOLOGY

DESIGN AND SETTING A clustered, randomized controlled trial with 6 month follow-up was conducted in 10 Dutch residential care homes. (9) Residential care homes were randomized to either the intervention or control group resulting in each arm of the trial including 5 residential care homes. A detailed description of the design was published elsewhere. (9, 18) The ethical committee of the VU Medical Centre approved the study.

RESIDENT SELECTION Patients were recruited from December 2006 until December 2007. All residents within the 10 residential care homes were invited to participate in the clinical trial. A resident was excluded from the study if he/she was viewed by the staff or primary care physician as too terminally ill to complete the study (9). All participants or their representative signed informed consent.

THE USUAL CARE MODEL A residential care home is a retirement home for seniors who can no longer live independently. (19) Residential care homes typically offer general care such as; domestic help, leisure activities and meals for all occupants or a large portion of the occupants. (19) Ad hoc nursing care for individual occupants is also possible. Many of these residential care homes have merged with nursing homes which have resulted in organizations with a wide variety of services. No new interventions were introduced into this arm of the study. Care providers were instructed to continue the care to the residents that they would normally provide.

THE MULTIDISCIPLINARY INTEGRATED CARE APPROACH The intervention of the multidisciplinary integrated care approach consists of three steps as explained in Boorsma et al. (9) Firstly, a quarterly in-home systematic and computerized multidimensional assessment of all residents by trained nurse-assistants systematically reviewed the functional health status and care needs using the InterRAI-LTCF which is a comprehensive, standardized instrument for evaluating the needs, strengths, and preferences of those in chronic care and nursing home institutional settings. (20) The InterRAI-LTCF assessment form incorporates domains such as; function, mental and physical health, social support, medication and service use. (20) The problem areas identified become the foundation for the individual care plan. (20) Secondly, the outcomes of the assessment were discussed in a multidisciplinary meeting in the homes with the family physician, elderly care physician, nurse-assistant, psychogologist and other involved disciplines. Lastly, a multidisciplinary consultation was offered to the frailest residents with complex health care problems which were identified by the level of expected resource utilization. (9, 21)

CLINICAL OUTCOME MEASURES

A weighted 32 item sum score was created to determine patient level quality of care. (18) The quality indicators were based on observations recorded in the interRAI-LTCF assessment form. (22) During the study independent trained interviewers collected these observations at baseline and after 6 months. The lower the sum score, the higher the quality of care. Functional health, an important aspect of quality of life, was measured by COOP WONCA charts. (23) Higher scores are indicative of better functional health. The 12- Item Short Form health survey (SF12) was used to measure general quality of life. Based on The SF12 data, Quality Adjusted Life Years (QALY) were calculated using utility scores estimated by the SF6D tariff. (24) Transitions between health states were linearly interpolated.

COST OUTCOME MEASURES

Cost data were collected at baseline and six months from a societal perspective. Health care utilization data were collected by patient or proxy interview and medical records at baseline and at six months. (9) Table 1 lists the cost categories and prices used in the economic evaluation. All prices were adjusted for the year 2007 using consumer price index figures. (25) Costs of medications were valued using prices from the Royal Dutch Society for Pharmacy. (26) A cost price for the multidisciplinary integrated care approach was calculated using a top down approach. Total costs included: organizational costs, training costs, InterRAI costs and multidisciplinary meeting costs (see Table 1). Costs were calculated on an annual basis and then proportioned for the six month trial. Total costs of the intervention were divided by the total number of residents living in the intervention residential homes. Multidisciplinary meetings are part of usual care by law. However, in daily practice, not all homes hold these meetings on a regular basis. We also calculated costs for the meetings held in the usual care home. In a sensitivity analysis, only the license costs of the InterRAI and the InterRAI subscription costs per patient were included.

Table 1. Costs used in the economic evaluation

Cost category	€ (2007)
Primary care costs	
General practitioner	
Visit to GP (per visit)	21.36
Visit from GP (per visit)	42.73
Contact by telephone	10.66
Physical therapy	
Physiotherapy (per visit)	22.40
Ergotherapy (per visit)	53.03
Psychosocial therapy	
Psychologist (per visit)	81.02
Psychiatrist (per visit)	80.38
Social psychiatric nurse (per visit)	80.38
Secondary care costs	
Medical specialist	
Geriatrician (per visit)	177.69
Other specialists (per visit)	59.23
Admission to hospital	
Day care (per day)*	242.15
Overnight stay (per day)*	353.35
Informal care (per hour)	8.78
Costs of multidisciplinary integrated care	
Organizational costs	2,510
Training of staff	6,824
Performing interRAI	1,999
Meeting costs	1,780
Total costs	13,113
Cost per patient	225

STATISTICAL ANALYSIS

Data was analyzed according to the intention to treat principle. However, patients who died during the study were excluded from the analyses. The multiple imputation function in SPSS-18 was used to predict missing values for cost and effect data. This function created five imputed data sets that were pooled together using Rubin's rules. (27) Individual cost components were imputed at a patient level instead of overall total cost per patient to minimize unnecessary deletion of information. As patient-level cost data have a highly skewed distribution, bootstrapping was performed with 5000 replications to estimate Approximate Bootstrap Confidence (ABC) intervals around cost differences. (28, 29) Incremental cost-effectiveness ratios (ICERs) were calculated by dividing the difference in total costs between multidisciplinary integrated care and usual care by the difference in

clinical effects. Non-parametric bootstrapping was also used to estimate the uncertainty surrounding the ICERs (5000 replications). The bootstrapped cost-effect pairs were plotted on a cost-effectiveness plane (CE plane) (30) and used to estimate cost-effectiveness acceptability curves (CEA curves). CEA curves illustrate the probability that the intervention is cost-effective in comparison with the control treatment for a range of ceiling ratios. The ceiling ratio is defined as the societal willingness to pay in order to gain one unit of effect. (31) Two sensitivity analyses were performed. One included only the complete cases and the second one included only the licensing and subscription costs of the interRAI as described above.

RESULTS

From December 2006 until December 2007, a total of 462 residents were requested to participate in the trial. Randomization was carried out at facility level. At baseline, 340 people were interviewed (201 intervention patients and 139 control patients). There were no significant differences in patient characteristics between the two groups at baseline (Table 2). A total of 33 people died (15 (11%) control and 18 (9%) intervention patients) before the six month follow up. Complete clinical outcome data was available for 147 patients (72%) in the intervention group and 87 (60%) patients in the control group. Selectively missing data was found as the participants that dropped out were approximately two years older (95% CI 0.42 ; 3.66) and had better activities of daily living score as measured by the Groningen Activity Restriction Scale (GARS) compared to completers (mean difference -3.4; 95% CI -6.7 ; -0.1).

Table 2. Mean (SD) baseline characteristics of multidisciplinary care group and usual care group

	Multidisiplinary integrated care (N=201)	Usual care (N=136)
Mean age	86 (6.2)	85 (8.0)
Female (%)	76	74
Education		
Primary school or less	112 (56)	79 (58)
Lower Technical vocational training	45 (22)	26 (19)
Average and higher vocational training	34 (17)	30 (22)
Missing	10 (5)	1 (1)
Marital status, n (%)		
Married	42 (21)	27 (20)
Widowed	130 (65)	93 (68)
Single	19 (9)	15 (11)
Missing	10 (5)	1 (1)
Physical Component Scale of the SF 12	34 (8.3)	33 (7.2)
Mental Component Scale of the SF 12	53 (9.3)	51(11.1)
Baseline utility SF-6D	0.64 (0.1)	0.64 (0.1)
COOP WONCA	18 (3.7)	18 (4.1)

CLINICAL EFFECTIVENESS Quality of care was significantly higher in the intervention group than the control group (mean difference -6.5, 95 % CI -9.5 ; -3.5). There was no statistically significant difference in effect for either of the other outcome measures (Table 3).

Table 3. Differences in clinical outcomes at 6 months

Outcome measure	Multidisciplinary integrated care (n= 181)	Usual care (n= 120)	Difference (95% CI)
Primary outcomes	mean (SD)	mean (SD)	mean
Quality Indicator Score	11.12 (1.1)	17.63 (1.0)	-6.5 (-9.5 ; -3.5)
COOP WONCA	0.85 (0.3)	0.65 (0.6)	0.2 (-1.1 ; 1.5)
QALY	0.31 (0.003)	0.32 (0.004)	0.00 (-0.01 ; 0.01)

COSTS Costs of the intervention amounted to €225. There was a trend that total costs were higher in the intervention group compared to UC by €404 (95 % CI -13 ; 826, Table 4). Direct healthcare costs were the largest contributor to total costs in both groups. The highest cost driver within direct healthcare costs for both groups was secondary care costs such as hospital admission (Table 4).

Table 4. Mean (SD) and cost differences € (95 % CI) during follow-up at 6 months

Cost category	Multidisciplinary integrated care (n= 181)	Usual care (n= 120)	Difference (95% CI)
Direct costs			
Direct healthcare costs	1,463 (158)	1,351 (161)	117 (-292 ; 529)
Primary care costs	299 (37)	389 (74)	-88 (-277 ; 48)
Secondary care costs	745 (143)	533 (135)	215 (-146 ; 579)
Medications	419 (40)	429 (31)	-8 (-84 ; 114)
Informal care costs	367 (47)	282 (32)	77 (-10 ; 204)
Implementation costs*	225	23	202
Total costs	2,061 (163)	1,656 (163)	405 (-13 ; 826)

*Implementation costs consist of the MIC costs in the intervention group and of the costs of the multi-disciplinary meetings in the control group.

COST-EFFECTIVENESS ANALYSIS

Quality Indicators The sum score of quality of care resulted in a negative ICER of 62, indicating that for every one point improvement on the sum score, the multidisciplinary integrated care approach costs €62 compared to usual care. Figures 1 and 2 show the CE plane and CEA curve. The majority of the cost- effectiveness pairs (97 %) were in the northeast quadrant suggesting that the intervention is significantly more effective and more costly than usual care. The CEA curve showed that the investment needed to reach a 0.95 probability that muldisciplinary integrated care was cost-effective compared to usual care was €129 or more.

Figure 1

North East: 97.3 %
South East: 2.7 %
South West: 0 %
North West: 0 %

Incremental costs pooled dataset

Incremental effects pooled datasets

Figure 2

Probability intervention is cost-effective

Ceiling ratio
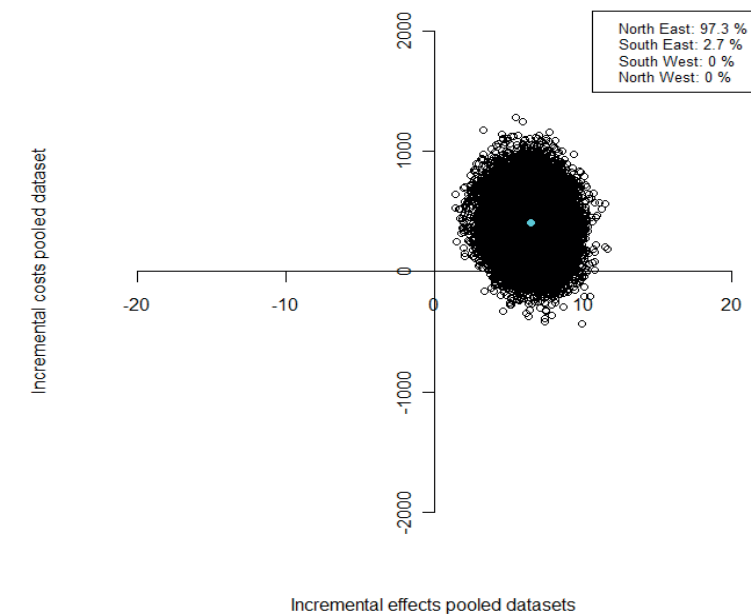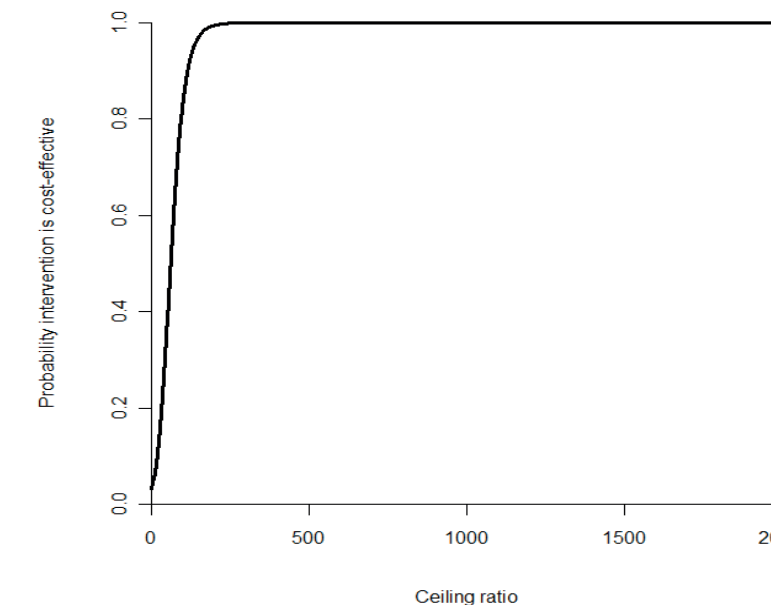
COOP WONCA The ICER for the COOP WONCA was 2,056 meaning that 1 point improvement in COOP WONCA score costs €2,056 for multidisciplinary integrated care versus usual care. The majority (97 %) of the cost-effect pairs fell in the Northern quadrants of the CEA plane indicating that total costs in the multidisciplinary integrated care group are higher compared to the usual care group while there is a statistically non-significant difference in effects. The CEA curve showed that the maximum probability that multidis-

ciplinary integrated care was cost-effective compared to usual care was 0.6. However, to reach this probability the societal willingness to pay should be approximately €5,000 per patient.

QALY The ICER for QALY scores was -248,308 indicating the multidisciplinary integrated care had higher costs and negative effects compared to usual care. Figures 3 and 4 show the CE plane and CEA curve. Most (63%) bootstrapped cost effect pairs were contained in the Northwest quadrant meaning that multidisciplinary integrated care was less effective and more costly than usual care. The CEA curve presented in Figure 4 shows that the maximum probability that multidisciplinary integrated care is cost-effective in comparison with usual care was 0.14. However, decision makers should be willing to invest huge amounts of money to reach this probability.

Figure 3

North East: 34.7 %
South East: 1.5 %
South West: 1.3 %
North West: 62.6 %

Incremental costs pooled dataset

Incremental effects pooled datasets

Figure 4

Probability intervention is cost-effective

Ceiling ratio
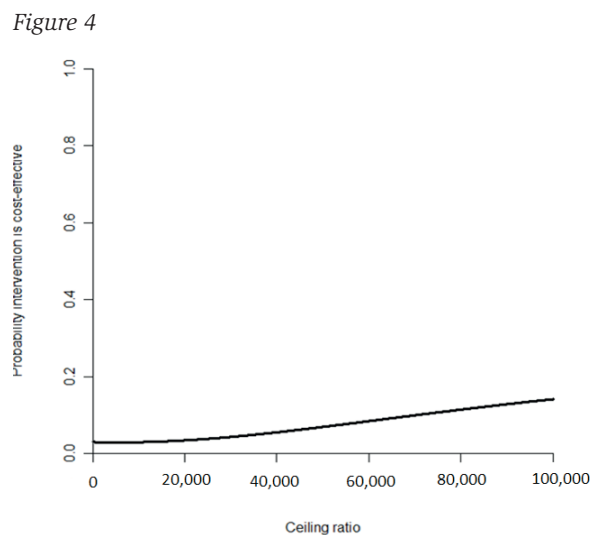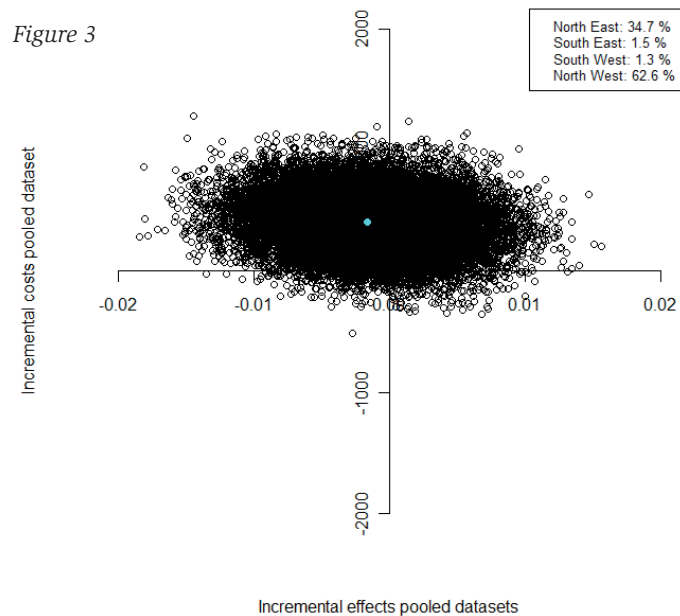
Sensitivity analysis The results of the clinical outcomes in the complete case analysis were consistent with those of the imputation analysis. Total costs were higher in the intervention group than in the control group but not statistically significantly which is consistent with the imputed analysis. Although the conclusion for the cost effectiveness analysis was the same for both the imputed and complete case analysis the numbers varied (data not shown). The second sensitivity analysis including only licensing and subscription costs for interRAI-LTCF showed that total costs were not significantly different between the intervention and the control group.

INTERPRETATION

SUMMARY An economic evaluation was performed to determine whether multidisciplinary integrated care was cost-effective compared to usual care. General scales of functional health did not significantly differ between the groups at six month although quality of care was significantly higher in the intervention group. There was a trend that total costs were higher in the intervention group than usual care. For functional health and QALYs we concluded that multidisciplinary integrated care was not cost-effective compared to usual care. Whether multidisciplinary integrated care is considered cost-effective in comparison with usual care for quality of care depends on the amount of money decision makers are willing to additionally spend on care for this group of elderly nursing home residents. Conclusions were similar in the complete case analysis.

EXPLANATION OF THE FINDINGS This raises the question why was quality of care higher in the intervention homes compared to the control homes? It is possible the quality indicators in the control homes did not improve to the same extent as in the intervention homes because intervention participants were receiving increased attention from the residential home staff as well as increased referrals to secondary care. The increase in secondary care may have induced the need for the informal caregiver to attend and help transport patients to the secondary care appointments which may explain the increased informal care costs. If there was unmet care, then the use of the interRAI-LTCF and the multidisciplinary meetings addressed this gap in care. However, a trade-off needs to be made whether the additional effects are worth the additional costs.

EXISTING LITERATURE COMPARISON Previous studies suggest interRAI has positive effects on health outcomes in nursing facilities as well as in residential homes. (32, 33) However, there were criticisms on the study designs and the conclusions drawn indicating a need for better designed trials. (34) A four month trial from New Zealand estimated health care services utilized and the cost of implementing the minimum data set home care assessment compared with usual care. (35) They found that the interRAI was significantly more costly in prescribed and delivered services compared to usual care but the author believed that the cost differences may be due to a genuine need of services for this population. (35) We think that our trial is an important addition to the knowledge base on the effect of the interRAI in clinical care.

LIMITATIONS The six month follow-up may not have been enough to capture all potential costs and effects. Patients in a residential home have a heterogeneous mix of chronic conditions that naturally erode health over time which makes it difficult to know if an intervention of this sort would be able to override the downward trend of health states associated with chronic conditions in such a short time span. The primary outcome variables may not have been sensitive enough to pick up differences within such a limited time interval. Another limitation was the considerable amount of missing data. In this

study, non-completers tended to be older and had better activities of daily living scores. As the intervention really targeted only the frailest it could be that they did not feel like they were benefitting enough from the study intervention. In situations where there are missing costs, multiple imputation is recommended which was also performed in this study.

CONCLUSION This study showed benefit on quality of care, against a modest cost increase. Longer term follow up of costs and effects is needed to further substantiate the findings. Future research should consider the reasons why it did not translate over to the other clinical outcome variables. Its pragmatic study design resembles clinical practice to a high degree which increases the relevance of the study results.

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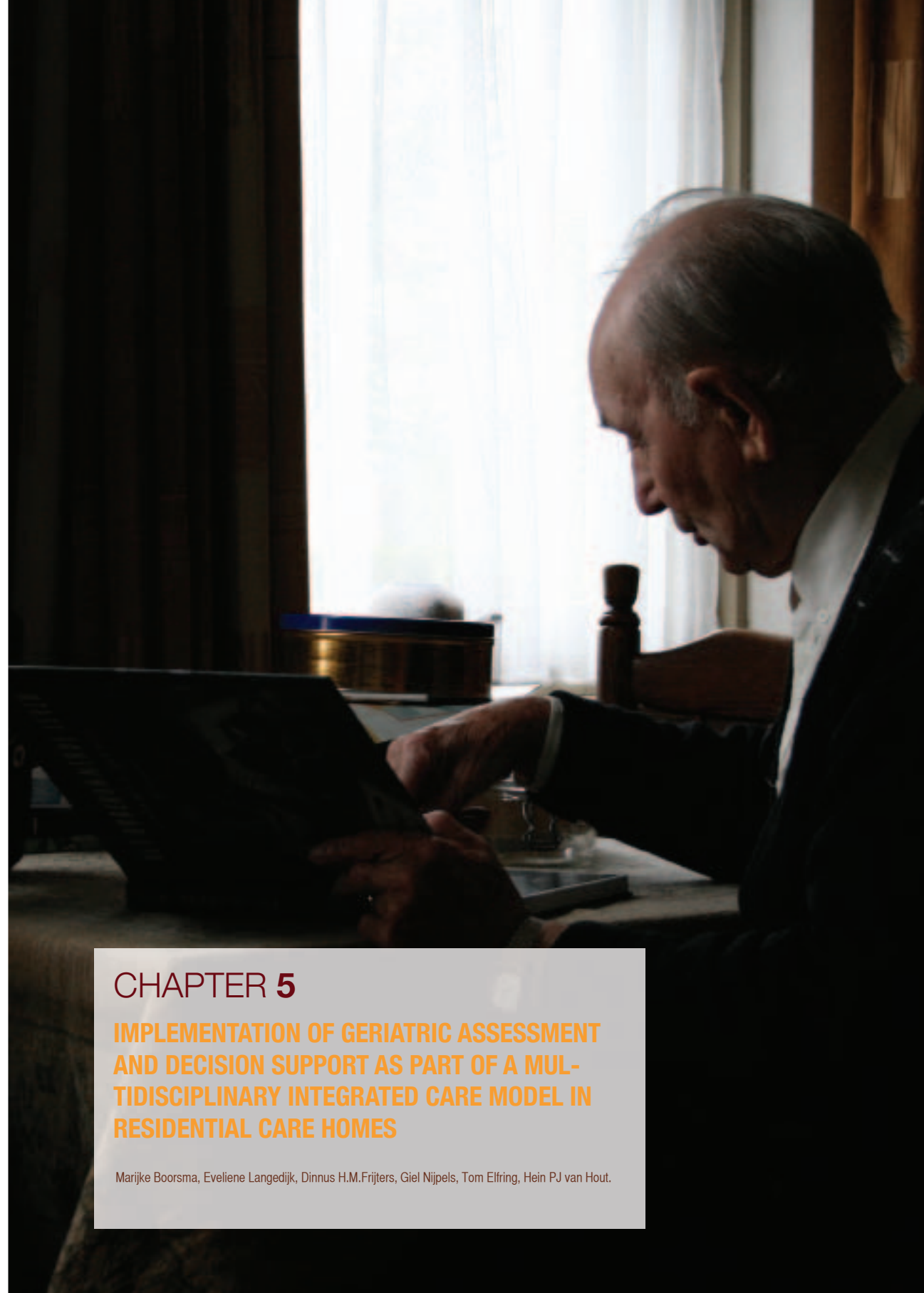
54   CHAPTER **4**   IS IT TIME FOR A CHANGE? A COST-EFFECTIVENESS ANALYSIS COMPARING A MULTIDISCIPLINARY INTEGRATED CARE MODEL FOR RESIDENTIAL CARE HOMES TO USUAL CARE

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CHAPTER **5**

IMPLEMENTATION OF GERIATRIC ASSESSMENT AND DECISION SUPPORT AS PART OF A MULTIDISCIPLINARY INTEGRATED CARE MODEL IN RESIDENTIAL CARE HOMES

Marijke Boorsma, Eveliene Langedijk, Dinnus H.M.Frijters, Giel Nijpels, Tom Elfring, Hein PJ van Hout.

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SUBMITTED

Marijke Boorsma, Eveliene Langedijk, Dinnus H.M.Frijters, Giel Nijpels, Tom Elfring,
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ABSTRACT

BACKGROUND Prerequisites of successful introduction versus maintenance of care innovations are not well understood and may depend on interplay of contextual issues such as type of care setting, type of innovation, and personal involvement. In this study the facilitating and impeding factors were studied of both initial and maintaining implementation of a multidisciplinary integrated care approach comprising monitoring and decision support with the inter RAI Long Term Care Facility Instrument (inter RAI-LTCF) in ten Dutch residential care homes aimed to improve quality of care.

METHODS Facilitating and impeding factors were studied and compared at the time of introduction of the inter RAI-LTCF in residential care homes as well as three years later, by surveys and semi structured interviews among nurse staff, managers, and physicians.

RESULTS Facilitating factors at introduction were positive opinions of staff and family physicians about the changes of the process of care and the anticipated improvement of quality of care. Staff was positive about the applicability of the software to support the inter RAI-LTCF assessments. Impeding factors were time constraints to complete inter RAI-LTCF assessments and insufficient computer equipment.
In the maintenance phase, the positive attitude of the manager and the perceived benefits of the care model were most important. Impeding factors after 3 years remained the lack of time to complete the assessments and lack of sufficient computer equipment.

CONCLUSIONS Impeding and facilitating factors were comparable in the initial and maintenance phase. Adoption of the inter RAI-LTCF assessment method depended on positive opinions of staff and management, continuing support of staff (predominantly in time, training and coaching) and the availability of sufficient computer equipment.

INTRODUCTION

Quality of care for elderly in residential care homes is under pressure in the Netherlands as in other countries.(5) Facilities tend to be understaffed and the care complexity of residents increases while expertise of staff does not keep pace.(17) Although most care organizations want to innovate and improve their quality of care, many lack the expertise or financial resources to do so.(7;8) Family physicians are responsible for the medical care in Dutch residential care homes but do not regard themselves suited for systematic management and long-term monitoring of chronic diseases and disabilities associated with frail health.(6) These conditions were the ingredients for the development and implementation of a new care model in a north-west region of the Netherlands. This new care approach was inspired by the Chronic Care Model of Wagner and Bodenheimer.(4) The effects of this innovation were studied in a Randomised Controlled Clinical Trial design in ten Dutch residential care homes (Boorsma et al 2011). This multidisciplinary integrated care approach demands changes at all levels of an organisation and consists of: (1) repeated structural computerised multidimensional geriatric observations by trained staff, (2) patient tailored care plans based on the outcome of the observations (3) multidisciplinary consultations including nurse staff, family physicians, elderly care physicians and psychologists, (4) quarterly benchmark reports on 32 quality of care indicators. The assessment instrument used in this care model was the web based Long Term Care Facility version of inter RAI (inter RAI-LTCF). Prerequisites of successful introduction versus maintenance of care innovations are not well understood. Reviews of dissemination and implementation strategies suggest that success depends on the type of care setting, type of intervention and specific circumstances.(10) People working in healthcare organizations mostly focus on their own profession. This professional identification limits the level of organizational identification; the willingness to collaborate across specializations or departments, which is imperative when organizations want to work on improvements and innovation.(15;16)A review by Grimshaw et al. (1999) showed that obstacles to use guidelines can arise at different levels of the health care system: at the level of the patients, the individual professional, the health care team, the health care organization or the wider environment.(11;12) The introduction of an assessment instrument like the inter RAI-LTCF had consequences for the care process at all of these different levels. We were able to study these consequences on the level of the individual professional, the health care team and health care organization (management residential care homes). Often not only the introduction (initial phase) but also the maintenance is under pressure in health organisations due to shifting priorities, lack of time and money needed for ongoing and renewed training and equipment.(3) Therefore we studied both moments in time.
The research questions that are addressed in this paper are:

1. *Which factors facilitate or impede the introduction of the inter RAI-LTCF as part of the Multidisciplinary Integrated Care model in residential care homes?*
2. *Which factors facilitate or impede the use of the inter RAI-LTCF in the maintenance phase, three years after introduction.*

METHODS

In this study a mix of quantitative and qualitative methods was used. During the initial phase of the implementation, the opinions and experiences of all home managers, nurse-assistants and family physicians were collected in surveys and semi structured interviews. These interviews and surveys were held in 5 residential care homes that participated in a a cluster randomized clinical trial and allocated to the intervention group. These homes started working with the inter RAI-LTCF according to the multidisciplinary integrated care model. Boorsma et al. 2011 described the design and outcome of this trial on quality of care and quality of life.(Boorsma et al CAMJ in press) During the maintenance phase, three years after the initial implementation, we selected 3 out of 10 participating homes on different scores of quality of care performance according to quarterly benchmark reports based on the VU RAI database. We selected the best, the lowest scoring home and one average scoring home compared to the benchmark. From these three homes the managers (n = 3) and two staff members were interviewed (n = 6). The staff members were nurse- assistants who work daily with the inter RAI-LTCF and coordinate care planning of individual residents.

MULTIDISCIPLINARY INTEGRATED CARE MODEL The Multidisciplinary Integrated Care model was inspired by the chronic care model and comprises 4 elements. First an assessment with inter RAI-LTCF of the patient's functional health and care needs is imperative. This enabled immediate identification of problem areas which supports individualised care planning. Secondly, the assessment outcomes were discussed in a Multidisciplinary Meeting (MM) with the nurse assistant, family physician, elderly care physician and psychologist. The Multidisciplinary Meeting (MM) provided advice on management and treatment of modifiable disabilities and risk factors. Thirdly, consultation by elderly care physician and psychologist was offered to the frailest residents at risk for nursing home admission. Finally, a quarterly benchmark report compared 32 risk adjusted indicators of quality of care across all residential and nursing homes in the Netherlands that used the inter RAI- LTCF.(9;18) Management can use this overview to improve specific areas of care. For example, if the (case mix adjusted) number of falls is substantially higher compared to the expected average (benchmark), management can decide on measures to improve safety in a particular home. The Association of RAI users in the Netherlands, Nedrai, owns the software, and provides these overviews for a limited tariff per resident (www.nedrai.nl).

THE INITIAL PHASE OF THE INTERVENTION On instigation of the family physicians of the residents, the management board of the residential care homes agreed to initiate a care improvement project in their homes. In the initial phase 45 nurse-assistants, five team coaches and managers of five residential care homes were trained in a two day course by external trainers. In this course the background and position of the assessment instrument in the multidisciplinary integrated care approach was explained and the use of the web based version of the inter RAI-LTCF was practiced. Special attention was given to designing individualized care-plans based on the assessments and in sharing this information with the residents or their relatives and other professionals like the family physician. The care organisation appointed a project leader during the implementation for two days a week. A steering committee was installed that initially met two weekly and less frequently as the project enrolled. In the maintenance phase new staff received in company training as sufficient experience was gained within the organisation.

MEASUREMENTS AND DATA ANALYSES
For research question 1 Semi-structured interviews were held in the initial phase of the introduction of inter RAI-LTCF with nurse- assistants, team coaches and managers of the intervention homes randomised in the randomised clinical trial study. In addition, a brief questionnaire was send to the family physicians who were involved. The interview and the questionnaire were composed based on literature review, expert opinion and piloted before the data collection. The questions were covered subjects like: training aspects, autonomy and self guidance for staff, time investment and applicability of inter RAI-LTCF, quality of care, and communication between family physicians and staff. Those interviews were held and analysed by one researcher and supervised by two other researchers. The answers of the questionnaire are presented in percentages (table 1,2).

For research question 2 The information and data of the maintenance phase was collected through in-depth interviews with three home managers and six nurse assistants who used the instrument. The focus of these interviews was to elicit opinions on the instrument and its use in real life work. The managers were chosen to be interviewed because of the overview they have in the homes and the possible usefulness of the inter RAI-LTCF according to their perspective. From each of the facilities two staff members were interviewed. These staff members were nurse assistants who worked on a daily basis with the inter RAI-LTCF. To obtain sufficient background information several interviews were held with the two project managers initially responsible for the implementation of inter RAI-LTCF in the homes. During the interviews the conversations were taped and described verbatim afterwards. During the analysis these notes have been re-read and the conversations re-listened to make sure all was noted well. (14) The data collected in the interviews was displayed in tables. Quotations were used to show explicit opinions and feelings that were present among the interviewees.

RESULTS

THE INITIAL PHASE Seventeen nursing assistants five team coaches and three managers of 5 residential care homes as well as 14 family physicians were interviewed. The average size of the homes was 46 residents. The average ratio nurse- assistant to residents was 1 to 15. Staff was predominantly female (88.2%) had a mean age 41.4 years, and the majority (64.7%) completed an education of nursing assistant and 17.6% of nurse. They had a mean job experience of 17.9 years and the average work hours a week was 28.4 (SD4.4). Application of the Multidisciplinary Integrated Care model Assessment: 55.2% percent of the residents in the five intervention homes was assessed with inter RAI-LTCF during the study period of 6 months. This was less than was aimed for and was partly due to implementation delay. For example, one intervention home actually started RAI assessments after 6 months because the house manager was on sick leave.

FACILITATING FACTORS Staff and family physicians' opinions (table 1 and 2)

Table 1. Opinion staff and family physicians of intervention homes on multidisciplinary integrated care (research question1)

opinion	Staf N = 17	Family physicians N = 14
Increased expertise after RAI use, %	52.9	54.5
Quality of multidisciplinary meeting increased, %	64.7	81.8
More knowledgeable about resident's health, %	52.9	63.6
Improved cooperation family physician and staff, %	58.8	81.8

Table 2. opinion of nurse-assistants in the initial phase (research question 1)

% (n = 22)	Yes	No	No opinion
Sufficient introduction and training staff			
Overall	52.9	29.4	17.6
Autonomy and self guidance staff	35.3	17.6	47.1
More expertise	88.2	5.9	5.9
Improvement quality of care	58.8	29.4	11.8
Enough support	88.2	5.9	5.9
Better overview of health problems	58.8	29.4	11.8
Time investment and applicability of the interRAI-LTCF			
Enough time available	5.9	76.5	17.6
Sufficient computer equipment	29.4	47.1	23.5
RAI is user friendly	70.6	17.6	11.8
Quality of care			
More knowledge about health of resident	52.9	35.3	11.8
Earlier detection of health problems	47.1	23.5	29.4
Better discussion of complex care needs in Multidisciplinary Meeting	64.7	17.6	11.8

The majority (82.4%) of the nurse- assistants was satisfied with the inter RAI-LTCF and 58.8% considered the individual parts of the instrument as obvious. About the training itself 47.1% was satisfied. But the same percentage of nurse-assistants ask for more explanation about the usefulness of the instrument. Staff was also satisfied of the applicability of the software to support the inter RAI-LTCF assessments (71%). About 55% of the family physicians (n = 14) considered the quality of care to be improved. They acknowledged that there was a need for a new care model (73%).Of the nursing assistants 52.9% had the opinion that their competence had increased with the application of inter RAI-LTCF but only 35.3% considers the quality of care improved. The managers were divided on this point. They say that the use of inter RAI-LTCF introduced uniformity and the possibility of quality control.

IMPEDING FACTORS Many nurse- assistants said that they did not receive enough time to fill in the inter RAI-LTCF and managers confirmed this. Other impeding factors mentioned by the nurse-assistants were not enough computers (47.1%) and insufficient capacity of these computers (64.7%).

THE MAINTENANCE PHASE All residential care homes used inter RAI-LTCF assessments for their residents (n = 322) every 6 month and extra in case of important changes in client situation. In 2008 the inter RAI-LTCF was implemented in the best and the average performing home, and in 2007 in the lowest scoring home. The latter home had faced problems like frequent change of management and lack of nursing staff which led to neglect the use of inter RAI-LTCF. (Table 3-8)

Table 3. Impeding and facilitating factors during maintenance according to managers and nurse-assistants of the best, the average and lowest scoring home (research question 2)

Residential care homes	Score on the outcome reports of RAI	RAI implemented in	Resistance at Introduction	Resistance in the present
Nr 1	Best	2007	Management: yes Care team: yes	Management: no Care team: no
Nr 2	Average	2007	Management: yes Care team: yes	Management: no Care team: yes
Nr 3	Lowest	2008	Management: no Care team: no	Management: no Care team: no

Table 4. Use of RAI- LTCF graded by nurse-assistants and managers during maintenance phase (research question 2)

Score 1-10	Manager Nr 1	Staff Nr 1	Manager Nr 2	Staff Nr 2	Manager Nr 3	Staff Nr 3
Grades given for the use of RAI- LTCF in the residential home	7	6	7	5	7	7.5

Table 5. Benefits of the inter RAI- LTCF according to nurse-assistants (research question 2)

Residential Home 1	Residential Home 2	Residential Home 3
The graphics and the plots in the outcome report show directly if there are improvements or that some conditions have become worse	The graphs and plots are useful in that they show a decline, stabilization or improvement on the physical or cognitive area that is immediate visible	The signalling of issues that you previously paid no or little attention to is very helpful because now it is acknowledged that these were serious issues important to the resident
All the information on residents is in a database and on the computer		Clear view of the residents actual needs.
Multidisciplinary meetings are improved Better cooperation with all the disciplines involved		It is helpful in that it gives indications for need and utility of care
More standardized methods to work with		Easy to use

Table 6. Drawbacks of the interRAI- LTCF according to nurse-assistants (research question 2)

Residential Home 1	Residential Home 2	Residential Home 3
Too much time spent behind computer instead of giving care	Not all the important information regarding a resident comes up in the interRAI- LTCF	Takes too much time sometimes
Some syndromes are not in the interRAI-LTCF	It is too limited to see the total condition of a resident	It does give a little bit extra work
Sometimes the interRAI- LTCF gives unnecessary information	There is still resistance among the employees working with interRAI-LTCF because we do not see the additional value	
Not all the important information comes up in the interRAI-LTCF	It is only a guideline, it could be improved to better fit the needs of the people on the work floor who actually have to fill out the interRAI-LTCF	
	Some sections in the interRAI-LTCF have not enough/ or the right questions to get a adequate overview of the resident	
Good observing and communicating with residents and their relatives and the physician provides also a good picture of the care a client needs	There always needs to be oral explanation in a Multidisciplinary Meeting otherwise not all information and problems become clear	

Table 7. Benefits according to the management of the three studied residential care homes during maintenance phase (research question 2)

Residential Home 1	Residential Home 2	Residential Home 3
Nursing assistants are more aware of the specific care needs because the care model considers the case history of the resident	One system Consistency in methods Everyone uses the same standards	More awareness is created of the specific care needs
It creates awareness of improvements that can be made in the care process. The structure of the care giving process has improved	Communication is easier because one set of terms is used	More attention to the wishes of clients
Care plans can be created with the specific care a resident needs and his or her wishes and preferences	Deeper insight in the resident's needs and wishes	

Table 8. Drawbacks according to the managers of the three studied residential care homes during the maintenance phase (research question 2)

Residential Home 1	Residential Home 2	Residential Home 3
Inter RAI- LTCF sometimes cannot detect specific syndromes	Time consuming	Questions are too complicated
Sometimes RAI- MDO gives a trigger but it is not always clear if something needs to be done and what needs to be done	The system is not always available	Not completely in line with the care need indication
The translation of the outcomes is sometimes difficult to link to specific actions	Sometimes difficult to interpret 6 monthly outcome reports	The instrument needs revising for better use in practice
Sometimes the inter RAI-LTCF system is not working on the computers	Not all medication is available in the system	Scores on the benchmark reports are easily distorted when there are in practice only one or two worse cases in the facility

RESISTANCE TO CHANGE Staff in all three studied facilities still tended to have resistance against working with the inter RAI- LTCF. Only in home Nr 3 (the lowest scoring home) staff was less resistant. Management in all three studied facilities described that they tried to reduce this resistance by emphasizing the usefulness of this new assessment system and involving staff by taking courses in the use of the inter RAI-LTCF.

FACILITATING FACTORS AFTER 3 YEARS After 3 years most nurse- assistants recognise that using the instrument improved communication with colleagues and other disciplines like the family physicians and elderly care physicians. Nurse- assistants do mention that they have a better overview of the health problems of the residents with the use of the inter RAI-LTCF. Most of them agree on the improvement of the quality of the Multidisciplinary Meetings.

IMPEDING FACTORS AFTER 3 YEARS Impeding factors also after 3 years were the lack of time and sufficient good working computers. Some nurse- assistants claimed that the benefits of the inter RAI-LTCF are not clear to them. Overall, in content and quantity the nurse- assistants of residential care home Nr2 are the least positive about the use of the inter RAI-LTCF. Remarkably, nurse- assistants of the lowest scoring residential care home saw the least drawbacks and the most benefits of the RAI-LTCF. This is somewhat contradictory to the finding that they had the lowest score compared to the other two homes on the quality of care outcome report. It may be explained by the fact that this home had serious troubles with management. The manager that took over was very positive about the instrument and the care model.

CONCLUSIONS

The main conclusion of this study is that the facilitating and impeding factors in the initial phase as well as in the continuing phase were comparable. Facilitating factors as positive opinions and support of managers is in both phases of great importance. Pointing out the benefits of the new care approach with the use of a time consuming assessment is an important factor for staff in the initial phase. These benefits of the assessment tool for nurse-assistants are a better understanding of the clients' problems, enabling them to go beyond

merely executing physicians' orders and to become active players in planning clients' care. The impeding factors as shortage of time and insufficient equipment were found in both phases and do frustrate the process.

COMPARISON WITH LITERATURE Bernabei et al. (1995) implemented a comparable care model for community dwelling elderly and used the Home Care version of the Resident Assessment Instrument (RAI-HC). They called the implementation a revolution similar in concept to the modifications seen in industry when a new technology is introduced and the traditional process of production is changed. It is not by chance that some have defined comprehensive geriatric assessment as the "technology" of geriatrics.(1;3) Because it is more complex than traditional tools, and probably also because, in Italy, like in our (Dutch) situation the assessment instrument was being used by people who had no previous knowledge of this kind of technology, the RAI-HC produced true innovation. This innovation also changed the relationships between professionals like family physicians, elderly care physicians and nurse-assistants. In comparison with Bernabei (6 days course), Holtkamp (4 days course) and Achterberg (4 days course) our training session was relatively short (2 days course) and almost half of the nurse assistants wanted more information.(2) The implementation also altered the role of the nursing assistant to a more proactive communicating professional. Like Bernabei we also found resistance likely due to the ignorance of the rationale of the multidimensional assessments by people working in geriatric care. Various professionals like the elderly care physician, psychogologist and some nurse- assistants had a hard time accepting the rationale of such an assessment tool and system. Other impeding factors like staffing problems and inadequate equipment were also found by Holtkamp (2003) and Achterberg (2004).(1;13)

STRENGTHS AND LIMITATIONS We were able to achieve participation from a large and extremely difficult study population and implemented a multidisciplinary integrated care approach in a single care organization having the possibility of uniform implementation. This contributed greatly to the internal validity of the study results. There are some limitations. For the first research question the investigated sample was limited due to lack of time, illness and vacation of managers and nurse assistants. In addition, the interviews used in the initial phase were tested on construct and expert validity but not on criterion validity and reproducibility. For the second research question an important limitation was the relatively small sample which was due to the exploratory and in- depth nature of the interviews. Another possible limitation is that this study was conducted in three residential care homes all belonging to the same care organization. Because of the small sample and the exploratory nature of the research all generalizations are merely indications.

PRACTICAL IMPLICATIONS Although the benefits seem to overrule the drawbacks, implementing the use of an assessment tool like the inter RAI-LTCF is not an easy process. Successful implementation in daily routine depends on sufficient training and coaching of professionals, sufficient equipment and sustaining support of management.

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CHAPTER 6

THE INCIDENCE OF DEPRESSION AND ASSOCIATED RISK FACTORS IN DUTCH NURSING HOMES AND RESIDENTIAL CARE HOMES.

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CHAPTER **6**

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ABSTRACT

OBJECTIVE Although it is known that depression is highly prevalent in institutionalized elderly, little is known about its incidence and risk factors in nursing homes and residential care homes. The aim of this study was to investigate and compare the incidence and associated risk factors for depression in Dutch nursing homes and residential care homes.

DESIGN Data on depression were extracted from the VU naturalistic cohort on routine care monitoring with the Minimum Data Set of the Resident Assessment Instrument.

PARTICIPANTS 1501 residents in six nursing homes and 1857 residents in 23 residential care homes with an average follow up of 1.2 years.

MEASUREMENTS Depression was defined as a clinical diagnosis according to DSM-IV criteria or the use of antidepressants. Residents with prevalent depression at baseline were excluded.

RESULTS The Incidence Rate was 13.6 per 100 person years in the nursing homes and 10.2 per 100 person years in the residential care homes. The independent risk factors for in-home depression for residents in nursing homes included dementia (OR 1.7; 95 % CI 1.02-2.95) and a score of 3 or more on the Depression Rating Scale (OR 2.1; 95 % CI 1.23-3.70). A protective effect was seen on the use of a hearing aid (OR 0.3; 95 % CI 0.12-0-80). In the residential care homes being male (OR 2.1; 95 % CI 1.27-3.30), having cancer (OR 2.9; 95 % CI 1.64-4.95) and a score of 2 or higher on the Cognitive Performance Scale (OR1.5; 95 % CI 1.05-2.22) increased the risk to develop depression. Age over 85 (OR 0.5; 95 % CI 0.31 - 0.67) and hearing impairment (OR 0.8; 95 %CI 0.60-1.00) appeared to be protective.

CONCLUSIONS The incidence rate for depression in residents of Dutch nursing homes and residential care homes was high and the associated risk factors found may have important implications for staff.

INTRODUCTION

In the Netherlands, around 10% of the elderly population aged 75 and over live in residential care homes (115,000 persons) or in nursing homes (60,000 persons).(1) Several studies have described the high prevalence of depression in institutionalized elderly and evaluated its correlates.(2-4;4-6) However, studies on risk factors for the onset of depression in institutionalized elderly are scarce and the findings are inconclusive. For example, some studies identified older age as a risk factor for depression, while others report no significant trends or even reported a decline with increasing age.(7;8) Onset of depression in community dwelling elderly was reported to be related to chronic physical illness and subsequent functional impairment to higher levels of bereavement, to sleep disturbances and to female gender.(9-11;11-14) Recent studies describe the relation between incident depression and cardiovascular diseases and identify cardiovascular diseases as important risk factors in community dwelling elderly people.(15;15-17) Institutionalized elderly may have different risk factors for the development of depression than community dwelling elderly or may have increased exposure to risk factors, such as functional -and cognitive impairment. More insight in the development of depression is important as depression unfavorable affects the prognosis of somatic illnesses and quality of life and is associated with excess mortality. Depression is also a burden for family caregivers and increases medical costs.(12;18-23) Understanding potentially manageable risk factors for the onset of depression that are associated with the living environment and characteristics of care provided in nursing homes as well as in residential care homes, may be important to be able to improve care. Medical care in Dutch nursing homes is delivered by elderly care physicians specialized in long term care.(24) Nursing homes offer geriatric rehabilitation as well as long term care and palliative care. Nursing homes provide professional care by highly trained staff including licensed practical nurses and psychotherapists. The residents of the residential care homes are vulnerable elderly persons, who need assistance with activities of daily living, supervision or sheltered accommodation. The family physician is responsible for the medical care of these residents. Staff in residential care homes is less trained than staff in nursing homes and consists of certified nurse- assistants and rarely licensed practical nurses. The aim of this study was to estimate and compare the incidence of depression between Dutch nursing homes and residential care homes, as well as to identify the associated risk factors.

METHODS

DESIGN AND SETTING We used data from the VU University Medical Centre RAI database in this cohort study. This database contains assessments from the InterRAI -Long-term Care Facility (LTCF) (Appendix 1) instrument and is used as part of the standard care for all residents of six Dutch nursing homes and 23 Dutch residential care homes. The Dutch nursing homes and residential care homes are comparable with respectively nursing homes and residential care facilities in the US, are publically funded and subject to governmental inspection and approval. The facilities in the Netherlands are situated in rural as well as urbanized regions. All citizens have equal access to Dutch long-term care facilities and less than 25% is living together with their spouse in these facilities. We had access to a wide range of social, psychological and medical data, including validated assessments. These routine care outcome measurements provide complete and reliable prevalence estimates of the presence of medically diagnosed depression or using antidepressants. All residents in the participating facilities in this study are virtually included.

SUBJECTS AND PROCEDURE Residents were excluded if the assessment contained no information about the clinical diagnosis of depression or use of antidepressants. To calculate the incidence of depression we excluded all prevalent cases (defined as presence of depression or use of antidepressants at first observation) and persons with no follow up assessment. Figure 1 shows a flowchart of the included and excluded persons.

Figure 1. Flow chart of the study sample
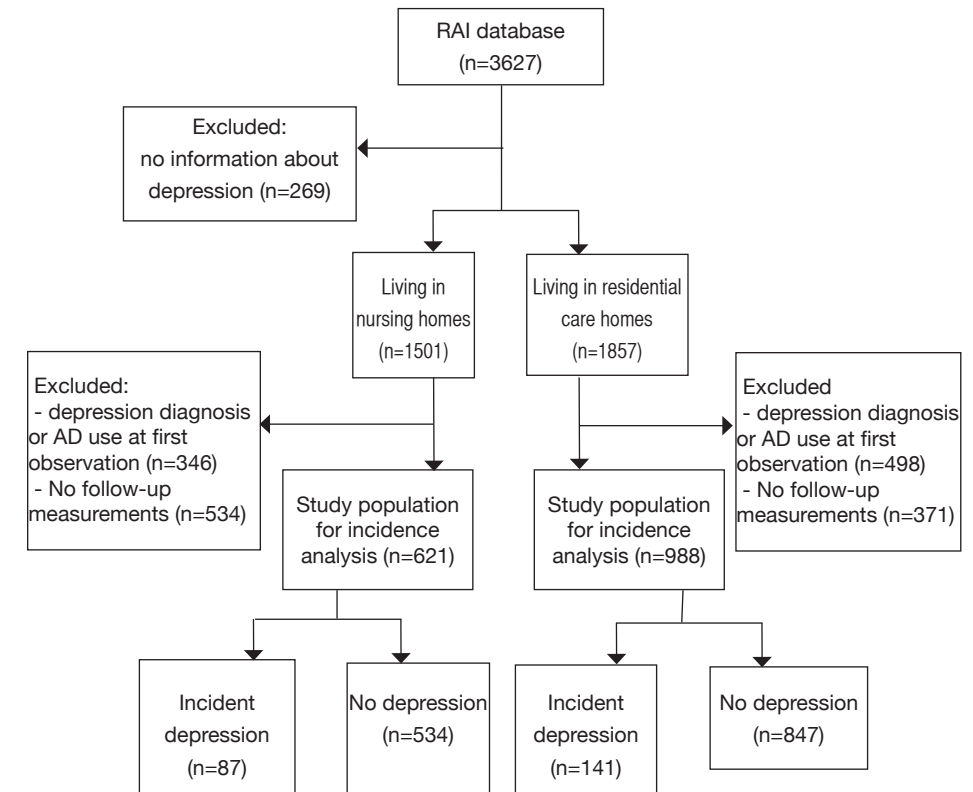
DATA COLLECTION We extracted anonymous data between June 2005 to January 2010 using a web-based application of the inter RAI- LTCF, which is an updated version of the Minimum Data Set of the Resident Assessment Instrument 2.0 for Long Term Care Facilities.(25;26) The inter RAI- LTCF provides an overview of the medical, physical, psychological, behavioral and social status of the residents. The inter RAI-LTCF has been used since 2005 to monitor the health of the residents and thereby improve the quality of health care. The assessment was completed every three months by specially trained nursing assistants or nurses in both the nursing homes and the residential care homes. The training consisted of two day courses in which the staff learned to work with the inter RAI- LTCF and to study the manual. An expert supervisor was present to answer questions whilst the inter RAI- LTCF was used in daily practice.(27-29) The inter RAI-LTCF comprises the Minimum Data Set (MDS) which is a structured and comprehensive observational assessment collecting information about the medical and functional status of the residents as well as their health risks. The items of the MDS may highlight up to 18 important problem areas or Client Assessment Protocols (CAPs). These are indications that there is a possible need for further action.(25;30) Five measurement scales have been developed based on the inter RAI-LTCF items of which four are used for this

study: the Cognitive Performance Scale (CPS), the Depression Rating Scale (DRS),the Activities of Daily Living scale (ADL) and the Revised Index for Social Engagement (RISE). These scales enable care-providers to monitor an individual resident's status.(31-35)

OUTCOME MEASURES

DIAGNOSIS OF DEPRESSION We considered depression to be present if a clinical diagnosis was recorded or if an antidepressant was prescribed as recorded in the medical records.All current medical diagnoses relevant for the personal care plan were recorded in the disease diagnosis part of the inter RAI-LTCF. These diagnoses were made by a general practitioner or a medical specialist. All Dutch clinical guidelines for depression refer to DSM-IV criteria of diagnoses. The recorded diseases reflected the awareness of medical diagnoses based on the standard care process. Antidepressant medication is recommended for moderate to severe major depression. Medical diagnoses remain recorded in the inter RAI- LTCF until the family physician indicates that the resident has recovered from the illness recorded. There are no financial barriers to the prescription of antidepressants in the Netherlands, as the obligatory health insurance covers the (modest) costs of these drugs. Screening for depression is not advocated in guidelines. (36;37)

INCIDENCE OF DEPRESSION The main outcome measures were the incidence rates (IRs) for depression in Dutch nursing homes and residential care homes and the comparison between both homes. As drop- outs could occur during follow-up, we calculated the incidence per 100 person-years. A person was deemed to be an incident case when two criteria were met: 1) absence of depression or use of antidepressants at first observation, 2) presence of depression or use of antidepressants at follow-up. Criterion 1 was used to ensure that the analysis was restricted to the group at risk for depression, criterion 2 to ascertain depression status at one of the follow-up measurements. The IRs of depression for nursing homes and residential care homes were calculated per 100 person-years by dividing the number of incident cases of depression by the total observation time during which the residents were free from depression. At least one follow up assessment should contain information about depression or use of antidepressants

POTENTIAL RISK INDICATORS OF THE INCIDENCE OF DEPRESSION Since the inter RAI-LTCF comprises an extensive geriatric assessment, we had the opportunity to investigate many baseline characteristics for associations with the onset of depression.(27) The variables we investigated are assorted into five categories and continuousvariables were dichotomised on the basis of the median to generate comprehensible odds ratios.

1. Demographic variables
Age (85 or older versus younger than 85)
Gender (male yes/ no)
Marital status (widowed yes/no)
2. Chronic diseases
chronic obstructive pulmonary disease (COPD), cancer, diabetes Parkinson's disease, dementia, cardiovascular diseases (including cerebral-vascular accidents, coronary disease, chronic heart failure, vascular diseases, cardiac arrhythmia and hypertension).These diseases were considered present when documented in the residents' medical record.
3. Psychological variables
anxiety observed in the last three days as repetitive anxious complaints/concerns (non health related) e.g. persistently seeks attention, reassurance regarding schedules, meals, laundry, clothing, relationships (present on at least one of the last three days versus not

present in the last three days) and psychiatric diagnoses registered in the disease diagnose section of inter RAI-LTCF, the inter RAI-LTCF Cognitive Performance Scale, scores from 0 (cognition intact) to 6 (very severe cognitive impairment), score 2 or higher indicates possible cognitive impairment (Crohnbach's $\alpha = 0.88$) (34), the inter RAI- LTCF Depression Rating Scale (DRS).(31) The DRS has scores ranging from 0 to14; scores 0-2 means no indication of depressive symptoms, 3 or higher indicates possible depression (Crohnbach's α .73).(32)
4. Functional variables
urinary incontinence,(daily present yes/no), fall incidents (at least one fall incident in the last 90 days) yes/no, ADL-dependency: 0–17 versus 18–54; sum score of nine items on help needed for activities of daily living (Crohnbach's $\alpha = 0.95$), higher scores indicate higher ADL-dependency (35); hearing impairment observed by staff: sum score of four items on hearing difficulties and use of hearing aid yes/no, visual impairment observed by staff: sum score of four items on vision difficulties and use of visual appliance yes/no, pain symptoms: sum score of four items on frequency, intensity, duration and occurrence of pain observed in the last three days; score 0-2 vs. 3-11. The higher the sum score, the more pain observed. (Crohnbach's $\alpha = 0.86$).
5. Social variables included:
The inter RAI LTCF -Revised Index for Social Engagement (RISE): 0–10 versus 11–18; sum score of 6 items on feelings of social engagement, a higher score indicates a higher level of social engagement (Crohnbach's $\alpha = 0.89$).(33)

STATISTICAL ANALYSIS

To determine the incidence of depression we calculated the incidence rates for residents of nursing homes and residential care homes per 100 person-years. Time- to- first event was measured from the date of the first observation (baseline). Residents who were depression-free during the entire follow-up period and those who dropped out of the cohort were censored on the date of their last assessment. Drop out could consist of death or discharge (with no return) to a hospital. The mean follow up time was 11.4 months in the nursing homes and 16.4 months in the residential care homes (max 4.8 year). Logistic regression analyses were carried out to determine the combination of risk factors that best predicted the incidence (yes/no) of depression. Firstly, univariate analyses were undertaken to select candidate risk factors for incident depression (p < .20). Secondly, the candidate risk factors were entered in a multivariate regression model. Risk factors with a p-value > .05 (Wald statistic) were removed manually with the stepwise backward selection procedure, until all variables showed a significant association with the outcome (p < .05). Survival curves for time until depression were compared using a Cox regression analysis and adjusted for the variables which were independently related to the hazard. To identify these variables, we performed a stepwise backward logistic regression with incident depression as the dependent outcome. All variables with p-values less than .05 (age, hearing impairment, dementia, cancer and DRS score at baseline) were entered as covariates in the adjusted model. All analyses were carried out with SPSS version 15.0.

RESULTS

STUDY SAMPLE The source population of this study consisted of 1501 residents in the nursing homes and 1857 in the residential homes. Of these, 621 residents in six nursing homes and 988 in 23 residential care homes were included in the study on incident depression (Figure 1). To detect possible selection bias we compared the total sample

of 3627 with the study sample of the included residents (621 in the nursing homes and 988 in the residential homes).The included residents in the nursing homes were less demented (p = 0.008) and had more daily incontinence. In the residential care homes the residents in the study sample were older (p = 0.000) and more ADL dependent. In order to explore a possible selection of residents without depression at baseline the characteristics of residents with and without prevalent depression are presented in Table 1 for both homes separately. In the nursing homes the residents with depression at baseline were younger, more often demented, more ADL dependent and suffered more from COPD and daily incontinence of urine. In the residential care homes, the residents with a depression at baseline were also younger and more often demented, suffered more from Parkinson, cardiovascular diseases, diabetes, ADL dependency and daily incontinence of urine.

Table 1. Characteristics of residents with and without prevalent depression in both homes at baseline

	Nursing homes			Residential care homes		
	Prevalent n=346	Population at risk n=1501		Prevalent n=498	Population at risk n=1857	
	n (%)		p-value	n (%)		p-value
Age>85	97 (28.1)	413 (35.8)	0.01	208 (41.9)	736 (54.3)	<0.001
Male	107 (30.9)	388 (33.7)	0.36	117 (23.5)	355 (26.1)	0.25
Widow/er	178 (51.4)	566 (49.0)	0.43	321 (64.5)	868 (64.0)	0.87
Dementia	166 (48.4)	350 (31.2)	<0.001	209 (42.4)	457 (34.4)	<0.001
Parkinson	13 (3.8)	56 (5.0)	0.47	27 (5.5)	35 (2.6)	0.01
Cardiovascular diseases	174 (50.7)	616 (54.9)	0.19	255 (51.7)	611 (46.0)	0.03
Diabetes	73 (21.3)	206 (18.4)	0.24	125 (25.4)	265 (19.9)	0.01
COPD	49 (14.3)	115 (10.2)	0.04	87 (13.6)	185 (13.9)	0.94
cancer	40 (11.7)	144 (12.8)	0.64	53 (10.8)	118 (8.9)	0.24
ADL dependency	206 (68.0)	592 (61.0)	0.03	204 (42.9)	409 (31.5)	<0.001
Vision impairment	236 (68.8)	743 (66.4)	0.43	374 (76.0)	1001 (75.4)	0.81
Hearing impairment	66 (19.2)	248 (22.2)	0.26	123 (25.0)	389 (29.3)	0.08
Daily incontinence of urine	169 (48.8)	418 (36.2)	<0.001	168 (33.7)	362 (26.6)	<0.001

INCIDENCE OF DEPRESSION Eighty-seven nursing home residents and 141 residential care home residents were newly diagnosed with depression. This corresponds with an incidence of 13.6 per 100 person-years and 10.2 per 100 person-years for residents of nursing homes and residential care homes respectively. The mean time until the first onset of depression in nursing homes was 10.8 months and in the residential care homes 15.6 months. Residents in residential care homes had a higher, but not significant chance on developing depression (adjusted HR 1.2; 95% CI 0.92-1.61 p = 0.18). Figure 2 shows the survival curves of both settings. We carried out a sensitivity analysis in which we calculated the incidence for residents with a clinical diagnosis of depression without those using antidepressants. This incidence for residents in nursing homes was 9.7 and for residents in residential care homes 11.7.

Figure 2. Survival function for nursing homes and residential care homes
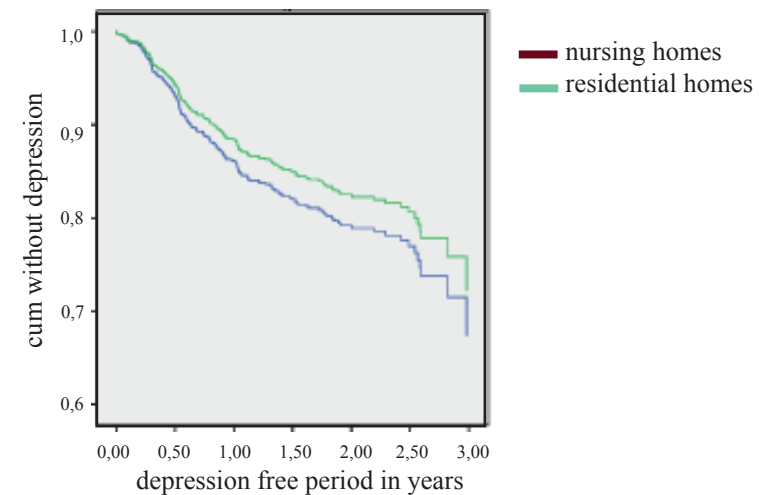
RISK FACTORS FOR THE ONSET OF DEPRESSION From the 18 potential risk factors entered in the univariate analysis, seven variables in the nursing homes and eight in the residential care homes had a p-value less than 0.20 (Table 2 and 3). These variables were selected for the multivariate model and we found three variables in the nursing homes and five in the residential care homes to be associated with the new onset of depression. In the nursing homes, dementia (OR 1.7; 95% CI 1.02-2.95) and a score of 3 or more on the Depression Rating Scale (OR 2.1 ; 95% CI 1.23-3.70) increased the risk to develop depression. A protective effect was seen on use of a hearing aid (OR 0.3; 95% CI 0.12-0-80). In the residential care homes being male (OR 2.1; 95% CI 1.27-3.30) having cancer (OR 2.9; 95% CI 1.64-4.95) and a score of 2 or higher on the Cognitive Performance Scale (OR1.5; 95% CI 1.05-2.22) increased the risk to develop depression. Age over 85 (OR 0.5; 95% CI 0.31 - 0.67) and hearing impairment (OR 0.8; 95%CI 0.60-1.00) appeared to be protective. The risk factors calculated for the incidence of depression without the use of antidepressants (sensitivity analysis) remained the same in both settings.

Table 2. Independent risk factors for incident depression in nursing homes

Risk factors	Univariate		Multivariate*	
Socio-demographic variables	OR (95%CI)	p-value	OR (95%CI)	p-value
Age>85	0.7 (0.39-1.12)	0.13		
Male	0.7 (0.43-1.09)	0.11		
Widow/er	0.8 (0.52-1.30)	0.40		
Chronic diseases				
Diabetes	1.4 (0.81-2.45)	0.23		
Parkinson	0.7 (0.21-2.34)	0.56		
Dementia	2.1 (1.33-3.36)	<0.001	1.7(1.02-2.95)	0.04
Cardiovasc diseases	0.8 (0.53-1.33)	0.45		
COPD	0.6 (0.22-1.45)	0.24		
Cancer	1.0 (0.48-1.94)	0.91		
Psychological variables				
Anxiety	1.3 (0.61-2.95)	0.47		
CPS	1.7 (1.05-2.73)	0.03		
DRS	2.2 (1.36-3.54)	<0.001	2.1(1.23-3.70)	<0.001
Functional variables				
ADL dependency	1.3 (0.77-2.27)	0.31		
Visual impairment	1.0 (0.59-1.55)	0.86		
Hearing impairment	1.0(0.72-1.31)	0.84		
Use of hearing aid	0.3(0.12-0.79)	0.01	0.3(0.12-0.80)	0.02
Daily incontinent of urine	1.6 (1.01-1.50)	0.05		
Pain	1.2 (0.74-1.96)	0.46		
Social variables				
RISE	1.1 (0.68-1.86)	0.64		

Including all univariate variables with P < 0.2

ADL = Activities of Daily Living; CPS = Cognitive Performance Scale; DRS = Depression Rating Scale;
RISE = Revised Index for Social Engagement

Table 3. Independent risk factors for incident depression in residential care homes

Risk factors	Univariate		Multivariate*	
Socio-demographic variables	OR (95%CI)	p-value	OR (95%CI)	p-value
Age>85	0.6(0.41-0,.85)	<0.001	0.5(0.35-0.76)	<0.001
Male	1.6(1.02-2.51)	0.04	2.1(1.27-3.30)	<0.001
Widow/er	1.4(0.97-2.10)	0.07		
Chronic diseases				
Diabetes	0.8(0.51-1.29)	0.37		
Parkinson	1.5(0.61-3.65)	0.39		
Dementia	1.2(0.86-1.80)	0.25		
Cardiovasc diseases	0.8(0.59-1.21)	0.34		
COPD	0.8(0.47-1.43)	0.49		
Cancer	2.0(1.22-3.43)	0.01	2.9(1.64-4.95)	<0.001
Psychological variables				
Anxiety	1.5(0.79-2.77)	0.22		
CPS	1.3(0.89-1.83)	0.19	1.5(1.05-2.22)	0.03
DRS	2.1(1.42-1.96)	<0.001		
Functional variables				
ADL dependency	1.1(0.73-1.73)	0.60		
Visual impairment	0.8(0.59-0.97	0.03		
Hearing impairment	0.8(0.48-1.18)	0.22	0.8(0.60-1.00)	0.05
Use of hearing aid	0.3(0.12-0.79)	0.01		
Daily incontinent of urine	1.1(0.74-1.64)	0.63		
Pain	1.4(0.95-1.98)	0.09		
Social variables				
RISE	0.8(0.56-1.20)	0.31		

Including all univariate variables with P < 0.2

ADL = Activities of Daily Living; CPS = Cognitive Performance Scale; DRS = Depression Rating Scale;
RISE = Revised Index for Social Engagement

DISCUSSION

MAIN FINDINGS In this study we investigated the incidence rate of depression and asso-
ciated risk factors for residents of six nursing homes and 23 residential care homes. The
incidence rate was 13.6 per 100 person-years and 10.2 per 100 person-years for residents of
nursing homes and residential care homes respectively and higher than previous reported
incidences. The risk factors for incident depression in residents of nursing homes included
dementia and a score of 3 or higher on the Depression Rating Scale.. The risk factors in
residents of the residential care homes included being male, having a cancer diagnosis and
a score of 2 or higher on the Cognitive Performance Scale. Age over 85 showed a protective
effect in both settings. Hearing impairment appeared to be protective in the residential care
homes and using a hearing aid was a protective factor in the nursing homes.

IMPLICATIONS Residents of both nursing homes and residential care homes run a high risk for developing depression. As these residents represent the eldest population with a high percentage of cognitive impaired residents, staff with good observational skills are required to detect symptoms of depressive disorders. Residents with dementia are more at risk to be under-diagnosed than non-demented residents.(38) Monitoring the individual resident's status can be enabled by measurement scales such as the Cognitive Performance Scale and the Depression Rating Scale of the inter RAI- LTCF. (32-34) Having a cancer diagnosis showed to be one of the independent risk factors for developing depression in residential care homes. Depression tends to be under-diagnosed in palliative care and is a great burden for patient and caregivers.(39) More attention for depression supported by structural assessments may help to identify mood problems in these situations. We found older age to be protective against the onset of depression in both settings. A common explanation is that neuroticism traits decrease with aging. (40;41) However, as depression increases mortality this may also be the result of a cohort effect. The latter effect will be reduced through the use of quarterly assessments in routine care. Frequent assessments might limit missing data for the most vulnerable persons and therefore a survivor effect may be reduced. Hearing impairment showed to be protective in the residential care homes. This risk factor is based on observations of staff and is not confirmed by pure-tone audiometry. We find this difficult to explain. The residents of the residential care homes in our study sample represented the oldest old with the highest ADL dependency. It might be possible that hearing impairment protect residents in a over demanding environment. Using a hearing aid might thereby protect against depression in the nursing homes. This emphasizes the importance of attention from staff to ensure the use of hearing aids.

COMPARISON WITH THE LITERATURE In this study we found a substantial higher incidence of depression than previously reported for institutionalized elderly.(3) This can be explained by differences in definition of depression and inclusion criteria. First, our definition of depression comprised clinically recorded diagnoses or the use of antidepressants. If we considered recorded diagnoses only, the prevalence was still higher than previous estimates, 13.9% and 18.8% in nursing and residential care homes respectively. The incidence per 100 person years dropped to 9.7 and 11.7 respectively. Former studies in elderly showed that only in a minority of cases antidepressants were prescribed by family physicians for other reasons than depression.(36;37) In the nursing homes, antidepressants are often prescribed for behavioral problems in demented residents.(42-45) This may declare the difference in incidences that did not include the use of antidepressants in the definition. Secondly, the differences may be related to the fact that our data collection was independent of informed consent by the resident and all residents with available data on the outcome measures were included. Previous studies are likely to be biased by selective refusal as depressed residents can be expected to be at higher risk of non-participation. (46) The use of RAI- LTCF itself might also influence incidence rates. By use of the Depression Rating Scale implemented in this instrument, staff is alerted to possible symptoms of depression and depression may be identified earlier in the residents.

The associated risk factors for residents in the studied nursing homes and residential care homes showed to be partly different from those previous studied in community dwelling elderly. In contrast with earlier studies, we did not find dependency of activities of daily living and being female as independent risk factors in both settings. The assistance with activities of daily living provided in both settings and the majority of females living in both settings may declare these differences.

STRENGTHS AND LIMITATIONS An important strength of this study was the significant external validity: no selection of subjects was made for the data collection as this was part of routine care independent of the resident's cooperation. This enabled us to include residents who would be excluded in other studies because of physical illness, cognitive dysfunction, insufficient communication or refusal. Other strengths were the structured and validated assessments by trained staff, the large sample size representing a considerable number of long-term care facilities.There were also some limitations. Firstly, although Dutch clinical guidelines recommend DSM-IV criteria to diagnose depression, we remain uncertain to what extent family physicians and medical specialists applied these diagnostic criteria. In addition, diagnoses could have been incorrectly recorded, since recovery had not yet been confirmed by a physician. Therefore, we also based the depression definition on the prescription of antidepressants. However, antidepressants may have been prescribed for other diagnoses than depression like behavioral problems in demented residents in the nursing homes .Therefore, our estimates for the residents of the nursing homes might be overestimated. We recognize that some selection bias could have occurred because the study sample showed to be less demented in the nursing homes but older and more ADL dependent in the residential care homes. Secondly, although the nursing assistants who completed the RAI-LTCF were trained to register observed behaviour objectively and were assisted by an expert-supervisor, (systematic) errors in rating depressive symptoms in residents could not completely be ruled out. Thirdly, the reliability and validity of the updated edition of the RAI-LTCF have been investigated, but is not yet published. Furthermore, the sample concerned a naturalistic cohort of vulnerable people with the most vulnerable admitted to hospitals or dying during the study period. If under-diagnosis and overestimation of observed time were an issue, the incidence rates we calculated are likely to be an underestimation of the true figures. Finally, we also explored possible selection bias by comparing residents with and without prevalent depression and use of antidepressants at baseline on demographic and clinical variables. The population at risk comprised in both settings older residents. (Table 1)

CONCLUSION

In this study, we found a high incidence rate for depression in residents of Dutch nursing homes and residential care homes. Skilled, properly trained staff, using structural assessments is needed to meet the care needs of residents with dementia, depressive symptoms and cancer in order to improve quality of care and quality of life of these vulnerable residents. Therefore, we recommend a structurally used geriatric assessment instrument.

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CHAPTER 7

DEPRESSION IN DUTCH RESIDENTIAL CARE HOMES: UNDER-DIAGNOSIS IN DEMENTED RESIDENTS?

Menke Baller, Marijke Boorsma, Dinnus HM Frijters, Harm WJ van Marwijk, Giel Nijpels and Hein PJ van Hout

CHAPTER **7**

DEPRESSION IN DUTCH RESIDENTIAL CARE HOMES: UNDER-DIAGNOSES IN DEMENTED RESIDENTS?

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ABSTRACT

OBJECTIVE Although community-based studies reported an increased incidence of depression among demented persons compared with non-demented persons, it is not clear whether this relationship also exists among institutionalised elderly persons. The aim of this study was to compare the prevalence of diagnosed depressive disorders and mood symptoms between demented and non-demented residents living in Dutch residential care homes.

METHODS Cross-sectional analysis in 16 residential care homes of routine outcome measurements by trained nurse assistants using the Resident Assessment Instrument (RAI) between January 2007 and April 2008. Nurse assistants recorded all known medical diagnoses including dementia and depression, as well as a structured observation of the presence or absence of 11 mood symptoms over the last three days.

RESULTS 313 demented and 463 non-demented residents with complete data were included (99% of all residents, mean age 84 years). 24.6% of participants were diagnosed with a depressive disorder, with no statistically significant difference between demented and non-demented persons (p = 0.237). Mood symptoms were more prevalent in demented residents (p < 0.001, OR 2.14, 95% CI 1.56-2.93). Among residents with mood symptoms, demented residents were less likely to be diagnosed with a depressive disorder than non-demented residents (p = 0.039, OR 0.61, 95% CI 0.38-0.98).

CONCLUSIONS The prevalence of diagnosed depressive disorders was comparable between demented and non-demented residents. However, demented residents suffered more from mood symptoms and may be at risk of under-diagnosis of depression.

INTRODUCTION

Depressive symptoms and disorders are highly prevalent in residents of residential care homes. (1-9,14-18,20-25) Since the prognosis of depression in residents is poor, including low recovery and higher mortality rate , depressive disorders and symptoms constitute a serious health problem. (12,19,25) Although community-based studies reported a higher prevalence of depression in persons with dementia or cognitive decline than in non-demented or cognitively unimpaired elderly people, it is not clear whether this is also the case in residential care homes.(3,10,24) To our knowledge, only two studies compared demented and non-demented residents on prevalence of depressive symptoms or disorders. (7,14) In an Australian study, major depressive disorders were more prevalent among cognitively impaired residents (27.5%) compared to cognitive unimpaired residents (15.5%). (7) In a Dutch study, no statistically significant difference was found in the prevalence of depressive syndromes and symptoms between demented and non-demented residents. (14) Both studies were hampered by non-response and exclusion of residents, as a result of which only 72% and 33% respectively of the source population was included.(7,14) This could have biased the comparisons between demented and non-demented residents. In our study, we had access to medical data, including validated assessments. These routine care outcome measurements provide complete and reliable prevalence estimates of diagnosed depressive disorders and symptom observations, since virtually all residents are included. The aim of this study was to compare the prevalence of diagnosed depressive disorders and observed mood symptoms between residents with and without dementia in Dutch residential care homes.

METHODS

DESIGN AND SETTINGS This cross-sectional analysis was performed on data collected on 787 residents in 16 residential care homes in the Netherlands. These homes were situated in rural as well as urbanised regions of the country and varied in number of residents (mean 54, SD 35). The residents of those homes are vulnerable elderly persons, who need assistance with activities of daily living (ADL), supervision or require sheltered living. In contrast to nursing homes, residential care homes provide neither specialised medical care nor nursing care. The family physician is responsible for the medical care in a residential care home. Informed consent was not required as the data concerned anonymous routine care data.

DATA COLLECTION took place between January 12th 2007 and April 11th 2008, using a web-based application of the inter RAI-LTCF (Appendix 1), an updated version of the Minimal Data Set of the Resident Assessment Instrument 2.0 for Long Term Care Facilities (inter RAI-LTCF) (inter RAI, 2008). Since the inter RAI-LTCF provides an overview of the medical, physical, psychological, behavioural and social status of the residents, it was employed in 2007 to monitor the health of the residents and thereby improve the quality of health care. The inter RAI-LTCF update includes more (key) symptoms of depression compared to previous versions, which should enable more appropriate monitoring of mood. The assessment was performed on a quarterly basis by specially trained nurse assistants in the residential care homes. The training consisted of two day courses, during which the nurse assistants learned to work with the inter RAI-LTCF and studied the manual. The nurse assistants also had the opportunity to frequently ask questions to an expert-supervisor while using the inter RAI-LTCF during their daily work activities. Only first-time assessments of a resident were used for the analyses in this cross-sectional study.

DEPRESSIVE DISORDER In the disease diagnosis part of the inter RAI-LTCF, all present medical diagnoses relevant for the personal care plan were registered. These diagnoses were made by a family physician or medical specialist. All Dutch clinical guidelines for depression refer to DSM-IV criteria to make diagnoses. The recorded diseases reflected the awareness of medical diagnoses based on the usual care process. Medical diagnoses remain recorded in the inter RAI-LTCF until a physician indicates that the resident has recovered. Compared to standardised testing, routine care registration of depressive disorders is accurate in severe cases but tends to under-diagnose in cases with mild to moderate severity.

DEMENTIA was also recorded as a medical diagnosis in the inter RAI-LTCF. Dementia diagnoses were made mostly by a geriatrician or memory clinic. All Dutch clinical guidelines for dementia refer to DSM-IV criteria to make diagnoses. Staff in the residential care homes were keen to instigate dementia diagnostics when signs were present, because the homes received a higher tariff for demented residents. Therefore under-diagnosis of dementia is likely to be limited.

MOOD SYMPTOMS The mood and behaviour section of the inter RAI-LTCF contains 11 items on mood, with regard to which observations are made by trained staff (Table 3). The scores per item vary between 0 (not present), 1 (present, but not in the last 3 days), 2 (present on 1 or 2 days of the last 3 days) and 3 (present daily in the last 3 days). The 11 items on mood, including the key symptoms of the DSM-IV depression criteria, reflect observed behaviour interpreted here as depressive symptoms (Cronbach´s alpha 0.84). Frequencies on individual items are presented in table 3. We decided to use the sum score of all 11 items on mood instead of the seven items that comprise the validated Depression Rating Scale (DRS), since substantial changes in the ratings of the inter RAI-LTCF have made the DRS based on the old RAI-LTCF version unsuitable.(6) Moreover, at least two studies reported a limited correlation of the DRS with the self-reported Geriatric Depression Scale and the psychiatrist-rated Hamilton Depression Rating Scale.(2,15)

STATISTICAL ANALYSIS

All analyses were done using SPSS 14.0. To carry out the analyses on mood symptoms, the sum score of the 11 mood items was dichotomised on the mean, with the result that residents with a sum score of 6 and higher were compared with those having less mood symptoms (sum score ≤ 5). Prevalence of diagnosed depressive disorders and dementia was calculated using descriptive statistics. P-values for differences between demented and non-demented residents were determined with 2-tailed Pearson Chi-Square tests, in which p-values < 0.05 were considered as statistically significant. Univariate regression analysis was used to calculate the odds ratio and 95% confidence interval for associations with dementia as the independent variable and diagnosed depressive disorders and mood symptoms as the dependent variables. This method was also used for the relation between dementia and diagnosed depressive disorders in the subgroup of residents with a sum score of 6 and higher on the 11 mood items. Furthermore, multivariate regression analyses were carried out to explore the presence of confounders of these relationships. Co-variables that changed the odds of a univariate association by 10% or more were considered a confounder and were added in the multivariate analyses to adjust the primary odds ratios. Subgroup effects were explored by interaction analyses. For example, modification of the main association between dementia and depressive disorders by social engagement was explored by adding the interaction term social engagement x dementia. When a statistically significant interaction term was found, the study population was split to demonstrate

the results for the subgroups (high versus low social engagement) separately.

The following variables recorded in the inter RAI-LTCF were explored as potential confounders and effect modifiers for each relationship under study. Continuous variables were dichotomised on the mean to generate comprehensible odds ratio's.

- Gender: men versus women.
- Age: 0-84 versus 85 and older.
- Pain symptoms: 0-2 versus 3-11, sum score of 4 items on frequency, intensity, duration and occurrences of pain. Internal consistency expressed in Crohnbach's alpha was 0.86. The higher the sum score, the more pain was observed.
- ADL-dependency: 0-17 versus 18-54, sum score of 9 items on help needed for activities of daily living (Crohnbach's alpha 0.95). The higher the sum score, the higher the dependency.
- Somatic symptoms: 0-10 versus 11-87, sum score of 22 items on frequency of health problems, dyspnoea and tiredness (Crohnbach's alpha 0.69). The higher the sum score, the more somatic symptoms were observed.
- Social engagement: 0-10 versus 11-18, sum score of 6 items on feelings of social engagement (Crohnbach's alpha 0.89). The higher the sum score, the better the social engagement.
- Number of diseases, except dementia and depressive disorder: 0-1 versus 2-63.
- Diabetes mellitus: yes versus no.
- Recent infections, including pneumonia and urinary tract infection in last 30 days: yes versus no.
- Cardiovasvular disease, including cerebrovascular accident, coronary disease, chronic heart failure, vascular diseases, cardiac arrhythmia, hypertension, heart diseases, decompensatio cordis and cerebrovascular diseases: yes versus no.

RESULTS

POPULATION The source population of this study consisted of 787 residents of residential care homes, and 776 cases had complete data on the variables of interest (99%). These 776 persons were included in the analyses and comprised 313 demented and 463 non-demented residents. The mean portion of demented residents was 40.3%, which varied between 18.6% and 76.9% across the 16 residential care homes. Demographic characteristics of the residents are shown in table 1.

PREVALENCE OF DIAGNOSED DEPRESSIVE DISORDERS Table 2 shows the prevalence of diagnosed depressive disorders and mood symptoms. 24.6% of all residents were diagnosed with a depressive disorder. No difference was found between demented and non-demented residents (p=0.237). Adjusted for the only confounder, ADL, the odds ratio (=OR) for the relation between a diagnosis of dementia and diagnosed depressive disorder in the total population was 1.06, with a 95% confidence interval (=CI) of 0.75-1.49. Social engagement modified this relationship: depression was more often diagnosed among highly socially engaged demented persons (OR 1.85, 95%CI 1.15-2.97), while there was no difference between demented and non-demented residents with low social engagement (OR 0.77, 95%CI 0.48-1.23).

Table 1. Characteristics of the residents

	All residents	Demented residents	Non-demented residents	p-value
Residents, N (%)	776 (100.0)	313 (40.3)	463 (59.7)	-
Female, N (%)	581 (74.9)	232 (74.1)	349 (75.4)	0.692
Age, mean (SD)	84 (7.8)	84 (7.3)	84 (8.1)	0.516
ADL-dependency score (0-54), mean (SD)	17 (16)	23 (16)	13 (14)	<0.001
Somatic symptom severity score (0-87), mean (SD)	10 (7.9)	11.6 (8.6)	9.0 (7.3)	<0.001
Pain severity score (0-11), mean (SD)	2.3 (3.1)	2.3 (3.0)	2.3 (3.2)	0.966
Number of diseases diagnosed (0-64), mean (SD)	2.0 (1.6)	1.7 (1.4)	2.3 (1.7)	<0.001
Cardiovascular disease, N (%)	374 (48.2)	134 (42.8)	240 (51.8)	0.014
Diabetes mellitus, N (%)	190 (24.5)	72 (23.0)	118 (25.5)	0.430
Pneumonia / urinary tract infection in last 30 days, N (%)	104 (13.4)	45 (14.4)	59 (12.7)	0.512
Incontinence, N (%)	244 (31.4)	143 (45.7)	101 (21.8)	<0.001
Falling in last 90 days, N (%)	193 (24.9)	90 (28.8)	103 (22.2)	0.040

Table 2. Prevalence of diagnosed depressive disorders and mood symptoms, compared between demented and non-demented residents

	N/total N (%)	OR (95%CI)	Adjusted OR (95%CI)
Prevalence of diagnosed depressive disorders	191/776 (24.6)	1.22 (0.88-1.70)	1.06 (0.75-1.49) [a]
Prevalence of mood symptoms	286/776 (36.9)	2.67 (1.97-3.61) *	2.14 (1.56-2.93)* [a]
Diagnosed depressive disorders in residents with mood symptoms	115/286 (40.2)	0.61 (0.38-0.98) *	-

OR, odds ratio which compares demented to non-demented residents
95%CI, 95% confidence interval
* statistically significant
[a] adjusted for the confounder ADL

PREVALENCE OF OBSERVED MOOD SYMPTOMS Table 3 shows the prevalence of 11 separately observed signs of depressed mood. The score 1 (present, but not in the last 3 days), 2 (present on 1 or 2 of the last 3 days) and 3 (present daily in the last 3 days) on these items were taken into account. 13.7% of the demented and 37.6% of the non-demented residents showed none of the observed symptoms, whereas in 59.1% of the demented and 39.3% of the non-demented residents three or more symptoms were observed. In demented residents, the signs of 'persistent anger with self or others' and 'reduced social interaction' were most prevalent (48.6%). However, the sign of 'sad, painful or worried facial expressions' was most prevalent in non-demented residents (36.1%). The sign 're-current statements that something terrible is about to happen' was observed least in both

groups (5.1% of the demented and 6.7% of the non-demented residents). Remarkably, 7 of the 11 items were observed significantly more frequently in demented residents than in non-demented residents. Using the cut-off point of 6 or higher of the sum score on the 11 observed items, 36.9% of the residents suffered from observed mood symptoms. There was a substantial and statistically significant difference between demented (50.5%) and non-demented (27.6%) residents (p < 0.001). After adjusting for the confounder ADL, the odds ratio was 2.14 (95%CI 1.56-2.93). Diabetes mellitus was an effect modifier for this relationship. In the subgroup of residents with diabetes mellitus, there was no statistically significant difference in the prevalence of mood symptoms between demented and non-demented residents (OR 1.02, 95%CI 0.54-1.91). Among persons without diabetes mellitus, demented residents showed more mood symptoms than non-demented residents (OR 2.74, 95%CI 1.90-3.95).

Table 3. Prevalence of observed signs of depressed mood, compared between demented and non-demented residents

Observed signs of depressed mood	N demented residents (%)	N non-demented residents (%)	OR	95%CI
1. Resident made negative statements	79 (25.2)	104 (22.5)	1.17	0.83-1.63
2. Persistent anger with self or others	152 (48.6)	145 (31.3)	2.07	1.54-2.78 *
3. Expressions of what appear to be unrealistic fears	97 (31.0)	72 (15.6)	2.44	1.72-3.45 *
4. Repetitive health complaints	84 (26.8)	152 (32.8)	0.75	0.55-1.03
5. Repetitive anxious complaints/concerns (non-health related)	112 (35.8)	105 (22.7)	1.90	1.38-2.61 *
6. Sad, pained, worried facial expressions	149 (47.6)	167 (36.1)	1.61	1.20-2.16 *
7. Crying, tearfulness	77 (24.6)	88 (19.0)	1.39	0.98-1.97
8. Recurrent statements that something terrible is about to happen	16 (5.1)	31 (6.7)	0.75	0.40-1.40
9. Withdrawal from activities of interest	119 (38.0)	71 (15.3)	3.39	2.41-4.76 *
10. Reduced social interaction	152 (48.6)	115 (24.8)	2.86	2.10-3.88 *
11. Expressed, also non-verbal, absence of joy of life (anhedonia)	103 (32.9)	110 (23.8)	1.57	1.15-2.16 *

N (%) = number and percentage of residents

OR = odds ratio which compares demented to non-demented residents

95%CI = 95% confidence interval

RELATION BETWEEN MOOD SYMPTOMS AND DIAGNOSED DEPRESSIVE DISORDER
40.2% of the residents who showed mood symptoms were diagnosed with a depressive disorder, with a significant difference between demented (34.8%) and non-demented (46.9%) residents (p = 0.039). Among persons with mood-symptoms, demented residents were less likely to be diagnosed for having a depressive disorder than non-demented residents, OR 0.61 (95%CI 0.38-0.98). No confounders or effect modifiers were found for this relationship.

DISCUSSION

MAIN FINDINGS This cross-sectional study compared the prevalence of diagnosed depressive disorders and observed mood symptoms between demented and non-demented residents of Dutch residential care homes. No statistically significant difference was found between demented and non-demented residents in the presence of diagnosed depressive disorders. However, observed mood symptoms were more prevalent in persons with dementia than in people without dementia. Among persons with mood-symptoms, demented residents were less likely to be diagnosed with a depressive disorder than non-demented residents.

IMPLICATIONS The higher prevalence of mood symptoms in demented residents compared with non-demented residents can be explained in at least two ways. One possibility is that their cognitive decline led to a depressed mood.(21) If elderly persons perceive symptoms of cognitive decline and decreased control over their lives, depressive symptoms could develop or become exacerbated.(4,26) However, it is also possible that some of the observed mood symptoms are accompanying symptoms of the dementia itself. Diagnosing depressive disorders in persons with dementia will prove to be a diagnostic puzzle for physicians. Since demented residents who show mood symptoms are less likely to receive a diagnosis of depressive disorder than non-demented residents, demented residents are more at risk of under-diagnosis than non-demented residents. For this reason, nurse assistants and other caregivers should take more notice of the mood symptoms of demented residents. Further, a physician should decide whether a depressive disorder should be diagnosed and consequently monitored or treated.

COMPARISON WITH THE LITERATURE Although three community-based studies reported a higher prevalence of depression in persons with dementia or cognitive decline than in non-demented or cognitively unimpaired elderly people , it was not clear whether this is also the case in residential care homes. (3,10,24) To our knowledge, two recent studies explored the prevalence of depressive disorders and depressive symptoms in demented and non-demented residents of residential care homes. The first was an Australian study including 290 residents of low-level aged care.(7) In this study, cognitive impairment was measured with the Standardized Mini Mental State Examination, in which scores between 25 and 30 indicated normal cognitive function, while scores between 19 and 24 indicated mild cognitive impairment, and scores between 10 and 18 indicated moderate cognitive impairment. A major depressive disorder was diagnosed with a structured clinical interview for DSM-IV axis I disorders. In the second study, among 201 residents of Dutch residential care homes, the presence of dementia was assessed with the Clinical Assessment Battery of the Consortium to Establish a Registry for Alzheimer's Disease, which included the DSM-III-R criteria for dementia.(14) Depressive syndromes and symptoms were measured with a full psychiatric assessment using the Geriatric Mental State. The Australian study, reported that major depressive disorders were more present in residents with moderate cognitive impairment (27.5%) compared to residents with mild cognitive impairment (14.6%) or normal cognitive function (15.5%).(7) In contrast, only a small and non-significant difference was found between demented (13.2%) and non-demented residents (10.9%) in the prevalence of depressive disorders in the Dutch study.(14) In our study, the prevalence of diagnosed depressive disorders did not differ significantly between demented (26.8%) and non-demented residents (23.1%). Concerning depressive symptoms, there is only one study with which to compare our results. Janzing et al. found no difference in the prevalence of depressive symptoms between demented and non-demented residents, whereas in the present study mood symptoms were more prevalent in demented residents.(14) The differences in prevalence found in the previous studies can at least partly be explained by the methods used. In the present study, all depression diagnoses that were relevant for the personal care plan were taken into account. This included present disorders, but also disorders in remission for which monitoring was

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recommended. Therefore, the prevalence of diagnosed depressive disorders in our study may have been higher compared to other studies that used clinical research assessment instruments to diagnose current depressive disorders. In addition, the instruments used for diagnosing dementia or cognitive impairment were different between studies, which is another possible explanation for the differences between the results. Moreover, there was high diversity in the response rate: Janzing et al. included only 33 % of the source population, Davison included 72 % of the population, and in the present study 99 % of the cases was explored. The lower response rates could have introduced a bias in the comparison between demented and non-demented residents.

STRENGTHS AND LIMITATIONS Routine care outcome measurements including validated instruments were used for data collection in residential care homes, resulting in a nearly complete dataset. Since no informed consent was required, non-response of the residents did not bias the findings. To investigate the prevalence of diagnoses made in the usual care process no special screening for disorders was carried out. This study also has some limitations. Firstly, although Dutch clinical guidelines recommend DSM-IV criteria to diagnose depression and dementia, we remain uncertain to what extent general physicians and medical specialists applied these diagnostic criteria in diagnosing dementia and depressive disorders. Furthermore, the recognition of these disorders by the medical practitioners was likely not 100 %. Since the usual care process was the subject of the study, this did not impede the statistical analysis. Secondly, if a resident had recovered after a period of disease, a physician had to confirm the return to health and remove the diagnosis from the personal care plan. Diagnoses could have been unjustly registered, since the recovery had not yet been confirmed by a physician. Thirdly, the nurse assistants who completed the inter RAI-LTCF were trained to register observed behaviour objectively and were assisted by an expert-supervisor. Although unlikely, (systematic) errors in rating depressive symptoms in residents with and without dementia could not completely be ruled out. Furthermore, the reliability and validity of the updated edition of the inter RAI-LTCF have been investigated, but are not yet published. The Depression Rating Scale based on the old RAI-LTCF, was not suitable because of substantial changes to the ratings (previously score 0-2 over 30 days on 7 items, now 0-3 over 3 days on 11 items). Since the internal consistency of the 11 mood items was high, we felt confident in using their sum score to explore differences between demented and non demented residents. Finally, it should be noted that the prevalence of diagnosed depressive disorders is different from the real prevalence of depressive disorders, since the prevalence of diagnoses contains information about the prevalence and recognition of disorders that may have been in remission for some time.

CONCLUSION

Since demented residents suffered more from mood symptoms and were less likely to be diagnosed with a depressive disorder than non-demented residents, demented persons may be at risk of under-diagnosis of depression.

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CHAPTER **8**

THE PREVALENCE, INCIDENCE AND ASSOCIATED RISK FACTORS FOR DELIRIUM IN DUTCH NURSING HOMES AND RESIDENTIAL CARE HOMES

Marijke Boorsma, Karlijn Joling , Dinnus Frijters, Miel Ribbe, Giel Nijpels, Hein van Hout

CHAPTER **8**

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ABSTRACT

OBJECTIVE To estimate and compare the prevalence and incidence of delirium and its risk factors in residents of Dutch nursing homes and residential care homes.

METHODS Data were extracted from the Long Term Care Facility (inter RAI-LTCF) version of the Resident Assessment Instrument which was filled in a routine care cohort for a total of 3627 residents. 828 residents of 6 nursing homes and 1365 residents of 23 residential homes were included in the analyses. Delirium was defined as a positive score on the adjusted Nursing Home–CAM.

RESULTS The prevalence of delirium was 8.9% in the nursing homes and 8.2% in the residential homes. The incidence was highest in the nursing homes with 20.7 versus 14.6 per 100 person years. Multivariate tests of risk factors for developing delirium included chair restraints (OR 2.3; 95% CI 1.27-4.28), dementia (OR 3.3; 95% CI 2.03-5.24) and Parkinson's disease (OR 2.3; 95% CI 0.96-5.63) for residents in nursing homes, and dementia (OR 1.8; 95% CI 1.31-2.55) and fall incidents (OR 1.7; 95% CI 1.20-2.48) for residents in residential care homes.

CONCLUSIONS The prevalence and incidence of delirium was high in both nursing homes and residential care homes. More focus on modifiable risk factors such as the use of restraints in nursing homes and fall incidents in residential care homes may help to prevent delirium.

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INTRODUCTION

Delirium is a cognitive disorder characterized by acute onset, fluctuating course, and among others disturbances of consciousness, attention and perception. Especially its fluctuating course frustrates diagnosis by staff not skilled in structural observation.(1,2) The prevalence and incidence of delirium in older people institutionalized in residential care homes and nursing homes is not well known. Previous studies mostly report on delirium in hospitalized older people, where prevalence estimates vary between 15% and 24%. (3,4,5) Reported rates of incidence of delirium among older people admitted to hospitals range from 5% to 35%.(6,5,7) Dosa et al. reported between 16 and 23% of possible cases of delirium in a subgroup of post-acute hospitalized older patients discharged to nursing homes depending on the diagnostic criteria used.(8) Recently Mc Cusker et al. reported a prevalence of 3.4% and a 6 month incidence of 1.6 per 100 person weeks in residents of long term care facilities without cognitive impairment. These figures were respectively 33.2% and 6.9% in residents with cognitive impairment. Failure to treat delirium may lead to adverse conditions, such as a decrease in cognitive functioning, increase of falls and even death.(6) Recent research suggests that delirium is associated with an increased risk of developing dementia.(9) In view of these adverse health consequences, early recognition of delirium is important in order to treat the underlying disease and improve outcomes. Preventative efforts could become more targeted with more precise information about the risk indicators. Medical care in Dutch nursing homes is delivered by specialized physicians in long term care of patients with complicated chronic diseases. Nursing homes offer geriatric rehabilitation as well as long term and palliative care. Nursing homes provide professional care by highly trained staff including licensed practical nurses and psychotherapists. The residents of the residential care homes are vulnerable elderly persons, who need assistance with activities of daily living (ADL), supervision or sheltered accommodation. The family physician is responsible for the medical care of these residents. Staff in residential care homes is less trained and includes certified nursing assistant and rarely licensed practical nurses. The aim of this study was to compare the prevalence and incidence of delirium between Dutch nursing homes and residential care homes, as well as to identify the associated risk factors.

METHODS

DESIGN AND SETTING In this naturalistic cohort study we used data of the RAI database of the VU University Medical Centre. This database contains longitudinal assessments with the interRAI Long Term Care Facility instrument of residents used in usual care on all residents of six Dutch nursing homes and 23 Dutch residential homes. RAI assessments took place every 3 months and when there was an important change in health. Informed consent was not required as the data concerned anonymous routine care data. The nursing homes are comparable with nursing homes and the residential care homes with residential care facilities in the US. Both facilities are publically funded and subject to governmental inspection and approval. The facilities are situated in rural as well as urbanized regions. All citizens have equal access to both facilities.

SUBJECTS AND PROCEDURE Residents were excluded if the observations missed information about delirium. The sample without information was in both settings more ADL dependent and represented in the nursing homes more widow(err) To calculate the incidence of delirium we excluded all prevalent cases (and residents without any follow up assessment). Figure 1 shows a flowchart of the included and excluded residents.
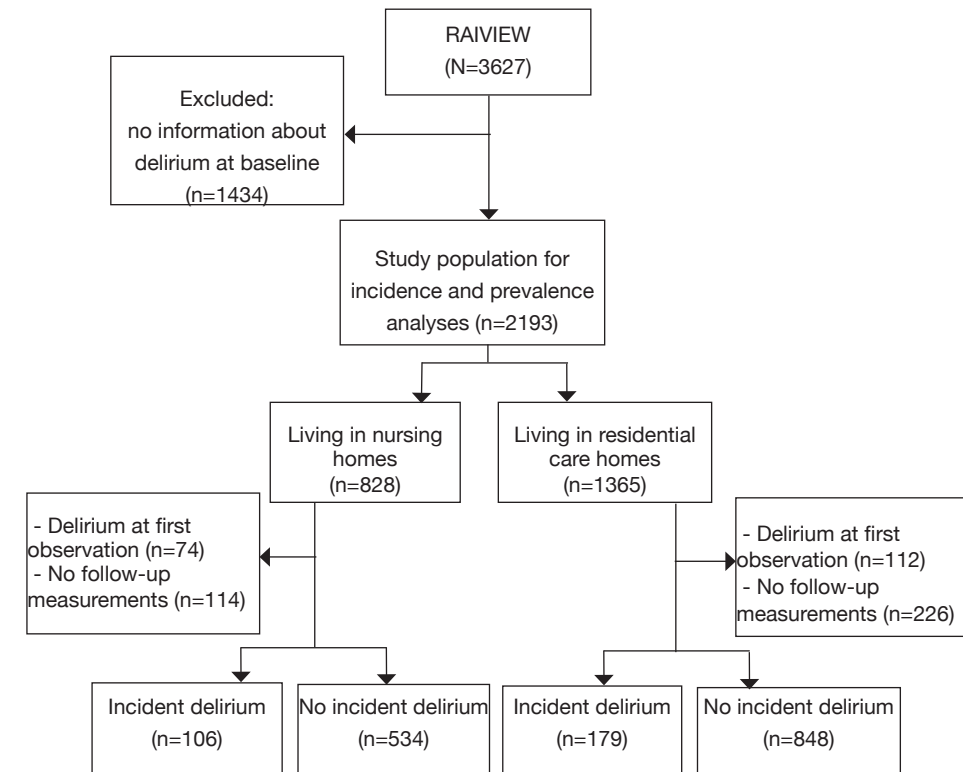
DATA COLLECTION Data collection took place from June 2005 to January 2010 using a web-based application of the inter RAI-LTCF, an updated version of the Minimum Data Set of the Resident Assessment Instrument 2.0 for Long Term Care Facilities (RAI-LTCF) (Inter Rai, 2008).(10) Inter RAI-LTCF provides an overview of the medical, physical, psychological, behavioural and social status of the residents. This has been employed since 2005 to monitor the health of residents and thereby improve the quality of health care. In both the nursing homes and the residential care homes, specially trained and supervised nursing assistants or licensed practical nurses completed the assessment every 3 months. The training consisted of two day courses, where they learned to work with the inter RAI-LTCF and studied the manual. While using the inter RAI-LTCF in daily practice they could frequently ask questions to an expert-supervisor. The assessors received an annual update training session of half a day.

OUTCOME MEASURES

DELIRIUM DEFINITION The presence of delirium was defined as a positive score on the Nursing Home–Confusion Assessment Method (NH-CAM).(8) The NH-CAM was based on a rearrangement of the inter RAI-LTCF variables to mimic the well-validated Confusion Assessment Method (CAM). It has recently been developed by Dosa et al. and was found to have good face and content validity.(8) In order to translate the items of the inter RAI-LTCF into the NH-CAM we used the inter RAI-LTCF Cognitive Performance Scale (CPS), scores from 0 (cognition intact) to 6 (very severe cognitive impairment) (Crohnbach's α = 0.88) (11), the inter RAI-LTCF Depression Rating Scale (DRS).(12) The DRS has scores ranging from 0 to 14; scores 0-2 means no indication of depressive symptoms, 3 or higher

indicates possible depression (Crohnbach's α .73).(13) Increases in behavioural problems were measured with 6 behavioural items: wandering, verbal aggression, physical aggression, social disturbing behaviour, sexual unadapted behaviour and resists given care; scores from 0-4 (0 = not present, 1 = present but not in the last three days, 2 = present on 1 or 2 of the last 3 days, 4 = daily present). A minimal reliable change in the DRS and CPS, and behavioural problems were defined as an increase on these scales of more than one standard error of the mean between the first and second time assessment (DRS:0.030 , CPS: 0.021, increase of behavioural problems:0.033), as well as either one or more of the four items of possible delirium symptoms (c3a: easily distracted, c3b: episodes of disorganized speech, c3c: mental function varies over the course of the day and c4: acute onset and fluctuating course). Box 1 shows an overview of the translation.

Box 1: overview of translated items of inter RAI –LTCF in order to mimic the NH-CAM

NH-CAM (Dosa)	NH-CAM (inter RAI-LTCF)
1. B5f: mental function varies over the course of the day or E3: mood decline over the last 90 days	C3c: mental function varies over the course of the day or DRS scale: mood decline over the last 90 days
AND	AND
2. B5a: easily distracted	C3a: easily distracted
AND EITHER	AND EITHER
3. B5b: periods of altered perception or awareness of surroundings or B5c: episodes of disorganized speech or B6: cognitive decline over the last 90 days	C4 : acute onset and fluctuating course or C3b: episodes of disorganized speech or CPS scale: cognitive decline over the last 90 days
OR	OR
4. B5d: periods of restlessness or B5e: periods of lethargy or E5: behaviour decline over the last 90 days	E3: increase of behaviour problems over the last 90 days

1. Defining the Nursing Home Confusion Assessment Method (NH-CAM)._ CAM and NH-CAM identify subjects as having full delirium if features 1 and 2 are present with feature 3 or 4.
CAM and NH-CAM defined subjects as having no delirium if none of the four features are present.
DRS scale: Depression Rating Scale

PREVALENCE OF DELIRIUM Prevalence of delirium was defined as the presence of delirium (according to the NH-CAM) at the second assessment. The prevalence of delirium was determined using changes between the first two assessments. (Box 1)

INCIDENCE OF DELIRIUM A person was deemed to be an incident case when two criteria were met: 1) absence of delirium at baseline, 2) presence of delirium at at least one follow-up assessment. Criterion 1 was used to ensure that the analysis was restricted to the group at risk for delirium; criterion 2 to ascertain delirium status at one of the follow-up measurements. The incidence rates of delirium for nursing homes and residential care homes were calculated per 100 person-years by dividing the number of incident cases of delirium by the total observation time that the population at risk was free from delirium. Because drop-out could occur during follow-up, we calculated annual incidence rates per 100 person-years.

POTENTIAL RISK FACTORS To identify variables that predict the onset of delirium, several potential risk factors assessed at baseline were investigated, including socio-demographics, chronic diseases, care-related variables, psychological variables and functional variables.

The selection of potential risk factors was based on the risk factors known from previous studies.(6,14,15,16,17)
Demographic variables included: age dichotomized at the median (85 or older versus 0-84), gender (male /female).
Chronic diseases included: (a) depression, (b) Parkinson's disease, (c) diabetes, (d) dementia, (e) cardiovascular diseases (including cerebral vascular accidents, coronary disease, chronic heart failure, vascular diseases, cardiac arrhythmia and hypertension). These diseases were considered present when documented in the residents' medical record. They were based on family physicians' or specialists' diagnoses.
Care related variables included: use of bedrails, trunk restraints, and chair restraints, all coded as: daily presence yes/no.
Psychological variables included: anxiety observed in the last three days (present on at least 1 of the last three days/not present in the last 3 days), use of antipsychotics as noted on the medical list of the inter RAI-LTCF (yes/no).
Functional variables included: (a) urinary incontinence (daily presence yes/no),(b) fall incidents (at least one fall incident in the last 90 days yes/no),(c) fractures in last 30 days(yes/no),(d) ADL-dependency dichotomized at the mean : 0–17 versus 18–54, sum score of 9 items on help needed for activities of daily living (Crohnbach's alpha 0.95) in which a higher sum score reflects a higher dependency,(e) hearing impairment (having some difficulty and using a hearing aid yes/no), (f) visual impairment (having some difficulty and using glasses yes/no),(g) recent infections including pneumonia and urinary tract infections (observed in the last 30 days yes/no),(h) pain symptoms 0-2 versus 3-11 dichotomized at the median sum score of 4 items on frequency, intensity, duration and occurrences of pain observed in the last 3 days . The higher the sum score the more pain was observed. Internal consistency expressed in Crohnbach's alpha was 0.86. (i) Bedridden in the last 3 days (yes/no).

STATISTICAL METHODS

Prevalence of delirium was calculated by dividing the number of cases with delirium at baseline by the total number of eligible residents. Persons with prevalent delirium were excluded to calculate the incidence and analyze the risk factors of incident delirium. To determine the incidence of delirium we calculated the Incidence Rates for nursing and residential care home residents per 100 person-years. Logistic regression analyses were carried out to determine the combination of risk factors that best predicted the incidence of delirium. First, univariate analyses were used to select variables associated with incident delirium (p < 0.20). Second, these factors were entered in a multivariate regression model. Risk factors were removed manually with the stepwise backward selection procedure, until all variables showed a significant association with the outcome (p < 0.05). Time-to-first event was measured from the date of the second observation (baseline). Persons who were delirium-free during the entire follow-up period and persons who dropped out of the cohort were censored on the date of the event or at the date of their last assessment. Survival curves of the populations were compared by Cox regression analysis, adjusted for the variables, which were significantly related to the hazard (dementia, Parkinson's and fall incidents). Differences in the incidence of delirium between residential care and nursing homes were expressed with the hazard ratio. All analyses were carried out with SPSS version 15.0.

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RESULTS

STUDY SAMPLE A total of 828 residents of six nursing homes and 1365 residents of 23 residential care homes were included in the study on the prevalence of delirium. In order to analyze the incidence and risk factors for the onset of delirium, we selected the persons without delirium up to the first follow-up in nursing homes (n = 640) and residential homes (n = 1027). Characteristics of residents with and without prevalent delirium are presented in Table 1 for both homes separately. In the nursing homes a higher percentage of the residents with prevalent delirium were more ADL dependent, had dementia and daily urinary incontinence. In the residential care homes a higher percentage had dementia and was more ADL dependent. The total observation time of the study population in the nursing homes was 10.8 months and 15.5 months in the residential care homes.

Table 1 Characteristics of the nursing home and residential home residents with and without prevalent delirium at baseline

Patient characteristics N (%)	Residential care home		Nursing home	
	Prevalent delirium (n=112)	Prevalent delirium (n=74)	Population at risk (n=754)	Population at risk (n=1253)
Male	32 (28.6)	24 (32.4)	250 (33.2)	314 (25.1)
Older age (>85)	54 (48.2)	22 (30.1)	235 (31.2)	652 (52.2)
Widow(er)	78 (69.6)	31 (41.9)	364 (48.3)	802 (64.0)
Dementia	64 (57.7)	44 (62.9)	249 (34.3)	414 (33.9)
Parkinson	6 (5.4)	6 (8.6)	31 (4.3)	40 (3.5)
Depression	25 (22.5)	11 (15.7)	110 (15.2)	232 (19.0)
Cardiovasc.diseases	58 (52.3)	34 (48.6)	400 (55.1)	580 (47.5)
Diabetes	30 (27.0)	11 (15.7)	136 (18.7)	264 (21.6)
ADL dependency#	52 (47.7)	51 (81.0)	413 (65.5)	399 (33.3)
Daily incontinence of urine	36 (32.1)	46 (62.2)	310 (41.1)	344 (27.5)
Fall incidents	34 (30.4)	21 (28.4)	185 (24.5)	290 (23.1)
Bed rails restraints	20 (18.0)	35 (50.0)	413 (56.9)	158 (12.9)
Trunk restraints	1 (0.9)	7 (10.0)	40 (5.5)	8 (0.7)
Chair restraints	4 (3.6)	13 (18.6)	98 (13.5)	41 (3.4)

PREVALENCE AND INCIDENCE OF DELIRIUM The prevalence of delirium was 8.9% (74/828) in the nursing homes and 8.2% (112/1365) in the residential care homes. In the nursing homes 106 residents were newly diagnosed with delirium and in residential care homes 179 residents developed delirium. This corresponds with an IR of 20.7 per 100 person-years and 14.6 per 100 person-years for nursing and residential care homes respectively. The mean time until the first onset of delirium was 11.0 months in nursing homes and 11.2 months in residential care homes. Residents in nursing homes had a 1.5 higher risk of developing delirium (HR adjusted for dementia, Parkinson's and fall incidents: 1.5; 95% CI: 1.16-1.88; p = 0.001). The survival curves are presented in Figure 2.

Figure 2
— nursing homes
— residential homes
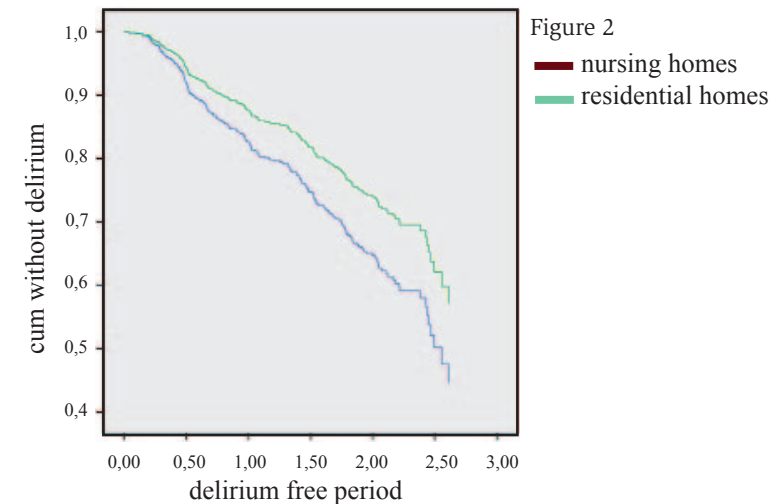
RISK FACTORS FOR THE ONSET OF DELIRIUM The univariate and multivariate relationships between the potential risk factors and the onset of delirium for both homes are presented in Table 2. From the multivariate model, we found chair restraints and dementia to be significant risk factors for incident delirium. In the residential care homes fall incidents and dementia were significant risk factors to developing delirium.

DISCUSSION

In this study we found a prevalence of delirium in both nursing homes and residential care homes of 8.9% and 8.2% respectively. The incidence was 20.7 per 100 person years in the nursing homes and 14.6 per 100 person years in the residential care homes. Residents in nursing homes had a 1.5 higher risk of developing delirium compared to residential care home residents. This may be related to the fact that persons in the nursing homes were more ADL dependent, had a higher rate of daily incontinence and were restrained more often (bed rails, trunk restraints and chair restraints). Multivariate analysis showed that the risk of developing delirium in the nursing homes was highest in patients with dementia, Parkinson's disease and those who were restrained in a chair. In the residential care homes, the risk of developing delirium was highest for residents with dementia and residents who had experienced at least one fall incident in the last 3 months. Both chair restraints and fall incidents have been reported previously as risk factors. These factors can be considered indicators of quality of care and are modifiable. The strengths of this study were the following: firstly, it represented a large sample collected from 6 different nursing homes and 23 different residential care homes. Secondly, this routine care cohort provided a strong external validity as residents were not excluded systematically and data collection did not depend on informed consent. This study also has some limitations. Firstly, using an updated version of RAI-LTCF our adjustment of the NH-CAM was partly identical to the NH-CAM Dosa et al. developed. Therefore, a direct comparison of the prevalence and incidence of delirium across studies should be done with caution. Secondly, neither the original NH-CAM nor our adjusted version was validated yet against a clinical diagnosis of delirium. The attention given with the assessment observations to changes in behaviour and cognitive function in demented residents may result in early detection of possible symptoms of delirium. Thirdly, given the fact that the population studied is very vulnerable, it is possible that the persons most at risk for developing delirium were lost in an

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Table 2: Independent risk factors for incident delirium in nursing homes and residential care homes

Risk factors	Nursing homes		Residential care homes	
	Univariable OR (95%CI)	Multivariable OR (95%CI)	Univariable OR (95%CI)	Multivariable OR (95%CI)
Socio-demographics				
Male	1.3 (0.8-2.0)		1.0 (0.7-1.5)	
Older age (>85)	1.2 (0.7-1.8)		1.1 (0.8-1.5)	
Chronic diseases				
Dementia	3.4 (2.2-5.3)**	3.1 (2.0-5.0)**	1.8 (1.3-2.5)**	1.8 (1.3-2.6)**
Depression	2.2 (1.3-3.7)**		1.4 (0.9-2.0)	
Parkinson	2.3 (1.0-5.3)*	2.4 (1.0-5.9)*	2.0 (0.9-4.2)	
Cardiovascular diseases	0.8 (0.5-1.1)		0.8 (0.6-1.1)	
Diabetes	0.6 (0.3-1.1)		0.8 (0.6-1.3)	
Care related variables				
Bed rails	1.0 (0.6-1.5)		1.3 (0.8-2.1)	
Chair restraints	2.3 (1.4-3.9)**	2.4 (1.3-4.4)**	0.9 (0.3-2.3)	
Trunk restraints	2.2 (1.1-4.6)*		1.0 (0.1-8.2)	
Psychological variables				
Anxiety	2.2 (2.0-4.0)*		1.5 (1.0-2.4)	
Use of antipsychotic agents	1.5 (0.9-2.7)		1.5 (0.9-2.5)	
Functional variables				
ADL dependency#	1.4 (0.9-2.4)		1.4 (1.0-1.9)	
Infection	1.3 (0.7-2.5)		1.1 (0.7-1.7)	
Visual impairment	1.1 (0.7-1.7)		0.9 (0.6-1.3)	
Hearing impairment	0.8 (0.5-1.4)		0.9 (0.6-1.2)	
Pain	0.9 (0.6-1.5)		1.0 (0.7-1.4)	
Fall incidents	0.8 (0.5-1.3)		1.8 (1.3-2.0)**	1.7 (1.2-2.5)**
Fractures	0.5 (0.2-1.1)		1.0 (0.5-2.0)	
Daily incontinence of urine	1.5 (1.0-2.3)		1.3 (0.9-1.9)	
Bedridden	1.1 (0.4-3.4)		2.4 (0.4-3.1)	

#Activities of daily living
*p-value < 0.05; **p-value < 0.01

early stage of the study. They were probably more often admitted in hospitals or scheduled for nursing home admission this may have caused an underestimation of the incidence. Fourth, the nursing assistants who completed the inter RAI-LTCF were trained to register observed behaviour objectively and were assisted by an expert-supervisor. Although unlikely, (systematic) errors in rating symptoms of delirium in residents could not completely be ruled out. Finally, the use of the inter RAI-LTCF may result in delirium being detected and treated earlier in comparison to homes that do not have routine outcome monitoring. The risk factors we found are probably related to the characteristics of our population (the

"oldest" old and most frail elderly), but also to the specific conditions of long-term care facilities where quality of care is under pressure nationally and internationally.

CONCLUSION

This study shows that delirium is a common condition in both nursing homes and residential care homes. In view of the identified risk factors, special attention should be paid to the use of restraints and fall incidents in residential homes in order to decrease the risk of delirium developing in these populations. Full attention should be paid to the training of staff responsible for the care of residents in both nursing homes and residential care homes in observing symptoms of delirium. The inter RAI-LTCF may be a good tool for the early identification and treatment of the risk factors of delirium, but other well-validated observation instruments are also available.(18,6,15,16,19) Policy in nursing homes should advocate that restraints are only used in strictly prescribed situations (20) and that management in residential care homes should pay more attention to the residents' environment in order to reduce fall incidents.

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CHAPTER 9

SUMMARY & GENERAL DISCUSSION
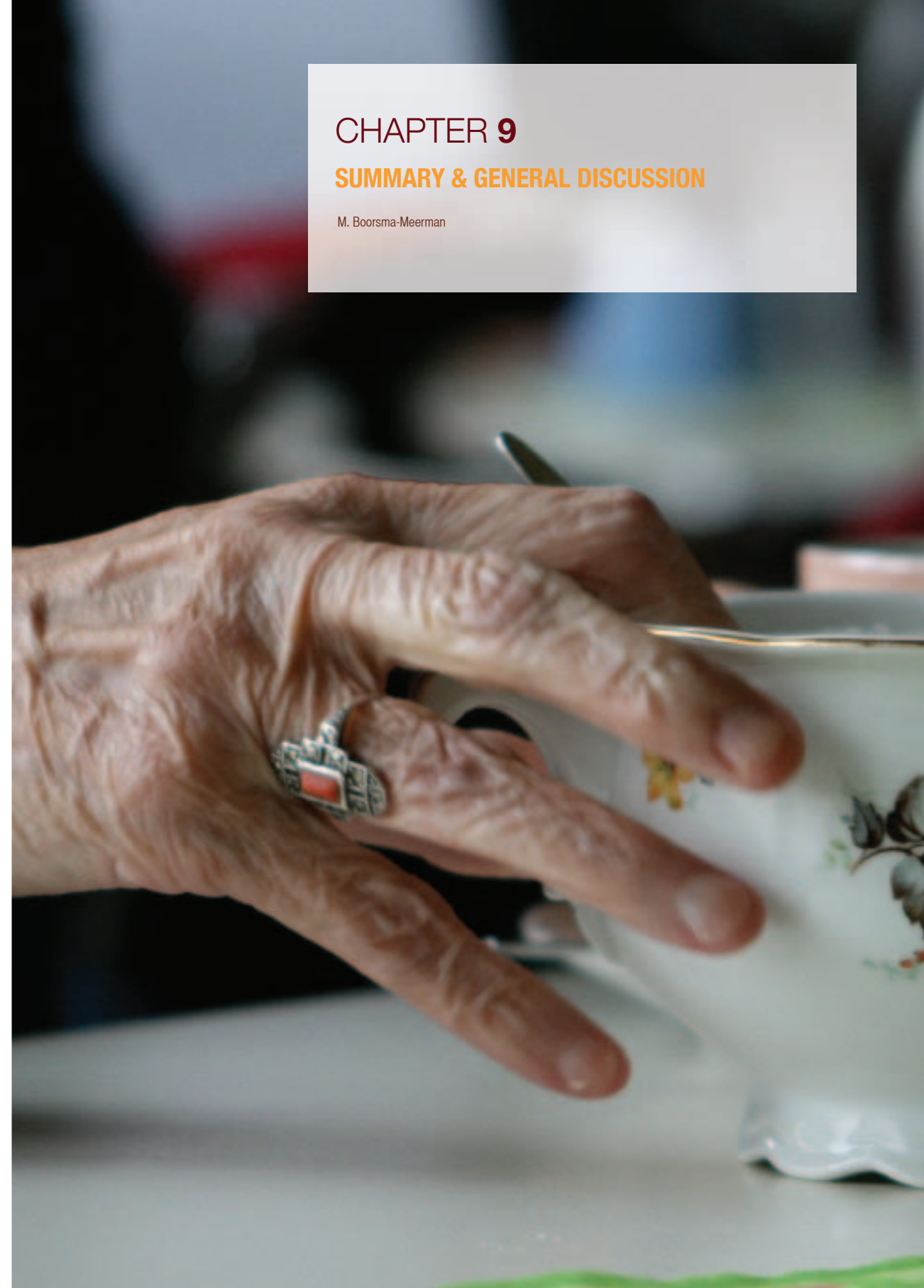
M. Boorsma-Meerman

CHAPTER **9**

SUMMARY AND GENERAL DISCUSSION

M. Boorsma-Meerman

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The main focus of this thesis was the effects of a multidisciplinary integrated care approach on quality of care. Moreover we studied the incidences of mental dysfunctions for residents in Dutch residential care homes and nursing homes. The initiative for this research project underlying this thesis was financially supported by the Netherlands organisation for health research and development (ZonMw). The research project started in 2007 and ended in June 2010. At the start of the project we realised that there are three main problem areas in current Dutch institutionalised aged care. Health care is insufficiently patient-orientated and integrated. The role of the elderly person and his/her environment is very limited. A greater degree of self-determination in the care process is possible, as well as a better alignment between the care and the care needs of the elderly person. In addition there is insufficient alignment between care providers. Health care providers are insufficiently timely in identifying frail elderly persons with unfulfilled care needs and health risks. Last but not least, knowledge and proven effective innovations are insufficiently implemented. The hypothesis was that implementing an integrated care approach on the basis of already existing principles of the chronic care model, would substantially improve the health care quality and by that the quality of life and well-being of the elderly living in de homes for the elderly. In this last chapter of the thesis we discuss the main findings, and some theoretical and methodological considerations. We will finalise the thesis with recommendations for further improving the quality of care for residents in residential care homes and future research on this complex group of patients.

MAIN FINDINGS

In chapter 3, the study on the effects of a multidisciplinary integrated care approach on the quality of care for and quality of life of residents in residential care homes compared to usual care is presented. This was studied in a pragmatic cluster randomised controlled trial involving ten Dutch residential care homes that included 462 residents with physical or cognitive disabilities. Five of the residential care homes applied multidisciplinary integrated care, and five provided usual care. The intervention consisted of three-monthly geriatric assessments of functional health including decision support with the inter RAI-Long Term Care Facilities instrument by trained nurse-assistants, discussion of the outcomes and care priorities with the family physician, the resident self and her/his family and finally monthly multidisciplinary meetings to discuss complex residents. The intervention homes performed significantly better on the sum score and on 11 out of 32 'quality of care' indicators. Moreover, less mortality and a tendency for more positive opinions on the quality of care by intervention residents was observed. Functional ability, number of hospital admissions and health-related quality of life remained comparable between the two groups. In the intention-to-treat analyses, no differences in disability or quality of care as seen through residents' eyes were found between the two groups of facilities. In the per-protocol analysis, residents in the intervention facilities tended to be more positive. Process of care outcomes indicate that training and empowerment of nurse-assistants, which was completed for all intervention homes, together with monitoring using the geriatric assessment instrument, were likely to be the most important ingredients for improvement of the quality of care. To conclude, compared with usual care, the multidisciplinary integrated care approach resulted in a higher quality of care for elderly people in residential care homes.

In chapter 4, we present the study of cost-effectiveness of the multidisciplinary integrated care approach. The economic evaluation was conducted from a societal perspective. Outcome measures included a weighted sum score of Quality of care indicators, functional health (COOP WONCA) and Quality Adjusted Life-Years (QALY). Missing cost and effect data were imputed using multiple imputations. Bootstrapping was used to analyze differences in costs and cost-effectiveness. The difference in costs between the usual care and multidisciplinary integrated care was not significant. The costs of providing multidisciplinary integrated care were at most €225 per resident, including implementation costs. Total costs were €2,061 in the intervention group and €1,656 for the usual care group (mean difference €405). The probability that the intervention was cost-effective was 0.95 or more for ceiling ratios larger than €129 regarding patient related quality of care. A multidisciplinary integrated care approach may be considered cost-effective in comparison with usual care.

In chapter 5, a study of the impeding and facilitating factors of the implementation of a geriatric assessment instrument (inter RAI-LTCF) as a driving element of multidisciplinary integrated care is described. These factors were studied in the initial phase and 3 years after using a mix of quantitative and qualitative methods. These methods comprised surveys, semi structured interviews and in-depth interviews. Facilitating factors at introduction were positive opinions of nurse-assistants and family physicians about the changes of the process of care and the anticipated improvement of quality of care. Nurse-assistants were positive about the applicability of the software to support the inter RAI-LTCF assessments. Impeding factors were time constraints to complete inter RAI-LTCF assessments and insufficient computer equipment. In the maintenance phase, the positive attitude of the manager and the perceived benefits of the care model were most important. Impeding

factors after 3 years remained the lack of time to complete the assessments and lack of sufficient computer equipment. We concluded that impeding and facilitating factors were comparable in the initial and maintenance phase. Adoption of the inter RAI-LTCF assessment method depended on positive opinions of staff and management, continuing support of staff, predominantly in time, training and coaching, and the availability of sufficient computer equipment.

In chapter 6, a study on the incidence of depression and its associated risk factors in Dutch nursing homes compared with the incidence and associated risk factors in residential care homes, is described. Data were extracted from the Long Term Care Facility (inter RAI-LTCF) version of the Resident Assessment Instrument which was filled in a routine care cohort for a total of 3627 residents. 621 residents of 6 nursing homes and 988 residents of 23 residential care homes were included in the analyses. The incidence rate was 13.6 per 100 person-years and 10.2 per 100 person-years for residents of nursing homes and residential care homes respectively and higher than previous reported incidences. The independent risk factors for incident depression in residents of nursing homes included dementia and a score of three or higher on the Depression Rating Scale. The risk factors in residents of the residential care homes included being male , having a cancer diagnosis and a score of two or higher on the Cognitive Performance Scale. Age over 85 showed to be protective in both settings. Hearing impairment showed to have a protective effect in the residential care homes and use of hearing aid in the nursing homes.

In chapter 7, a study on possible under diagnoses of depression in demented residents in residential care homes is described. In this cross-sectional study the prevalence of diagnosed depressive disorders and observed mood symptoms between demented and non-demented residents of Dutch residential care homes were compared. Routine outcome measurements by trained nurse assistants using the Resident Assessment Instrument of residents in sixteen residential care homes, were analysed in this study. No statistically significant difference was found between demented and non-demented residents in the presence of diagnosed depressive disorders. However, the observed mood symptoms were more prevalent in persons with dementia than in people without dementia. Among persons with mood-symptoms, demented residents were less likely to be diagnosed with a depressive disorder than non-demented residents. We concluded that the prevalence of diagnosed depressive disorders was comparable between demented and non-demented residents. However, demented residents suffered more from mood symptoms and may be at risk of under-diagnosis of depression.

In chapter 8, the prevalence and incidence of delirium in residents of residential care homes and nursing homes was reported as well as the risk factors associated with the onset of delirium. Data were extracted from the Long Term Care Facility (inter RAI-LTCF) version of the Resident Assessment Instrument which was filled in a routine care cohort for a total of 3627 residents. 828 residents of 6 nursing homes and 1365 residents of 23 residential care homes were included in the analyses. Delirium was defined as a positive score on the adjusted Nursing Home–CAM. The prevalence of delirium was 8.9% in the nursing homes and 8.2% in the residential care homes. The incidence was highest in the nursing homes with 20.7 versus 14.6 per 100 person years. The higher percentage of delirium found in nursing homes may be related to the fact that persons in the nursing homes were more ADL dependent, had a higher rate of daily incontinence and were restrained more often (bed rails, trunk restraints and chair restraints). Multivariate analysis showed that the risk of developing delirium in the nursing homes was highest in patients with dementia, Parkinson's disease, and those who were restrained in a chair. In the residential

care homes, the risk of developing delirium was highest for residents with dementia and residents who had experienced at least one fall incident in the last 3 months. These factors can be considered indicators of quality of care and could be modifiable. The risk factors that we found are probably related to the characteristics of our population (the "oldest" old and most vulnerable elderly), but also to the specific conditions of long-term care facilities where the quality of care is under pressure nationally and internationally. We concluded that the prevalence and incidence of delirium was high in both nursing homes and residential care homes. More focus on modifiable risk factors such as the use of restraints in nursing homes and fall incidents in residential care homes may help to prevent delirium.

THEORETICAL AND METHODOLOGICAL REFLECTION

THEORETICAL The elements of the chronic care model according to Wagner et al. comprise a clinical information system, decision support, delivery system, and self management support that lead to productive interactions between prepared proactive practice teams of care providers and informed activated patients.(12) Moreover, the individual interaction between elderly people living in residential care homes and the nurse-assistant who has a direct responsibility, contributed to the improved outcomes in our study. In order to get this result we adapted the principles of the chronic care model to suit institutionalised elderly people. All of these elements were applicable with the exception of self management support. The latter was hampered by severe disablement and cognitive impairment of the majority of the residents. Therefore, we trained the nurse-assistants in systematically monitoring residents and better communication with the residents, medical staff and families. The introduction and implementation of the multidisciplinary integrated care approach we used was as expected complex and demanded a substantial effort of the care organization. The implementation of the three monthly assessments with inter RAI-LTCF as a driving element of the multidisciplinary integrated care approach demanded the greatest effort on the part of the organisation, and the good use of this instrument is vital for the performance of the model. The impeding factors are described in chapter 5. The most persistent impeding factors concerned the shortage of time and lack of sufficient equipment, such as enough and good working computers. Therefore quarterly assessments of the residents proved to be impossible to maintain. So after the study period the number of assessments was diminished to every six months. Despite these barriers the implementation in the ten participating residential care homes in this study was introduced as routine daily care.

METHODOLOGICAL This study is one of the few studies that targets care in residential care homes. Its pragmatic study design resembles clinical practice to a high degree, which increases the relevance of the study results. An additional strong point of this study is the fact that this is the first cost-effectiveness analysis study investigating the Inter RAI-LTCF in this particular population. Our main study was limited by the fact that the participants were frail elderly people living in residential care homes and comprised a high percentage of cognitively impaired residents. As a result, a portion of the data was collected from interviews with proxies. The judgments of proxies may have differed from the residents' judgments. Therefore, we adjusted for proxy interview and cognitive status in our analyses. The cluster randomization produced an imbalance between the intervention and control homes in the number of participating residents and in some of the functional characteristics of the residents at baseline. Although we adjusted for the imbalance in functional characteristics, imbalance in the number of participating residents may have led to underpowered results. Variation across the intervention facilities in the application of

the complete protocol (3%–66%) was another limitation. This variation can be explained by financial and administrative issues during the study period. The financial obligations for residential care facilities resulting from a new national funding system for residential care of elderly people caused uncertainty about job continuation, high turnover of managers and new priorities at the homes in this study. We found that functional ability, number of hospital admissions and health-related quality of life remained comparable between the multidisciplinary integrated care group and usual care group. In the intention-to-treat analyses, no differences in disability or quality of care as seen through residents' eyes were found between the two groups of facilities In the per-protocol analysis, residents in the intervention facilities tended to be more positive about the quality of care. Health related quality of life was measured using a short-form 12-item version of the Rand Health Insurance Study questionnaire.(11) It is known by previous studies that elderly people aged over 85 have higher scores except for social functioning than elderly people aged 75-84. The oldest old may have lower standards of living. Many friends and relatives are already deceased or suffer from chronic diseases.(11) This may explain the fact that we did not find differences in health related quality of life between the intervention group and the control group. Elderly people living in residential care homes have a heterogeneous mix of chronic conditions that naturally erode health over time, which makes it difficult to know if an intervention of this sort would be able to override the downward trend of health states associated with chronic conditions in such a short time span. As the duration of the trial was short, sensitive instruments were vital. Perhaps the generic quality of life outcome variables were not sensitive enough to pick up differences within such limited time interval. Data used for studies on depression and delirium were extracted from the VU naturalistic cohort on routine care monitoring with the Minimum Data Set of the Resident Assessment Instrument. Regarding the international large samples of assessments with the inter RAI versions and its reliability the outcomes of inter RAI assessments will represent the clinical health status of the resident.(2;6-8) Such data are regularly national and international used for research and are recommended.(4) All current medical diagnoses relevant for the personal care plan are recorded in the disease diagnosis part of the inter RAI-LTCF. An important strength of using these data is the significant external validity: no selection of subjects was made for the data collection as this was part of routine care independent of the resident's cooperation. This enabled us to include residents who would be excluded in other studies because of physical illness, cognitive dysfunction, insufficient communication or refusal. Although the nursing assistants who completed the RAI-LTCF were trained to register observed behaviour objectively and were assisted by an expert-supervisor, (systematic) errors in rating symptoms in residents could not completely be ruled out. For the study on incidences and associated risk factors of delirium we used the Nursing Home–Confusion Assessment Method (NH-CAM) developed by Dosa et al. As we used data from an updated version of interRAI-LTCF, we had to translate our items into the items of the NH-CAM. Although the fact that the original NH-CAM was found to have good face and content validity neither the original NH-CAM nor our adjusted version was validated yet against a clinical diagnosis of delirium.

PRACTICAL IMPLICATIONS AND RECOMMENDATIONS

The results of this study are suitable for settings such as residential care homes and nursing homes and even for elderly living in a community. In all of the primary care settings it may be beneficial to have a model to monitor the chronically ill and elderly to prevent a functional decline and acute hospitalisations. It is also important to have an instrument that not only delivers output on the patient levels but also on the management level. It should facilitate managers to monitor and increase the quality of care in a sector of health

care that is under enormous societal pressure to improve performance. The inter RAI-LTCF is such an instrument. Future research should look at the reasons as to why the residents in the multidisciplinary integrated care group were satisfied with the multidisciplinary integrated care approach and why it did not translate over to the other clinical outcome variables. Longer term cost-effectiveness analysis will provide a more reliable outcome as the results in this study were relatively short term.

FUTURE IMPLICATIONS

Many is already written about the deficiencies in care for patients with chronic diseases and for elderly people. Despite reports and recommendations of national and international Health Councils less than expected is accomplished and quality of care is under pressure. (3;5;9;10) The multidisciplinary integrated care approach as a variation on the chronic care model, does not offer a quick and easy fix; it is a multidimensional solution to a complex problem. However it is a tangible guide to improve practice and not an abstract theory. (1) It demands a paradigm shift of professionals, from individual responsibility to team responsibility with a higher contribution of non-physician personnel and a more central role for nurses. It demands better collaboration with primary care physicians, elderly care physicians and other professionals specialized in chronic care. Financial barriers should be eliminated and care providers should initiate the elements of the chronic care model. This study showed that it can be done.(1) Our study presents a substantial improvement in quality of care already achieved in a 6 months period. The nurse-assistants, the family physicians, the elderly care physician and psychologist representing the pro- active care team in our study were enthusiastic and still embracing all elements of this approach in their daily routine. The residents of the ten residential care homes and their family or relatives were satisfied with the improvement of the quality of care. This care model is also applicable in primary care settings to improve the quality of care for community dwelling elderly people. In these times of incredible visualisation possibilities you cannot sell a new care model on paper! To visualise the care process in a multidisciplinary integrated care approach we have made a professional movie with the funds of the vocational training institutes for family physicians and elderly care physicians led by the audiovisual centre of the VU. This movie has been made in one of the studied residential care homes with the co-operation of the residents and their relatives, staff, family physicians, elderly care physicians and psychologists. Besides for the main movie, you can also find a very nice instructional part for the use of inter RAI-LTCF. This fine movie can be seen at *www.nedrai.nl*.

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NEDERLANDSE SAMENVATTING

M. Boorsma-Meerman

Samenvatting

NIEUW IN OUD: EVALUATIE VAN EEN GERIATRISCH ZORG MODEL. EN STUDIES IN NEDER-LANDSE VERZORGINGSHUIZEN.

Kwaliteit van zorg in verzorgingshuizen staat wereldwijd onder druk. De zorg voor de bewoners is complexer geworden door veroudering van de bewoners en beperking van het aantal verpleeghuisbedden. Het verzorgend personeel van verzorgingshuizen is vaak onvoldoende opgeleid om de toenemende complexiteit van de zorg aan te kunnen. De meeste zorgorganisaties willen wel innoveren en hun kwaliteit verbeteren maar missen de expertise en financiële middelen . Huisartsen zijn verantwoordelijk voor de medische zorg in de verzorgingshuizen maar voelen zich vaak onvoldoende uitgerust qua tijd en kennis om deze complexe zorg te leveren. Effectieve interventies voor chronisch zieken is in het algemeen afhankelijk van een multidisciplinaire benadering. Een dergelijke benadering omvat een gestructureerde geriatrische beoordeling, geprotocolleerde controle op medicatie, ondersteuning van de patiënt in het zelf beslissingen nemen en een intensief volgen van de patiënt. Bewoners van verzorgingshuizen hebben vaak meerdere chronische ziekten en worden door de gevolgen van deze ziekten bedreigd in hun functionele autonomie. Wij ontwikkelden daarom een multidisciplinair integraal zorgmodel volgens het principe van het Chronisch Zorgmodel van Wagner et al. Dit multidisciplinaire integrale zorgmodel is niet gericht op de chronische ziekte zelf maar op de handicaps die chronische ziekten met zich meebrengen. Het omvat een drie maandelijkse beoordeling van de bewoners met behulp van de voor langdurige zorg ontwikkelde versie van het Resident Assessment Instrument (inter RAI-LTCF). Wij hebben de gebruiksvriendelijke internet applicatie genaamd RAIview gebruikt in ons onderzoek. Dit instrument bestaat uit een, alle domeinen van de geriatrie omvattende, vragenlijst die gekoppeld is aan probleemsignaleringen die de verzorgende een direct overzicht geven over de actuele gezondheidstoestand, de zorgbehoefte en de mogelijkheden van de bewoner. De probleemsignaleringen zijn weer gekoppeld aan protocollen die de verzorgende helpen meer inzicht te krijgen in de aard en mogelijke aanpak van de gesignaleerde problemen. Aan de hand van de gesignaleerde problemen kan de verzorgende samen met de bewoner en of zijn familie een zorgplan opstellen naar de wensen van de oudere zelf. Dit zorgplan wordt besproken met de huisarts en de verzorgende zet de afgesproken acties in gang en vervolgd de effecten daarvan. Ouderen met complexe zorgbehoeften kunnen in een multidisciplinair overleg (MDO) met de verantwoordelijke verzorgende (evv'er), de huisarts, specialist ouderengeneeskunde en psycholoog besproken worden. Indien nodig kan de huisarts de specialist ouderengeneeskunde in consult vragen in complexe situaties. Er zijn bij ons weten tot nu toe geen studies gedaan naar de effecten van een dergelijk zorgmodel op de functionele gezondheid en kwaliteit van zorg bij bewoners van verzorgingshuizen. De effecten van het multidisciplinaire integraal zorgmodel op de kwaliteit van zorg en de kosten van een dergelijk zorgmodel vormen het belangrijkste onderwerp van deze studie.

In hoofdstuk 2 wordt het studie ontwerp beschreven.

In hoofdstuk 3 worden de uitkomsten van de studie naar de effecten van het multidisciplinair integraal zorg model op kwaliteit van zorg en kwaliteit van leven voor bewoners van verzorgingshuizen beschreven. Het betreft een cluster gerandomiseerde gecontroleerde studie met 462 deelnemers. De studie is uitgevoerd in tien verzorgingshuizen in de regio West-Friesland die allen behoren tot één zorgorganisatie. In vijf verzorgingshuizen werd het nieuwe zorgmodel geïntroduceerd en de vijf nader huizen dienden als controle huizen en leverden de gebruikelijke zorg. Ondanks het feit dat er slechts zes maanden gemeten kon worden heeft het multidisciplinair integraal zorgmodel in de interventie huizen een indrukwekkende verbetering van de kwaliteit van zorg teweeg gebracht. De interventie huizen scoorden op 30 van de 32 gemeten kwaliteitsindicatoren voor zorg beter (waarvan 11 significant) dan de controle huizen. De bewoners in de interventiehuizen beoordeelden de kwaliteit van zorg positiever dan de bewoners in de controle huizen. Meer dan 50 % van de verzorgende en de betrokken huisartsen vonden hun deskundigheid verbeterd met gebruik van het inter RAI-LTCF. Ruim 80 % van de huisartsen en ruim 64 % van de verzorgende vonden het multidisciplinaire overleg inhoudelijk verbeterd. Iets minder dan 53 % van de verzorgende gaf aan beter op de hoogte te zijn van de gezondheidstoestand van hun bewoner en dat gold voor bijna 64 % van de huisartsen.. Bijna 60 % van de verzorgende en ruim 81 % van de huisartsen vonden de samenwerking verbeterd. Hieruit kon geconcludeerd worden dat de ondersteuning van de verzorgende door training en coaching in het gebruik van een geriatrisch beoordelingsinstrument ingebed in de andere onderdelen van het zorgmodel belangrijke ingrediënten zijn voor verbetering van kwaliteit van zorg.

Het vierde hoofdstuk beschrijft de studie naar de kosten van het multidisciplinaire integrale zorgmodel. De economische evaluatie is uitgevoerd vanuit een sociaal perspectief.

De uitkomsten omvatten een gewogen som score van kwaliteit van zorg indicatoren, functionele gezondheid (COOP WONCA) en kwaliteit van leven (QALY). De kosten van de toepassing van het multidisciplinaire zorgmodel waren ongeveer 225 euro per bewoner. De totale kosten bedroegen in de interventie groep 2,061 euro en in de controle groep 1,656 euro (gemiddeld verschil: 405 euro). Daar staat de indrukwekkende verbetering van kwaliteit van zorg tegenover. Of een multidisciplinaire integrale zorgbenadering beschouwd worden als kosten effectief ten opzichte van gebruikelijke zorg, hangt mede af van de bereidwilligheid van beleidsmakers in de zorg om te investeren in kwaliteit van zorg.

Vervolgens wordt in hoofdstuk 5 de implementatie van het geriatrische beoordelings-instrument (inter RAI-LTCF) als onderdeel van het geïntroduceerde zorgmodel bestudeerd. Het onderzoek naar belemmerende en bevorderende factoren werd op twee momenten in de tijd uitgevoerd; namelijk in de introductiefase en in de continueringfase na drie jaar met behulp van een combinatie van kwalitatieve en kwantitatieve methodes. Deze methodes omvatten vragenlijsten, semigestructureerde interviews en diepte interviews. Bevorderende factoren in de introductiefase waren de positieve meningen van de verzorgende en huisartsen over de veranderingen van het zorgproces en de kwaliteit van zorg. Ruim 80 % van de verzorgende geeft aan tevreden te zijn over de mogelijkheden van het inter RAI-LTCF voor coördinatie van het zorg proces Ook waren de verzorgende positief over de gebruiksvriendelijkheid van RAIview (de internet applicatie van inter RAI-LTCF). Belemmerende factoren waren tijdgebrek van de verzorgende en onvoldoende beschikbaarheid van computers. In de continueringfase bleken de positieve houding van de manager en de ervaren voordelen van het zorgmodel de belangrijkste bevorderende factoren te zijn. Maar ook in deze fase waren het tijdgebrek van de verzorgende en onvoldoende beschikbaarheid van computers de belangrijkste belemmerende factoren. De conclusie uit dit onderzoek is dat de belemmerende en bevorderende factoren in de introductie fase en continueringfase vergelijkbaar zijn. De mate van acceptatie van de RAIview beoordelings methode is afhankelijk van de positieve mening van verzorgende en management, de continue ondersteuning van verzorgende en de beschikbaarheid van voldoende computer uitrusting.

Hoofdstuk 6 tot 8 bevat studies naar het voorkomen van depressie en delier en de daarbij behorende risico factoren bij verzorgingshuisbewoners en verpleeghuisbewoners in Nederland. Beide aandoeningen hebben een negatief effect op de kwaliteit van leven en zijn met name bij dementerende bewoners moeilijk te herkennen. Deze studies zijn

uitgevoerd met behulp van data uit de RAI database van het VU medisch centrum.

In hoofdstuk 6 wordt de incidentie van depressie en de risico factoren voor het krijgen van een depressie voor bewoners in 23 verzorgingshuizen en in zes verpleeghuizen onderzocht en vergeleken. Data van in totaal 3627 bewoners waarvan 621 in de verpleeghuizen en 988 in de verzorgingshuizen zijn voor deze studie gebruikt. Deze data zijn verkregen middels invulling van inter RAI-LTCF als onderdeel van gebruikelijke zorg in deze huizen. De incidentie bedroeg 13.6 per 100 persoonsjaren voor verpleeghuisbewoners and 10.2 per 100 persoons-jaren voor verzorgingshuisbewoners. Deze incidenties zijn hoger dan die uit eerdere studies. De risico factoren voor het krijgen van een depressie waren in de verpleeghuizen dementie en een score van drie of hoger op de Depressie Schaal (Depression Rating Scale of DRS , één van de uitkomst schalen van het interRAI-LTCF). De risico factoren in de verzorgingshuizen omvatten het man zijn, enige vorm van kanker en een score van 2 of hoger op de Cognitief Presteren Schaal (Cognitive Performance Scale of CPS, uitkomst schaal van inter RAI-LTCF). Het ouder zijn dan 85 bleek een beschermend effect te geven in beide voorzieningen en gehoorverlies bleek dat te zijn in de verzorgingshuizen en het gebruik van een hoorapparaat in de verpleeghuizen.

Hoofdstuk 7 bevat een studie naar verschillen in depressie bij dementen en niet dementen en de vraag was of depressie bij dementen minder goed herkend wordt. Er werd geen significant verschil gevonden tussen demente en niet demente bewoners van verzorgingshuizen wat betreft het aantal gediagnosticeerde depressies. Echter bij dementen was de prevalentie van waargenomen stemming stoornissen hoger dan bij niet demente bewoners. In deze groep kregen dementen minder vaak de diagnose depressie met het risico onder behandeld te worden.

Hoofdstuk 8 gaat over de prevalentie en incidentie van delier en de daarbij behorende risico factoren bij bewoners van 23 verzorgingshuizen en 6 verpleeghuizen. De gegevens van in totaal 3627 bewoners waarvan 828 in de verpleeghuizen en 1365 in de verzorgingshuizen zijn in deze studie gebruikt. Deze gegevens zijn beschikbaar in de VU data base en met routine matig gebruik van inter RAI-LTCF als onderdeel van de gebruikelijke zorg in deze huizen verzameld. In deze studie vonden we een prevalentie van delier van 8.9% in de verpleeghuizen en 8.2 % in de verzorgingshuizen. De incidentie van 20.7 per 100 persoon jaren in de verpleeghuizen en 14.6 per 100 persoon jaren in de verzorgingshuizen bevestigden ons vermoeden dat de bewoners van deze type huizen een groot risico lopen op het ontwikkelen van een delier. De bewoners van verpleeghuizen hebben een 1.5 keer zo groot risico om een delier te krijgen als de bewoners van verzorgingshuizen. Dit zou kunnen samenhangen met het feit dat bewoners van verpleeghuizen meer ADL afhankelijk zijn, een hoger percentage van dagelijkse incontinentie hebben en vaker gefixeerd waren (bedhekken, lichaamsfixatie en fixatie in de stoel). Als risicofactoren voor het krijgen van een delier kwamen in de verpleeghuizen dementie, de ziekte van Parkinson en gefixeerd zijn in de stoel naar voren. Voor de bewoners van de verzorgingshuizen waren de risicofactoren dementie en minstens één keer gevallen zijn in de laatste 3 maanden. Zowel fixatie in de stoel als valincidenten zijn al eerder gerapporteerd als risico factoren. Deze factoren kunnen ook beschouwd worden als risico indicatoren voor kwaliteit van zorg en kunnen mogelijk verbeterd worden.

CONCLUDEREND

Kunnen we zeggen dat het invoeren van een multidisciplinair integraal zorgmodel in verzorgingshuizen, zoals in onze studie, een indrukwekkende verbetering van kwaliteit van zorg kan geven. Binnen dat zorgmodel zijn het coördineren en monitoren van zorg door getrainde verzorgenden de belangrijkste ingrediënten. Het trainen en coachen bestond uit het leren uitvoeren van een halfjaarlijkse geriatrische beoordeling, het opstellen van een

zorgplan waarin de wensen van de bewoner centraal staat en het leren bespreken daarvan met de huisarts. Het multidisciplinaire overleg bleek in dit zorgmodel door de structurering middels het zorgplan inhoudelijk kwalitatief verbeterd waardoor deze overleggen voor de huisarts rendeerden. Of een dergelijk zorgmodel als kosten effectief beschouwd kan worden hangt mede af van de bereidheid van beleidsmakers om in kwaliteit van zorg te investeren. Verder is gebleken dat depressie en delier niet alleen veel voorkomen bij bewoners van verzorgingshuizen en verpleeghuizen maar ook veelvuldig tijdens het verblijf in de instelling ontstaan. Beide aandoeningen tasten de kwaliteit van leven ernstig aan en hebben, als zij niet op tijd herkend en behandeld worden, een slechte prognose. De meest kwetsbare groep met risico op onderdiagnose blijkt de groep dementerenden te zijn. Het gebruik van een beoordelingsinstrument zoals de internet applicatie van inter RAI-LTCF (RAIview) kan een belangrijk hulpmiddel zijn voor de verzorgende om depressie en delier op tijd te herkennen.Het onderzochte zorgmodel kan zonder al teveel aanpassingen in zowel verzorgingshuizen , verpleeghuizen als bij thuiswonende kwetsbare ouderen ingezet worden. Ook in de eerste lijn kan een zorg model dat geschikt is om chronisch zieken en kwetsbare ouderen te vervolgen teneinde functionele achteruitgang en acute ziekenhuisopnames te voorkomen gunstig uitpakken. Het is daarbij ook van belang om een instrument te hebben dat niet alleen uitkomsten op patiënt niveau levert maar ook op management niveau waardoor het management in staat is te sturen op kwaliteit. De Resident Assessment Instrumenten, waarvan de inter RAI-LTCF versie gebruikt is in deze studie, is tot nu toe het enige instrument dat zo compleet is. Daarbij levert dit instrument belangrijke onderzoeksdata, die in deze kwetsbare patiënten groep moeizaam te verzamelen zijn. .

TENSLOTTE

In deze snelle tijd verkoopt een zorgmodel niet op papier! Om het zorgproces binnen het multidisciplinaire integrale zorgmodel te visualiseren hebben we met subsidie van het audiovisuele centrum van de VU een professionele film laten maken. Deze film is gemaakt in één van de verzorgingshuizen en met medewerking van bewoners, personeel, huisarts, specialist ouderengeneeskunde en psycholoog. Naast de hoofdfilm staat er ook een enthousiasmerende instructiefilm voor het gebruik van inter RAI- LTCF op de DVD. Deze prachtige film is te zien op *www.nedrai.nl.*

ABOUT THE AUTHOR

M. Boorsma-Meerman

About the author

The author of this thesis was born on October 7 th, 1949 in Vlaardingen, the Netherlands. She graduated from Secondary School in 1967 and started medical studies in September of that same year at the VU university in Amsterdam. After obtaining her medical degree in November 1974, she parted with her husband Pieter (a plant breeder graduated from Agriculture University Wageningen) for Morocco. She lived in Rabat and worked in Salé in a Rehabilitation Centre (Hôpital El Ayachi) for three years. After returning to Holland and already the proud mother of three little children she worked as a consultation physician for children from 0-4 years old in Enkhuizen. When the fifth and the last child reached the age of four years she started the two year course to become a family physician (1989-1991).

She had a wonderful time in a partnership with Giel Nijpels as a family physician in Gezondheidscentrum Risdam in Zwaag. This lasted about ten years and ended because Giel Nijpels became a professor at the VU university in Amsterdam. She accepted a job in a nursing home in Hoorn and completed the two year course to become a elderly care physician (2002-2004). The study for this thesis started in 2005 while she was working as an elderly care physician in the *Omring care organisation* in Hoorn.

DANKWOORD

M. Boorsma-Meerman
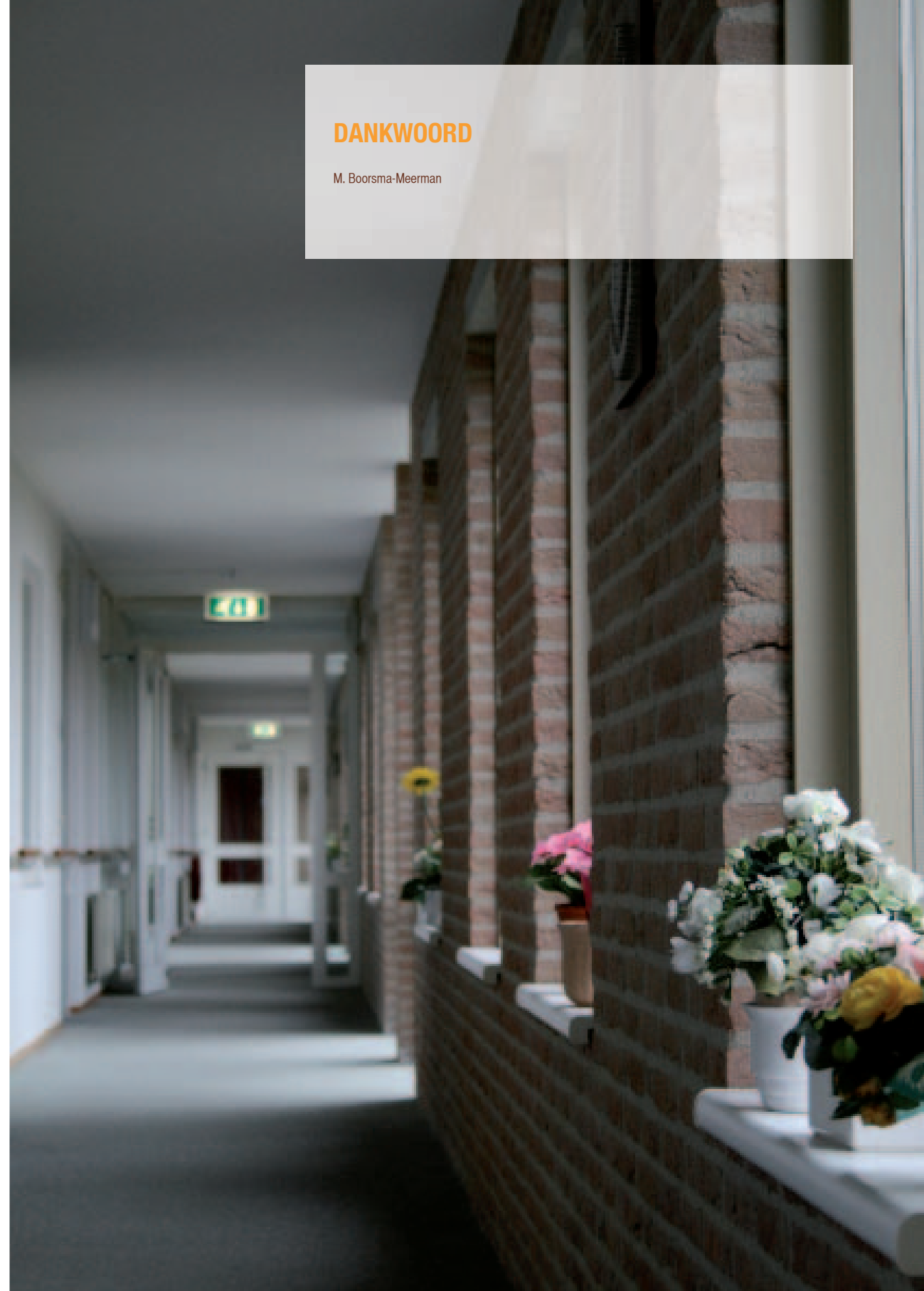
Dankwoord

Dat dit proefschrift er nu ligt is aan heel veel mensen te danken. En wel zoveel dat ik waarschijnlijk mensen vergeet te noemen. Daarvoor bij voorbaat excuus. De volgorde waarin ik mensen noem is ook volstrekt willekeurig en houdt geen enkel verband met de mate van ondersteuning.

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Ik wil Marlies en Don, evv'er en teamcoach van verzorgingshuis Almere in Opperdoes en Manja, psycholoog apart noemen omdat jullie ook nog aan de film mee wilde werken en daarmee een beetje beroemd zijn geworden.

Alle huisartsen in West Friesland die meegewerkt hebben aan dit onderzoek hartelijk dank. Jullie hebben het zorgmodel omarmd en zijn er vandaag aan de dag nog steeds enthousiast over. Ik wil Cees speciaal bedanken voor zijn rol in de film.

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Miriam jij hebt als coördinator van TRAFO (een organisatie voor extramurale projecten in West Friesland, waarin het ziekenhuis, de huisartsen en de zorgorganisaties vertegenwoordigd zijn) voor een duurzaam draagvlak gezorgd binnen het bestuur van TRAFO, waardoor het project ondanks de vele bedreigingen toch door kon blijven gaan. Je

bent een bijzonder mens voor mij.
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Giel jou dank ik voor het feit dat we niet los komen van elkaar en daar genoegen in scheppen.
Jij kan mijn eigengereidheid en ongrijpbaarheid verdragen.

Hein; het was een 'hell of a job' om iemand zoals ik tijdens een promotie traject te begeleiden. Ik vind dat je het fantastisch hebt gedaan en hoop dat we nog wat leuke projecten in de zorg kunnen realiseren voordat ik echt met pensioen ga.
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Karlijn; zonder jou waren de laatste artikelen niet gepubliceerd. Gelukkig vergeleek je mijn gestuntel altijd met dat van je moeder en daarom kon je erom lachen.

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Zonder een fantastisch thuis en al meer dan 40 jaar dezelfde vent was ik hier nooit aan begonnen. Pieter; jij en ik hebben een onverwoestbare band en vijf zeer inspirerende kinderen met dito aanhang én een prachtig kleinkind. Ik ben de rijkste vrouw van de wereld.

APPENDIX

interRAI Long-Term Care Facility (LTCF) ©
[CODE FOR LAST 3 DAYS, UNLESS OTHERWISE SPECIFIED]

SECTION A. IDENTIFICATION INFORMATION

1. NAME

a. (First)   b. (Middle Initial)   c. (Last)   d. (Jr/Sr)

2. GENDER
1. Male
2. Female

3. BIRTHDATE
Year   Month   Day

4. MARITAL STATUS
1. Never married
2. Married
3. Partner / Significant other
4. Widowed
5. Separated
6. Divorced

5. NATIONAL NUMERIC IDENTIFIER [EXAMPLE - USA]
a. Social Security number

b. Medicare number (or comparable railroad insurance number)

c. Medicaid number
[Note: "+" if pending; "N" if not a Medicaid recipient]

6. FACILITY / AGENCY PROVIDER NUMBER

7. CURRENT PAYMENT SOURCES FOR INPATIENT STAY [EXAMPLE - USA]
[Note: Billing Office to indicate]
0. No   1. Yes
a. Medicaid
b. Medicare
c. Self or family pays for full per diem cost
d. Medicare with Medicaid co-payment
e. Private insurance
f. VA
g. Other per diem

8. REASON FOR ASSESSMENT
1. First assessment
2. Routine reassessment
3. Return assessment
4. Significant change in status reassessment
5. Discharge assessment, covers last 3 days of service
6. Discharge tracking only
7. Other—e.g., research

9. ASSESSMENT REFERENCE DATE
2 0
Year   Month   Day

10. PERSON'S EXPRESSED GOALS OF CARE
Enter primary goal in boxes at bottom

11. TIME SINCE LAST HOSPITAL STAY
Code for most recent instance in LAST 90 DAYS
0. No hospitalization within 90 days
1. 31 to 90 days ago
2. 15 to 30 days ago
3. 8 to 14 days ago
4. In the last 7 days
5. Now in hospital

SECTION B. INTAKE AND INITIAL HISTORY

[Note: Complete Section B at Admission/First Assessment only]

1. LEVEL OF CONTROL PERSON HAD OVER DECISION TO MOVE INTO LTCF
0. Complete
1. Some control
2. Little or no control
8. Could not (would not) respond

2. DATE STAY BEGAN
Year   Month   Day

3. ETHNICITY AND RACE [EXAMPLE - USA]
0. No   1. Yes

ETHNICITY
a. Hispanic or Latino

RACE
b. American Indian or Alaska Native
c. Asian
d. Black or African American
e. Native Hawaiian or other Pacific Islander
f. White

4. PRIMARY LANGUAGE [EXAMPLE-USA]
1. English
2. Spanish
3. French
4. Other

5. ADMITTED FROM AND USUAL RESIDENCE
1. Private home / apartment / rented room
2. Board and care
3. Assisted living or semi-independent living
4. Mental health residence—e.g., psychiatric group home
5. Group home for persons with physical disability
6. Setting for persons with intellectual disability
7. Psychiatric hospital or unit
8. Homeless (with or without shelter)
9. Long-term care facility (nursing home)
10. Rehabilitation hospital / unit
11. Hospice facility / palliative care unit
12. Acute care hospital
13. Correctional facility
14. Other

a. Admitted from
b. Usual residential status

6. POSTAL / ZIP CODE OF USUAL LIVING ARRANGEMENT PRIOR TO ADMISSION [EXAMPLE - USA]

7. LIVING ARRANGEMENT PRIOR TO ADMISSION
1. Alone
2. With spouse / partner only
3. With spouse / partner and other(s)
4. With child (not spouse / partner)
5. With parent(s) or guardian(s)
6. With sibling(s)
7. With other relative(s)
8. With non-relative(s)

8. RESIDENTIAL HISTORY OVER LAST 5 YEARS
Code for all settings person lived in during 5 YEARS prior to date stay began [B2]
0. No   1. Yes
a. Long-term care facility—e.g., nursing home
b. Board and care home or assisted living
c. Mental health residence —e.g., psychiatric group home
d. Psychiatric hospital or unit
e. Setting for persons with intellectual disability

9. MENTAL HEALTH
Record indicates history of mental illness or intellectual disability
0. No   1. Yes

SECTION C. COGNITION

1. COGNITIVE SKILLS FOR DAILY DECISION MAKING
Making decisions regarding tasks of daily life—e.g., when to get up or have meals, which clothes to wear or activities to do
0. Independent—Decisions consistent, reasonable, and safe
1. Modified independence—Some difficulty in new situations only
2. Minimally impaired—In specific recurring situations, decisions become poor or unsafe; cues/supervision necessary at those times
3. Moderately impaired—Decisions consistently poor or unsafe; cues / supervision required at all times
4. Severely impaired—Never or rarely makes decisions
5. No discernable consciousness, coma [Skip to Section G]

2. MEMORY/RECALL ABILITY
Code for recall of what was learned or known
0. Yes, memory OK   1. Memory problem
a. Short-term memory OK—Seems / appears to recall after 5 minutes
b. Long-term memory OK—Seems / appears able to recall distant past
c. Procedural memory OK—Can perform all or almost all steps in a multitask sequence without cues
d. Situational memory OK—Both: recognizes caregivers' names / faces frequently encountered AND knows location of places regularly visited (bedroom, dining room, activity room, therapy room)

3. PERIODIC DISORDERED THINKING OR AWARENESS
[Note: Accurate assessment requires conversations with staff, family or others who have direct knowledge of the person's behavior over this time]
0. Behavior not present
1. Behavior present, consistent with usual functioning
2. Behavior present, appears different from usual functioning (e.g., new onset or worsening; different from a few weeks ago)
a. Easily distracted—e.g., episodes of difficulty paying attention; gets sidetracked
b. Episodes of disorganized speech—e.g., speech is nonsensical, irrelevant, or rambling from subject to subject; loses train of thought
c. Mental function varies over the course of the day—e.g., sometimes better, sometimes worse

4. ACUTE CHANGE IN MENTAL STATUS FROM PERSON'S USUAL FUNCTIONING—e.g., restlessness, lethargy, difficult to arouse, altered environmental perception
0. No   1. Yes

5. CHANGE IN DECISION MAKING AS COMPARED TO 90 DAYS AGO (OR SINCE LAST ASSESSMENT)
0. Improved   2. Declined
1. No change   8. Uncertain

SECTION D. COMMUNICATION AND VISION

1. MAKING SELF UNDERSTOOD (Expression)
Expressing information content—both verbal and non-verbal
0. Understood—Expresses ideas without difficulty
1. Usually understood—Difficulty finding words or finishing thoughts BUT if given time, little or no prompting required
2. Often understood—Difficulty finding words or finishing thoughts AND prompting usually required
3. Sometimes understood—Ability is limited to making concrete requests
4. Rarely or never understood

2. ABILITY TO UNDERSTAND OTHERS (Comprehension)
Understanding verbal information content (however able; with hearing appliance normally used)
0. Understands—Clear comprehension
1. Usually understands—Misses some part / intent of message BUT comprehends most conversation
2. Often understands—Misses some part / intent of message BUT with repetition or explanation can often comprehend conversation
3. Sometimes understands—Responds adequately to simple, direct communication only
4. Rarely or never understands

3. HEARING
a. Ability to hear (with hearing appliance normally used)
0. Adequate—No difficulty in normal conversation, social interaction, listening to TV
1. Minimal difficulty—Difficulty in some environments (e.g., when person speaks softly or is more than 6 feet [2 meters] away)
2. Moderate difficulty—Problem hearing normal conversation, requires quiet setting to hear well
3. Severe difficulty—Difficulty in all situations (e.g., speaker has to talk loudly or speak very slowly; or person reports that all speech is mumbled)
4. No hearing

b. Hearing aid used
0. No   1. Yes

4. VISION
a. Ability to see in adequate light (with glasses or with other visual appliance normally used)
0. Adequate—Sees fine detail, including regular print in newspapers/books
1. Minimal difficulty—Sees large print, but not regular print in newspapers/books
2. Moderate difficulty—Limited vision; not able to see newspaper headlines, but can identify objects
3. Severe difficulty—Object identification in question, but eyes appear to follow objects; sees only light, colors, shapes
4. No vision

b. Visual appliance used
0. No   1. Yes

SECTION E. MOOD AND BEHAVIOR

1. INDICATORS OF POSSIBLE DEPRESSED, ANXIOUS, OR SAD MOOD
Code for indicators observed in last 3 days, irrespective of the assumed cause [Note: Whenever possible, ask person]
0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days
a. Made negative statements—e.g., "Nothing matters; Would rather be dead; What's the use; Regret having lived so long; Let me die"
b. Persistent anger with self or others—e.g., easily annoyed, anger at care received
c. Expressions, including non-verbal, of what appear to be unrealistic fears—e.g., fear of being abandoned, being left alone, being with others; intense fear of specific objects or situations
d. Repetitive health complaints—e.g., persistently seeks medical attention, incessant concern with body functions
e. Repetitive anxious complaints / concerns (non-health related)—e.g., persistently seeks attention / reassurance regarding schedules, meals, laundry, clothing, relationships
f. Sad, pained, or worried facial expressions—e.g., furrowed brow, constant frowning
g. Crying, tearfulness
h. Recurrent statements that something terrible is about to happen—e.g., believes he or she is about to die, have a heart attack
i. Withdrawal from activities of interest—e.g., long-standing activities, being with family / friends
j. Reduced social interactions
k. Expressions, including non-verbal, of a lack of pleasure in life (anhedonia)—e.g., "I don't enjoy anything anymore"

2. SELF-REPORTED MOOD
0. Not in last 3 days
1. Not in last 3 days, but often feels that way
2. In 1-2 of last 3 days
3. Daily in the last 3 days
8. Person could not (would not) respond

Ask: "In the last 3 days, how often have you felt..."
a. Little interest or pleasure in things you normally enjoy?
b. Anxious, restless, or uneasy?
c. Sad, depressed, or hopeless?

3. BEHAVIOR SYMPTOMS
Code for indicators observed, irrespective of the assumed cause
0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days
a. Wandering—Moved with no rational purpose, seemingly oblivious to needs or safety
b. Verbal abuse—e.g., others were threatened, screamed at, cursed at
c. Physical abuse—e.g., others were hit, shoved, scratched, sexually abused

d. **Socially inappropriate or disruptive behavior**—e.g., made disruptive sounds or noises, screamed out, smeared or threw food or feces, hoarded, rummaged through other's belongings ☐

e. **Inappropriate public sexual behavior or public disrobing** ☐

f. **Resists care**—e.g., taking medications / injections, ADL assistance, eating ☐

SECTION F. PSYCHOSOCIAL WELL-BEING

1. SOCIAL RELATIONSHIPS
[Note: Ask person, direct care staff, and family, if available]
- 0. Never
- 1. More than 30 days ago
- 2. 8 to 30 days ago
- 3. 4 to 7 days ago
- 4. In last 3 days
- 8. Unable to determine

a. **Participation in social activities of long-standing interest** ☐

b. **Visit with a long-standing social relation or family member** ☐

c. **Other interaction with long-standing social relation or family member**—e.g., telephone, e-mail ☐

2. SENSE OF INVOLVEMENT
- 0. Not present
- 1. Present but not exhibited in last 3 days
- 2. Exhibited on 1-2 of last 3 days
- 3. Exhibited daily in last 3 days

a. **At ease interacting with others** ☐

b. **At ease doing planned or structured activities** ☐

c. **Accepts invitations into most group activities** ☐

d. **Pursues involvement in life of facility**—e.g., makes or keeps friends; involved in group activities; responds positively to new activities; assists at religious services ☐

e. **Initiates interaction(s) with others** ☐

f. **Reacts positively to interactions initiated by others** ☐

g. **Adjusts easily to change in routine** ☐

3. UNSETTLED RELATIONSHIPS
  0. No   1. Yes

a. **Conflict with or repeated criticism of other care recipients** ☐

b. **Conflict with or repeated criticism of staff** ☐

c. **Staff report persistent frustration in dealing with person** ☐

d. **Family or close friends report feeling overwhelmed by person's illness** ☐

e. **Says or indicates that he/she feels lonely** ☐

4. MAJOR LIFE STRESSORS IN LAST 90 DAYS—
e.g., episode of severe personal illness; death or severe illness of close family member / friend; loss of of home; major loss of income/assets; victim of a crime such as robbery or assault; loss of driving license/car
  0. No   1. Yes ☐

5. STRENGTHS
  0. No   1. Yes

a. **Consistent positive outlook** ☐

b. **Finds meaning in day-to-day life** ☐

c. **Strong and supportive relationship with family** ☐

SECTION G. FUNCTIONAL STATUS

1. ADL SELF-PERFORMANCE
Consider all episodes over 3-day period.

If all episodes are performed at the same level, score ADL at that level. If any episodes at level 6, and others less dependent, score ADL as a 5.

Otherwise, focus on the three most dependent episodes [or all episodes if performed fewer than 3 times]. If most dependent episode is 1, score ADL as 1. If not, score ADL as least dependent of those episodes in range 2-5.

- 0. **Independent**—No physical assistance, setup, or supervision in any episode
- 1. **Independent, setup help only**—Article or device provided or placed within reach, no physical assistance or supervision in any episode
- 2. **Supervision**—Oversight / cuing
- 3. **Limited assistance**—Guided maneuvering of limbs, physical guidance without taking weight

4. **Extensive assistance**—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks

5. **Maximal assistance**—Weight-bearing support (including lifting limbs) by 2+ helpers —OR— Weight-bearing support for more than 50% of subtasks

6. **Total dependence**—Full performance by others during all episodes

8. **Activity did not occur during entire period**

a. **Bathing**—How takes a full-body bath / shower. Includes how transfers in and out of tub or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area - EXCLUDE WASHING OF BACK AND HAIR ☐

b. **Personal hygiene**—How manages personal hygiene, including combing hair, brushing teeth, shaving, applying make-up, washing and drying face and hands - EXCLUDE BATHS AND SHOWERS ☐

c. **Dressing upper body**—How dresses and undresses (street clothes, underwear) above the waist, including prostheses, orthotics, fasteners, pullovers, etc. ☐

d. **Dressing lower body**—How dresses and undresses (street clothes, underwear) from the waist down including prostheses, orthotics, belts, pants, skirts, shoes, fasteners, etc. ☐

e. **Walking**—How walks between locations on same floor indoors ☐

f. **Locomotion**—How moves between locations on same floor (walking or wheeling). If in wheelchair, self-sufficiency once in chair ☐

g. **Transfer toilet**—How moves on and off toilet or commode ☐

h. **Toilet use**—How uses the toilet room (or commode, bedpan, urinal), cleanses self after toilet use or incontinent episode(s), changes pad, manages ostomy or catheter, adjusts clothes - EXCLUDE TRANSFER ON AND OFF TOILET ☐

i. **Bed mobility**—How moves to and from lying position, turns from side to side, and positions body while in bed ☐

j. **Eating**—How eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g., tube feeding, total parenteral nutrition) ☐

2. LOCOMOTION / WALKING

a. **Primary mode of locomotion**
- 0. Walking, no assistive device
- 1. Walking, uses assistive device—e.g., cane, walker, crutch, pushing wheelchair
- 2. Wheelchair, scooter
- 3. Bedbound ☐

b. **Timed 4-meter (13 foot) walk**
[Lay out a straight unobstructed course. Have person stand in still position, feet just touching start line]
Then say: "When I tell you begin to walk at a normal pace (with cane/walker if used). This is not a test of how fast you can walk. Stop when I tell you to stop. Is this clear?" Assessor may demonstrate test.
Then say: "Begin to walk now" Start stopwatch (or can count seconds) when first foot falls. End count when foot falls beyond 4-meter mark.
Then say: "You may stop now"
Enter time in seconds, up to 30 seconds.
- 30. 30 or more seconds to walk 4-meters
- 77. Stopped before test complete
- 88. Refused to do the test
- 99. Not tested—e.g., does not walk on own ☐☐

c. **Distance walked**–Farthest distance walked at one time without sitting down in the LAST 3 DAYS (with support as needed)
- 0. Did not walk
- 1. Less than 15 feet (under 5 meters)
- 2. 15-149 feet (5-49 meters)
- 3. 150-299 feet (50-99 meters)
- 4. 300+ feet (100+ meters)
- 5. 1/2 mile or more (1+ kilometers) ☐

d. **Distance wheeled self**–Farthest distance wheeled self at one time in the LAST 3 DAYS (includes independent use of motorized wheelchair)
- 0. Wheeled by others
- 1. Used motorized wheelchair / scooter
- 2. Wheeled self less than 15 feet (under 5 meters)
- 3. Wheeled self 15-149 feet (5-49 meters)
- 4. Wheeled self 150-299 feet (50-99 meters)
- 5. Wheeled self 300+ feet (100+ meters)
- 8. Did not use wheelchair ☐

3. ACTIVITY LEVEL

a. **Total hours of exercise or physical activity in LAST 3 DAYS**—e.g., walking
- 0. None
- 1. Less than 1 hour
- 2. 1-2 hours
- 3. 3-4 hours
- 4. More than 4 hours ☐

b. **In the LAST 3 DAYS, number of days went out of the house or building in which he / she resides** (no matter how short the period)
- 0. No days out
- 1. Did not go out in last 3 days, but usually goes out over a 3-day period
- 2. 1-2 days
- 3. 3 days ☐

4. PHYSICAL FUNCTION IMPROVEMENT POTENTIAL
  0. No   1. Yes

a. **Person believes he / she is capable of improved performance in physical function** ☐

b. **Care professional believes person is capable of improved performance in physical function** ☐

5. CHANGE IN ADL STATUS AS COMPARED TO 90 DAYS AGO, OR SINCE LAST ASSESSMENT IF LESS THAN 90 DAYS AGO
- 0. Improved
- 1. No change
- 2. Declined
- 8. Uncertain ☐

SECTION H. CONTINENCE

1. BLADDER CONTINENCE
- 0. **Continent**—Complete control; DOES NOT USE any type of catheter or other urinary collection device
- 1. **Control with any catheter or ostomy** over last 3 days
- 2. **Infrequently incontinent**—Not incontinent over last 3 days, but does have incontinent episodes
- 3. **Occasionally incontinent**—Less than daily
- 4. **Frequently incontinent**—Daily, but some control present
- 5. **Incontinent**—No control present
- 8. **Did not occur**—No urine output from bladder in last 3 days ☐

2. URINARY COLLECTION DEVICE (Exclude pads / briefs)
- 0. None
- 1. Condom catheter
- 2. Indwelling catheter
- 3. Cystostomy, nephrostomy, ureterostomy ☐

3. BOWEL CONTINENCE
- 0. **Continent**—Complete control; DOES NOT USE any type of ostomy device
- 1. **Control with ostomy**—Control with ostomy device over last 3 days
- 2. **Infrequently incontinent**—Not incontinent over last 3 days, but does have incontinent episodes
- 3. **Occasionally incontinent**—Less than daily
- 4. **Frequently incontinent**—Daily, but some control present
- 5. **Incontinent**—No control present
- 8. **Did not occur**—No bowel movement in the last 3 days ☐

4. OSTOMY
  0. No   1. Yes ☐

SECTION I. DISEASE DIAGNOSES

Disease Code
- 0. Not present
- 1. Primary diagnosis / diagnoses for current stay
- 2. Diagnosis present, receiving active treatment
- 3. Diagnosis present, monitored but no active treatment

1. DISEASE DIAGNOSES

MUSCULOSKELETAL

a. **Hip fracture during LAST 30 DAYS (or since last assessment if less than 30 DAYS)** ☐

b. **Other fracture during LAST 30 DAYS (or since last assessment if less than 30 DAYS)** ☐

NEUROLOGICAL

c. **Alzheimers disease** ☐

d. **Dementia other than Alzheimers disease** ☐

e. **Hemiplegia** ☐

f. **Multiple sclerosis** ☐

g. **Paraplegia** ☐

h. **Parkinson's disease** ☐

i. **Quadriplegia** ☐

j. **Stroke / CVA** ☐

CARDIAC OR PULMONARY

k. **Coronary heart disease** ☐

l. **Chronic obstructive pulmonary disease** ☐

m. **Congestive heart failure** ☐

PSYCHIATRIC

n. **Anxiety** ☐

o. **Bipolar disorder** ☐

p. **Depression** ☐

q. **Schizophrenia** ☐

INFECTIONS

r. **Pneumonia** ☐

s. **Urinary tract infection in LAST 30 DAYS** ☐

OTHER

t. **Cancer** ☐

u. **Diabetes mellitus** ☐

2. OTHER DISEASE DIAGNOSES

Diagnosis	Disease Code	ICD code
a.		|_|_|_|.|_|_|
b.		|_|_|_|.|_|_|
c.		|_|_|_|.|_|_|
d.		|_|_|_|.|_|_|
e.		|_|_|_|.|_|_|
f.		|_|_|_|.|_|_|

[Note: Add additional lines as necessary for other disease diagnoses]

SECTION J. HEALTH CONDITIONS

1. FALLS
- 0. No fall in last 90 days
- 1. No fall in last 30 days, but fell 31-90 days ago
- 2. One fall in last 30 days
- 3. Two or more falls in last 30 days ☐

2. RECENT FALLS
[Skip if last assessed more than 30 days ago or if this is first assessment]
- 0. No
- 1. Yes
- [blank] Not applicable (first assessment, or more than 30 days since last assessment) ☐

3. PROBLEM FREQUENCY
Code for presence in last 3 days
- 0. Not present
- 1. Present but not exhibited in last 3 days
- 2. Exhibited on 1 of last 3 days
- 3. Exhibited on 2 of last 3 days
- 4. Exhibited daily in last 3 days

BALANCE

a. **Difficult or unable to move self to standing position unasssisted** ☐

b. **Difficult or unable to turn self around and face the opposite direction when standing** ☐

c. **Dizziness** ☐

d. **Unsteady gait** ☐

CARDIAC OR PULMONARY

e. **Chest pain** ☐

f. **Difficulty clearing airway secretions** ☐

PSYCHIATRIC

g. **Abnormal thought process**–e.g., loosening of associations, blocking, flight of ideas, tangentiality, circumstantiality ☐

h. **Delusions**–Fixed false beliefs ☐

i. **Hallucinations**–False sensory perceptions ☐

NEUROLOGICAL

j. **Aphasia** ☐

GI STATUS

k. **Acid reflux**–Regurgitation of acid from stomach to throat ☐
l. **Constipation**–No bowel movement in 3 days or difficult passage of hard stool ☐
m. **Diarrhea** ☐
n. **Vomiting** ☐

SLEEP PROBLEMS

o. **Difficulty falling asleep or staying asleep; waking up too early; restlessness; non-restful sleep** ☐
p. **Too much sleep**—Excessive amount of sleep that interferes with person's normal functioning ☐

OTHER

q. **Aspiration** ☐
r. **Fever** ☐
s. **GI or GU bleeding** ☐
t. **Peripheral edema** ☐

4. DYSPNEA (Shortness of breath)
0. Absence of symptom
1. Absent at rest, but present when performed moderate activities
2. Absent at rest, but present when performed normal day-to-day activities
3. Present at rest ☐

5. FATIGUE
Inability to complete normal daily activities—e.g., ADLs, IADLs
0. **None**
1. **Minimal**–Diminished energy but completes normal day-to-day activities
2. **Moderate**–Due to diminished energy, UNABLE TO FINISH normal day-to-day activities
3. **Severe**–Due to diminished energy, UNABLE TO START SOME normal day-to-day activities
4. **Unable to commence any normal day-to-day activities**–Due to diminished energy ☐

6. PAIN SYMPTOMS
[Note: Always ask the person about pain frequency, intensity, and control. Observe person and ask others who are in contact with the person.]

a. **Frequency with which person complains or shows evidence of pain (including grimacing, teeth clenching, moaning, withdrawal when touched, or other non-verbal signs suggesting pain)**
0. No pain
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days ☐

b. **Intensity of highest level of pain present**
0. No pain
1. Mild
2. Moderate
3. Severe
4. Times when pain is horrible or excruciating ☐

c. **Consistency of pain**
0. No pain
1. Single episode during last 3 days
2. Intermittent
3. Constant ☐

d. **Breakthrough pain**—Times in last 3 days when person experienced sudden, acute flare-ups of pain
0. No   1. Yes ☐

e. **Pain control**—Adequacy of current therapeutic regimen to control pain (from person's point of view)
0. No issue of pain
1. Pain intensity acceptable to person; no treatment regimen or change in regimen required
2. Controlled adequately by therapeutic regimen
3. Controlled when therapeutic regimen followed, but not always followed as ordered
4. Therapeutic regimen followed, but pain control not adequate
5. No therapeutic regimen being followed for pain; pain not adequately controlled ☐

7. INSTABILITY OF CONDITIONS
0. No   1. Yes

a. **Conditions / diseases make cognitive, ADL, mood or behavior patterns unstable** (fluctuating, precarious, or deteriorating) ☐
b. **Experiencing an acute episode, or a flare-up of a recurrent or chronic problem** ☐
c. **End-stage disease, 6 or fewer months to live** ☐

8. SELF-REPORTED HEALTH
Ask: "In general, how would you rate your health?"
0. Excellent
1. Good
2. Fair
3. Poor
8. Could not (would not) respond ☐

9. TOBACCO AND ALCOHOL

a. **Smokes tobacco daily**
0. No
1. Not in last 3 days, but is usually a daily smoker
2. Yes ☐

b. **Alcohol**—Highest number of drinks in any "single sitting" in LAST 14 DAYS
0. None
1. 1
2. 2-4
3. 5 or more ☐

SECTION K. ORAL AND NUTRITIONAL STATUS

1. HEIGHT AND WEIGHT [INCHES AND POUNDS– COUNTRY SPECIFIC]
Record (a.) height in inches and (b.) weight in pounds. Base weight on most recent measure in LAST 30 DAYS.

a. HT (in.) ☐☐   b. WT (lb.) ☐☐☐

2. NUTRITIONAL ISSUES
0. No   1. Yes

a. **Weight loss of 5% or more in last 30 days, or 10% or more in last 180 days** ☐
b. **Dehydrated, or BUN/Cre ratio>25** [Ratio, country specific] ☐
c. **Fluid intake less than 1,000cc per day (less than four 8 oz cups/day)** ☐
d. **Fluid output exceeds input** ☐

3. MODE OF NUTRITIONAL INTAKE
0. **Normal**–Swallows all types of foods
1. **Modified independent**—e.g., liquid is sipped, takes limited solid food, need for modification may be unknown
2. **Requires diet modification to swallow solid food**— e.g., mechanical diet (puree, minced, etc.) or only able to ingest specific foods
3. **Requires modification to swallow liquids**—e.g., thickened liquids
4. **Can swallow only pureed solids —AND— thickened liquids**
5. **Combined oral and parenteral or tube feeding**
6. **Nasogastric tube feeding only**
7. **Abdominal feeding tube**—e.g., PEG tube
8. **Parenteral feeding only**—includes all types of parenteral feedings, such as total parenteral nutrition (TPN)
9. **Activity did not occur**—During entire period ☐

4. PARENTERAL OR ENTERAL INTAKE
The proportion of TOTAL CALORIES received through parenteral or tube feedings in the LAST 3 DAYS
0. No parenteral / enteral tube
1. Parenteral / enteral tube, but no caloric intake
2. 1% to 25% of total calories through device
3. 26% or more of total calories through device ☐

5. DENTAL OR ORAL
0. No   1. Yes

a. **Wears a denture (removable prosthesis)** ☐
b. **Has broken, fragmented, loose, or otherwise non-intact natural teeth** ☐
c. **Reports mouth or facial pain / discomfort** ☐
d. **Reports having dry mouth** ☐
e. **Reports difficulty chewing** ☐
f. **Presents with gum (soft tissue) inflammation or bleeding adjacent to natural teeth or tooth fragments** ☐

SECTION L. SKIN CONDITION

1. MOST SEVERE PRESSURE ULCER
0. No pressure ulcer
1. Any area of persistent skin redness
2. Partial loss of skin layers
3. Deep craters in the skin
4. Breaks in skin exposing muscle or bone
5. Not codeable, e.g., necrotic eschar predominant ☐

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2. PRIOR PRESSURE ULCER
0. No   1. Yes ☐

3. PRESENCE OF SKIN ULCER OTHER THAN PRESSURE ULCER—*e.g., venous ulcer, arterial ulcer, mixed venous-arterial ulcer, diabetic foot ulcer*
0. No   1. Yes ☐

4. MAJOR SKIN PROBLEMS—*e.g., lesions, 2nd or 3rd degree burns, healing surgical wounds*
0. No   1. Yes ☐

5. SKIN TEARS OR CUTS—*Other than surgery*
0. No   1. Yes ☐

6. OTHER SKIN CONDITIONS OR CHANGES IN SKIN CONDITION—*e.g., bruises, rashes, itching, mottling, herpes zoster, intertrigo, eczema*
0. No   1. Yes ☐

7. FOOT PROBLEMS—*e.g., bunions, hammer toes, overlapping toes, structural problems, infections, ulcers*
0. No foot problems
1. Foot problems, no limitation in walking
2. Foot problems limit walking
3. Foot problems prevent walking
4. Foot problems, does not walk for other reasons ☐

SECTION M. ACTIVITY PURSUIT

1. AVERAGE TIME INVOLVED IN ACTIVITIES—*e.g., alone, in social group*
[Note: When awake and not receiving treatments or ADL care]
0. Most—more than 2/3 of time
1. Some—from 1/3 to 2/3 of time
2. Little—less than 1/3 of time
3. None ☐

2. ACTIVITY PREFERENCES AND INVOLVEMENT (adapted to current abilities)
0. No preference, not involved in last 3 days
1. No preference, involved in last 3 days
2. Preferred, not involved
3. Preferred, regularly involved but not in last 3 days
4. Preferred, involved in last 3 days

a. **Cards, games, or puzzles** ☐
b. **Computer activity** ☐
c. **Conversing or talking on the phone** ☐
d. **Crafts or arts** ☐
e. **Dancing** ☐
f. **Discussing/reminiscing about life** ☐
g. **Exercise or sports** ☐
h. **Gardening or plants** ☐
i. **Helping others** ☐
j. **Music or singing** ☐
k. **Pets** ☐
l. **Reading, writing, or crossword puzzles** ☐
m. **Spiritual or religious activities** ☐
n. **Trips or shopping** ☐
o. **Walking or wheeling outdoors** ☐
p. **Watching TV or listening to radio** ☐

3. TIME ASLEEP DURING DAY
0. Awake all or most of time (no more than one nap in the morning or afternoon)
1. Had multiple naps
2. Asleep most of the time, but some periods awake and alert (e.g., at meals)
3. Largely asleep or unresponsive ☐

SECTION N. MEDICATIONS

1. LIST OF ALL MEDICATIONS
List all active prescriptions, and any non-prescribed (over the counter) medications taken in the LAST 3 DAYS

[Note: Use computerized records if possible, hand enter only when absolutely necessary]

For each drug record:

a. **Name**
b. **Dose**—A number such as 0.5, 5, 150, 300. [NOTE: Never write a zero by itself after a decimal point (X mg). Always use a zero before a decimal point (0.X mg).]

c. **Unit**—Code using the following list:

gtts (Drops)	mEq (Milli-equivalent)	**Puffs**	
gm (Gram)	mg (Milligram)	% (Percent)	
L (Liters)	ml (Milliliter)	**Units**	
mcg (Microgram)	oz (Ounce)	OTH (Other)	

d. **Route of administration**—Code using the following list:
PO (By mouth/oral)   REC (Rectal)   ET (Enteral Tube)
SL (Sublingual)   TOP (Topical)   TD (Transdermal)
IM (Intramuscular)   IH (Inhalation)   EYE (Eye)
IV (Intravenous)   NAS (Nasal)   OTH (Other)
Sub-Q (Subcutaneous)

e. **Freq**—Code the number of times per day, week, or month the medication is administered using the following list:

Q1H (Every hour)	5D (5 times daily)		
Q2H (Every 2 hours)	Q2D (Every other day)		
Q3H (Every 3 hours)	Q3D (Every 3 days)		
Q4H (Every 4 hours)	**Weekly**		
Q6H (Every 6 hours)	2W (2 times weekly)		
Q8H (Every 8 hours)	3W (3 times weekly)		
Daily	4W (4 times weekly)		
BED (At bedtime)	5W (5 times weekly)		
BID (2 times daily)	6W (6 times weekly)		
(includes every 12 hrs)	1M (Monthly)		
TID (3 times daily)	2M (Twice every month)		
QID (4 times daily)	OTH (Other)		

f. **PRN**
0. No   1. Yes

g. **Computer-entered drug code**   g.ATC or NDC code

	a. Name	b.Dose	c.Unit	d.Route	e.Freq.	f.PRN	g.ATC or NDC code
1.							
2.							
3.							
4.							
5.							

[Note: Add additional lines, as necessary, for other drugs taken]
[Abbreviations are Country Specific for Unit, Route, Frequency]

2. ALLERGY TO ANY DRUG
0. No known drug allergies   1. Yes ☐

SECTION O. TREATMENTS AND PROCEDURES

1. PREVENTION
0. No   1. Yes

a. **Blood pressure measured in LAST YEAR** ☐
b. **Colonoscopy test in LAST 5 YEARS** ☐
c. **Dental exam in LAST YEAR** ☐
d. **Eye exam in LAST YEAR** ☐
e. **Hearing exam in LAST 2 YEARS** ☐
f. **Influenza vaccine in LAST YEAR** ☐
g. **Mammogram or breast exam in LAST 2 YEARS (for women)** ☐
h. **Pneumovax vaccine in LAST 5 YEARS or after age 65** ☐

2. TREATMENTS AND PROGRAMS RECEIVED OR SCHEDULED IN THE LAST 3 DAYS (OR SINCE LAST ASSESSMENT IF LESS THAN 3 DAYS)
0. Not ordered AND did not occur
1. Ordered, not implemented
2. 1-2 of last 3 days
3. Daily in last 3 days

TREATMENTS
a. **Chemotherapy** ☐   h. **Tracheostomy care** ☐
b. **Dialysis** ☐   i. **Transfusion** ☐
c. **Infection control**— j. **Ventilator or respirator** ☐
   e.g., isolation,   k. **Wound care** ☐
   quarantine ☐   **PROGRAMS**
d. **IV medication** ☐   l. **Scheduled toileting program** ☐
e. **Oxygen therapy** ☐   m. **Palliative care program** ☐
f. **Radiation** ☐   n. **Turning / repositioning program** ☐
g. **Suctioning** ☐

3. THERAPY/NURSING SERVICES IN LAST 7 DAYS — *e.g., therapist or therapy assistant under direction of therapist*
[Note: count only post admission therapies]

A. **# of days** treatment scheduled in the LAST 7 DAYS
B. **# of days** administered for **15 minutes or more**
C. **Total # of minutes** provided in LAST 7 DAYS
(or *ordered* if days administered = 0
and days scheduled > 0)

	Days Sched-uled	Days Admin-istered	Total Minutes in last week
	A	B	C
a. Physical therapy			
b. Occupational therapy			
c. Speech-language pathology and audiology services			
d. Respiratory therapy			
e. Functional rehabilitation or walking program by licensed nurse			
f. Psychological therapy (by any licensed mental health professional)			

4. HOSPITAL AND EMERGENCY ROOM USE
Code for number of times in LAST 90 DAYS (or since last assessment if LESS THAN 90 DAYS)

a. Inpatient acute care hospital with overnight stay

b. Emergency room visit (not counting overnight stay)

5. PHYSICIAN VISITS
Number of days in LAST 14 DAYS (or since admission if less than 14 days in facility) physician examined person. Include authorized assistant or practitioner. Enter 0 if None

6. PHYSICIAN ORDERS
Number of days in LAST 14 DAYS (or since admission if less than 14 days in facility) physician changed person's orders. Include authorized assistant or practitioner. Do not include order renewals without changes. Enter 0 if None

7. RESTRICTIVE DEVICES
0. Not used
1. Used less than daily
2. Used daily—Nights only
3. Used daily—Days only
4. Used night and days, but not constant
5. Constant use for full 24 hours (may include periodic releases)

a. Full bed rails on all open sides of bed

b. Trunk restraint

c. Chair prevents rising

SECTION P. RESPONSIBILITY AND DIRECTIVES

1. RESPONSIBILITY / LEGAL GUARDIAN [EXAMPLE– USA]
0. No   1. Yes

a. Legal guardian

b. Other legal oversight

c. Durable power of attorney / health care

d. Durable power attorney / financial

e. Family member responsible

2. ADVANCE DIRECTIVES [EXAMPLE - USA]
0. Not in place   1. In place

a. Advance directives for not resuscitating

b. Advance directives for not intubating

c. Advance directives for not hospitalizing

d. Advance directives for not tube feeding

e. Advance directives for medication restriction

SECTION Q. DISCHARGE POTENTIAL

1. DISCHARGE POTENTIAL
0. No   1. Yes

a. Expresses / indicates preference to return to or remain in the community

b. Has a support person who is positive towards discharge or maintaining residence in community

c. Has housing available in community

2. How long person is expected to stay in the current setting or under the care of this service prior to discharge to community (count from assessment reference date, including that day)

0. 1-7 days
1. 8-14 days
2. 15-30 days
3. 31-90 days
4. 91 or more days
5. Discharge to community not expected

SECTION R. DISCHARGE

[Note: Complete Section R at Discharge only]

1. LAST DAY OF STAY

2	0			—			—		

Year   Month   Day

2. DISCHARGED TO
1. Private home / apartment / rented room
2. Board and care
3. Assisted living or semi-independent living
4. Mental health residence—e.g., psychiatric group home
5. Group home for persons with physical disability
6. Setting for persons with intellectual disability
7. Psychiatric hospital or unit
8. Homeless (with or without shelter)
9. Long-term care facility (nursing home)
10. Rehabilitation hospital / unit
11. Hospice facility / Palliative care unit
12. Acute care hospital
13. Correctional facility
14. Other
15. Deceased

3. SCHEDULED TO RECEIVE HOME CARE SERVICES AT DISCHARGE
0. No   1. Yes
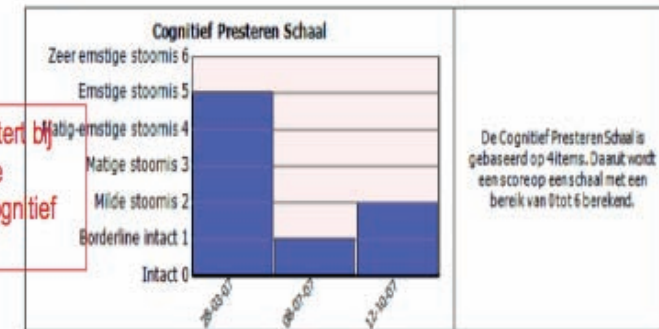
SECTION S. ASSESSMENT INFORMATION

SIGNATURE OF PERSON COORDINATING / COMPLETING THE ASSESSMENT

1. Signature (sign on above line)

2. Date assessment signed as complete

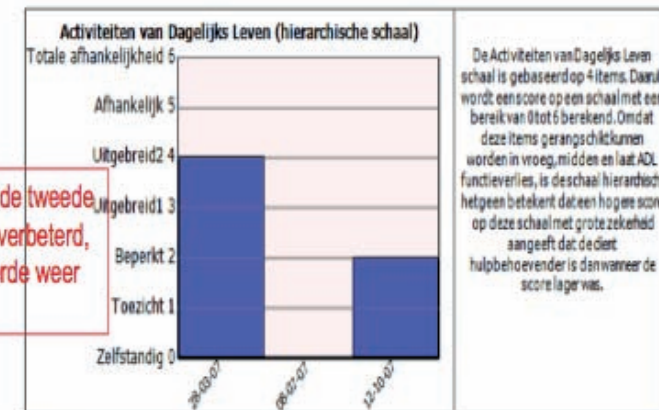| 2	0			—			—		

Year   Month   Day

interRAI

CAP	Thuiszorg beoordeling	Beschermd wonen	Intramurale zorg
FUNCTIONEEL PRESTEREN			
Lichaamsbewegingbevordering	X	X	X
IADL	X	X	
ADL	X	X	X
Omgevingscompensatie	X	X	
Instellingsopnamevooruitzicht	X	X	
Lichaamsfixatie	X	X	X
COGNITIE EN GEESTELIJKE GEZONDHEID			
Cognitieverlies	X	X	X
Delier	X	X	X
Communicatie	X	X	X
Stemming	X	X	X
Gedrag	X	X	X
Mishandeling	X	X	
SOCIAAL LEVEN			
Vrijetijdsactiviteiten			X
Mantelzorg	X	X	
Sociale omgang	X	X	X
CLINISCHE COMPLEXITEIT			
Valincidenten	X	X	X
Pijn	X	X	X
Decubitus	X	X	X
Hart en ademhaling	X	X	X
Ondervoeding	X	X	X
Dehidratie	X	X	X
Sonde voeding	X	X	X
Preventie	X	X	X
Medicatiegebruik	X	X	X
Tabak- en alcoholgebruik	X	X	
Urine-incontinentie	X	X	X
Fecale incontinentie	X	X	X
Gezichtsvermogen	X	X	X

CODE	INDICATOR	COUNTER	DENOMINATOR
adl01	Activities of daily life, late-loss worsening	Scores of measurement are compared with the previous measurement on bed mobility, eating, toilet transfer, toilet use, two scoring units higher.	Is not comatose, not terminal, no hospice care. On the previous assessment bed mobility, eating, toilet transfer, toilet use, do not already have a maximum score.
mob01	Locomotion worsening	Moving on the ward score> than the previous measurement.	Is not comatose, not terminal, no hospice care. In the previous assessment is not totally dependent on moving across the ward.
fal01	Falls increase change	Cases with falls in the last 30 days.	In the previous assessment cases without falls in the last 30 days.
cog01	Cognitive decline	Cognition Performance Scale > than the previous measurement.	Is not comatose, not terminal, not hospice care. In the previous assessment Cognition Performance Scale <6.
com01	Communication decline	Communication score> than the previous measurement	Is not comatose, not terminal, no hospice care. In the previous assessment Communication score<6.
del01	Delirium new or persistent	Recently started delirium problem (score 1 or 2 on the items) or new delirium and in the previous assessment score 1 or 2 and Cognition Performance Scale <4.	Is not comatose, not terminal, no hospice care.
beh01	Behaviour problem	Presence of 4 behavioral problems.	Without coma, staying 30 days or longer. Only most recent assessment.
beh02	Idem, high risk	Idem	Idem & impaired cognitive skills for daily decision making.
beh03	Idem, low risk	Idem	Idem & all cases not under high risk denominator.
soc02	Little or no (social) activities	Little time or no time involved in activities.	Is not comatose, no terminal, no hospice care, stay 30 days or longer. Only most recent measurement.
cat01	New indwelling catheter	Score on catheter stay> than previous measurement.	Is not terminal, no hospice care.
cat02	Indwelling catheter	Stay present Catheter.	Is not terminal, no hospice care and stay 30 days or longer. Only most recent measurement.
cnt01	Bladder/bowel incontinence	Often or always incontinent of faeces or urine.	Not comatose, not terminal, no hospice care, stay 30 days or longer, no residence and no stoma catheter. Only most recent measurement.
Cnt05	Idem, high risk	Idem	Idem & impaired cognitive skills & short term memory or extensive assistance in walking or locomotion or toilet transfer.
Cnt06	Idem, low risk	Idem	Idem & all cases not under high risk denominator.
cnt02	Bowel continence decline	Faecal incontinence score> than previous measurement.	Is not comatose, not terminal, no hospice care. In the previous assessment has not completely incontinent for faeces.
cnt03	Bladder continence decline	Urinary incontinence score> than previous measurement.	Is not comatose, not terminal, no hospice care. In the previous assessment has not completely incontinent for urine.
cnt04	Urinary tract infection	Urinary tract infection.	Not terminally ill, no hospice care, stay 30 days or longer. Only most recent measurement.
nut01	Feeding tube	Presence of a feeding tube.	Not comatose, not terminal, not hospice care, stay 30 days or longer. Only most recent measurement.
bmi01	Low Body Mass Index	Body Mass Index ? 19.	Not terminally ill, not hospice care, stay 30 days or longer and a Body Mass Index between 12 and 40. Only most recent measurement.
wgt01	Weight loss change	5% or more weight loss in the last 30 days or 10% or more in the last 180 days.	Not terminally ill, no hospice care, does not participate in a weight-change treatment, staying 30 days or longer. Only most recent measurement.
pai01	Inadequate pain management prevalence	Daily moderate or worse pain, or from time to time terrible or unbearable pain.	Staying 30 days or longer. Only most recent measurement.
pan01	Pain worsening	Score on pain frequency> than previous measurement.	In the previous assessment is no daily pain.
pru01	Pressure ulcer stage 1-4	Presence of pressure ulcer.	Staying 30 days or longer. Only most recent measurement.
pru02	Idem, high risk	Idem	Idem & Extensive assistance in locomotion or toilet transfer or coma.
pru03	Idem, low risk	Idem	Idem & all cases not under high risk denominator.
pru04	Pressure ulcers worsening	Decubitus score> than previous measurement.	In the previous assessment is not the worst possible pressure ulcer.