Screening, geriatric assessment and intervention strategies to prevent functional decline in hospitalized older patients

Buurman, B.M.

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Chapter 9

General Discussion
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The general aim of this thesis was to investigate strategies for screening and diagnostic assessment on geriatric conditions to prevent functional decline and other hospital related complications in acutely hospitalized patients. One of these strategies is the DEFENCE-care model, a three-step systematic approach to prevent functional decline, which was developed as part of this thesis. In this General Discussion chapter the main findings will be summarized and placed in a broader perspective related to three components of the DEFENCE-care model: screening, diagnostic assessment on geriatric conditions, and geriatric intervention. Furthermore, the implications for daily practice and recent developments in the care for older people will be discussed. The thesis concludes with directions for further research within the context of the Netherlands National Care for the Elderly Program.

Activities of daily living and functional decline

The thesis started with a systematic review on measuring (instrumental) activities of daily living (I)ADL) and definitions of functional decline (chapter 2). We demonstrated that there is some uniformity in measuring patient’s functioning, but there is far less uniformity in the definitions of functional decline. Some studies defined functional decline solely in terms of ADL, whereas some studies incorporated elements of IADL. Most studies also excluded items of the validated Katz ADL index. This heterogeneity in definition and operationalisation may partly explain the differences in incidence of functional decline found in different studies.

The results of our systematic review stipulate some methodological issues concerning the measurement of functional health. Most important are the need for consensus regarding the activities of daily living that should be incorporated into the disability continuum, the measurement instrument that should be used, the optimal time frame to assess functional decline, and the definitions of cut-off scores on outcome scales.
In our studies we used the complete version of the validated Katz ADL index score to measure ADL functioning and defined functional decline as a loss of one point or more on the Katz at three and twelve months after admission compared to premorbid functioning.

**Screening for expected adverse health outcomes**

Developing and validating screening instruments to detect patients at risk was described in three studies *(chapters 3, 4 and 5)*. Screening is considered an efficient method to roughly divide patients in low and high risk for a certain health outcome and can assist health professionals or patients to select those people needing extra care during hospital admission or those benefiting most from intervention 1. There are many screening instruments available to detect high risk patients. A first step should be to test the prognostic ability of these instruments in new populations to support their external validity 2,3. We followed this strategy in older patients attending to the emergency department in which we tested the prognostic properties of four screening instruments. Our results showed that all four measures performed poorly *(chapter 3)*. The instruments were developed in specific health care environments (United Kingdom, USA and Canada) and it is generally acknowledged that the application of screening instruments in other populations or health care environments is often difficult because of differences in case mix of patients and subsequently results in more or less events and a other distribution of candidate predictors 4. This seemed to be confirmed in our study.

If current instruments do not perform well, the next step then is to develop and validate new screening models *(chapters 4 and 5)*. A consistent finding in our studies was that the accuracy of these models was rather moderate, with areas under the ROC curves ranging between 0.72 and 0.77. This can be explained by several factors. First of all, in the ISAR-HP development and validation study 5 *(chapter 5)* candidate predictors, such as age and years of education, were dichotomized which might have reduced sensitive assessments.
Secondly, using less candidate predictors also decreases the ROC, due to information loss 6.

However, both strategies enhance the face validity of the screening instrument which is also essential and is mainly based on clinicians’ judgement of clinical relevance of the screening instrument and can be a strong factor during implementation2,4. The Framingham risk index and the APACHE-II score also have an AUC between 0.70-0.80 and are widely utilized in daily practice. Both screening models from our studies comprise four variables that are easy to use in clinical practice. This enhances the clinical usefulness of the screening instrument into daily practice.

**Diagnostic assessment on geriatric conditions**

A second step in the DEFENCE-care model, in patients with an increased risk for poor health outcomes, is to perform a diagnostic assessment on geriatric conditions. We described this step in two ways; for a complete population of included patients and for a subgroup of patients identified at risk for functional decline. The first study confirmed that geriatric conditions were highly present in acutely hospitalized patients (chapter 6). Older patients presented with a mean of six geriatric conditions of which ADL and IADL impairment, mobility difficulty, polypharmacy, malnutrition, and high level of care giver burden and were all present in more than 50% of the patients. We also demonstrated that geriatric conditions were significantly associated with functional decline, cognitive impairment, and mortality one year after admission (chapter 6).

In chapter 7 we focused on the geriatric conditions in relation to the risk status of the patients. The study showed that patients at low, intermediate and high risk for functional decline have distinct clinical profiles and health outcomes. In the low risk group, mainly conditions related to multimorbidity and acute phase of the disease were present, such as polypharmacy, pain and malnutrition. In the high risk group, which presented with an average of seven geriatric conditions, a high percentage of the patients also had geriatric
syndromes, such as delirium, frequent falls, incontinence and pressure ulcers. Geriatric syndromes are highly prevalent in frail elders and have a major impact on quality of life and disability \(^7,^8\). In addition, geriatric syndromes are multifactorial conditions with many underlying risk factors and interacting pathogenetic pathways \(^9\). Only 30% of the high risk group remained their baseline level of functioning.

An important issue related to the in-depth assessment of geriatric conditions is which patient group benefits most from geriatric intervention. The comprehensive geriatric assessment (CGA) approach, consisting of screening, diagnostic assessment, and geriatric intervention, has demonstrated mixed results in preventing negative health outcomes \(^10\)-\(^12\). A recent meta-analysis on inpatient rehabilitation suggested that evidence on subgroups of patients benefiting from inhospital intervention is needed \(^10\). Dividing the patient population in a low, intermediate and high risk group clearly stipulates that these subgroups have different clinical characteristics and outcomes (chapter 7). At present, there is little evidence supporting the applicability of this approach in hospitalized older patients and this strategy should mainly be employed for screening \(^13\)-\(^15\). Expert opinion strongly suggests approaching the older patient group in a more differentiated way in order to develop effective interventions \(^16\)-\(^17\). Relatively healthy older patients, with some chronic diseases will not be in need of specialised geriatric care but should be educated how to prevent deterioration in functioning. The middle group, patients with some chronic diseases and few functional limitations, is probably to expect the most benefit from a rehabilitative approach, focusing on restoration of functional impairments. High risk patients, represented by the presence of (multiple) chronic diseases, functional impairments and limited rest capacity, will presumably favour most from an approach focused on preventing further complications and retaining an acceptable level of quality of life.
Geriatric intervention

The third step of the DEFENCE-care model is to provide patients at risk for functional decline and prevalent geriatric conditions with an integrated care- and treatment plan during and after hospital admission. In this step the geriatric consultation team will advice nurses and physicians on the inpatient wards with this care and treatment plan. To enhance the use of the DEFENCE-care model in daily practice, an evidence-based toolkit has been created, containing information on screening, diagnostic assessment and intervention strategies for nurses and physician on 25 common geriatric conditions. Available practice protocols should further enhance implementation. The toolkit is accessible at www.effectieveouderenzorg.nl.

Outside the Netherlands several hospital-based studies have been conducted to evaluate prevention of adverse outcomes after hospital admission using a combination of comprehensive geriatric assessment, intensive home follow up, and transitional care. These studies have shown mixed results in preventing poor health outcomes. The only type of intervention that demonstrates a clear benefit for geriatric patients in terms of preventing functional deterioration is the implementation of a Geriatric Evaluation and Management Unit wards (GEMU) within the hospital organisation. GEMU’s are specially designed for frail older persons, with personnel that are specialized in providing care to geriatric patients. Successful ingredients of all effective intervention studies are: targeting the intervention to high risk subgroups, performance of a multidimensional and multidisciplinary diagnostic assessment and intervention and long-term follow up.

These ingredients are all used in the Transitional Care Brigade. A recently initiated randomized clinical trial investigates the efficacy of comprehensive geriatric assessment in combination with home follow up after discharge (chapter 8). All enrolled patients receive care according to the DEFENCE-care model. Before discharge, patients are randomly allocated to either the intervention or control group. Patients in the intervention group receive care by a transitional care nurse, who visits the patient during
hospital admission and furthermore two days, two, six, twelve and twenty-four weeks after hospital discharge. The transitional care nurse closely collaborates with the general practitioner of the patient. The control group will receive 'care as usual' after discharge.

**Methodological issues**

We encountered several methodological problems in our studies. Around 40% of the included patients presented with (temporary) cognitive impairment and many patients were very ill in the first 48 hours of hospital admission. There is a need for minimally invasive strategies to maximize inclusion rates. We tried to achieve this by interviewing the nearest proxy and by minimizing the diagnostic assessments during the first 48 hours of admission *(chapters 5-8)*.

A substantial number of our patients died within the first year after admission, resulting in missing data when building prognostic models to predict functional decline *(chapter 6)*. Most studies in acutely hospitalized older patients simply exclude these patients from further outcome analysis, leading to biased prognostic models. To solve this statistical problem, several strategies can be followed, such as patient’s last observation carry-forward using a Cox proportional hazards model, considering deceased patients as patients experiencing the ultimate functional decline, or imputation of missing outcome data. In this thesis we applied the first two approaches. Imputation of missing outcome data in this population is not preferable 21, as patients at low risk for functional decline and survivors generally have a better functional status at admission *(chapter 7)*.

Another methodological issue emerging from this thesis is the use of functional decline as a continuous or dichotomous outcome variable. In line with the international literature, we dichotomized functional decline after comparing post-discharge functioning with premorbid functioning *(chapter 2)*. A decline of one point or more was considered as functional decline. Undoubtedly with such an approach clinical information is lost 5,22.
A final challenge are the in- and exclusion criteria used in clinical studies in older patients. At the moment, the inclusion criteria are quite broadly defined, focusing on patients at risk for functional decline. As mentioned before, being at high risk for functional decline, is not synonymous to benefiting from geriatric intervention. However, to date, none of the studies using the CGA approach, clearly separates patients that can be rehabilitated and patients that are so frail that maintaining quality of life should be the major goal.

**Implications for daily practice**

The College voor de Beroepen en Opleidingen in de Gezondheidszorg (CBOG) and the Koninklijke Nederlandse Maatschappij ter Bevordering van de Geneeskunst (KNMG) have proposed far reaching innovative strategies to reform current medical and nursing practice in order to be prepared for the demands of older people. To reach the goals described, such as the need for a tailored approach to the care of older people, a better transfer of patients from hospital, or early detection of patients at high risk for adverse health outcomes, there is an urgent need for more and better trained professionals that are dedicated to care for elderly people. Hopefully, some of the practice-based tools developed in our study, including our ten day post-bachelor training for nurses in general practice, will contribute to better equipped health care professionals.

In the Netherlands the ‘VeiligheidsManagementSysteem zorg praktijkgids kwetsbare ouderen’ should be implemented in the 93 participating hospitals. This practice guide consists of four geriatric conditions; delirium, falls, malnutrition and disability that should be assessed at admission and monitored during hospital stay. It contributes to a systematic screening and early recognition of geriatric conditions. However, in our view this is a only a minimal strategy that should be implemented. The DEFENCE-care model is a far more optimal and efficient approach, as it selects those patients at increased risk for functional decline, followed by an in-depth assessment of geriatric conditions.
**National Care for the Elderly Programme**

In April 2008 the National Care for the Elderly Programme (NCEP) was set up by the Ministry of Health, Welfare and Sports with the main purpose to improve care for elder people with complex care needs. The programme is coordinated by ZonMW, the Netherlands Organisation for Health Research and Development. The eight academic hospitals in the Netherlands were asked to establish a geriatric network in their region, consisting of hospitals, general practitioners, home care services, nursing homes, welfare organisations, knowledge-based organisations, educational organisations and older people themselves. Proceeding from this geriatric network and the needs of older people, transition experiments, research projects and implementation projects were set up. Transition experiments are large scale projects, in which there is (financial and organisational) space to test the efficacy and efficiency of new care. This type of experiments should also link welfare, primary care based care and hospital based care. The transitional care bridge (**chapter 8**) is one of the Transition experiments in the Kring Ouderenzorg AMC and partners geriatric network that is currently running in three hospitals.

The primary outcome in all of the projects and studies within the framework of NCEP is the maintenance of functioning of older people.

**Directions for further research**

*Activities of daily living and functional decline*

More clinimetric studies are needed concerning the measurement of ADL functioning. The crude Katz ADL scale, which at the moment is considered as the gold standard, has a number of limitations related to its responsiveness to measure health change over time. A new and promising approach is the Item Response Theory (IRT). The advantage of this psychometric techniques that not all the same items of an instrument have to be assessed in all patients to determine their level of functioning, as is the case with the classical health instruments. Using their clinical judgment, researchers / care professionals can make their own selections of items from an IRT item bank that are applicable to the
population they are investigating. By using a small number of items tailored to the expected ADL level of patients, a detailed clinical picture can be obtained without the need to have all the questions answered by the patient \(^\text{27}\).

Recent research activities in the field of measuring ADL functioning are moving towards more objective measurements, such as gait speed and balance, instead of using patient-self-reports. Studies are needed to investigate if this approach is also applicable to acutely hospitalized older patients. Safety and the use of these tests in cognitive impaired should be key components. Moreover, as acutely hospitalized older patients often already decline before hospital admission, an important question should be if these measurements have clinical surplus value above self-reports.

The patient perspective on functioning and functional decline has not been given sufficient attention. In contrast to the highly valued objective measurement, patients own valuation of function is underrepresented in many studies, including our studies. This concerns not only the question which items should be included into the disability continuum, but also what older patients consider as a significant decline. In the view of empowerment and self management, patients’ own perspective deserves further research attention. It could provide new directions for interventions based on stimulating rest capacities and teaching patient’s adequate self management skills.

Another scope for further research in the field of functional health is the role of environmental factors in preventing, delaying or compensate disability in hospitalized older patient. Topics to focus on could be: technological support and devices for use during and after hospital admission, supporting the primary care giver to provide optimal care after hospital admission and the role of social support.
**Screening and diagnostic assessment on geriatric conditions**

Related to screening and the use of screening instruments several studies would be useful. The first study is an impact study, testing if using the ISAR-HP changes clinical decision making of health care professionals.

In addition, testing the clinical applicability of the three risk profiles for functional decline should be tested. In most RCTs to prevent functional decline a large subgroup of patients at risk for adverse outcomes is currently targeted. As already discussed before, the question remains if all patients need to be and can be rehabilitated during and after hospital admission. The World Health Organisation rehabilitation strategy framework provides an overview of rehabilitation goals for different patient groups which might be useful for clinical practice.

The diagnostic assessment in the DEFENCE-care model currently consists of preselected geriatric conditions. Further research should focus on which geriatric conditions are most important for patients to be treated during and after their hospital stay.

**Interventions to improve outcomes**

Several intervention studies, based on the DEFENCE-care model, have already been started up in the Netherlands. The Transitional Care Bridge has already been described in this thesis (chapter 8) and is part of the NCEP. Maintain Functioning In Transition (FIT) is another large scale transition experiment from the NCEP (8000 community-dwelling older people), using an RCT design, in which the effect of nurse-led care coordination on the level of daily functioning in community-dwelling older persons in the general practice is studied. Both transition experiments are linked together, using a comparable method of screening, diagnostic assessment and intervention, and should provide an effective strategy to prevent functional decline in community-dwelling older people and hospitalized older people.
Furthermore the DEFENCE-III study is currently running, testing the efficacy and efficiency of implementing the DEFENCE-care model in seven hospitals in the Netherlands. A pre-test post-test design is used to assess the effect of care model on ADL functioning three months after hospital discharge.

**Conclusion**

In conclusion, this thesis demonstrated that in the field of measuring ADL functioning and functional decline, substantial differences exist in the methods of measurement and applied definitions of functional decline. Older people that are acutely hospitalized are at high risk for mortality, functional decline and cognitive impairments three and (up to) twelve months after hospital admission. We developed a geriatric screening- and consultation model, the DEFENCE-care model that can be applied in daily practice consisting of screening, diagnostic assessment on geriatric conditions and geriatric interventions. Several practice-based tools have been developed to enhance implementation in daily medical and nursing care. Further study should focus on testing the efficacy of the DEFENCE-care model in preventing functional decline and other adverse health outcomes. Studies should also comprise issues related to the impact of screening on decision-making of health professionals and on clinimetrics of ADL functioning.
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