

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eMethods 1. The Health Care System in the Netherlands

Primary care, hospital care, homecare and nursing home care

In total, more than 16.9 million persons live in the Netherlands of which 17% are 65 years or older. All inhabitants in the Netherlands have a General Practitioner (GP). The GP is the gatekeeper of the health care system. Only in case of emergencies, a patient can directly go to a specialist in the hospital or to the emergency department; in all other cases a patient needs a referral from the GP. In the past five years, many GPs have implemented structured care for older persons in their practice. Mostly, this is a nurse who visits ‘high risk’ older persons at home and performs screening on geriatric conditions after which tailored interventions are carried out.

There are 92 hospitals in the Netherlands of which eight are university teaching hospitals. Most of the hospitals have a geriatric team available for consultation; some hospitals also have geriatric wards. In the past five years hospital care for older persons was on the nationwide health care agenda. A large program was implemented called Safety Management Program (VeiligheidsManagement System), and one of the themes was ‘Care for Vulnerable Older Persons’. All hospitals have implemented a short assessment, performed by a nurse, focused on falls, delirium, activities of daily living and malnutrition. This has increased awareness. The specialist knows the patient’s GP for handover of discharge information.

Homecare is available for patients in need. An indication is needed for homecare, and the community care registered nurse is the person that performs an assessment to identify a patients’ needs. If a patient is hospitalized, in all hospitals, a transfer nurse is available who arranges home care (help with bathing, dressing, household, medications). These nurses do not visit the patient at home, but, in collaboration with the nurses on the ward, they arrange the care that they foresee will be needed. Community care nurses work in close collaboration with the GP.

A nursing home physician who is present during workdays and hours and is in charge of the medical care within the nursing home leads a nursing home. Only a few RNs are employed within the NH setting, most staff are nursing aides trained at the vocational

level. At the time of the study many patients were admitted to the NH for recovery; intensive geriatric rehabilitation for patients discharged from Internal Medicine was quite uncommon at that time.

Financing of care & health coverage

There is universal health coverage for all inhabitants, meaning that everyone needs to have health insurance. There is a deductible fee of 350 euros (around 400 US dollars), which patients pay for visits to the hospital, emergency department visits and medications. GP care is excluded from this deductible fee. Patients pay an income-dependent deductible fee for homecare.

eMethods 2. The Identification of Seniors At Risk–Hospitalized Patients (ISAR-HP) Risk Assessment Instrument

The ISAR-HP is a validated screening instrument, developed to detect older hospitalized persons at risk for functional decline. The screening instrument consists of four questions:

ISAR-HP	Yes	No
1. Before hospital admission, did you need assistance with IADL? (e.g. assistance in housekeeping, preparing meals and shopping) on a regular basis	1	0
2. Do you use a walking device (e.g. a cane, walker, walking frame, crutches, etc.)?	2	0
3. Do you need assistance with travelling?	1	0
4. Did you continue education after the age of 14?	0	1
Total score (circled numbers)		
Score 0-1=not at risk for functional decline		
Score 2-5= at risk for functional decline		

The range of scores varies between 0-5, and the cut-off score is 2 or more. The four-item model could accurately predict functional decline with an AUC of 0.71 in the development cohort (n=492). At threshold score 2, sensitivity, specificity, positive and negative predictive values were 87, 39, 43 and 85%, respectively. In the validation study (n=484), the AUC was 0.68, and sensitivity, specificity, positive and negative predictive values were 89, 41, 41 and 89% (1). Further study also demonstrated that patients with a higher ISAR-HP score had significantly more geriatric conditions and died more frequently (2).

In the Transitional Care Bridge Randomized Controlled Trial only patients with a score of two or more were eligible to participate in the trial.

Other inclusion criteria required: 1) a life expectancy of more than three months as indicated by the attending physician; 2) not transferred to another ward within 48 hours

after admission; 3) not admitted from another department or another hospital; 4) able to speak and understand Dutch, and 5) not admitted from a nursing home.

eMethods 3. Training of Nurses Involved in the Study

All nurses (n=14) who provided the intervention were experienced community care registered nurses (CCRNs). As the CCRNs did not have a specific or specialized training in geriatrics, a 10-day training was developed focused on geriatric care in the community and in the transition from hospital to home. The training was developed by the AMC, in collaboration with the School of Nursing from InHolland University of Applied Sciences and the Regional Council of General Practitioners (HKA), all based in Amsterdam. The training consisted of three modules; 1) introduction to research and frail older patients; 2) somatic and functional geriatric conditions; and 3) psychological and social conditions.

Module 1: Introduction to scientific research and frail older patients. This module focused on participating in a randomized clinical trial, ethical issues with regard to research, withdrawal from the study, methodological aspects of a RCT. The introduction of frail older patients involved basic information on ageing, care models, frailty, comprehensive geriatric assessment. Moreover CCRNs received training on the comprehensive geriatric assessment, making a care and treatment plans and how to coach and empower patients to formulate their own goals of care.

Module 2: Focused on somatic and functional geriatric conditions. Lessons were provided by content experts (e.g. geriatricians, pharmacist, clinical nurse specialist) and included polypharmacy, sleep disorder, pain management, malnutrition, fall prevention, incontinence, ADL impairments, and other highly prevalent conditions and diseases.

Module 3: The training on psychological and social conditions was provided by content experts and consisted of cognitive impairment, depression, delirium, caregiver burden, financial problems, loneliness and elder abuse.

Across the 3 modules the training focused on what evidence-based intervention CCRNs could perform, how CCRNs could provide patient-centered care and empower the older person. Two afternoons were spent on communication training, applying principles of

motivational interviewing and complex situations (e.g. the informal caregiver has a different priority than the patient).

eMethods 4. Evidence-Based Protocols Used in the Study

For 18 geriatric conditions included in the comprehensive geriatric assessment (CGA), we developed evidence-based care protocols that CCRNs could use while providing care.

The protocols are accessible through a website:

<http://www.effectieveouderenzorg.nl/Toolkit.aspx> [in Dutch]

The protocols are a practical translation of guidelines and were used after the initial CGA. If an older participant was screened positive for a geriatric condition during the CGA, the older participant recognized the specific geriatric condition as a problem, and the condition was identified a priority by the older person, the evidence-based protocol were used subsequently.

The protocols consisted of a further diagnostic assessment of the geriatric condition; for example if a participant had a previous fall, risk factors for falling were assessed. Or if an older participant had a score of ≥ 4 on the visual analogue scale for pain, a pain assessment identifying the sort, severity and possible cause of pain that was present, leading to a target pain plan.

Subsequently, in these evidence-based care protocols CCRNs were guided to make an overview and discuss these with the GP or geriatrician, addressing the most important risk factors, to reach a tailored-care program.

In the protocols evidence-based interventions were provided, that the CCRN could implement, or that other professionals or the older participant could perform.

For each geriatric condition, background and in-depth information was available, such as prevalence, risk factors, screening, diagnostic assessment and interventions. This was used when CCRNs needed more information about these topics. For some topics also understandable information for older participant was created.

eMethods 5. Example of a Quality Indicator Used for the Process Evaluation

3.2 Indicator of percentage of older participants that where visited by the community-based RN in the hospital	
Aim	All participants in the intervention group of the Transitional Care Bridge program were visited by a community-based RN during hospitalization
Operationalization	Percentage of older participants that were visited by the community-based RN
Numerator	All participants visited by the community-based RN in the hospital
Denominator	All participants in the intervention group of the Transitional Care Bridge program
Definition	A participant is visited in the hospital if: <ul style="list-style-type: none">- The community-based RN and the participant met each other during hospitalization. In the log there is a notification that the nurse visited the hospital.
In-/exclusion criteria	Inclusion criteria Transitional Care Bridge program
Type of indicator	Process indicator
Source numerator	Care and treatment plans or log
Source denominator	Inclusion list of the Transitional Care Bridge program
Measurement frequency	Continuous
Report rate	Once every three months in the research team
Measurement level	Participant level

eTable 1. Adherence to the Intervention Protocol

Treatment protocol	Intervention arm
	% (n/total number of eligible participants)
	(n=337)
Comprehensive geriatric assessment at admission	100 (337/337)
Care and treatment plan was made	95 (320/337)
Visit of the community care registered nurse to hospital	73 (199/272)
Home visit within 2 days after hospital discharge	90 (244/272)
Medication reconciliation in participants who were discharged with new medications	88 (210/238)
Home visit 2 weeks after hospital discharge	78 (203/262)
Home visit 6 weeks after hospital discharge	66 (166/251)
Home visit 12 weeks after hospital discharge	68 (138/202)
Home visit 24 weeks after hospital discharge	61 (110/181)

At the start of randomization there were 337 participants randomized to the intervention group. No logs were available for 21 participants who died during hospital admission, and 44/337 logs were non-recoverable. The 26% of missed visits of the community care registered nurse to the hospital were due to logistics (e.g. participant was undergoing medical procedures or discharged). During the 6 month follow-up 85 intervention group participants died and 27 dropped out for the home visits after week 6. The denominator for each of the home visits differs because only survivors were at risk of receiving a visit. Some interventions were only performed if necessary, e.g. medication reconciliation was performed if participant received new medication. Home visits through week 6 were required; afterward it was dependent on the needs of the participant whether the visit was actually performed.

Of the 88% who received new medications; 50% of this group was able to administer medications themselves, the others needed help from their informal caregiver, a home

care nurse who assisted with medication intake, or special medication boxes prepared by the pharmacy. In 16% extra actions were necessary after the medication reconciliation, this concerned contact with the GP, medical specialist in the hospital or pharmacy. Common medication errors included; not clear if the medication that a patient used at home before admission still needs to be taken (5.0%), medication that patients took in the hospital (often specific brands) have not been switched to generic medication that needs to be taken at home (5.0%), no stop date for antibiotics (3.5%), no scheme for insulin (0.7%); use of opioids without laxantia (8.0%); dose for anticoagulants not specified (2.9%). We have not added this information to the manuscript, due to lack of space.

eTable 2. Additional Baseline Characteristics

Variable	Intervention arm n=337	CGA-only arm n=337
Scores on the Identification of Seniors at Risk-Hospitalized Patients – % (n)		
Needed help on a regular basis	91.1 (307)	92.3 (311)
Use of a walking aid	87.5 (294)	87.5 (295)
Do you need help with travelling	69.9 (235)	66.5 (224)
Did not follow education after the age of 14	46.9 (157)	44.6 (149)
Scores on individual items of the Charlson Comorbidity index- % (n)		
Myocardial infarction	19.6 (64)	23.6 (77)
Congestive Heart Failure	30.1 (98)	32.5 (106)
Peripheral Vascular Disease	21.5 (70)	18.1 (59)
Cerebrovascular Disease	24.2 (79)	25.5 (83)
Dementia	5.2 (17)	5.8 (19)
Chronic Obstructive Pulmonary Disease	26.1 (85)	28.2 (92)
Auto Immune Disease	0.6 (2)	0.0 (0)
Peptic Ulcer Disease	5.8 (19)	6.7 (22)
Mild Liver Disease	1.2 (4)	0.3 (1)
Diabetes (no complications)	11.7 (38)	13.8 (45)
Hemiplegia	1.2 (4)	0.6 (2)
Moderate kidney disease/renal dysfunction	25.5 (83)	26.4 (86)
Diabetes (with end-organ damage)	21.8 (71)	24.8 (81)
Leukemia	1.5 (5)	0.6 (2)
Malignant Lymphoma	2.5 (8)	1.8 (6)
Solid Tumor	11.0 (36)	9.5 (31)
Moderate/severe Liver Disease	2.5 (8)	2.1 (7)

Metastatic Tumor	5.2 (17)	7.1 (23)
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**eTable 3. Time to Death by Indicated Predefined Subgroup by Treatment Arm
From Cox Regression Models Adjusted for Site and Cognitive Functioning (MMSE
<24 vs ≥24)**

	1 month, HR (95% CI)	Treatment x Subgroup p-value	6 month, HR (95% CI)	Treatment x Subgroup p-value
ISAR-HP		0.920		0.936
2-3	0.58 (0.20- 1.74)		0.75 (0.40- 1.40)	
4-5	0.62 (0.37- 1.04)		0.73 (0.53- 1.00)	
Charlson Index		0.404		0.726
0-3	0.57 (0.28- 1.19)		0.81 (0.53- 1.24)	
4+	0.86 (0.46- 1.60)		0.73 (0.48- 1.10)	

ISAR-HP= Identification of Seniors At Risk-Hospitalized Patients. This was the risk assessment instrument that was used to select older patients for the trial. A higher score indicates a higher risk for functional decline and mortality. Charlson comorbidity index is an indicator for the number and the severity of illnesses and is associated with mortality (3). A higher score indicates an increased risk for mortality.

HR= hazard ratio, CI=confidence interval, p-value=probability adjusted with Hochberg method (4) for all secondary outcomes.

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