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Methods: In a pre and post cohort study patients aged ≥70 years, admitted to the hospital for ≥48 hours and discharged home with an Identification of Seniors at Risk (ISAR) score of ≥2, were included. The TCB programme, started before discharge, encompassed six visits by the Community Nurse. Data were obtained from the hospital registry and by three questionnaires over a three months period, addressing activities of daily living (ADL) , self-rated health, self-rated quality of life and health care utilisation.

Results: In total, 100 patients were enrolled in this study, fifty patients in the TCB group and fifty patients in the usual care group. After three months 36.7% was dependent on ADL in the TCB group compared to 47.1% in the usual care group. Mean number of visits by the CN in the TCB group was 3.8. Although the TCB group had a lower mortality, we did not find any statistically significant differences in health outcomes and health care utilization.

Discussion: Challenges in the delivery of the programme may have influenced patient outcomes. More research is needed on implementation of evidence-based programmes in smaller research settings. A qualitative phase of the study needs to address these outcomes and explore the perspectives of health professionals and patients on the delivery of the programme.

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Keywords

transitional care, older adults, evaluation, functional decline, self-management, health care utilisation, health outcomes

Introduction

Globally, populations around the world are living longer and are ageing (WHO, 2022). It is expected that the number of people aged 60 years old and over is projected to reach nearly 2.1 billion by 2050 (WHO, 2022). The United Nations proclaimed 2021-2030 the Decade of Healthy Ageing with the WHO leading international action to improve the lives of older people, their families and communities (WHO, 2020). One of the four areas outlined in the WHO (2020) Plan of Action focuses on delivering person-centered integrated care and primary health services responsive to older people needs and provides technical series on safer primary care, including transitions of care (WHO, 2016).

After acute hospitalisation, 30% of older adults experience functional decline, often resulting in a decline in health-related quality of life and autonomy (Hoogerduijn et al., 2012). In particular, during the transition from the hospital to home, older adults are at risk for medication errors, communication related adverse events and problems with fragmentation of care (Enthoven, 2009). One year after admission, 35% of older adults in this group had died and 33% had suffered from functional decline (Buurman et al, 2011). Of all older adults (65+ years) 20% are re-hospitalized within one month after discharge .

In the Netherlands, of all persons aged 75 years and above, 50% have multiple complex conditions (RIVM, 2014), resulting in policies aiming to prolong independent living and closing of care homes (Dutch Ministry of Health, 2018). In 2020, 73.6% of people older than 85 years lived independently (Statistics Netherlands [CBS], 2020). In the Netherlands transitional care programmes emerged since 2004 based upon the initial work of Naylor (2004) and Coleman (2003) to support this growing group in adjusting at home after discharge from hospital, providing the necessary care and enhancing self-management. Because of longevity and ageing in place, ttransitional care developed towards a longitudinal process of adapting to a new care regimen and coping at home (Werner, 2019; Buurman, Parlevliet, van Deelen, de Haan, & de Rooij, 2010; Occelli et al., 2016; Krumholz, 2013). Nowadays, many transitional care programmes are high intensity interventions and share similar

components to ensure continuity and quality of care, promote recovery, restore independence (Mabire et al., 2016; O'Donnell et al., 2021; Morkisch et al., 2020). The interventions may be enacted by the Community Nurse (CN), Advanced Practice Nurse, the Geriatrician and/or Hospital Nurse in collaboration with the General Practitioner (GP). The main objectives of transitional care programmes are safe transitions between care settings, preventing re-hospitalisations and functional decline (Coleman, 2003;Naylor & Keating, 2008). Reviews on transitional care in the last seven years shifted toward older adults aged over 65 years old, yet the age groups of the middle-old (75-85) and the oldest-old (over 85) remain under researched (Piraino et al, 2012, Lee et al., 2022; Liebzeit et al, 2021; Allen et al., 2017).

In a previous randomised controlled (RCT) study, within Amsterdam, *The Transitional Care Bridge (TCB) programme* was developed for patients aged ≥65 years admitted to internal wards. The TCB is a pro-active, multi-component, nurse-led transitional care programme offered during hospitalisation, at the time of discharge and within 48 hours and up to 6 months after discharge. The in-hospital component of the TCB was part of the RCT study. This showed a 26% reduction in mortality at six months after discharge but did not show an effect on daily functioning in acutely hospitalized older patients (Buurman et al., 2016). Adherence to the intervention protocol was high in this study, e.g. 80% received a home visit within 2 days after hospital discharge and 68% received a home visit 12 weeks after hospital discharge. Recommendation for further studies was to identify whether the programme might improve patient safety during the vulnerable period that occurs shortly after hospital discharge (Buurman et al., 2016, p.308). Although reducing mortality was not one of the main aims of the TCB programme, after the RCT the programme was embraced by the health care insurers in the Netherlands in 2016. As part of the Dutch National Programme for Elderly Care (2008-2016) the spreading and scaling-up of evidence-based innovations was encouraged with funding of The Netherlands Organization for Health Research and Development (ZonMw), including the Transitional Care Bridge.

Methods

The implementation of the TCB programme in our study setting commenced in 2015 and was partly funded by ZonMw. This study is the first to explore the impact of the scaling up of the TCB and addresses the evaluation of this transitional care programme in the implementation phase in a regional hospital. Professionals from the different domains were trained together. Ethical approval was obtained for the University of Central Lancashire (UClan) and the regional hospital in which this study took place. This study is part of a larger sequential mixed methods study which aims to describe the effect of the TCB programme on health care utilisation, functional decline and health outcomes in a regional hospital in the Netherlands in comparison to usual care for the average old and the oldest old and explore the implementation.

Study setting

Between 2010 and 2015 a shared vision of care for older adults was developed in this hospital. The implementation of the Transitional Care Bridge contributed to becoming a Senior Friendly Hospital, a quality mark, funded by the healthcare insurers, which are not-for-profit cooperative organisations in the Netherlands. All wards within the 332-bed regional hospital in the Netherlands and six home care organisations were included in the study.

Study design and population

As people now work until the age of 67 and frailty often occurs later in life, the study hospital chose to include patients aged ≥70 years, who were admitted to the hospital ≥48 hours and were discharged home. Patients were screened for risk for functional decline using the same validated Identification of Seniors at Risk – hospitalised (ISAR-HP) tool as was used in the RCT study in Amsterdam (Hoogerduin et al., 2012). Exclusion criteria included living in a nursing home, being

discharged to a nursing home, having advanced dementia and not able to speak the Dutch language.

A pre-post design of the quantitative phase of the study was chosen. Due to the small size of the hospital a first group of 50 patients following usual care was recruited between August and December 2015, followed by a group of 50 patients following the TCB in between March and October 2016. Following at least 50 patients in every arm was mandatory for funding. All patients eligible for the programme were visited during admission in the hospital to provide information about the research and received an information sheet. All patients received three questionnaires for completion, one before discharge, and at one and three months post-discharge. All patients provided written informed consent before discharge.

Usual care and Transitional Care Bridge

The risk of functional decline was assessed with the ISAR-HP at the Emergency Department (ED). With help of the informal caregiver with an ISAR-HP ≥2, an additional 26-item triage questionnaire (not yet validated), developed by the geriatric team was filled out by the patient. This triage assessment form was developed to limit the influx of patients for the geriatric team and comprises 26 questions about physical and mental conditions and everyday living. Those with a score ≥5 yes responses received a consultation with the geriatric team. Additionally 5 specific questions in the questionnaire were marked as indicators for consultation with the geriatric team, these included, alcohol use of over than 3 units a day, Parkinson's disease, long standing memory problems, sudden confusion, or an unplanned readmission within 30 days after discharge. For those referred the geriatric team performed a Comprehensive Geriatric Assessment (CGA) during consultation and developed a care and treatment plan.

<< Insert figure 1.>>

Usual care in this study includes the "in-hospital" steps 1, 2 and 3 and usual referral after discharge to primary care. The Transitional Care Bridge (TCB) programme started during hospitalisation (component 4, figure 1) with a visit to the patient from a CN in hospital and handover of CGA and treatment plan, medicine list, nursing information, occupational therapist information. All key health information was shared through a digital information technology system called POINT (Point of assignment, information, reference and transfer, the digital information transfer system between hospital and care organizations). In our study the CN was a bachelor level educated nurse with a special focus on the elderly. The programme continued after discharge with home visits at 2 days and at 2, 6, 12, and 24 weeks. The first home visit after 2 days covered medication and care evaluation, at 2 weeks issues that occurred after hospital discharge and goals identified, at 6 weeks the focus was on social participation with specific attention for the informal caregiver, at 12 weeks follow up steps potentially involving health or social care providers and at 24 weeks an evaluation and handover of care plan to the GP and other care providers. The CNs used a template to document each meeting.

Measurements

~~Data retrieved from the hospital registry included: reason for admission, comorbidities, length of hospital stay, re-admissions, mortality, ISAR-HP score at the ED, the~~

Short Nutritional Assessment Questionnaire (SNAQ) (Kruizenga, Seidell, de Vet, Wierdsma, & van

Bokhorst-de van der Schueren, 2005), the risk for delirium (three one point questions), physical restrictions in ADLs (6-item Katz Index of Independence in Activities of Daily Living, on a 0-6 scale) (Katz, 1983) and a self-assessment triage questionnaire for the geriatric team. As functional status is an indicator for being able to live independent and there is scant research for the average and the oldest old, this study included this indicator. Examples of comorbid conditions were: Heart disease, vascular disease, lung disease, neurological disease, kidney disease, diabetes mellitus, obesities, gastro-intestinal disorders, osteoporosis, dementia and cognitive disorders, psychiatric disorder (e.g. depression), joint or back problems, arthritis or rheumatic problems, cancer. A numerical scale from 0 -10 was used for self-rated health and quality of life, as part of the TOPICS-MDS questionnaire. Relevant outcomes were measured at three moments in time through this questionnaire on the physical and mental health, well-being, self-rated health and quality of life. The first questionnaire for patients during hospitalisation included items regarding socio-demographics (e.g. age, gender, marital status, living situation) and items regarding the extent of home care and informal care, self-rated health and self-rated quality of life. The follow-up questionnaires at one and three months after discharge included questions on ADLs, number of visits to the GP, visits to the ED, re-hospitalisation, admission to care home, changes in living situation and formal and informal care, self-rated health and self-rated quality of life.

During the implementation, programme data and project documents were collected to address programme fidelity, based on predefined quality indicators.

Statistical analyses

Chi-square test of homogeneity (categorical) and Independent-sample t-test (continuous) were conducted to test for differences between usual care patients and transitional care patients regarding demographic characteristics. Descriptive statistics (mean and standard deviation (SD), median (IQR) and proportions) were used to determine the prevalence of: mortality, health care

utilisation (e.g. length of stay, readmissions, care home admissions, CNs care, informal care) and health outcomes (e.g. frailty, functional outcome, risk delirium, self-rated health).

Results

1. Patient characteristics

In total, 100 patients were enrolled in this study of which 50 patients followed the usual care path and 50 patients the transitional care bridge programme **(appendix 1)**. The mean age of patients in the usual care group and the TCB group were respectively 84.6 (SD: 6.1) and 84.0 (SD: 4.8) years and respectively 62% and 74% were female (**table 1**). In the usual care group 58% of the patients were living alone compared to 74% in the TCB group. The majority of patients were educated to secondary or tertiary levels (72% in usual care group and 70% in TCB group).

Of the patients in the usual care group, 52% had 3 or more comorbidities compared to 66% in the TCB group. In both groups, lung problems such as dyspnoea, pneumonia or exacerbation of COPD, seemed to be highly prevalent (24% in the usual care group and 30% in the TCB group). Of patients in the usual care group, 13% died within 3 months after hospital discharge compared to 6% of patients in the TCB group.

<< Insert table I.>>

2. Health care utilisation

Patients with usual care had a mean hospital stay of 10.0 (SD: 6.4) days compared to 9.1 (SD: 3.9) days for patients following transitional care. Of patients in the usual care group, 52% had a hospital stay longer than 8 days, compared to 70% of patients in the transitional care group. Nearly a quarter of the patients had one or more readmissions to the hospital within 3 months (24% in usual care group and 22% in TCB group). The majority of patients visited the GP at least one time within three months after discharge and half of the patients (49% in usual care group and 51% in TCB group) visited the GP more than 3 times. After three months 53% of the patients in the usual care group and 80% of the patients in the TCB group received care from a CN. There were no statistically significant differences in health care utilisation between the transitional care and usual care groups. Three months after discharge informal care in the usual care group (81%) was lower than in the TCB group (88%), although not statistically significant.

<< Insert table II.>>

3. Health outcomes for patients in usual care group and TCB group

At baseline, 36% in the usual care group and 20% in the TCB group were dependent in ADLs. After three months, respectively 47% and 37% were dependent in ADLs. Risk for delirium occurred more frequently in the TCB group at baseline and during follow-up, although not statistically significant. Additionally no differences were found for malnutrition, self-rated heath and quality of life between the usual care and TCB group.

<< Insert table III.>>

4. Programme fidelity

The average number of visits to the participants was 3.8, ranging from one to six visits. In 60% the CN visited the patient within 48 hours after discharge (90% being the quality indicator). Of all patients enrolled in the programme 10% received all six visits by the CN. Follow-up data were missed if patients were readmitted to hospital or admitted to a care home. Not every questionnaire was returned or patients could no longer be reached and some patients decided to terminate their participation.

Discussion

This study addressed the evaluation of a newly implemented programme on transitional care in a regional hospital in the Netherlands. Our results, similarly to the initial RCT, failed to reveal any significant results on the effect of TCB on the prevention of functional decline and other health outcomes in the more vulnerable period up to three months after hospital discharge, albeit some small differences were found. No significant differences were found in health care utilisation. It is remarkable that the initial programme was embraced by the health care insurers in the Netherlands, as in the RCT study only a drop in mortality was found. The literature shows one-quarter to one-third of re-hospitalisations in older adults are believed to be preventable (Occelli et al., 2016). This study however, does not show a drop in re-hospitalisations in patients following the TCB programme compared to those following usual care. While the patients following our TCB programme already seemed frailer at inclusion compared to those in the group following usual care, the lack of difference in rehospitalisations and the lower mortality do indicate the effectiveness of the programme. As GPs and CNs guide and educate people on staying healthy the higher prevalence of GP and CN care in the TCB group might indicate more preventative care. 10

~~The strength of this study is the inclusion of all admitted vulnerable patients with a high risk of functional decline from every ward of the h~~ospital and the use of data from the evaluation of the transitional care programme in a relatively small, regional hospital. Smaller organization have less experience and tradition in gaining funding and doing research projects. This study provides valuable information on the evaluation of a transitional care programme in a smaller setting. During the implementation of this programme, we encountered professionals who were inclined to alter the guidelines, and found that the capacity problems of the geriatric team and CNs may have negatively influenced adherence to the programme. The geriatric team tried to limit the influx of patients for geriatric care by adding an additional questionnaire at the ED. This strict criteria might have caused more frail patients eligible for inclusion in the TCB group. As for the home care organisations the lack of capacity of CNs influenced the number of visits by the CNs. This reflects that during dissemination and implementation elsewhere, a practice is continually reframed and adjusted in accordance to local context and priorities (Greenhalgh et al, 2004).

There are several limitations to this study. First, as our study was performed in a smaller hospital the number of patients included was relatively small. Additionally, baseline characteristics varied slightly between the TCB and usual care group, as for example more patients in the TCB groups lived alone and more patients had 3 or more comorbidities. This could indicate that patients in the TCB group were more frail at baseline compared to patients in the usual care group. However, ISAR-HP scores at baseline were comparable between the 2 groups. For future studies on the TCB programme it would be valuable to include a larger patient population in smaller settings and to take into consideration the loss to follow-up in this older population due to mortality and admissions in care homes. Second, the relatively small sample size and the loss to follow up has limited the statistical power of this study.

Conclusions

This study described the evaluation of the TCB programme in a regional hospital in the Netherlands. While no significant differences were found, the lower mortality rates in the TCB group do indicate that the programme could be effective in reducing the mortality for older adults. Implementation and research in a regional hospital comes with its challenges. The experience in and funding for implementation research in a small hospital is limited and the context is often complex and rapidly changing.

Recommendations for practice and research

More preventative approaches are needed before or at the first signs for functional decline. Functional status could be used not only as an outcome measure, but as a predictive instrument for the need of support in the transition period after discharge. As social wellbeing is a major issue for patients during their transition from hospital to home, other stakeholders such as social services, physiotherapists, and sports and exercise advisors should be considered as well to broaden the whole system approach to ageing well at home.

Very old patients should not be excluded from programmes of transitional care and further research should address the extent of frailty in this group the support required. More research is needed that addresses results of implemented programmes, also in smaller research settings. It is recommended for further research to make the link between the mechanisms of the intervention and the outcomes explicit, as well as to illuminate the process of implementation in the specific different contexts and investigate issues of conflicting interests. Because of the reciprocal interaction between the context and the programme, research should engage with professionals and patients.

A second phase of the study has been carried out involving interviews with professionals and patients. Analysis of the qualitative phase of the study may help to illuminate reasons for the lack of significance in the results of the quantitative part of the study and illuminate the process of implementation.

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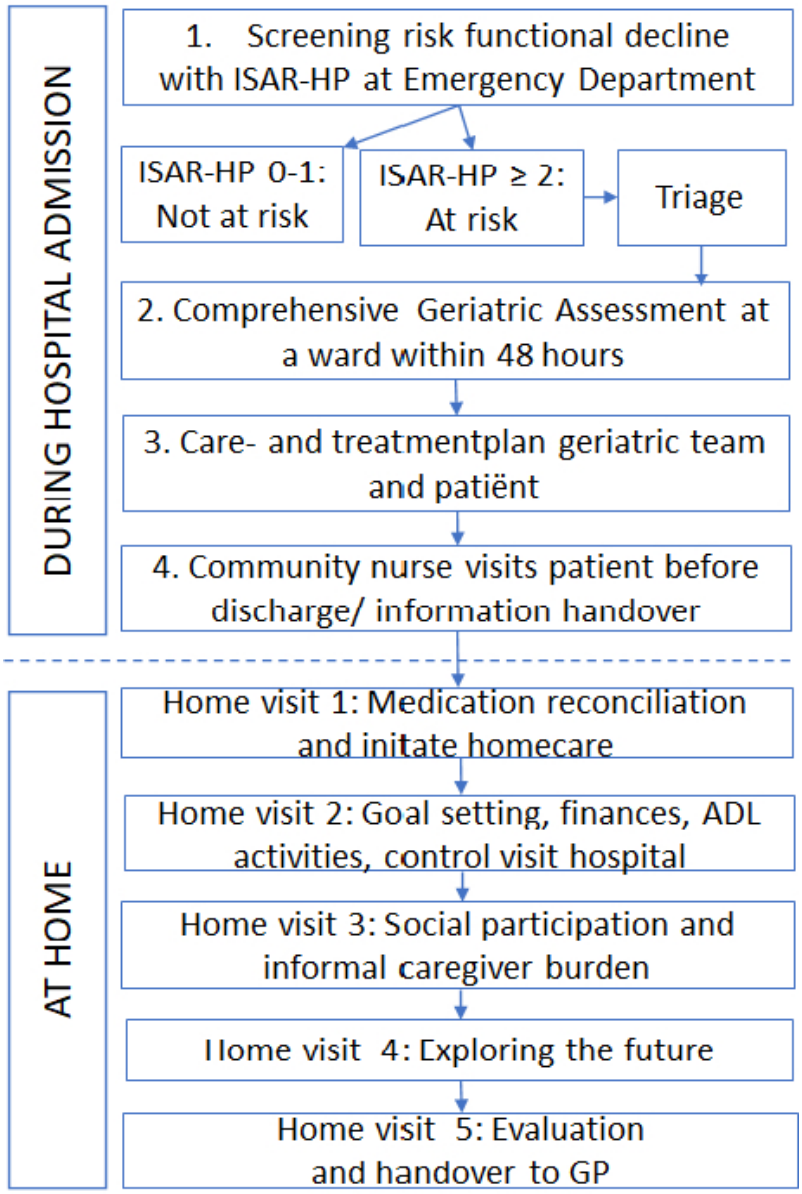


Figure 1. Building blocks of the Transitional Care Programme

307x462mm (38 x 38 DPI)

Table I. Patient characteristics for patients in usual care group or TCB group

Characteristics	Usual care group	TCB group	p-value
Participants, n (%)	50 (50.0%)	50 (50.0%)	
Gender, n (%)			0.198
Male	19 (38.0%)d	13 (26.0%)	
Female	31 (62.0%)	37 (74.0%)	
Age, mean (SD)	84.6 (6.1)	84.0 (4.8)	0.610
Age, n (%)			0.315
70-84 years	25 (50.0%)	30 (60.0%)	
≥85 years	25 (50.0%)	20 (40.0%)	
Marital status, n (%)			0.091
Living with a partner	21 (42.0%)	13 (26.0%)	
Living alone	29 (58.0%)	37 (74.0%)	
Education[a]			0.784
Primary education	14 (28.0%)	12 (24.0%)	
Secondary/tertiary education	36 (72.0%)	35 (70.0%)	
Comorbidity status [a]			0.232
1-2 comorbidities	22 (44.0%)	17 (34.0%)	
3 or more comorbidities	26 (52.0%)	33 (66.0%)	
Mortality			
Within one month after discharge [b]	3 (6,4%)	2 (4,3%)	0.646
Within three months after discharge [b]	6 (12,8%)	3 (6,4%)	0.293

[a] 2 (4.0 %) missing values in usual care group (no hospital registry report on comorbidities)

[b] 3 missing values in the usual care group and 3 missing values in the TCB group

Table II. Hospital length of stay and three-month healthcare utilisation

Health care use	**Usual care group**	**TCB group**	**p-value**
Median (IQR) hospital length of stay	8.0 (6.0-12.0)	8.0 (6.75-11.0)	0.368
Hospital length of stay, n (%)			0.099
3 - 7 days	23 (46.0%)	15 (30.0%)	
≥8 days	26 (52.0%)	35 (70.0%)	
Health care use within 3 months after discharge, n (%)			
ED visit [a]	6 (13.0%)	11 (23,9%)	0.179
Hospital readmission [b]	11 (24,4%)	10 (21,7%)	0.795
Admission care home [c]	8 (17,8%)	10 (21,3%)	0.672
Visits GP [d]	32 (78%) [d]	32 (74,4%)	0.696
≥ 3 Visits GP	21 (48.8%)	22 (51,2%)	0.894
Community Nurse [e]	18 (52,9%)	24 (80%)	0.467
Informal care [f]	30 (81,1%)	29 (87,9%)	0.435

IQR= Inter Quartile Range

[a] 4 missing in the usual care group and 4 missing in the TCB group

[b] 5 missing in the usual care group and 4 missing in the TCB group

[c] 5 missing in the usual care group and 3 missing in the TCB group

[d] 9 missing in the usual care group and 7 missing in the TCB group

[e] 16 missing in the usual care group and 20 missing in the TCB group

[f] 13 missing in the usual care group and 17 missing in the TCB group

Table III. Health-outcomes

	Usual care group			**TCB group**		
Health outcomes	Hospital	1 month	3 months	Hospital	1 month	3 months
Dependent in ADL, n (%)	18 (36.0%) [a]	14 (37.8) [b]	16 (47.1%) [c]	10 (20.4%) [a]	16 (44.4%) [b]	11 (36.7%) [c]
At risk for delirium, n (%)	29 (58.0)	16 (50.0) [d]	17 (56.7) [e]	34 (68.0%)	26 (78.8%) [d]	23 (76.7%) [e]
Risk of malnutrition, n (%)	15 (30.0%)	14 (43.8%) [g]	6 (19.4%)[h]	17 (34.7%) [f]	11 (30.6%) [g]	5 (16.7%)[h]
Self-rated health, mean (SD)	5.4 (1.4)[i]	6.4 (1.3)[j]	6.6 (1.6)[k]	5.7 (1.3)	6.0 (1.4)[j]	5.9 (1.6)[k]
Quality of life, mean (SD)	6.4 (1.9)[l]	7.0 (1.5)[m]	6.4 (2.0)[n]	6.3 (1.6)	6.3 (1.6)[m]	5.9 (1.7)[n]

SD= Standard Deviation

[a] 1 (2.0%) missing in the TCB group

[b] 13 (26.0 %) missing in the usual care group and 14 (28.0 %) missing in the TCB group

[c] 16 (32.0 %) missing in the usual care group and 20 (40.0 %) missing in the TCB group

[d] 16 (32.0 %) missing in the usual care group and 14 (28.0 %) missing in the TCB group

[e] 18 (36.0 %) missing in the usual care group and 20 (40.0 %) missing in the TCB group

[f] 1 (2.0 %) missing in the TCB group

[g] 17 (34.0 %) missing in the usual care group and 14 (28.0 %) missing in the TCB group

[h] 17 (34.0 %) missing in the usual care group and 20 (40.0 %) missing in the TCB group

[i] 1 (2.0 %) missing in the usual care group

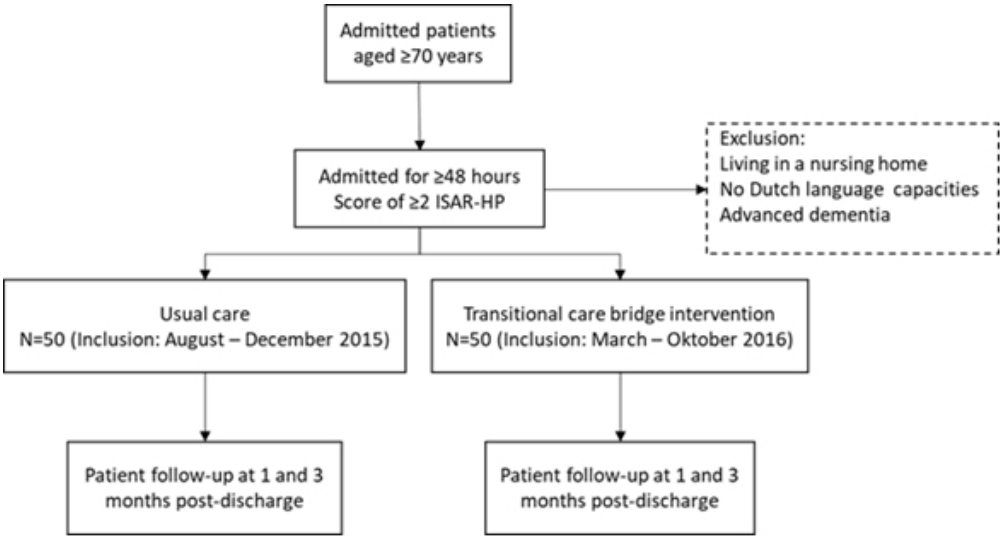
[j] 12 (24.0 %) missing in the usual care group and 14 (28.0 %) missing in the TCB group

[k] 16 (32.0 %) missing in the usual care group and 20 (40.0 %) missing in the TCB group

[l] 1 (2.0 %) missing in the usual care group

[m] 12 (24.0 %) missing in the usual care group and 14 (28.0 %) missing in the TCB group

[n] 17 (34.0 %) missing in the usual care group and 21 (42.0 %) missing in the TCB group



Appendix Flow chart of patient selection

391x208mm (38 x 38 DPI)