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Structured scoring of supporting nursing tasks to enhance early discharge in geriatric rehabilitation: The BACK-HOME quasi-experimental study

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ABSTRACT

Introduction: In geriatric rehabilitation it is important to have timely discharge of patients, especially if they have low nursing support needs. However, no instruments are available to identify early discharge potential.
Objective: To evaluate if weekly scoring of a nursing support scorecard in the evenings/nights and discussing the results in the multidisciplinary team meeting, leads to potential differences in discharge of geriatric rehabilitation patients.
Design: Quasi-experimental study with a reference cohort (n = 200) and a Back-Home implementation cohort (n = 283).
Setting/Participants: Patients in geriatric rehabilitation in the four participating skilled nursing facilities in the Netherlands.
Methods: Implementation of the nursing support scorecard during one year consisted of (1) weekly scoring of the scorecard to identify the supporting nursing tasks during the evenings/nights by trained nurses, and (2) discussion of the results in a multidisciplinary team meeting to establish if discharge home planning was feasible. Data on patients' characteristics and setting before admission were collected at admission; at discharge, the length of stay, discharge destination and barriers for discharge were collected by the nursing staff.
Results: Both cohorts were comparable with regard to median age, gender [reference cohort: 81 (IQR 75–88) years; 66% females vs. Back-Home cohort 82 (IQR 76–87) years; 71% females] and reasons for admission: stroke (23% vs. 23%), joint replacement (12% vs. 13%), traumatic injuries (31% vs. 34%), and other (35% vs. 30%). Overall, the median length of stay for the participants discharged home in the reference cohort was 56 (IQR 29–81) days compared to 46 (IQR 30–96) days in the Back-Home cohort (p = 0.08). When no home adjustments were needed, participants were discharged home after 50 (IQR 29.5–97) days in the reference cohort, and after 42.5 (IQR 26–64.8) days in the Back-Home cohort (p = 0.03). Reasons for discharge delay were environmental factors (36.7%) and patient-related factors, such as mental (21.5%) and physical capacity (33.9%).
Conclusion: Structured scoring of supporting nursing tasks for geriatric rehabilitation patients may lead to earlier discharge from a skilled nursing facility to home, if no home adjustments are needed.

What is already known about this topic?

- The purpose of geriatric rehabilitation is to restore functioning or enhance residual functional capability and discharge to home.
- A pilot study using this (evening/night) scorecard showed that 13 of 31 patients (49%) might be dismissed home earlier.
- No instruments are available to adequately evaluate earlier discharge to home based on the need for supporting nursing tasks.

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What this paper adds

- Structured scoring of supporting nursing tasks may lead to earlier discharge to home, if no home adjustments are required.
- Besides patient-related factors, environmental factors play an important role in delay of discharge.
- Nursing staff play an important role in targeting patients for early discharge.

1. Introduction

Approximately 25% of hospitalized older patients experience new disabilities in activities of daily living (Boyd et al., 2008) and may benefit from geriatric rehabilitation before they can return to their own home. In the Netherlands, post-acute geriatric rehabilitation takes place within skilled nursing facilities, sometimes followed by rehabilitation in an ambulatory setting. Rehabilitation is performed by a multidisciplinary specialized team, led by an elderly care physician. (Holstege et al., 2013) As part of the multidisciplinary team approach, 24-h specialized nursing care and support during self-care activities is available during the stay in the skilled nursing facility.

The purpose of geriatric rehabilitation is to restore functioning or enhance residual functional capability in geriatric rehabilitation patients to discharge them to their own living environment, with continuation of geriatric rehabilitation in an ambulatory care setting when required. (Boston Working Group, 1997) Primary reasons for geriatric rehabilitation are stroke, traumatic injuries, total joint replacement and a miscellaneous group (heart failure, chronic obstructive pulmonary disease, and amputation). These patients are characterized by having complex care needs because of a high burden of comorbidities and pre-morbid limitations in functioning. (Levenson, 2013; Kus et al., 2011).

Timely home discharge after inpatient rehabilitation is thought to improve functional status after discharge, in both stroke and hip fracture patients. (Donohue et al., 2013; Crotty et al., 2002; Langhorne et al., 2005; Geddes and Chamberlain, 2001; Shepperd et al., 2013). However, discharge potential and timing are dependent on patient-related factors (e.g. functioning, capacity, activities of daily living, participation in social life) and environmental factors (e.g. housing situation), thereby leaving the important discussion on timely discharge relatively open. (Gladman, 2008; Jesus and Hoenig, 2015) An earlier study in the Netherlands found that 25% of the included geriatric rehabilitation patients thought that earlier discharge had probably been possible. (Peerenboom et al., 2008). In addition, Arling et al. (2010) reported that 20% of the total population of nursing home residents were still in the nursing home at 90 days, despite that only minimal supporting nursing tasks (supervision with eating, transferring, bed mobility, hygiene and activities of daily living) were needed. If minimal nursing support is needed, discharge to home with home care and additional ambulatory rehabilitation is feasible and desirable.

We hypothesized that in geriatric rehabilitation patients with a maximum of two supporting nursing tasks during the evening, and no support needed at night, discharge to home would be possible at an earlier stage, because such assistance can be provided by a homecare provider and/or an informal caregiver. Rehabilitation during daytime, including nursing support, could then be continued in an ambulatory setting or at their own home. However, to our knowledge, no instruments are available to adequately evaluate geriatric rehabilitation patients based on the need for supporting nursing tasks, for earlier discharge to home. In a previous study a nursing support scorecard was developed to record the supporting nursing tasks required during evenings/nights to target geriatric rehabilitation patients possibly eligible for earlier discharge. (Bakker et al., 2011) A pilot study using this (evening/night) scorecard showed that 13 out of 31 patients (49%) could be discharged home earlier. (Bakker et al., 2011) Besides the potential beneficial effects on patient outcomes, this could also lead to a more cost-effective rehabilitation program.

The aim of this study was to evaluate whether structured scoring of supporting nursing tasks leads to potential differences in discharge of geriatric rehabilitation patients.

2. Methods

2.1. Setting and population

The BACK-HOME study is a quasi-experimental study with a reference cohort (n = 200) and a Back-Home cohort (n = 283). For the reference cohort, data were collected prospectively during one year from 50 patients in each of the 4 participating skilled nursing facilities, to establish the length of stay before implementation of the scorecard. Thereafter, the scorecard was implemented in the Back-Home cohort and data were collected between October 2011 and November 2012. All consecutive patients admitted for geriatric rehabilitation in the participating skilled nursing facilities were invited to participate in the study by a research nurse; no exclusion criteria were applied.

The present study was conducted within the University Network for the Care sector South-Holland (UNC-ZH). In this network care professionals work together with researchers of the Leiden University Medical Center (LUMC) to put initiatives from professionals into research with the aim to improve quality of care. (Koopmans et al., 2013; Achterberg et al., 2015).

The medical ethics committee of the Leiden University Medical Center approved the study. All participants gave oral informed consent for the entire study, including the use of data from their medical records for additional analyses, following explanation of the study requirements and assurance of confidentiality and anonymity.

2.2. Data collection

Data in both cohorts were collected by the nursing staff at admission and at discharge. All participants were followed for a maximum of 4 months, because after 4 months no major recovery is expected. (Arling et al., 2010)

At admission, data were collected on patient characteristics: sociodemographic variables (i.e. age, gender, marital status), setting before hospital admission, medical indication (diagnosis) for geriatric rehabilitation, and functioning in activities in daily living measured with the Barthel Index. (Mahoney and Barthel, 1965). At discharge, data were collected on length of stay in the skilled nursing facility, discharge locations, readmissions to hospital, death during rehabilitation stay, or not yet discharged (4 months after admission). Discharge locations were categorized into discharge to home (independent living environment) with or without the need for (new) home adjustments, or a long-term care facility, or an inpatient medical (non-geriatric) rehabilitation facility.

Environmental and patient-related reasons for discharge delay were registered, based on two categories of the International Classification of Functioning, Disability and Health (ICF model). (Gladman, 2008) First, patient-related factors subdivided into the domains mental functioning (cognitive impaired, anxiousness and depression) and low physical capacity. Second, environmental factors (e.g. no realized home adjustments, waiting for institutional care or another home, and low physical capacity of the informal caregiver).

2.3. Introduction of the nursing support scorecard

The Back-Home implementation consisted of (1) completing a weekly scorecard to identify the supporting nursing tasks during the evenings/nights provided by a trained nurse (Bakker et al., 2011), and (2) discussion of the results of the scorecard in a weekly multidisciplinary team meeting.

Nursing support scorecard

To target the potential of geriatric rehabilitation patients for earlier discharge home, a scorecard was implemented to assess the nursing support required during the evenings/nights. (Bakker et al., 2011). The scorecard was scored weekly every Wednesday at the end of both the evening and night shift by trained nurses. The reliability of the scorecard has been established (Cronbach's α 0.895) and the inter-rater agreement of the items was sufficient to good (Cohen's Kappa κ = 0.40–0.82). (Bakker et al., 2011)

The 12 items on the scorecard are presented in Box 1. If the patient is in need of physical or cognitive nursing assistance during the evening the item is scored with 1 point. Items 7, 9, 11 and 12 refer to nursing tasks at night. This leads to a maximum score on the scorecard of 16 points (maximum of 12 points during the evening and 4 points at night). If the patient needs assistance in maximally two nursing tasks during the evening and no assistance at night, this is defined as targeted for discharge home with an ambulatory rehabilitation program. Theoretically, the remaining nursing support can be provided by a homecare provider or an informal caregiver. The outcome on the scorecard is discussed in the weekly multidisciplinary team meetings; if the patient was targeted for discharge to home, the aim was to plan discharge to home within 2 weeks, or register the reasons why discharge was not possible or desirable.

3. Statistical analysis

For the reference cohort and the Back-Home cohort, differences in the length of stay in the skilled nursing facility were compared for each discharge location using an independent *t*-test or a Mann-Whitney *U* test, depending on the distribution of the data. In addition, data on patient characteristics were compared between the reference cohort and the Back-Home cohort using a chi-square test for gender, marital status, diagnosis and setting before admission; for median age and the Barthel Index, differences were calculated with a Mann-Whitney *U* test.

Analyses were performed with SPSS for Windows, version 20.0 (SPSS, Inc., Chicago, IL, USA). A p-value < 0.05 was considered statistically significant.

In the Back-Home cohort descriptive statistics were used to report the percentage of the population targeted for discharge, reasons for discharge delay, and discharge duration (i.e. number of days between targeted date for discharge and the actual discharge).

Box 1. Items on the nursing support scorecard scored during evening and night.

Scored during the evening:	Scored during the night:
1. Medication intake	
2. Fluid and food intake	
3. Transfer to toilet room	
4. Going on or off the toilet	
5. Getting (un)dressed when toileting	
6. Hygiene	
7. Incontinence pads	7. Incontinence pads
8. Transfer to bedroom	
9. Going in and out of bed	9. Going in and out of bed
10. Getting (un)dressed for the night	
11. Position in bed	11. Position in bed
12. Change of position in bed	12. Change of position in bed

4. Results

4.1. Study population

A total of 200 participants were included in the reference cohort. Of the 306 patients invited to participate in the Back-Home cohort, 22 did not want to participate and 1 was discharged shortly after admission; this resulted in 283 participants in the Back-Home cohort. In the reference cohort none of the included patients dropped out. Characteristics of the study population are presented in Table 1. At admission, the reference cohort and the Back-Home cohort were comparable with regard to gender, age, marital status, setting before admission, diagnosis and Barthel Index. In the reference cohort the median age was 81 (interquartile range 75–88) years, compared with 82 (interquartile range 76–87) years in the Back-Home cohort. In both cohorts the majority of the participants was female.

4.2. Length of stay and discharge location

There was no difference in the percentage of participants discharged to the various discharge locations between the reference cohort (n = 121) and the Back-Home cohort (n = 163); p = 0.43. Of the participants not discharged in the reference cohort (n = 79) and in the Back-Home cohort (n = 119), the percentage of hospital readmissions was comparable in both cohorts (6% vs. 3.9%; p = 0.28). However, in the Back-Home cohort fewer participants died during their rehabilitation stay (13.6% vs. 7.1%; $p < 0.001$) and more participants were still in the rehabilitation ward 4 months after admission (20% vs. 31.1%; $p < 0.001$).

Table 2 presents data on comparison of the population discharged in the reference cohort (n = 121) and in the Back-Home cohort (n = 163) for length of stay (median days) and the mean difference for each discharge location. The overall length of stay in the reference and Back-Home cohorts was similar. In the population discharged to home, only those discharged to home without new home adjustments had a shorter length of stay in the Back-Home cohort compared with the reference cohort [median 50 [interquartile range (IQR) 29.5–97 days vs. 42.5 (IQR 26–64.8) days; p = 0.03]. There was no difference in the median length of stay for the population discharged to the living environment with new home adjustments (p = 0.72) or to a long-term care facility (p = 0.33).

4.3. Discharge planning

In the Back-Home cohort, 156 (55.1%) participants who were targeted for discharge, were discussed in the multidisciplinary team meetings with the aim to plan discharge within 2 weeks. Of this targeted population, 115 were discharged and 41 were not discharged (2 died; 3 re-hospitalizations and 36 were not yet discharged at 4 months).

Of the population targeted, 112 (71.8%) were discharged to home in a median of 26 (IQR 12–42) days between the moment of targeting and actual discharge. For the participants discharged to home without home adjustments (n = 95) the median discharge duration was 22 (IQR 12–36) days compared to 42 (IQR 22–70) days for participants discharged to home with new home adjustments (n = 17); p = < 0.001. One participant was discharged to an inpatient medical (non-geriatric) rehabilitation facility and 2 participants to a long-term care facility.

Table 1
Characteristics of the study population at admission to the reference and Back-Home cohort.

	Reference cohort		Back-Home cohort		
	n	n (%)	n	n (%)	p-value[#]
Sociodemographic					
Female	200	131 (65.5)	283	200 (70.7)	0.23
Age in years; median (IQR)	200	81.1 (74.6–88.2)	283	82.4 (75.8–87.4)	0.72[*]
Married/living together	199	76 (37.7)	281	85 (30.2)	0.09
Setting (before admission to hospital)	200		281		0.38
Home (independent living environment)		197 (98.5)		280 (99.6)	
Without home adjustments		177 (88.5)		254 (90.4)	
With home adjustments		20 (10.0)		26 (9.2)	
Long-term care facility		3 (1.5)		1 (0.4)	
Diagnosis	200		282		0.69
Stroke		45 (22.5)		65 (23)	
Joint Replacement		24 (12)		36 (12.8)	
Trauma		62 (31)		96 (34)	
Other		69 (34.5)		85 (30.2)	
Functioning					
Barthel Index at admission (0–20); median (IQR)	199	9.6 (6–14)	274	10 (6–14)	0.41[*]

IQR: interquartile range. Values are numbers (%) unless indicated otherwise.
[#] p-value calculated with Chi-square test unless indicated otherwise.
[*] Mann-Whitney *U* test.

Table 2
Comparison of length of stay for patients who were discharged in the reference and Back-Home cohort.

	Reference cohort n = 121		Back-Home cohort n = 163		p-value[#]	Mean difference (95% CI)
	n (%)	Median (IQR)	n (%)	Median (IQR)		
Length of stay (days) for patients discharged	121	56 (30–80)	163	47 (30–70)	0.21	−4.2 (−11.2 to 2.7)
Length of stay (days) for each discharge location[*]:						
Home (Independent living environment)	99 (49.7)	56 (29–81)	142 (50.4)	46 (30–69)	0.08	−6.6 (−13.8, 0.69)
No (new) home adjustments needed	84 (42.2)	50 (29.5–97)	118 (41.8)	42.5 (26–64.8)	0.03	−9.3 (−17, −1.6)
With (new) home adjustments	15 (7.5)	62 (27–88)	24 (8.5)	62 (46.5–90.5)	0.72	6.5 (−12.6, 25.7)
Long-term care facility	22 (13.8)	60.5 (31.5–80)	20 (10.3)	70.5 (28–106.8)	0.33	12 (−10.1, 34.2)

IQR: interquartile range.
[#] p-value calculated with Mann-Whitney *U* test.
[*] One person in the Back-Home cohort was discharged to an inpatient medical (non-geriatric) rehabilitation facility, length of stay for this person was not reported due to the low number.

In the population that was targeted by the scorecard and that were discharged to home (n = 115), 36 (31.3%) were discharged within the 2 weeks that were set as a goal. The reasons for delay in discharge for the remaining 79 (68.7%) participants that were discharged after ≥ 2 weeks can be divided into two categories. First, patient-related factors (n = 46; 58.2%) subdivided into the domains mental functioning (21.5%) and low physical capacity (33.9%). Second, environmental factors (n = 29; 36.7%) were also reasons for discharge delay.

5. Discussion

The present study shows that implementation of structured weekly scoring of supporting (evening and night) nursing tasks has the potential to lead to earlier discharge from a skilled nursing facility to home in patients for whom no new home adjustments are needed. Nursing staff play an important role in targeting patients for possible discharge. The nursing support scorecard has the potential to assist staff to identify patients that are eligible for early discharge. After discussion in the multidisciplinary team, discharge to home with additional ambulatory rehabilitation is feasible. This is important because of the potential beneficial effects of earlier discharge with ambulatory rehabilitation on increased independency, e.g. better functional outcomes and reduced institutionalization. (Fox et al., 2013; Tistad and von, 2015; Langhorne et al., 2011; Shepperd et al., 2013)

In this study several barriers to earlier discharge were observed: i.e. patient factors (e.g. mental or physical capacity) and environmental factors (e.g. delay of adjustments to the living environment, low physical capacity of the informal caregivers and impaired cognition). These latter barriers are also related to hospital discharge delay, whereas discharge arrangements and nonmedical factors played a more prominent role in predicting discharge delay than the patient factors. (Challis et al., 2014; Watkins et al., 2014)

After being targeted for possible discharge, the reported barriers for discharge were also explained (in part) by unplanned medical or nursing care needs, other than those incorporated in the scorecard. This emphasizes the importance of discussing the scorecard results in a multidisciplinary team setting. (Levenson,

2013). The multidisciplinary team plays an important role in discharge planning because the various professionals together can provide a broader view on the contributing factors (e.g. patient and environmental factors) that help make a well-considered decision for discharge.

To overcome these barriers, early identification of these factors by assessing them at admission (or at pre-admission in patients with elective joint replacement) may be warranted. Earlier identification of environmental factors (such as the need for home adjustments) could help to avoid discharge delay. Between the moment of targeting and actual discharge in the BACK-HOME cohort there was a significant difference in the median discharge duration of 20 days between the population discharged to home without home adjustments (compared to participants discharged to home with new home adjustments). This indicates that a median reduction of approximately 20 days in the length of stay for the population discharged to home with home adjustments could be aspired.

In addition, more knowledge on (predictive) validity of the scorecard and patient-related factors for discharge possibilities and reasons for delay is needed to improve tailored and efficient discharge planning. These insights may also help to improve the content of the scorecard and determine the effect size in further interventional studies. Further, more pro-active involvement is required of the patient and informal caregiver in setting rehabilitation goals focused on discharge planning. Positive outcomes have been found on wellbeing, accepting a caring role, satisfaction with the process and continuity of care, when patients and informal caregivers are actively involved in discharge planning (from acute care to home) (Parry et al., 2003; Langhorne et al., 2005). However, these outcomes have not been studied in the setting of post-acute care to home.

This study was conducted within the University Network for the Care sector South Holland (UNC-ZH). It provides a good example of bottom-up research, initiated by a care professional (physiotherapist) and supported by researchers. (Achterberg et al., 2015; Koopmans et al., 2013) Within this context, the scorecard was easy to implement in the total population receiving geriatric rehabilitation in the skilled nursing facility. However, in a quasi-experimental design there is a risk of low internal validity due to potential differences between the cohorts due to non-randomization. Although baseline characteristics were similar in both cohorts, the Back-Home cohort included more participants who were still in the rehabilitation ward 4 months after admission, and fewer participants who died during rehabilitation stay; this could have altered the effect on the length of stay when comparing the cohorts due to other reasons. This study gives recommendations on further development of the nursing support scorecard and gives insight in important barriers for discharge and how to overcome those barriers.

6. Conclusion

Structured weekly scoring of supporting nursing tasks may result in earlier discharge of geriatric rehabilitation patients from a skilled nursing facility to home, if no home adjustments are needed. The nursing staff plays an important role in targeting patients for possible discharge and the use of a scoring card may help staff to assess earlier discharge planning for geriatric rehabilitation patients in the post-acute care setting.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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Ethical approval

None.

Authors' contributions

WA, MC, RvB and EB designed the study. EB participated in data collection. MC had full access to all data in the study and takes responsibility for integrity of the data and accuracy of the data analysis. MH did the initial analysis. MH, WA, MC RvB and JG interpreted the data. MH prepared the manuscript. All authors critically revised the manuscript and approved the final version.

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