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Factors and post-discharge outcomes associated with patients' readiness for discharge from the emergency medicine ward: A prospective study

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ABSTRACT

Background: Discharging patients with a self-reported low readiness for hospital discharge (RHD) may be challenging, as these patients may be vulnerable to risks and adaptation issues that can delay recovery. However, little is known about whether emergency medicine ward (EMW) patients are sufficiently prepared for discharge to home. Therefore, the aim of this study is to examine the factors and outcomes associated with patients' RHD in an EMW setting.

Methods: One hundred and eighty-four patients were recruited from the EMW of a tertiary hospital in Hong Kong. Cross-sectional data were collected from self-administered questionnaires and patients' medical records at the time of discharge and 1 month later. Descriptive statistics were obtained, and the variables were subjected to multivariable regression analyses.

Results: Seventy-three patients (40%) reported a low RHD at the time of discharge. Living with someone was a factor contributing to a patient's perceived RHD. A greater RHD was associated with a lower risk of 30-day emergency department readmission (odds ratio [OR] = 0.75; 95% confidence interval [CI] = 0.57–0.99) and hospital readmission (OR = 0.59; 95% CI = 0.38–0.91). However, patients who reported higher scores on the knowledge RHD subscale had a higher risk of hospital readmission (OR = 2.34; 95% CI = 1.38–3.98).

Conclusion: These findings demonstrate the importance of paying careful attention to social support network of patients and the provision of patient education, as these may improve patients' RHD prior to discharge from the EMW. (242 words)

1. Introduction

The emergency medicine ward (EMW) is an observation ward located within or near the emergency department (ED) of a hospital. This extension of services provided by the ED healthcare team allows for the immediate management and extended monitoring of patients with subacute conditions without requiring inpatient admission [1]. Accordingly, patients admitted to the EMW are usually observed for 1 to 2 days and discharged as soon as their acute condition stabilizes. However, some patients requiring longer-term treatment may be transferred to the appropriate inpatient services for specialty care. This method of care delivery has effectively reduced overcrowding in the ED by allowing for prompt medical treatment without requiring inpatient admission [1]. As EMWs are designed for short-term care management, it remains unclear whether patients with chronic conditions who are discharged from the EMW are adequately prepared to return home. The discharge of patients from the EMW to home involves the transfer of caregiving responsibilities from healthcare providers to patients and their families. Hence, post-discharge care and follow-up instructions are particularly important, as most EMW patients are discharged with residual symptoms. Notably, patients who do not feel ready for discharge may be vulnerable to risks and adaptation issues that could affect their health outcomes and delay recovery [2].

2. Background

A patient's readiness for hospital discharge (RHD) is defined as the patient's assessment of their own preparedness for discharge and their ability to cope with their illness at home [3,4]. In previous studies, patients who reported a greater RHD were more likely to exhibit

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effective coping abilities after hospital discharge [3,4] and less likely to require additional support from their informal caregivers [4], less likely to experience hospital and ED readmissions [3,5–7,10–12], and less likely to die within 30 days post-discharge [8,9,12]. Patients who feel unprepared for discharge may experience unmet needs and issues with self-care management at home that may further complicate their recovery [13].

Discharge education and planning, when provided by nurses before hospital discharge, can help prepare patients and their family members to safely transition between hospital and home [14]. However, the provision of discharge education is challenging, as the fast-paced clinical environment in the ED and EMW may not be conducive to patient learning. In a population-based patient satisfaction survey, 11 percent of patients reported that they had not received adequate information about their diagnosis and treatment plan at the time of ED discharge [15]. Additionally, age [16], social isolation [16], income [17], education level [17,18], and health literacy [19] have been identified as factors associated with the patient's ability to understand discharge instructions. In one study, older adults who were discharged from the EMW reported varying levels of RHD [20]. Patients who perceived a lower RHD perceived the need to address not only the physical and emotional effects of their acute illnesses but also the uncertainty and limitations of coping with their conditions at home. Slatyer et al. further highlighted the complexity of discharge planning for older adults, especially those with chronic conditions, as well as the extent of support needed at home after receiving emergency care [20].

Compelling evidence indicates that patients who do not comprehend their discharge instructions use more healthcare resources and are at risk of encountering adverse events [21,22]. Although the point of contact between the patient and a healthcare provider at the time of EMW discharge is brief, it offers valuable opportunities for therapeutic interactions. For instance, a recent health event may allow the patient to better understand their condition and the nurse to emphasize the importance of self-care strategies to avoid future relapses and complications. Therefore, an understanding of the patient's needs with regard to their self-reported RHD may allow EMW nurses and other healthcare providers to assess potential challenges and determine the extent of care coordination and patient education needed before discharge.

The factors associated with low RHD involve the domains of nursing (e.g., quality of discharge preparation and coordination [3,6]) and clinical care (e.g., poor satisfaction with care, presence of mental health conditions [8], and prior hospital and ED admissions). In addition, living alone, a factor related to social interaction, was found to correlate with RHD [3,23]. Other factors, such as a low education level and poor quality of life [6,8,23], are associated with a low RHD. These findings suggest that patients with a lower socioeconomic status require more assistance when accessing supportive services in a community setting.

The association of a low RHD with an increased risk of poor outcomes is somewhat supported by the evidence. However, most previous studies involved general medical and surgical inpatient populations. Therefore, it remains unknown whether patients who are medically fit for discharge from the EMW truly feel ready to return home. Given the limited research conducted in EMW settings, more evidence is needed to understand the experiences of these patients and elucidate an approach for effective discharge planning.

3. Methods

This paper reports the factors and post-discharge outcomes associated with patients' RHD at the time of discharge from the EMW. We used published recommendations and guidelines during the preparation and reporting of this study [24].

3.1. Study design and setting

This prospective study was conducted between May and September 2016. We recruited a cohort of eligible patients from a 26-bed EMW within a 583-bed acute general tertiary public hospital in Hong Kong. This hospital serves approximately 300,000 patients within the district area and handles approximately 400 ED patient visits per day.

3.2. Participants

Eligible patients recruited for this study (i) were adults aged ≥18 years, (ii) had been admitted to the EMW from the hospital ED, (iii) had a previous diagnosis of at least one preexisting chronic condition (e.g., cardiovascular-related disease, chronic obstructive pulmonary disease, cancer, or diabetes), (iv) were selected for home discharge, and (v) were able to provide voluntary informed consent.

3.3. Data collection

Two research assistants were trained to administer the questionnaire and conduct telephone interviews. These research assistants were also responsible for identifying potential participants from the daily census discharge list. The ED charge nurse then checked the list against the patients' medical records to determine eligibility.

The eligible patients who consented to participate in this study were asked to complete a questionnaire including items regarding sociodemographic information, social support, medical history, and perceived RHD. Post-discharge information, such as hospital and ED readmissions at 24 and 48 h and 30 days post-discharge, was retrieved from the administrative hospital discharge database system.

3.4. Measurement

We used the Chinese version of the RHD scale to measure patient-reported RHD (patient-RHD) prior to discharge from the EMW [25]. The 22-item RHD scale was originally developed by Weiss and Piacentine [4] and comprises four subscales: personal status, knowledge, coping ability, and expected support. Each item is assessed using a 10-point Likert scale. "Personal status" refers to the patient's physical and emotional state at the time of discharge. "Knowledge" refers to the extent of a patient's understanding of information related to management of their condition at home. "Coping ability" refers to the patient's perception of their ability to manage their own personal and healthcare needs after discharge. "Expected support" refers to the patient's perception of the availability of tangible and emotional assistance after discharge.

We then calculated the overall patient-RHD score by averaging all subscale scores. The total scores ranged from 0 to 10, with higher scores indicating greater patient-RHD. A dichotomized patient-RHD was obtained using a cut-off point of ≥7 to indicate a greater RHD, in accordance with previous studies [6,8]. One study that tested the psychometric properties of the Chinese version of the RHD scale in two Taiwanese hospitals demonstrated good results [25]. The authors reported good internal consistency for both the overall scale (Cronbach's alpha = 0.89) and the four subscales (Cronbach's alpha = 0.73–0.90).

We used the Charlson Comorbidity Index (CCI) to evaluate the burden of comorbid diseases with respect to mortality risk [26]. The CCI score is calculated as the sum of all comorbidities with and without age-weighting [27]. Based on the age-adjusted CCI scores, we stratified patients into low-risk (score: 0–5), borderline (score: 6–7), and high-risk groups (score ≥ 8) [28]. In the Hong Kong population, the CCI can be used to measure the presence of comorbidity with good discrimination (area under the receiver operating characteristic curve = 0.68; 95% confidence interval [CI] = 0.64–0.72) [28]. To determine the comorbid conditions of study patients admitted to the EMW, we obtained International Classification of Diseases–10th

Revision diagnostic codes from the administrative hospital discharge database.

3.5. Data analysis

We summarized the patients' demographic and outcome characteristics using the appropriate descriptive statistics. Unadjusted bivariate analyses were performed to describe the relationships between variables among patients who reported a high and low RHD. All tests of collinearity, normality, and homoscedasticity were performed. Multiple linear regression and multiple logistic regression models were used to examine the post-discharge outcomes and factors associated with RHD. The following control variables were added to the regression models according to previous reports [8,29,33]: age, sex, marital status, education, income, dependence level, triage category, length of EMW stay, unadjusted CCI, previous ED visits, previous hospital visits, and living arrangement.

The following formula was used to determine the minimum sample size required for multiple regressions: $n \geq 50 + 8 \times$ number of independent variables. A sample size of at least 154 patients was considered adequate for the detection of statistical significance in the relationship between RHD and readmissions. Assuming that approximately 15% of eligible participants would drop out or refuse to participate [7], we approached 230 eligible patients. All of the statistical analyses were two-sided, with the level of significance set at 0.05. All of the statistical tests were performed using IBM SPSS 22.0 for Windows (IBM Corp., Armonk, NY, USA).

3.6. Ethical considerations

This study was approved under a full review by the Joint Chinese University of Hong Kong–New Territories East Cluster Clinical Research Ethics Committee (reference no: CREC-2016.214). Prior to data collection, all eligible patients received information about the study and were asked to provide written informed consent.

4. Results

4.1. Participant characteristics

Of the 230 eligible patients approached for this study, 184 agreed to participate and completed the study (Fig. 1). Table 1 reports the demographic characteristics of the study participants, who had a mean age of 72 ± 15.1 years. Most of the patients were female, married, currently unemployed, receiving financial aid, and had a primary- or secondary-level education. The patients usually lived with their spouse and/or children. Approximately a third of the patients either lived alone or with other people who were not immediate family members. Most were independent and did not require additional assistance with activities of daily living. Patients who required a caregiver upon discharge were most likely to rely on their spouse or domestic helper for assistance.

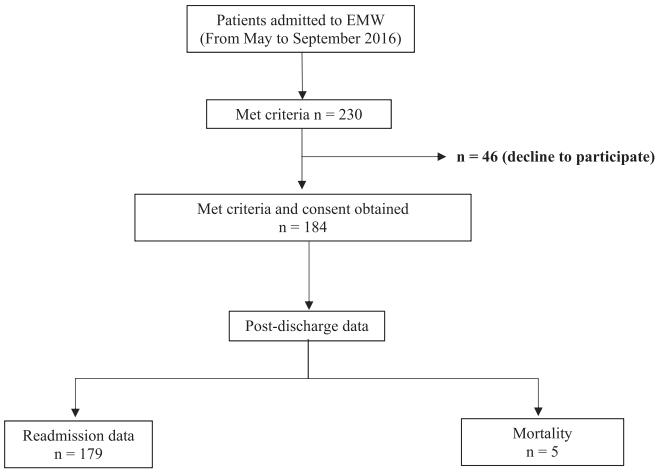

Fig. 1. Flow diagram of participant recruitment and follow-up.

The median unadjusted CCI score was 1 (range: 0–2). According to the age-adjusted CCI, 65%, 27%, and 8% of the patients were classified as having a low, borderline, or high risk of mortality, respectively. The average length of EMW stay was 2 ± 0.6 days. Most of the patients were triaged as semi-urgent cases (61%), and the remaining were urgent cases (39%). The most common reasons for admission were (i) dizziness, syncope, vertigo, and migraine (28%); (ii) cardiovascular symptoms (24%) such as chest pains, hypertension, cardiovascular disease, and heart failure; and (iii) respiratory conditions (17%) such as chronic obstructive pulmonary disease and chest infections. None of the study participants admitted to the EMW had an ED readmission within 48 h after discharge. However, 56 patients (30%) attended the ED, and 28 (15%) were readmitted to the hospital within 30 days after discharge. Patients with an ED admission diagnosis of a respiratory or cardiovascular condition were more likely to be readmitted to the hospital or ED.

The overall patient-RHD score was 7.38 ± 1.38. The majority of the patients (60%) reported high RHD scores (≥7.0), although 40% (n = 73) reported RHD scores < 7.0. The patients who reported lower RHD were generally older, lived alone, and did not have a caregiver. These patients were also more likely to be readmitted to the ED and hospital. Regarding the RHD subscales, the patients generally reported high scores on the coping ability (8.38 ± 1.66) and personal status subscales (7.92 ± 1.37) but low scores on the knowledge (6.86 ± 1.85) and expected support subscales (6.37 ± 2.77). However, the patients with a lower overall patient-RHD reported lower mean scores for all of the subscale items except coping ability (7.24 ± 1.80).

4.2. Factors associated with patient-RHD

We conducted multiple regression analyses to identify the factors associated with patient-RHD (Table 2). Our analysis revealed that living with either a spouse and/or children (B = 1.24, t = 3.60; p < 0.001) or others (B = 0.91, t = 2.16; p = 0.03) was a significant predictor of greater patient-RHD. In addition, the length of stay in the EMW was not significantly associated with the patient-RHD scores (B = −0.33, t = −1.83; p = 0.07). The overall regression model, which included all of the independent variables, significantly predicted approximately 24% of the total variance in patient-RHD [$R^2 = 0.244$, F(19, 160) = 2.71; p < 0.01]. An additional logistic regression analysis conducted using patient-RHD as a dichotomous variable (high and low RHD) yielded similar findings.

4.3. Post-discharge outcomes associated with patient-RHD

Next, we conducted multivariable logistic regression analyses to examine the relationship between the overall patient-RHD score and post-discharge readmission (Table 3). Notably, a higher patient-RHD score was significantly associated with a lower risk of 30-day ED readmission (odds ratio [OR] = 0.75, 95% CI = 0.57–0.99; p = 0.045) and 30-day hospital readmission (OR = 0.59, 95% CI = 0.38–0.91; p = 0.02).

Finally, we examined the associations between each patient-RHD subscale and the post-discharge outcomes. Here, only personal status was associated with a lower risk of 30-day ED readmission after EMW discharge (OR = 0.72, 95% CI = 0.52–0.99; p = 0.04); knowledge, coping, and expected support had no significant effects on this outcome. Furthermore, patients who perceived higher levels of personal status (OR = 0.43, 95% CI = 0.25–0.77; p < 0.001), coping ability,

Table 1
Characteristics of study participants.

	All	Low patient-RHD (< 7)	High patient-RHD (≥7)	
	N = 184	N = 73	N = 111	p-value
Sociodemographic:				
Age in years, (mean ± sd)	72 ± 15.1	75 ± 13.6	70 ± 15.8	0.02
Female, n (%)	114 (62%)	47 (64%)	67 (60%)	0.58
Married, n (%)	164 (89%)	62 (85%)	101 (91%)	0.31
Education level, n (%)				0.47
None	47 (26%)	19 (26%)	28 (25%)	
Primary	69 (38%)	31 (43%)	38 (34%)	
Secondary	55 (30%)	20 (27%)	35 (32%)	
Tertiary	13 (7%)	3 (4%)	10 (9%)	
Household income, n (%) per month				0.3
Financial aid/unemployed	115 (63%)	47 (64%)	68 (61%)	
< $10,000	24 (13%)	12 (16%)	12 (11%)	
$10,000–$19,999	30 (16%)	11 (15%)	19 (17%)	
≥$20,000	15 (8%)	3 (4%)	12 (11%)	
Living arrangement, n (%)				< 0.001
Alone	40 (22%)	23 (32%)	17 (15%)	
Spouse or children	86 (47%)	42 (58%)	44 (40%)	
Spouse and children	43 (23%)	6 (8%)	37 (33%)	
Others	15 (8%)	2 (3%)	13 (12%)	
Dependence on others, n (%)	39 (21%)	14 (19%)	25 (23%)	0.59
Primary caregiver after discharge, n (%)				0.03
No caregiver	109 (59%)	51 (70%)	58 (52%)	
Spouse	32 (17%)	7 (10%)	25 (23%)	
Domestic helper	19 (10%)	5 (7%)	14 (13%)	
Children, relatives, and others	24 (13%)	10 (13%)	14 (12%)	
Clinical:				
Charlson comorbidity index, median (IQR)	1 (0–2)	1 (0–2)	1 (0–1)	0.16
General practitioner visit past 3 months, n (%)	106 (58%)[g]	38 (52%)[a]	68 (61%)	0.31
ED visit past 3 months, n (%)	77 (42%)[e]	34 (47%)[b]	43 (39%)	0.21
Hospitalization past 3 months, n (%)	57 (31%)	24 (33%)	33 (30%)	0.65
Triage assessment, n (%)				0.29
Urgent	72 (39%)	32 (44%)	40 (36%)	
Semi-urgent	112 (61%)	41 (56%)	71 (64%)	
EMW length of stay in days, (mean ± sd)	2.3 ± 0.6	2.4 ± 0.6	2.3 ± 0.5	0.24
Patient-RHD:				
Total RHD, (mean ± sd)	7.38 ± 1.38	6.03 ± 0.77	8.27 ± 0.87	< 0.001
Personal status	7.92 ± 1.37	6.95 ± 1.35	8.55 ± 0.94	< 0.001
Knowledge	6.86 ± 1.85	5.56 ± 1.52	7.72 ± 1.52	< 0.001
Coping ability	8.38 ± 1.66	7.24 ± 1.80	9.13 ± 1.03	< 0.001
Expected support	6.37 ± 2.77	4.37 ± 2.46	7.68 ± 2.11	< 0.001
Outcomes:				
Readmission, n (%)				
48-hour ED readmission	0	0	0	
30-day ED readmission	56 (30%)	29 (40%)	27 (24%)	0.03
30-day hospital readmission	28 (15%)	19 (26%)	9 (8%)	0.001
Mortality, n (%)	5 (3%)	4 (6%)	1 (1%)	

Note: ED = emergency department, EMW = emergency medicine ward, IQR = interquartile range, RHD = readiness for hospital discharge, SD = standard deviation.

(OR = 0.47, 95% CI = 0.28–0.80; p = 0.01) and expected support (OR = 0.73, 95% CI = 0.56–0.96; p = 0.02) had a lower risk of 30-day hospital readmission. Conversely, patients who reported higher scores on the knowledge subscale had a significantly higher risk of 30-day hospital readmission (OR = 2.34, 95% CI = 1.38–3.98; p < 0.001).

5. Discussion

In this study, patients who reported a greater RHD were less likely to be readmitted to the ED or hospital within 30 days after EMW discharge. This result was consistent with the findings of previous studies [3,5–7]. Possibly, patients who perceived a greater RHD were more confident in their ability to cope with their illness during the initial post-discharge period [3]. In addition, patients with a greater RHD were more likely to have better social support systems at home. Our findings contradict those of other studies in which the RHD of patients was not associated with their post-discharge outcomes [8,29]. This discrepancy may be due to the use of a single-item measure of RHD [8] and inclusion of a surgical patient population [29]. Other factors such as frailty, disability, functional deficits [30], and the deterioration or exacerbation of an existing condition [31] may also contribute to readmission risk. However, these factors were not assessed in our study.

We additionally examined the associations between the patient-RHD subscales (personal status, knowledge, coping ability, and expected support) and readmission outcomes and found that higher scores for personal status, coping ability, and expected support were associated with a lower risk of hospital admission. Only a higher personal status score was associated with a lower risk of ED readmission. Our findings suggest that these factors are important predictors of the requirement for hospital readmission. This is unsurprising, as patients who perceived difficulty with managing their condition at home were more likely to develop further complications requiring subsequent hospital admissions.

Interestingly, we found that a higher level of knowledge was associated with a higher likelihood of hospital readmission. Generally, studies that examined the relationship between knowledge and the risk of readmission have reported inconsistent findings [32]. Two published studies have reported that patients who perceived a lower readiness

Table 2
Multivariable regression of predictors associated with readiness for hospital discharge.

	Model 1 (patient-RHD continuous)			Model 2 (patient-RHD dichotomous)		
Parameter	B	SE(B)	p	OR	95% CI	p
Age	0.00	0.01	0.92	0.98	(0.94–1.02)	0.25
Female	−0.30	0.20	0.15	0.63	(0.30–1.33)	0.23
Marital status (ref: single)						0.32
Married	0.10	0.47	0.83	3.10	(0.54–17.92)	0.21
Others (divorced, separated)	−0.25	0.65	0.70	0.96	(0.09–10.54)	0.97
Education level (ref: none)						0.33
Primary	−0.10	0.26	0.69	0.64	(0.26–1.59)	0.33
Secondary	0.37	0.29	0.20	0.80	(0.28–2.25)	0.67
Tertiary	0.64	0.43	0.14	2.61	(0.51–13.50)	0.25
Household Income (ref: government aid)						0.63
< $10,000	−0.19	0.31	0.54	0.59	(0.20–1.73)	0.34
$10,000-$20,000	−0.41	0.30	0.17	0.59	(0.20–1.77)	0.35
> $20,000	0.25	0.40	0.54	1.08	(0.21–5.63)	0.92
Level of dependence (ref: independent)	−0.28	0.25	0.26	1.29	(0.53–3.12)	0.58
Living arrangement (ref: alone)						0.00
Spouse or children	0.11	0.28	0.68	1.30	(0.52–3.25)	0.58
Spouse and children	1.24***	0.34	0.00	6.81***	(1.84–25.19)	0.00
Others	0.91*	0.42	0.03	9.56*	(1.63–56.16)	0.01
Urgent triage (ref: semi-urgent)	0.05	0.20	0.81	0.80	(0.38–1.65)	0.54
Charlson comorbidity index	0.04	0.11	0.74	0.93	(0.62–1.38)	0.70
EMW Length of stay	−0.33	0.18	0.07	0.61	(0.31–1.19)	0.15
ED visit past 3 months (ref: none)	−0.34	0.24	0.17	0.57	(0.24–1.36)	0.21
Hospital visit past 3 months (ref: none)	0.20	0.26	0.44	1.40	(0.55–3.55)	0.48
R-square	0.24***					
Nagelkerke R-square				0.27		

Note: B = unstandardized beta, CI = confidence interval, OR = odds ratio, ED = emergency department, EMW = emergency medicine ward, ref = reference, RHD = readiness for hospital discharge, SE (B) = standard error of unstandardized beta. p = p-value.

* $p < 0.05$.

*** $p < 0.001$.

Table 3
Association between readiness for discharge and post-discharge characteristics on 30-day readmission.

	30-day ED readmission						30-day hospital readmission					
Parameter	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Patient-RHD overall score				0.75*	(0.57–0.99)	0.04				0.59*	(0.38–0.91)	0.02
RHD: personal	0.72*	(0.52–0.99)	0.04				0.43***	(0.25–0.77)	0.00			
RHD: knowledge	1.12	(0.85–1.48)	0.41				2.34***	(1.38–3.98)	0.00			
RHD: coping	0.95	(0.71–1.27)	0.71				0.47*	(0.28–0.80)	0.01			
RHD: support	0.90	(0.77–1.06)	0.20				0.73*	(0.56–0.96)	0.02			
Age	1.00	(0.97–1.04)	0.81	1.00	(0.97–1.04)	0.90	1.10*	(1.03–1.18)	0.01	1.07*	(1.01–1.14)	0.02
Gender (ref: males)	1.02	(0.48–2.13)	0.96	1.07	(0.51–2.21)	0.86	0.61	(0.17–2.19)	0.44	0.82	(0.28–2.38)	0.72
Marital status (ref: single)												
Married	0.36	(0.07–1.78)	0.21	0.33	(0.07–1.66)	0.18	0.29	(0.02–3.89)	0.35	0.15	(0.01–1.52)	0.11
Others (divorced, separated)	0.12	(0.01–1.68)	0.11	0.16	(0.01–2.16)	0.17	0.34	(0.01–12.61)	0.56	0.75	(0.03–18.16)	0.86
Education (ref: none)												
Primary	0.56	(0.22–1.43)	0.23	0.62	(0.25–1.52)	0.30	0.31	(0.07–1.40)	0.13	0.79	(0.24–2.60)	0.69
Secondary	0.66	(0.23–1.87)	0.43	0.74	(0.27–2.06)	0.57	0.19	(0.03–1.22)	0.08	0.49	(0.11–2.19)	0.35
Tertiary	1.07	(0.24–4.82)	0.93	1.23	(0.28–5.50)	0.78	0.49	(0.03–7.45)	0.61	0.62	(0.05–7.54)	0.71
Income (ref: government aid)												
< $10,000	0.69	(0.22–2.16)	0.52	0.73	(0.24–2.23)	0.59	0.65	(0.10–4.30)	0.66	0.42	(0.07–2.39)	0.33
$10,000–$20,000	1.07	(0.38–3.06)	0.89	0.98	(0.35–2.75)	0.97	1.41	(0.30–6.71)	0.67	0.84	(0.19–3.63)	0.81
> $20,000	1.13	(0.27–4.69)	0.86	1.24	(0.30–5.05)	0.76	0.69	(0.03–18.85)	0.83	1.09	(0.06–18.43)	0.95
Level of dependence (ref: indep)	0.46	(0.16–1.29)	0.14	0.50	(0.19–1.28)	0.15	0.13*	(0.02–0.80)	0.03	0.53	(0.15–1.85)	0.32
Triage category (ref: semi-urgent)	1.05	(0.50–2.18)	0.90	1.04	(0.51–2.13)	0.92	0.66	(0.20–2.22)	0.51	0.81	(0.28–2.33)	0.69
EMW length of stay	0.51	(0.25–1.05)	0.07	0.59	(0.30–1.16)	0.12	0.12*	(0.02–0.59)	0.01	0.28*	(0.08–0.97)	0.04
Charlson comorbidity index	1.05	(0.70–1.57)	0.83	1.07	(0.72–1.60)	0.73	1.79	(1.00–3.19)	0.05	1.48	(0.88–2.51)	0.14
ED visit (ref: none)	0.98	(0.41–2.37)	0.97	1.16	(0.49–2.72)	0.73	1.04	(0.27–4.03)	0.95	1.86	(0.55–6.34)	0.32
Hospital stay (ref: none)	1.50	(0.57–3.98)	0.41	1.24	(0.49–3.11)	0.65	3.91	(0.82–18.72)	0.09	1.36	(0.37–4.98)	0.64
Living arrangement (ref: alone)												
Spouse only	2.13	(0.74–6.19)	0.16	1.99	(0.74–5.37)	0.17	2.12	(0.43–10.43)	0.36	1.62	(0.48–5.43)	0.44
Spouse and children	2.12	(0.54–8.23)	0.28	2.10	(0.58–7.66)	0.26	5.37	(0.55–52.24)	0.15	2.82	(0.44–18.30)	0.28
Others	2.37	(0.46–12.16)	0.30	1.94	(0.41–9.14)	0.40	0.00	(0.00–0.00)	1.00	0.00	(0.00–0.00)	1.00
Nagelkerke R-square	0.137			0.113			0.484			0.338		

Note: CI = confidence interval, OR = odds ratio, ED = emergency department, EMW = emergency medicine ward, indep = independent, OR = odds ratio, ref = reference, RHD = readiness for hospital discharge. p = p-value.

* $p < 0.05$.

*** $p < 0.001$.

with regard to knowledge had a higher risk of readmission [6,7]. Consistent with our finding, one previous study [33] reported that patients who received more discharge planning had a significantly higher risk of 30-day hospital readmission. Our finding may suggest that patients who are more informed about their condition are more likely to seek medical help when needed. We assume that patients are given information about symptoms of which they should be aware, as well as the recommended course of action in the event of complications or deterioration, with the aim of avoiding hospitalization. However, we could not ascertain whether our patients had acquired this knowledge before or after their hospital visit. We were also unable to determine whether the patients' hospital visits were attributable to complications of their existing conditions or other new health conditions.

We further examined the factors associated with patient-RHD and found that patients who lived with family members or others were more likely to report a greater RHD. This finding was consistent with previous studies that identified family support as an important indicator of a high RHD [3]. The involvement of immediate family members in the care of patients with chronic conditions is crucial during the initial recovery period after discharge from the EMW. Older patients are more likely than younger patients to visit the ED or be admitted to the EMW for observation [34]. Our study sample largely comprised patients who were older, had chronic conditions and a lower socioeconomic status, and reported potential caregiver issues and inadequate family support. This may explain why some of the patients did not feel ready to be discharged. Our findings indicate the need to pay attention to older patients who live alone and do not have adequate family support at home. For patients who require additional assistance, care coordination on a case-by-case basis may play an important role in the transfer of care from the EMW to the community. The identification of patients' needs at the time of EMW discharge may allow nurses to determine which patients may require additional assistance.

We also found that a longer length of EMW stay was not associated with a lower patient-RHD. Similar results were reported in other studies [3,5,9]. In contrast, Kaya et al [12] found that higher average length of stay in hospital was significantly associated with lower RHD. They attributed this finding to longer-stay patients being sicker and more likely to have complex hospitalizations and post-discharge needs.

We observed that 40% of the patients in our sample did not feel ready to leave the EMW at the time of discharge. Previous studies conducted in an inpatient setting reported a low RHD in 15–41% of inpatients [6–8,12,35]. Other studies found that patients frequently left the ED with an incomplete understanding of their discharge instructions. This lack of comprehension increased their risk of experiencing poor outcomes, such as complications, nonadherence, and readmission [21]. In addition, it is difficult for nurses to provide discharge education in an environment which is characterized by high turnover rates and heavy manpower requirements [36]. Our study provided evidence to suggest that the assessment of patient-RHD before EMW discharge is crucial to an understanding of post-discharge needs. However, strategies to address these needs could be explored further in future studies.

5.1. Limitations

First, this study was based on a convenience sample obtained from a single EMW at a tertiary hospital in Hong Kong. Therefore, the socioeconomic status of the patient sample may differ from that of other populations. Furthermore, patients who felt ready for discharge may have been less inclined to participate in the study because they did not anticipate issues during the initial post-discharge period. Accordingly, the study findings may not be generalizable to other populations. Second, this study may face a risk of recall bias. Some of the questionnaire items required the patients to recall the number of visits made to their general practitioner, the ED, and the hospital during the past 3 months. This is in contrast with most previous studies, which asked patients to recall their past clinical visits for up to 6 months post-discharge.

Third, we did not include some potential confounding factors in the analysis. Although a prior study reported that patients who are not ready for discharge are more likely to exhibit greater depressive symptoms, higher anxiety, and a lower quality of life [9], we did not measure these variables in our study. We also did not measure other factors that might influence patients' understanding of their discharge instructions, such as their level of health literacy. Some patients may have been enrolled previously in programs that affected their RHD. For instance, we did not consider the roles of liaison nurses from community outreach services in the provision of long-term care to eligible community-dwelling older adult patients with chronic conditions.

6. Conclusions

This study provides some evidence supporting an association of patient-RHD at the time of EMW discharge with the patient's current living arrangements and risk of readmission. In addition, a higher patient-RHD knowledge score was associated with a higher likelihood of 30-day hospital readmission. Our findings suggest that nurses could provide additional resources, including outlets for seeking community support, to patients living alone. Moreover, other methods of investigation are needed to examine the role of the caregiver in discharge planning, particularly how the presence of a caregiver influences the patient's perception of RHD and the provision of support to caregivers during the initial stages of recovery.

An improved discharge process may enhance RHD and ensure the continuity of care from the EMW to home. For some patients, the provision of information to improve their knowledge may help them to cope with their recent health event. Additionally, efforts to develop more innovative nurse-led discharge planning practices should consider manpower requirements and workload demands. Future studies could develop and test effective discharge interventions that incorporate the use of mobile health technology.

Declarations of conflict of interest

None.

Declaration of ethical statement

All named authors have knowledge and approve of the submission of this paper. This study was conducted in accordance to the ethical standards of the Joint Chinese University of Hong Kong – Hospital Authority Ethics Committee and the 1964 Declaration of Helsinki.

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Appendix A. Supplementary material

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