Clarifying differences in viewpoints between multiple healthcare professionals during discharge planning assessments when discharging patients from a long-term care hospital to home

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ABSTRACT

Comprehensive discharge planning provided by interprofessional collaboration is critical for discharging patients from hospitals to home. For effective interprofessional discharge planning, the evaluation that clarifies the differences in assessment viewpoints between various healthcare professionals is needed. This study aimed to clarify the assessment viewpoints of multiple healthcare professional groups when discharging patients from a long-term care hospital (LTCH) to home. We reviewed 102 medical records from an LTCH in Japan, extracted descriptions of discharge planning assessments written by 3 doctors, 13 nurses, 3 physical therapists, 13 care workers, and 2 social workers, linked these to the International Classification of Functioning, Disability and Health, and conducted the statistical analysis. Doctors and nurses significantly focused on "*Body Functions*". Physical therapists and care workers significantly focused on "*Activities and Participation*". Social workers significantly focused on "*Environmental Factors*". We also identified the factors less or missing from assessments in the clinical field of the LTCH. Our findings could be contributed as a base of knowledge to foster a better understanding of different healthcare professionals' assessment viewpoints. The further development of comprehensive discharge planning assessment tools, service programs, and research on discharge planning methods that could contribute to effective interprofessional discharge planning is needed.

Keywords: Discharge planning assessment, Interprofessional work, Multiple viewpoints, Long-term care hospital, ICF

1. Introduction

With the recent aging of society, healthcare interventions through interprofessional work are increasingly required for older people with multiple risk factors (Beswick, Rees, Dieppe, Ayis, Gooberman-Hill et al., 2008). In particular, comprehensive discharge planning provided by interprofessional collaboration is critical for elderly patients discharged from hospitals with combined complex needs such as health, comorbidity, and social issues (M. Naylor, Brooten, Jones, Lavizzo-Mourey, Mezey et al., 1994; M. D. Naylor, Brooten, Campbell, Jacobsen, Mezey et al., 1999). Interprofessional interventions at discharge improve patients' physical functions (Courtney, Edwards, Chang, Parker, Finlayson et al., 2012; Huang & Liang, 2005), quality of life (Huang & Liang, 2005), medication adherence (Laramee, Levinsky, Sargent, Ross, & Callas, 2003), identification of disease diagnosis (Jack, Chetty, Anthony, Greenwald, Sanchez et al., 2009), preparation for discharge (Jack et al., 2009), relationships with primary care providers (Jack et al., 2009), and satisfaction (Laramee et al., 2003). Moreover, interprofessional discharge planning reduces patients' hospital stay (Huang & Liang, 2005), readmission rate (Huang & Liang, 2005; Rich, Beckham, Wittenberg, Leven, Freedland et al., 1995), and medical costs (Jack et al., 2009; Rich et al., 1995). In regard to interprofessional discharge planning, findings have been reported in acute care hospitals (Goncalves-Bradley, Lannin, Clemson, Cameron, & Shepperd, 2016) and long-term care facilities (Freeman, Bishop, Spirgiene, Koopmans, Botelho et al., 2017). Along with the importance increase of interprofessional discharge planning for patients with long-term care needs (Denson, Winefield, & Beilby, 2013; Freeman et al., 2017), interprofessional discharge planning is also the rising need in long-term care hospitals (LTCHs) (Eliason, Grieco, McDevitt, & Roberts, 2018).

Whereas, inadequacies and difficulties in interprofessional collaboration at the time of patient discharge have been reported. For instance, insufficient information exchange about

patients at discharge has been shown to lead to frustration among healthcare professionals (Wong, Yam, Cheung, Leung, Chan et al., 2011), judgments regarding patient status have been reported to vary among professionals despite similar scores on quantitative assessment tools (Grimmer, May, Dawson, & Peoples, 2004), and poorly shared decision-making in discharge planning has been shown to result in conflict (Atwal, 2004). Opinions often differ between multiple healthcare professionals at discharge planning, and this has been suggested as a reason for these difficulties (Connolly, Deaton, Dodd, Grimshaw, Hulme et al., 2010; Wong et al., 2011), which in turn, makes it difficult to understand each other's viewpoints. Confusion among healthcare professionals can lead to adverse results for patients (Connolly et al., 2010). As each healthcare professional may assess patients to be discharged based on different viewpoints, the evaluation that clarifies the differences in viewpoints between various healthcare professionals regarding assessments for discharge planning is needed. This could clarify the role of each profession (Watts, Pierson, & Gardner, 2007; Wong et al., 2011) and lead to the development of more effective interprofessional discharge planning.

When a patient is discharged home from an LTCH, comprehensive assessments rooted in that patient's life are required, such as their mobility, economic status, or home environment (Senda, 2017). Therefore, this study evaluated the wide-ranging viewpoints of multiple healthcare professionals concurrently and plurally, using the International Classification of Functioning, Disability and Health (ICF), a conceptual framework and standard language developed by the World Health Organization. The ICF was developed to describe health and health-related status, and it enables to evaluate bio-psycho-social aspects (World Health Organization, 2001). One of the recommendations for its application is to use it in interdisciplinary researches (World Health Organization, 2001).

The purpose of this study was to clarify the differences in assessment viewpoints of multiple healthcare professionals when discharging patients from an LTCH to home.

2. Methods

2.1. Study design

In this descriptive study, we retrospectively investigated medical records from a single LTCH in Japan. We extracted descriptions of qualitative assessments written by doctors, nurses, physical therapists, care workers, and social workers regarding patients discharged home from an LTCH, and linked these to the ICF. Then we conducted statistical analysis. The flow of the study procedure and data collection for each step is shown in Fig. 1. Each type of data is presented as A, B, and C in Fig. 1, as well as in the manuscript.

The discharge planning process consists of the following steps: “Step 1: pre-admission assessment”, “Step 2: case finding on admission”, “Step 3: inpatient assessment and preparation of a discharge plan based on individualized patient needs”, “Step 4: implementation of the discharge plan”, and “Step 5: monitoring in the form of an audit to assess if the discharge plan was implemented” (Marks, 1994). For the purposes of this study, we focus on Step 3, which we refer to as “discharge planning assessment”.

2.2. Setting

We conducted the present survey at the medical institution Hakuyoukai, an LTCH in Kagoshima, Japan. Long-term care beds in LTCHs are defined in Japan, and at the time of the survey, long-term care beds were classified into two types: medical long-term care beds and sanatorium long-term care beds. Medical long-term care beds were defined as “beds in hospitals and clinics that mainly accommodate patients who need long-term treatment and care”, and sanatorium long-term care beds were defined as “beds in hospitals and clinics that provide social care under medically controlled and necessary medical treatment to certified frail patients who need long-term treatment and care”; in addition, the minimum standard regarding the composition of hospital staffs has been established (Ministry of Health, Labour

147 and Welfare, 2016). The medical institution Hakuyoukai meets the standard regarding staff
148 composition and possesses both medical and sanatorium long-term care beds. We
149 investigated the medical records of patients discharged home from the medical institution
150 Hakuyoukai after using medical long-term care beds. This LTCH has been certificated by the
151 Japan Council for Quality Health Care, and standards have been put in place to assure
152 appropriate care.
153
154 *2.3. Medical record survey*
155 We reviewed the medical records of 102 patients discharged from the medical institution
156 Hakuyoukai and extracted descriptions of discharge planning assessments (Data A). The
157 inclusion criteria for the medical records were as follows: 1) cases in which the patients were
158 discharged home from the LTCH from 2014 to 2017; and 2) cases in which the patients were
159 admitted to the LTCH for ≥7 days, in accordance with patients' median length of hospital stay
160 in LTCHs in the US (6 days) (Gruber D, 2016). The characteristics of the patients for whom
161 medical records were selected are shown in Table 1.
162 We defined discharge planning assessment as follows, referring to the definition by the
163 Department of Human Services, State Government of Victoria (Department of Human
164 Services, 1998): "physiological, physical, psychological, social and cultural assessment
165 which becomes the base of information of discharge planning development and intervention
166 provided in LTCHs." The qualitative descriptions of discharge planning assessments that met
167 this definition were extracted by two investigators (KM and MM) (Data A). The descriptions
168 extracted (Data A) were written by 3 doctors, 13 nurses, 3 physical therapists, 13 care
169 workers, and 2 social workers in the LTCH. The individuals who wrote the descriptions were
170 identifiable based on their signatures. The assessments involving descriptions of treatments
171 for primary diseases that were the reason for admission were excluded, as were common

routine assessments.

2.4. Linking to the ICF

The qualitative data extracted from the medical record survey (Data A) were then linked to the ICF, using established ICF linking rules (Cieza, Geyh, Chatterji, Kostanjsek, Ustun et al., 2005) (Fig. 1). The components of the ICF, except for component 5: *"Personal Factors"*, are encoded with letters as follows: component 1: *"Body Functions"* (b), component 2: *"Body Structures"* (s), component 3: *"Activities and Participation"* (d), and component 4: *"Environmental Factors"* (e). Each component is hierarchized from the first- to the fourth-level categories, and the category descriptions become more detailed as the level descents (Fig. 2). The first-level categories were used in the linking procedure.

First, we extracted meaningful concepts (Data B) from the descriptions of discharge planning assessments (Data A). Then, we linked these meaningful concepts (Data B) to the first-level ICF categories that reflected their meaning most precisely (Data C) (Fig. 1). For quality assurance, two independent investigators (KM and MM) performed the linking procedure, and the findings of both investigators were then compared. Any disagreements were discussed until consensus was reached to determine which first-level ICF category to be linked.

2.5. Statistical analysis

The percentage of linked first-level ICF category (Data C) and ICF component (Data C were totaled for each component) were respectively compared between the five healthcare professional groups, and the latter also in each professional group. For comparison, a one-way analysis of variance (ANOVA) was performed. When a one-way ANOVA indicated a significant difference, this was followed by a Tukey–Kramer *post hoc* test for multiple

comparisons. A chi-squared test of goodness-of-fit or an exact multinomial test was performed to compare the relative frequency of linked first-level ICF category (Data C) between five healthcare professional groups in each first-level ICF category. When a chi-squared test of goodness-of-fit or an exact multinomial test indicated a significant difference, this was followed by a *post hoc* exact binomial test for multiple comparisons, and the p values were adjusted using the Benjamini–Hochberg method. All statistical analyses were performed using IBM SPSS Statistics for Windows (version 25.0; IBM Corp., Armonk, NY) or R for Windows (version 3.6.3; R Development Core Team, Vienna, Austria), with the level of significance set at $p < 0.05$. The notation in Table 2, Appendix A, and Fig. 3 were followed the ways to present the results of pairwise comparisons by the letter display (Piepho, 2018).

3.Results

*3.1. Comparison of f*ive healthcare professional groups in each ICF component

The results of pairwise comparisons of percentages between five healthcare professional groups in each ICF component are shown in Fig. 3(A). In component 1: "*Body Functions*", the groups of doctor, nurse, and physical therapist were significantly higher than care worker and social worker (all $p < 0.01$). In component 3: "*Activities and Participation*", the groups of care worker and physical therapist were significantly higher than doctor, nurse, and social worker (all $p < 0.01$). In component 4: "*Environmental Factors*", the group of social worker significantly higher than the other four occupations (all $p < 0.01$).

3.2. Comparison of ICF components in each healthcare professional group

The results of pairwise comparisons of percentages between three ICF components in each healthcare professional group are shown in Fig. 3(B). In the groups of doctor and nurse, component 1: *"Body Functions"* was significantly higher than the other two components (all

$p < 0.01$). In the groups of physical therapist and care worker, component 3: "*Activities and Participation*" was significantly higher than the other two components (all $p < 0.05$). In the group of social worker, component 4: "*Environmental Factors*" was significantly higher than the other two components (all $p < 0.01$).

3.3. Comparison of first-level ICF categories between five healthcare professional groups

The results of pairwise comparisons of the first-level ICF categories' percentages between five groups of healthcare professionals are shown in Table 2. In "b1 Mental Functions", the groups of nurse and doctor were significantly higher than physical therapist, care worker and social worker (all $p < 0.05$). In "b2 Sensory Functions and Pain", the groups of doctor, nurse, and physical therapist were significantly higher than care worker and social worker (all $p < 0.05$). In "b7 Neuromusculoskeletal and Movement-related Functions", the group of physical therapist was significantly higher than the other four occupations (all $p < 0.01$). In "d4 Mobility", the groups of physical therapist and care worker were significantly higher than doctor, nurse, and social worker (all $p < 0.01$). In "d5 Self-care", the group of care worker was significantly higher than the other four occupations (all $p < 0.01$). In "e5 Services, Systems and Policies", "e4 Attitudes", and "e3 Support and Relationships", the group of social worker was significantly higher than the other four occupations (all $p < 0.01$).

The results of pairwise comparisons of relative frequencies between five healthcare professional groups in each first-level ICF category are shown in Appendix A. Notable results are as follows. In "b1 Mental Functions", the group of nurse was significantly higher than the other four occupations (all $p < 0.05$). In "d4 Mobility", the group of physical therapist was significantly higher than the other four occupations (all $p < 0.01$). In "d5 Self-care", we found no significant difference between the groups of care worker, physical therapist, nurse and doctor.

3.4. First-level ICF categories not assessed by any healthcare professional groups

Twelve first-level ICF categories were not assessed by any of the groups (Table 2). None of the first-level categories for component 2: "*Body Structures*" were linked with the qualitative data. Under component 1: "*Body Functions*", "b3 Voice and Speech Functions", "b6 Genitourinary and Reproductive Functions", and "b8 Functions of the Skin and Related Structures" were not assessed. Under component 4: "*Environmental Factors*", "e2 Natural Environment and Human-made Changes to Environment" was not assessed.

4. Discussion

Our findings revealed that multiple healthcare professionals assess patients from different viewpoints when discharging them from an LTCH to home. Overall, doctors and nurses focused on aspects related to the ICF component 1: *"Body Functions"*, whereas physical therapists and care workers focused on component 3: *"Activities and Participation"*. In particular, more than 80% of care workers' assessments were associated with component 3: *"Activities and Participation"*. Social workers focused on component 4: *"Environmental Factors"*. Notably, assessments of care workers and social workers were infrequently associated with component 1: *"Body Functions"* (4.7% and 4.1%, respectively).

In the following, we discuss based on the results shown in Table 2, and in case discuss the results from Appendix A, we note as aside. The results of Table 2 compared the assessment viewpoints per person between five groups, and Appendix A compared the assessment viewpoints which reflect the composition of hospital staffs in the LTCH clinical field.

4.1. Different assessment viewpoints between multiple healthcare professionals

4.1.1. Comparison of first-level ICF categories in component "Body Functions"

In the discharge planning assessments, doctors, nurses and physical therapists placed

272 importance on the category “b2 Sensory Functions and Pain”. As pain assessments have been
273 shown to lead to appropriate pain management (Ruben, van Osch, & Blanch-Hartigan, 2015),
274 doctors, nurses, and physical therapists appear to capture patients’ pain status at the discharge
275 process is essential. It has been considered that the appropriate management of chronic pain
276 might reduce patients’ hospitalization costs (Gupta, Lee, Mojica, Nairizi, & George, 2014).
277 Accurate pain assessment is assumed to be one of the important factors of effective discharge
278 planning to reduce the burden of both patients and healthcare systems of LTCH. In addition,
279 doctors, nurses, and physical therapists also focused on sensory functions. As sensory
280 functions are important for smooth communication (Yorkston, Bourgeois, & Baylor, 2010),
281 doctors, nurses, and physical therapists may be carefully assessing patients’ sensory functions
282 to help ensure their safe community-dwelling after discharge, which requires interactions
283 with others.
284 Nurses and doctors also focused on the category “b1 Mental Functions”, which consists
285 of several cognitive functions. In the previous study, implementation rates of cognitive
286 assessments by nurses and doctors increase at patients’ discharge than admission (Shermon,
287 Vernon, & McGrath, 2015). Our study also showed that doctors and nurses in the clinical
288 field of the LTCH recognize to judge patients’ cognitive status is critical for their discharge.
289 In addition, from the result of Appendix A, nurses highly focused on “b1 Mental Functions”
290 even than doctors. The previous study has shown that one of most important reasons that
291 nurses place importance on cognitive function is to determine discharge arrangements
292 (Persoon, Banningh, van de Vrie, Olde Rikkert, & van Achterberg, 2009). From our results, it
293 seems that nurses assess patients’ cognitive status more carefully to determine discharge
294 planning interventions.
295 Our findings suggest that when assessing patients to be discharged from an LTCH to
296 home, in particular doctors and nurses place importance on bio- and psycho- aspects such as

297 cognitive functions, sensory functions, and pain status, which are important for smooth and
298 safe behavior in their community lives after discharge.
299
300 *4.1.2. Comparison of first-level ICF categories in component "Activities and Participation"*
301 Physical therapists mainly focused on the category "d4 Mobility", whereas care workers
302 mainly focused on both "d4 Mobility" and "b5 Self-care"; these results are clearly higher
303 than other groups of healthcare professionals. Items related to activities of daily living
304 (ADLs) are included in both "d4 Mobility" and "d5 Self-care": basic activities, transferring,
305 and moving are included in "d4 Mobility", while eating, dressing, toileting, bathing, and
306 grooming are included in "d5 Self-care". Our findings showed that physical therapists placed
307 importance on partial ADLs along with "b7 Neuromusculoskeletal and Movement-related
308 Functions", whereas care workers assessed ADLs totally. Our findings regarding physical
309 therapists are in line with a previous study that the standardized assessment tools used by this
310 occupation consist mainly of basic physical function status (Bland, Whitson, Harris,
311 Edmiaston, Connor et al., 2015). Our findings are unique because we found that compared
312 with physical therapists, care workers assessed discharged patients' life-rooted physical
313 functions in addition to basic physical functions. It seems that physical therapists assessed
314 highly specified physical functions with the knowledge of muscle motor functions, whereas
315 care workers assessed physical functions from a perspective rooted in patients' everyday
316 lives. In this regard, however, our findings from Appendix A also indicated that doctors and
317 nurses assessed these two categories "d4 Mobility" and "d5 Self-care" comparatively,
318 especially the latter. As physical function is most frequently treated as a predictor of
319 readmission after discharge from the post-acute care setting (Middleton, Graham, Lin,
320 Goodwin, Bettger et al., 2016; Ottenbacher, Karmarkar, Graham, Kuo, Deutsch et al., 2014),
321 it seems that the groups of healthcare professionals (physical therapists, care workers,

doctors, and nurses) recognize the importance of assessing patients' physical function status at discharge. More specifying the differences in viewpoints regarding physical function assessments between multiple healthcare professionals could improve the outcomes of patients discharged from LTCHs.

In three categories, "d7 Interpersonal Interactions and Relationships", "d8 Major Life Areas", and "d9 Community, Social and Civic Life", had a low ratio in all five groups. These categories include relationship-building, money management, and social relationships. These aspects have been proposed as social factors to predict discharged patients' readmission or mortality (Calvillo-King, Arnold, Eubank, Lo, Yunyongying et al., 2013). Previous studies have considered that these social factors are important for anticipating the sustainability of community-dwelling of patients (Calvillo-King et al., 2013; Nagasako, Reidhead, Waterman, & Dunagan, 2014). Especially, socioeconomic factors are reported to be highly accurate as predictors of readmission rates (Nagasako et al., 2014). However, it seems that the importance of assessing relationships between discharged patients and society has not been sufficiently recognized by healthcare professionals in the LTCH clinical field. These results suggest the need for further research on discharge planning methods or the development of discharge planning service programs that encourage frontline healthcare professionals to be aware of and consider the social factors of patients during discharge planning assessments.

4.1.3. Comparison of first-level ICF categories in component "Environmental Factors"

Social workers placed the highest assessment importance on "e5 Services, Systems and Policies". Social workers also focused on "e3 Support and Relationships" and "e4 Attitudes". For effective discharge planning, sufficient assessments of both formal and informal social support are needed (Yam, Wong, Cheung, Chan, Wong et al., 2012). In the present study, we found that social workers are assessing these factors. Previous studies have reported that not

only patients, but also caregivers require support by someone at home, such as family members, friends, or neighbors, after discharge from hospitals (Cain, Neuwirth, Bellows, Zuber, & Green, 2012); hence, social resources also need to be assessed from the perspective of assessments for caregivers (Bauer, Fitzgerald, Haesler, & Manfrin, 2009).

The other four groups of healthcare professionals seldom assessed "e5 Services, Systems and Policies" and "e3 Support and Relationships", under component 4: *"Environmental Factors"*. Although doctors and nurses assessed "e4 Attitudes", social workers placed the importance significantly higher. On the other hand, social workers, similarly to care workers, seldom assessed the categories under component 1: *"Body Functions"*. There are undergraduate curricula for each healthcare professionals to learn the contents associated with every first-level ICF category; however, our findings indicated that healthcare professionals in the clinical field notably placed the viewpoints on each specialty. We suggest that these differences in assessment viewpoints require mutual understanding when developing comprehensive discharge planning. Interprofessional education is increasingly becoming important to cultivate collaboration skills among healthcare professionals (Gilbert, Yan, & Hoffman, 2010). Our present findings could contribute as the base of knowledge for interprofessional education by clearly identifying the different viewpoints and roles of various types of healthcare professionals, which cause the need for collaboration.

4.2. First-level ICF categories not assessed by any healthcare professional

No first-level ICF categories included in the component 2: *"Body Structures"* were linked. The reason for this seems that the assessment descriptions of treatment for the primary disease were excluded from the data, and thus, no subjects could be linked to this component. The assessment descriptions related to "b6 Genitourinary and Reproductive Functions" and "b8 Functions of the Skin and Related Functions" were also excluded because

they are seen as common routine assessments.

The reason that "b3 Voice and Speech Functions" was not assessed was that no speech therapists were included in this survey. This survey also did not include occupational therapists, pharmacists, nutritionists, or dentists, as they had few descriptions in the medical records. However, this does not mean that these healthcare professionals are not important for interprofessional collaboration for discharge planning.

The category "e2 Natural Environment and Human-made Changes to Environment" is related to the natural environment, including geographical elements, and was not assessed by any of the healthcare professionals. This seems to be because the reviewed medical records in this study did not include patients who are sensitively affected by the natural environment, such as those with rheumatological or immune disorders. However, a previous study that investigated readmission rates from the perspective of the hospital location highlighted the importance of assessing the geographical environment of the community (Joynt, Orav, & Jha, 2011). It is therefore considered that developing more comprehensive bio-psycho-social discharge planning checklists or assessment tools that could be used to assess general patients with varying diseases in LTCHs is needed, which cover different wide-ranging assessment viewpoints among multiple healthcare professionals, including an evaluation of aspects related to the natural environment of the community.

4.3. Limitations

This study has several limitations. First, the number of healthcare professionals that wrote a discharge planning assessment was small. Second, our survey was conducted at a single center, which raises the possibility that the discharge planning assessments were framed by the culture or policy of the LTCH. However, the LTCH examined in this study aims to standardize their care by implementing practical training and conferences. In addition, we

compared the staff component structure of, and patients status in, the medical institution Hakuyoukai with national data (Ministry of Health, Labour and Welfare, 2016). We carefully considered the representativeness of these data, and assume that our findings reflect the standard viewpoints of multiple healthcare professionals. Furthermore, several types of healthcare professionals which are important for interprofessional collaboration at discharge, such as occupational therapists, speech therapists, pharmacists, nutritionists, and dentists, were not included in this survey. Further research with a greater variety of hospitals and healthcare professionals is needed to enhance the external validity of the present findings.

5. Lessons learned

In this study, we clarified the viewpoints of doctors, nurses, physical therapists, care workers, and social workers concurrently and plurally, with using the ICF. We found that multiple healthcare professionals have different assessment viewpoints when discharging patients from an LTCH to home. Our findings suggest that comprehensive discharge planning may be developed by complementing the different assessment viewpoints of each healthcare professional based on mutual understanding. We also clarified the factors that were less or missing from the assessments in the clinical field of LTCHs which may be important for effective discharge planning development. We suggested strategies for complementing these assessment factors, such as developing comprehensive discharge assessment tools or checklists that cover wide-ranging and differing assessment viewpoints among various healthcare professionals including an evaluation of aspects related to the natural environment of the community, service programs, and research that encourages frontline healthcare professionals to be aware of and consider the social factors of patients for more effective discharge planning assessments. These strategies may contribute to comprehend a patient's bio-psycho-social health status more accurately with more interactive interprofessional

collaboration for discharge planning.

6. Conclusion

In conclusion, healthcare professionals assess patients from different viewpoints when discharging patients from an LTCH to home. Doctors and nurses significantly focused on component 1: "*Body Functions*". Physical therapists and care workers significantly focused on component 3: "*Activities and Participation*". Social workers significantly focused on component 4: "*Environmental Factors*". Our findings could be expected to serve as a base of knowledge for interprofessional collaboration in terms of developing and implementing comprehensive discharge planning. The development of comprehensive discharge assessment instruments, service programs, and research on valid discharge planning methods is further needed for more effective interprofessional discharge planning.

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Table 1

Characteristics of the patients examined in the selected medical record survey.

Characteristics (n=102)	
Age, y	87.0 (77.3–89.0)
Hospitalized days	26.5 (15.0–51.5)
Males	42.2 (43)
Body mass index, kg/m^2	20.4 (18.7–22.9)
Barthel Index	83 (40–100)
HDS-R	20 (14–25)
Living alone	38.2 (39)
Primary disease at admission	
Acute disease[§]	35.3 (36)
Chronic disease[¶]	64.7 (66)

Note: Data for age, hospitalized days, body mass index, Barthel Index, and HDS-R are presented as median (interquartile range). Data for males, living alone, and primary disease at admission (Acute disease and Chronic disease) are presented as percentage (n).

HDS-R=Revised Hasegawa Dementia Scale.

[§] Acute disease includes acute pyelonephritis, acute pneumonia, vertigo, hemorrhagic cystitis, and ileus.

[¶] Chronic disease includes osteoarthritis, chronic renal failure, sequelae of cerebral infarction, benign prostatic hyperplasia, diabetes mellitus, Parkinson's disease, urinary retention, chronic subdural hematoma, Alzheimer's disease, bladder cancer, neurogenic bladder, sequelae of cerebral hemorrhage, hepatocellular carcinoma, hypertension, and prostate cancer.

575 **Table 2**

576 Comparison of each first-level ICF category between five groups of healthcare professionals.

	Doctor (n=3)	Nurse (n=13)	Physical Therapist (n=3)	Care Worker (n=13)	Social Worker (n=2)
Component 1: *Body Functions*					
b1 Mental Functions	13.1 ± 0.7 a	13.8 ± 4.4 a	1.0 ± 0.02 b	1.6 ± 4.0 b	4.1 ± 0.5 b
b2 Sensory Functions and Pain	20.0 ± 2.4 a	16.3 ± 3.6 a	10.8 ± 1.0 a	3.0 ± 4.8 b	0 b
b3 Voice and Speech Functions	0	0	0	0	0
b4 Functions of the Cardiovascular, Haematological, Immunological and Respiratory Systems	3.0 ± 0.5 b	8.0 ± 2.0 a	1.7 ± 0.3 b	0 b	0 b
b5 Functions of the Digestive, Metabolic and Endocrine systems	3.0 ± 1.4 a	2.3 ± 2.2 a	0.4 ± 0.3 a	0 b	0 b
b6 Genitourinary and Reproductive Functions	0	0	0	0	0
b7 Neuromusculoskeletal and Movement-related Functions	4.4 ± 0.6 b	2.3 ± 2.0 b	19.8 ± 0.9 a	0 c	0 c
b8 Functions of the Skin and Related Structures	0	0	0	0	0
Component 2: *Body Structures*	None of the first-level ICF categories in this were linked.[§]				
Component 3: *Activities and Participation*					
d1 Learning and Applying Knowledge	0	0	1.4 ± 0.3	1.3 ± 3.1	0
d2 General Tasks and Demands	0 a	1.3 ± 1.2 a	0 a	0 a	0 a
d3 Communication	0.7 ± 1.1	1.8 ± 1.5	4.5 ± 0.5	3.1 ± 5.0	0.8 ± 0.1
d4 Mobility	12.0 ± 0.6 b	9.5 ± 3.1 b	44.5 ± 1.4 a	38.2 ± 8.6 a	4.1 ± 0.5 b
d5 Self-care	12.0 ± 0.6 b	11.9 ± 3.0 b	8.5 ± 0.6 b	39.6 ± 7.9 a	3.3 ± 0.7 c
d6 Domestic Life	0.7 ± 0.6 b	0 b	0 b	0 b	10.4 ± 1.0 a
d7 Interpersonal Interactions and Relationships	0 b	0.4 ± 1.1 b	0 b	0 b	2.9 ± 0.1 a
d8 Major Life Areas	0 b	0 b	0 b	0 b	2.4 ± 0.8 a
d9 Community, Social, and Civic Life	2.2 ± 1.0 a	2.0 ± 2.0 a	0 a	0 a	0.8 ± 0.1 a
Component 4: *Environmental Factors*					
e1 Products and Technology	21.1 ± 1.1 ab	23.7 ± 2.5 a	7.3 ± 0.3 c	13.2 ± 7.7 bc	14.1 ± 1.0 abc
e2 Natural Environment and Human-made Changes to Environment	0	0	0	0	0
e3 Support and Relationships	0 b	0.4 ± 1.0 b	0 b	0 b	16.5 ± 0.2 a
e4 Attitudes	7.9 ± 0.2 b	6.2 ± 2.0 b	0 c	0 c	17.4 ± 0.3 a
e5 Services, Systems and Policies	0 b	0 b	0 b	0 b	23.1 ± 0.01 a

Note 1: Data are the proportions of each first-level ICF category out of the total of linked first-level ICF category (Data C) for each occupation, and presented as mean percentage ± standard deviation.

Note 2: Data with different letters within the same row indicate significant differences (ANOVA with Tukey-Kramer *post hoc* test, $p < 0.05$). Data that shared a common letter within the same row are not significantly different.

§ None of the first-level ICF categories in component 2: "*Body Structures*" were linked. The first-level categories under this component are "s1 Structures of the Nervous System", "s2 The Eye, Ear, and Related Structures", "s3 Structures Involved in Voice and Speech", "s4 Structures of the Cardiovascular, Immunological, and Respiratory Systems", "s5 Structures Related to the Digestive, Metabolic and Endocrine Systems", "s6 Structures Related to the Genitourinary and Reproductive Systems", "s7 Structures Related to Movement", and "s8 Skin and Related Structures".

602 **Figure captions**

603

604 **Fig. 1. The flow of the study procedure and data collection for each step.**

605 First, the description of discharge planning assessments written by doctors, nurses, physical
606 therapists, care workers, and social workers were extracted (Data A) from the selected
607 medical records. Meaningful concepts were extracted (Data B) from Data A. Then, Data B
608 were linked to the first-level ICF categories (Data C).

609

610 **Fig. 2. The International Classification of Functioning, Disability and Health (ICF).**

611 The first-level ICF categories were used in the linking procedure. In addition, the first-level
612 categories and components were used in the quantitative analysis (based on World Health
613 Organization, 2001, 2018).

614

615 **Fig. 3. (A) Comparison of five groups of healthcare professional in each ICF**
616 **component. (B) Comparison of ICF components in each group of healthcare**
617 **professional.**

618 ICF= International Classification of Functioning, Disability and Health.

619 Data are the proportions of each ICF component out of the total of numbers of ICF
620 component for each occupation, and presented as mean percentage ± standard deviation.
621 Data with different letters within the same ICF component (in Fig.3(A)) and healthcare
622 professional group (in Fig.3(B)) indicate significant differences (ANOVA with Tukey-
623 Kramer *post hoc* test, $p < 0.05$). Data that shared a common letter within the same ICF
624 component (in Fig.3(A)) and healthcare professional group (in Fig.3(B)) are not
625 significantly different. Number of each group was as follows: Doctor: 3, Nurse:13, Physical
626 therapist: 3, Care worker: 13, Social worker: 2.

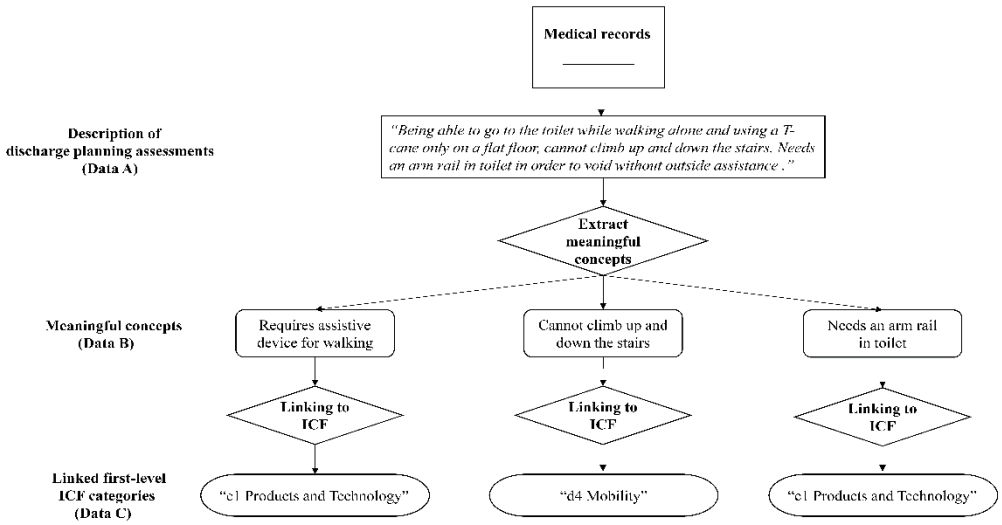

Medical records
Description of discharge planning assessments (Data A)
"Being able to go to the toilet while walking alone and using a T-cane only on a flat floor, cannot climb up and down the stairs. Needs an arm rail in toilet in order to void without outside assistance."
Extract meaningful concepts
Meaningful concepts (Data B)
Requires assistive device for walking
Cannot climb up and down the stairs
Needs an arm rail in toilet
Linking to ICF
Linking to ICF
Linking to ICF
Linked first-level ICF categories (Data C)
"e1 Products and Technology"
"d4 Mobility"
"e1 Products and Technology"

Fig. 1.

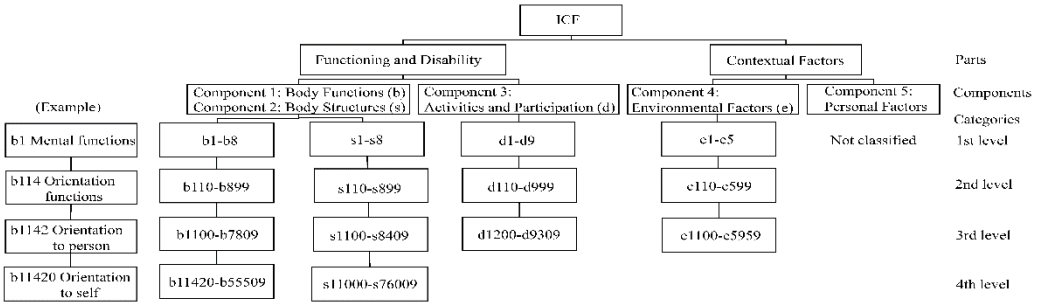
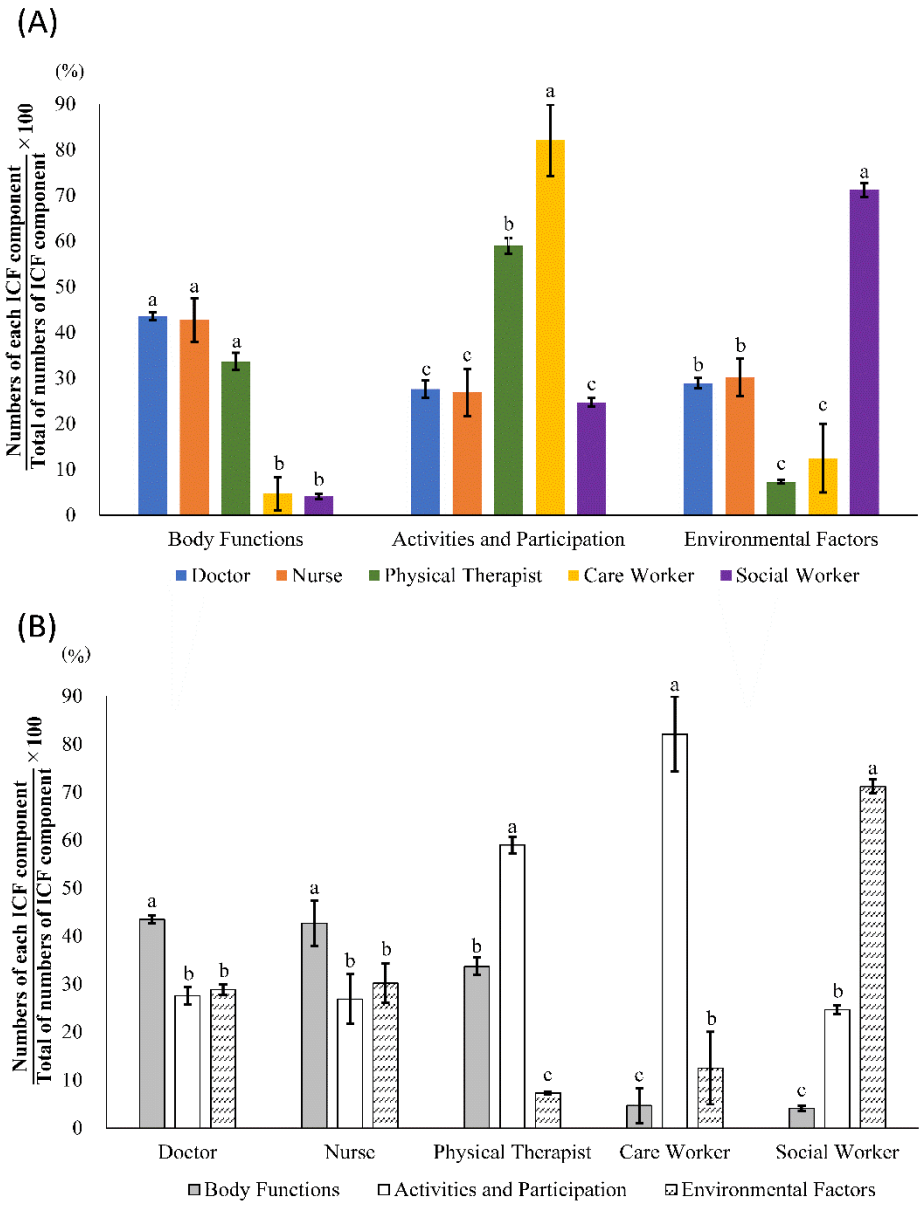

ICF
Functioning and Disability
Contextual Factors
Parts
Component 1: Body Functions (b)
Component 2: Body Structures (s)
Component 3:
Activities and Participation (d)
Component 4:
Environmental Factors (e)
Component 5:
Personal Factors
Components
(Example)
Categories
b1 Mental functions
b1-b8
s1-s8
d1-d9
e1-e5
Not classified
1st level
b114 Orientation functions
b110-b899
s110-s899
d110-d999
e110-e599
2nd level
b1142 Orientation to person
b1100-b7809
s1100-s8409
d1200-d9309
e1100-e5959
3rd level
b11420 Orientation to self
b11420-b55509
s11000-s76009
4th level

Fig. 2.



660

661 **Fig. 3**

662

663

664

665

Appendix A.

Comparison of relative frequencies between five groups of healthcare professionals in each first-level ICF category.

	Doctor (n=3)	Nurses (n=13)	Physical Therapists (n=3)	Care Workers (n=13)	Social Workers (n=2)	Total
Component 1: *Body Functions*						
b1 Mental Functions	31.3 b (35)	52.7 a (59)	5.4 cd (6)	1.8 d (2)	8.9 c (10)	100 (112)
b2 Sensory Functions and Pain	28.2 a (53)	36.7 a (69)	33.0 a (62)	2.1 b (4)	0 b (0)	100 (188)
b3 Voice and Speech Functions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
b4 Functions of the Cardiovascular, Haematological, Immunological and Respiratory Systems	15.4 b (8)	65.4 a (34)	19.2 b (10)	0 c (0)	0 c (0)	100 (52)
b5 Functions of the Digestive, Metabolic and Endocrine systems	40.0 ab (8)	50.0 a (10)	10.0 bc (2)	0 c (0)	0 c (0)	100 (20)
b6 Genitourinary and Reproductive Functions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
b7 Neuromusculoskeletal and Movement-related Functions	8.8 b (12)	7.4 b (10)	83.8 a (114)	0 c (0)	0 c (0)	100 (136)
b8 Functions of the Skin and Related Structures	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Component 2: *Body Structures*	None of the first-level ICF categories in this component were linked.§					
Component 3: *Activities and Participation*						
d1 Learning and Applying Knowledge	0 b (0)	0 b (0)	80.0 a (8)	20.0 ab (2)	0 b (0)	100 (10)
d2 General Tasks and Demands	0 b (0)	100 a (6)	0 b (0)	0 b (0)	0 b (0)	100 (6)
d3 Communication	4.8 b (2)	19.0 b (8)	61.9 a (26)	9.5 b (4)	4.8 b (2)	100 (42)
d4 Mobility	8.2 b (32)	10.3 b (40)	66.0 a (256)	12.9 b (50)	2.6 c (10)	100 (388)
d5 Self-care	16.8 a (32)	26.2 a (50)	25.7 a (49)	27.2 a (52)	4.4 b (8)	100 (191)
d6 Domestic Life	7.4 b (2)	0 b (0)	0 b (0)	0 b (0)	92.6 a (25)	100 (27)
d7 Interpersonal Interactions and Relationships	0 b (0)	22.2 ab (2)	0 b (0)	0 b (0)	77.8 a (7)	100 (9)
d8 Major Life Areas	0 b (0)	0 b (0)	0 b (0)	0 b (0)	100 a (6)	100 (6)
d9 Community, Social, and Civic Life	37.5 ab (6)	50.0 a (8)	0 b (0)	0 b (0)	12.5 b (2)	100 (16)
Component 4: *Environmental Factors*						
e1 Products and Technology	22.4 b (56)	40.0 a (100)	16.8 bc (42)	7.2 d (18)	13.6 c (34)	100 (250)
e2 Natural Environment and Human-made Changes to Environment	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
e3 Support and Relationships	0 b (0)	4.8 b (2)	0 b (0)	0 b (0)	95.2 a (40)	100 (42)
e4 Attitudes	23.6 b (21)	29.2 b (26)	0 c (0)	0 c (0)	47.2 a (42)	100 (89)

e5 Services, Systems and Policies	0 b (0)	0 b (0)	0 b (0)	0 b (0)	100 a (56)	100 (56)

Note 1: Data are relative frequencies of linked first-level ICF category (Data C) of five healthcare professional groups out of the total of Data C for each category, and presented as percentage (absolute frequency).

Note 2: Data with different letters within the same row indicate significant differences (Chi-squared test of goodness-of-fit or an exact multinomial test with *post hoc* exact binomial test, $p < 0.05$). The p values were adjusted using the Benjamini–Hochberg method. Data that shared a common letter within the same row are not significantly different.

§ None of the first-level ICF categories in component 2: "*Body Structures*" were linked. The first-level categories under this component are "s1 Structures of the Nervous System", "s2 The Eye, Ear, and Related Structures", "s3 Structures Involved in Voice and Speech", "s4 Structures of the Cardiovascular, Immunological, and Respiratory Systems", "s5 Structures Related to the Digestive, Metabolic and Endocrine Systems", "s6 Structures Related to the Genitourinary and Reproductive Systems", "s7 Structures Related to Movement", and "s8 Skin and Related Structures".