Capability formulation considering individual positions

Empirical and theoretical exploration in healthcare

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Table of Contents

List of figures

List of tables

Introduction

0.1.Background

In the latter half of the 20th century medicine and healthcare had achieved remarkable progress, which contributed to decrease death rate of diseases and to extend life expectancy. On the other hand, the progress occurred two problems. Firstly, 'curing' was separated from 'caring' in healthcare, and personal values and purposes of individual living were not sufficiently considered in healthcare with disease-specific healthcare outcomes measured by death rate and life expectancy. The other problem was the increasing expenditure and tight budget for healthcare. The increase was shown to be more correlated with the progress in medical technology than with ageing in the population (Nghiem & Connelly 2017). Facing harder situations under weaker economic growth, challenging those two problems required to reconcile patient-centred care and economic efficiency in healthcare practice. From the perspective of patient-centred care, more generally, person-centred care, healthcare professionals had emphasised on the quality of living (QOL) since 1980s. This stream was reflected in health policy as promoting development of evaluation indicators like the quality-adjusted life years (QALYs) to apply for cost-utility analysis or cost-benefit analysis. Here another problem was pointed out that application of a specific indicator can abstract the other aspects of a person's life.

For capturing aspects of individual patient's life, a concept of empowerment has been widely used in medicine and nursing. It has evolved from viewpoints of health improvement in the 1970s (Lewin and Piper 2007) and led the Ottawa Charter (WHO 1986) which refereed to community empowerment as the centre concept of health

promotion (Piper 2009, p.143, 167). Then the target of empowerment has been expanded from community to individual patient in a context of consumer empowerment[1], which is shown for example as a new approach in the UK Expert Patient Programme to manage chronic disease (Wilson 2002). In a patient empowerment context they emphasise on 'patients' control over health and health-related decision-making … in line with the developing consumer culture in health care' (Piper 2009, p. 163), and the role of healthcare personnel is to help patients to change, or, to improve. Here the viewpoint of healthcare evaluation was focused on changing in patient's condition and behaviour. Here the problem is it cannot consider whether the person require a change or not. For individual well-being, it is important that they *can* change in various ways, and that they may choose to change, or they may not choose to change. From this point, the empowerment concept is not sufficient to capture to consider a person to capture well-being.

On this point, the capability approach, proposed by Amartya Sen (Sen 1985), is applicable to reconcile the requirements on person-centred care and resource allocation, that is, to develop health economic evaluation capturing diverse values and positions of individuals, and to discuss how to allocate healthcare resource.

0.2. From basic needs and social rights

This paper deals with nursing services provided to patients during hospitalisation. Since the introduction of primary nursing, nurses have been regarded as having higher levels of accountability, authority and responsibility in clinical decision making, from admission to discharge from the hospitalisation (Webb et al, 1996). Nurses should

[1] Consumer is empowered through their choice, information, and awareness of consumer rights (Commission of the European Communities 2007)

assess their patients, plan the nursing care, and evaluate the procedure. From one perspective, this can be regarded as a kind of allocation process of nursing resources to their patients. Nurses assess their patients, listen to their opinions, and make a decision concerning the allocation of nursing service. Resources for nursing services that nurses can utilize at their own discretion are scarce, as is the case with other resources in health care system. In addition, requirements for nurses to engage in collaboration with medical doctors to deal with problems have increased, in accordance with the remarkable advances in medical technology and with progress in the skill mix in the health care sector for chronic disease management (Jenkins-Clarke, Garr-Hill and Dixon, 1998). Therefore, a recent degradation in the quality of nursing service can be assumed. Under such changing circumstances, existing practice can "be challenged as unfair, inefficient, or failing to account for important patient characteristics", and nurse managers should consider equity when they make decisions on patient care (Williams, 2005). If the nursing care needs of a patient were judged to be less than the actual needs and nursing services were then planned according to such insufficient judgement, then the nursing service provided would be insufficient to meet the patient's actual needs. This situation would arise involuntarily and subconsciously, but nurses may also make unjust judgements or decisions to some patients by intention.

Distributive justice can be judged as either "distribution with regard to individual contribution" or "distribution with regard to individual needs". The latter is used to judge justice in social security (Gotoh & Yoshihara, 2003). Since health care is a field of social security, individual needs should be considered when nurses' allocate nursing services to their patients. Needs is one of the most discussed fundamentals in nursing theories. In the 1950s to 1970s Henderson, Abdellah and Orem developed needs

theories in the nursing field (Meleis 2007). Henderson did remarkable work in 14 areas of basic human needs (Henderson & Nite, 1978). Additionally, her work "Basic Principles of Nursing" (Henderson, 2004) was considered by the International Councils of Nurses, and used to develop the fundamental theory of nursing diagnosis.

How should the fulfilment of basic needs be defined? Some researchers have related basic needs to rights. Maslow mentioned the concept of basic needs as things that are necessary to be "fully human," and considered their fulfilment as a natural right (Maslow, 1970). Subsequently, basic needs were related to the concept of human rights, which is composed of "human rights in a narrow sense", "civil rights", "political rights", and "economic and social rights." The right to adequate health standards is included among economic and social rights (Streeten, 1980). In this paper we focus on the concept of social rights, which citizens are entitled to, and which society has a duty to guarantee to citizens. With regard to individual needs, equal basic liberties and fair opportunities are proposed (Rawls, 1993). A similar discussion has been conducted with regard to social justice. This focused on two aspects of standard living conditions: opportunities and life chances (Commission in Social Justice, 1993). Sen insisted on the application of a capability approach; namely, that a person's opportunities and freedom are related to what he or she does, and what he or she is in his or her position (Sen, 1992). The needs of an individual are judged with regard to the lack of a reference level of capability in a given social context (Sen, 1970). Freedom and opportunity of an individual's choices from sets are necessary in making fair judgements on the individual's needs. Even Maslow stated that the way people's motivation is stimulated is similar to choosing foods from a "smorgasbord table... in accordance with their own tastes and appetites" (Maslow, 1970). Here, a person's ability to choose from sets is

mentioned in the context of securing basic needs. Although Maslow's attention is weighted to psychological motivations, for which he formed a hierarchical structure, Rawls and Sen rejected utilitarian methodology which measured expected overall psychological well-being and utility. Instead, Rawls shifted attention from goods themselves to what goods do to human beings, while Sen focused on the capability of an individual. (Sen, 1982; Rawls, 1993)

In the health care field, researchers have also pointed out that a utility measurement, patient satisfaction, which has long been studied in many settings, has a tendency to make the problem of quality in health care provision invisible (Fitzpatrick & Hopkins, 1983), and to lead to a shift in focus from a patient's overall satisfaction to patients' concrete experiences with particular processes or events in health care (Jenkinson, Coulter and Bruster, 2002).

Each concrete experience in health care can be considered to focus not on existing goods, but on what a person does or on what he or she is in his or her particular position. In this paper, therefore, Sen's capability approach will be prioritised over Rawl's social primary goods approach. Patients' experiences can be dealt with as functionings, and the set of experiences can be regarded as capability (**Fig. 0.1**). Based on this perspective, this paper discusses the validity of applying the evaluation of patients' experiences to judgement of and decision making about nursing services.

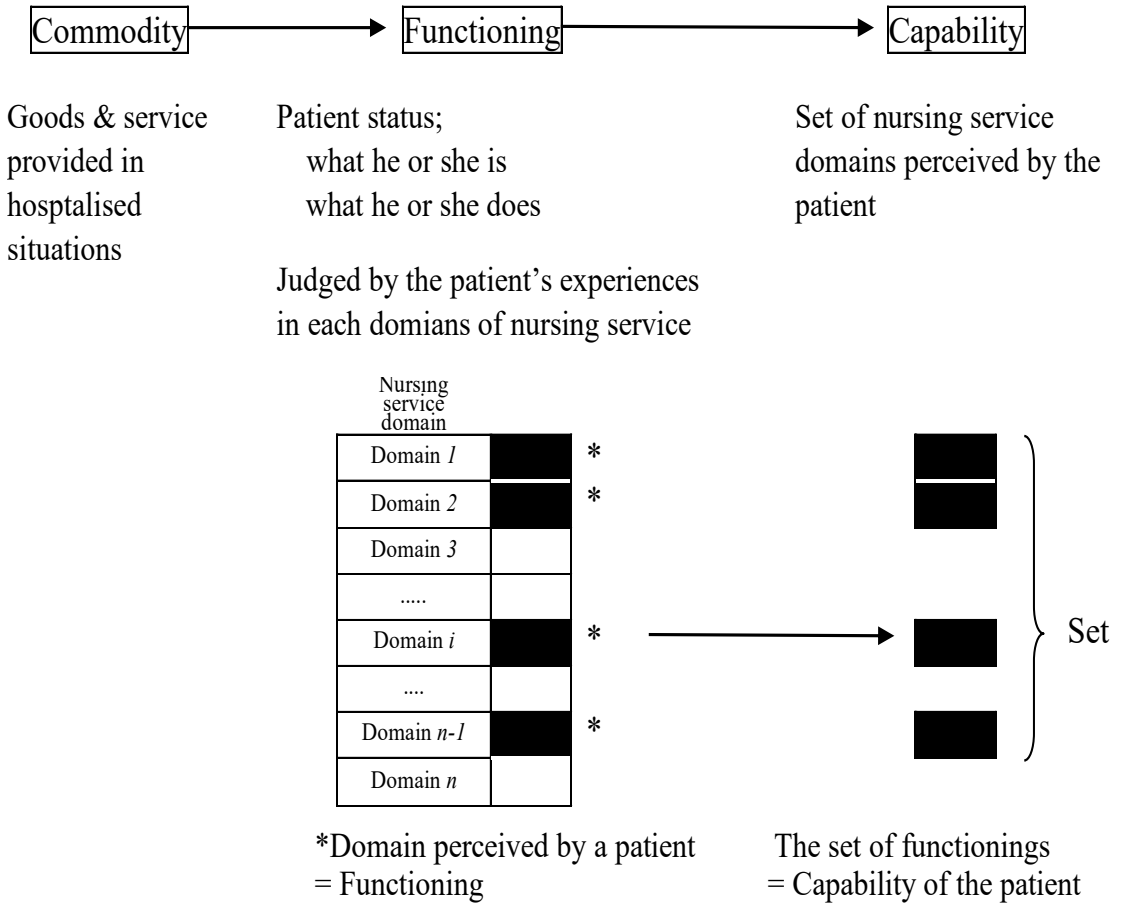

Fig.0.1 Capability approach applied to nursing service domains perceived by patients

Fig.0.1 Capability approach applied to nursing service domains perceived by patients
Note: It is assumed that, amongst all domains, some of patients' functionings are achieved by by provision of nursing service, and that the set of achieved functioning represents the capability of the patient.

0.3. Patient evaluation and their collective choice for nursing service

Health problems have been regarded as what society should secure for people as an economic and social right (Streeten, 1980). Nurses' role in health care and the content of nursing services should be decided according to the entitlement of patients. What is the entitlement that requires social compensation for health problems? In modern states every citizen is thought to be entitled to health care as a social right (Commission on Social Justice, 1993). Dworkin introduced the responsibility and compensation approach (Dworkin, 2000), wherein he distinguished between two spheres: public and

private. People with natural or social unluckiness have neither the freedom nor opportunity to make decisions. This implies that they are not responsible for the consequences that buffet them and are thus entitled to be compensated for negative outcomes by society. This is distinguished as the public sphere. On the contrary, in the private sphere, people have freedom or opportunity in decision-making. They have to take responsibility for their choice, and are thus not entitled to any compensation. Health problems are usually a risk that an individual cannot foresee on an individual level. It is therefore necessarily to handle them on a group level. Health problems themselves can be dealt with in the public sphere and patients should be entitled to compensation for negative outcomes while they have health problems. Patients' freedom or opportunity is reduced with the health problem, and the border criterion between the two spheres shifts. The reduced freedom or opportunity with the health problem should be compensated by society as it belongs to the public sphere. From these perspectives, the provision of nursing service is included in the compensation in the public sphere, and the patients manage in the private sphere by their own. Of noted, the degree of patients' autonomy or independence with regard to freedom or opportunity in daily living activity largely differs among individuals and between different time-periods for the same individual. The difficulty that nurses face is to distinguish the border between the public and private sphere, and to assess the degree of reduced freedom or opportunity of patients.

Although the contents and standard of nursing services are naturally dependent on political decisions, nursing care is planned and performed in interactions between patients and nurses. Therefore, the real status of nursing service is thought to be influenced by patients; that is, nursing service is, to some extent, decided with regard to

patients' meta evaluation, which is collected from each individual patient. In the public sphere of responsibility, each patient makes an evaluation individually and a patient group makes a choice collectively. This implies that patient participation is required to improve health services. To collect the individual evaluations is meaningful in the assessment of the collective decision of the group. From this perspective, the individual patient's perception of nursing service is meaningful in examining and evaluating nursing services.

The importance of patient participation in health care has been focused on not only with regard to hospital settings but also in general care. One of the backgrounds of this movement is the fact that patients have not played an independent role in health care service. Although patient-centred care was pronounced in 1980s, rapid and remarkable advances in medical technology and professional hierarchy in the field has kept patients from being and acting independently. More recently, the movement of patient participation in health care has been advanced by inter-professional efforts. Nurses have also become engaged in this movement from the perspective that people are responsible for improving their own health, and need to be advocated to do so by nurses. The responsibility of nurses expands not only in treatment processes in health care but is also included in patients' everyday life activities. Therefore, nurses can have a strong influence in contributing to patients' welfare status. Returning to the point that patients' meta evaluation is a dependent factor of nursing service, examining patient opinions will make the content, structure of nursing service more evident.

In this paper, patients' collective choice for nursing service, as reflected in their evaluation, is also examined. To examine the patients' collective choice, a comparative analysis was conducted between Swedish and Japanese wards. Both countries have

among the highest standard of health care systems, and their life expectancy is among the longest. However, based on the criteria of welfare capitalism as defined by Esping-Anderson (1990), Sweden has the background of a social-democratic country, while Japan is a mixture of corporative and liberal countries. Such types of welfare state can relate to people's collective choice. In this paper, the difference in the process of collective choice in nursing services is analysed using patients' evaluation of nursing services.

0.4. Focusing on the specific scene of nursing services

For patients, nursing service is not particular and clear. The notion that a patient has when they are hospitalised is that he or she visits a doctor in a chosen hospital. In most cases he or she does not choose the nurse. He or she thinks that nursing service is a part of the hospital, the treatment, or the doctors. In such a situation, patients do not express a particular opinion on nursing. Evaluation of nursing is often referred to as evaluation of the whole hospital care. However, in this paper, the capability approach is used to focus on the situation of individual patients and their functionings; that is, what he or she does and what he or she is. Well-being achievement and freedom, which the capability approach both includes, are freedoms or opportunities which are strongly related to the situation of a person, such that they are observed in many aspects of his or her daily life. Nursing care is also related to patient's daily life, and is not simply limited to the treatment process for health problems. Therefore, focusing on specific experiences in nursing service means to evaluate patients' opportunities and freedoms in their daily life, and evaluate their functionings.

In the next chapter, along the context above, functioning achievement of individuals

is evaluated by focusing on nursing services which can be perceived by patients, which are used for capturing individual capability later.

0.5. Objectives of the paper

The capability approach can capture diversity and opportunity of individual life beyond monistic indicator like resource and utility, and evaluate policy and social condition. With this approach the paper aims to consider not only health condition, but overall perspective of individual life including societal economic status. To construct evaluation of individual capability, it is required to capture the resource entitled for an individual, utilisation ability of the resource realisable of the individual, and functionings set achievable with choice of resource and utilisation ability. For the application to health economic evaluation, this paper aims to discuss specific points below and to develop theoretical exploration with empirical data sets collected in healthcare settings.

1. To develop how to evaluate the achievement of functionings in individual life.
2. To develop how to capture individual capability based on empirical data.
3. To explore operational formulation of capability considering individual diverse position.
4. To discuss the possibility to applicate the capability approach to empirical studies in healthcare fields.

Chapter 1

Evaluation of functioning achievement by focusing on patients' experiences with nursing services

Abstract

Individual patients experience reduced opportunities and freedoms during hospitalisation with regard to social rights, the compensation for which is related to the quality of nursing service. The capability approach, advocated by Sen, has been used to examine the situation of individuals, as categorised in terms of well-being and freedom. The aim of this chapter was to examine whether individual patient's perceptions of nursing services can be used as functioning achievement in the capability approach, to investigate patients' collective evaluation of nursing services to capture the patients' normative judgement of functioning achievement in healthcare setting, and to compare the patients' norm between Sweden and Japan.

Methods

A questionnaire based on patients' specific experiences with nursing service, which was developed in Japan (Kobayashi et al. 2011) and in Sweden (Kobayashi 2009), was used in the inquiries. Patient data were collected at cardiac wards in Sweden (in 2008) and Japan (in 2006-2008). Patient perceptions of specific domains of nursing service, and individual perceptions of nursing care for well-being and freedom, were compared.

Results

Data on 716 Japanese patients (mean age: 64.1 years, male: 69%, mean length of stay: 12.0 days) and those on 116 Swedish patients (mean age: 64.8 years, male: 68%, mean

length of stay: 6.1 days) were included in the analysis. Swedish patients scored significantly higher results than Japanese in both well-being- and freedom-related domains. Japanese patients scored lower for 2 of the freedom-related domains (*post-discharge support* and *self-care*) than the others. In Sweden the perception of freedom of care (β= 0.46), but not that of well-being (β= 0.09), was a strong determinant factor of patient satisfaction, whereas in Japan both were determinants (β= 0.28, 0.23).

Conclusions

Judgement of Swedish individuals was strongly affected by compensation of freedom, while Japanese individuals approximately equated compensation of well-being and freedom. These results suggest that freedom-weighted individual judgement is effective in maintaining the quality of nursing services related to compensation for reduced freedom.

1.1. Introduction

This chapter focuses on patients' experiences with nursing services aiming at evaluation of functioning achievement of individual patients in hospitalisation settings. It is generally known that patients cannot evaluate the quality of medical and nursing services provided for them, therefore evaluation on patients' experiences has been focused in order for obtain objective evaluation indicators which can be applied to healthcare quality measurement (Jenkinson et al 2002). Presupposing that nursing service was provided according to the requirement for patients to fulfil the shortage in daily living, the phenomena that nursing services are provided indicate that there had existed shortage in the patient's life, and when nursing service are completed, it means

that the shortage was fulfilled with sufficient nursing service provision. Specific scenes during nursing service provision, which can be perceived by patients, are identified and classified according to individual patients' needs in life in the previous study (Kobayashi et al. 2011). Individual patients experience reduced opportunities and freedoms during hospitalisation with regard to social rights, the compensation for which is related to the quality of nursing service. This reflects the shortage in achieving patients' functionings like statuses and actions, and the nursing service provision for the fulfilment of it. The shortage in functionings is specified for evaluating the level of well-being achievement.

In this chapter we will examine the relationship between individual patient's functioning achievement and subjective well-being measured using patient satisfaction, through comparative study of patients' inquiry in Sweden and Japan.

As reviewed in the introduction, nursing theory of basic needs is explored from the perspective of individual well-being and opportunity as social rights. The capability approach is applied. In addition, the quality of nursing service is assumed to be influenced by patients' collective evaluation under patient-participation circumstances, and a questionnaire survey aimed at inpatients was planned to assess how patient evaluations are reflected in the forming of nursing services. To examine this, an international comparison study between different social settings was planned. Sweden and Japan were chosen since they have two of the most advanced health care systems, accomplished under different political settings. Both countries are facing challenges brought about by the aging society.

The specific aims of this chapter are:

1. To develop well-being achievement and freedom under functioning

achievement of hospitalised patients captured by focusing on patient experiences on the specific scene for nursing services.

2. To compare functioning achievement between Swedish and Japanese hospitalised patients in terms of well-being achievement and freedom in order to discuss differences in patients' collective evaluation of nursing services.

1.2. Method

Data

Patient data were collected at 1 cardiac-medical and 1 cardiac-surgical ward of a university hospital in 2008 in Sweden and at 11 cardiac-medical and 4 cardiac-surgical wards of 11 hospitals in 2006-2008 in Japan. Eligible subjects were patients who were hospitalized in the ward for at least 2 days (Sweden)/ 3 days to less than 30 days (Japan), were scheduled for discharge within a few days, were lucid, were able to make decisions, and were able to fill in the questionnaire themselves or with family assistance in reading and writing. Patient selection was not limited by diagnosis. Ward nurses determined whether a patient met the selection criteria. The nurses gave participants oral and written information about the purpose of the study and informed them that their responses were voluntary and independent of the medical services provided to them. When patients consented to participate in the study, they received a questionnaire and an envelope that could be sealed. The questionnaire includes 32 items in terms of nursing services that can be perceived by patients in Japanese (Kobayashi et al. 2011) and in Swedish (Kobayashi 2009). After responding to the questionnaire and sealing the envelope, respondents handed it to a nurse who passed it to the researchers. The patient also had the opportunity to send it directly to the research group for analysis.

Questionnaire responses with more than 7 data items missing (more than 20% of all items) were excluded from analysis. Participant responses on patient experience items were converted as follows: *always*: 4, *often*: 3, *sometimes*: 2, *occasionally*: 1 and *not*: 0. Hence, higher scores indicated a better perception by patients. Items were presumed to be perceived by a respondent when their score was 0 to 4, and as not perceived when the category *does not apply* was chosen. The perception rate of patient experiences was calculated as the rate of perceived respondents amongst total respondents without missing responses. For each item of overall satisfaction, the responses were converted from *strongly agree*: 4 to *not agree*: 0, i.e. higher scores indicated greater satisfaction.

Length of stay was transformed into 3 categories: less than 1 week, 1 week to less than 2 weeks, and 2 week to less than 1 month. Disease history was transformed into 3 categories: less than 3 months, 3 months to less than 3 years, and 3 years or longer. Dependence on self-care was chosen from 'independent,' 'partly dependent,' and 'totally dependent' for 4 aspects of eating, toileting, bathing and mobility; and then transformed to dependence on self-care in total, which included *independent* (when all aspects were 'independent'), *partly dependent* (when at least one aspect was 'partly dependent'), and *totally dependent* (when at least one aspect was 'totally dependent').

When more than half of the corresponding items were not missing, we calculated domain scores by averaging the scores of the corresponding items without weighting, hence transforming them from 0 to 4. Responses of *does not apply* were not regarded as missing data, but were not substituted to calculate domain scores.

Model: care as compensation for freedom

When applying the capability approach to patients situation in hospitalization, it is

required to evaluate functioning achievement of patients. For the purpose the study focuses on status of nursing service provision. Nursing service is provided only when nurses make an assessment that patients face shortage in achieving functionings in their living, therefore status of nursing service provision shows the extent of achievement of patients' functionings. Generally it is impossible for patients to evaluate by themselves the quality of nursing service, the shortage in achieving functionings, nor provision of nursing service. In the previous study developing quality indicator of nursing service, they introduce patients' experience with nursing service, which can perceive by patients using questionnaire items describing the scene of nursing service provision (Kobayashi et al. 2011). In the present study patients' experiences with nursing service is introduced to capture the compensation for the shortage in achieving patients functionings. When the compensation is fully provided, patients fully enjoy the functionings. On the other hand, when the compensation is not fulfilled, the patients cannot achieve the functioning by the extent they can achieve, that is, patients lose the opportunity to achieve the functionings.

Patients' experiences with nursing care is composed of nursing service domains (Kobayashi et al. 2011). Given that patients' lost capability is compensated with nursing service, that is, the shortage in patients' functioning achievement is fulfilled by nursing service, then a domain of nursing service provision is corresponded to patients' functioning achievement (**Table 1.1**).

Table 1.1 Nursing service domains perceived by patients and corresponded patients' functioning achievement

Nursing service domains	Patients' functionings
Well-being achievement	
Emotional support	Feeling secure
Essential care	Feeling comfortable
Pain management	Relieved of pain
Courtesy	Treated courteously
Room odour	Staying without smell
Disturbance	Disturbed
Freedom	
Education/ information support	Informed
Post-discharge support	Setting social services
Self-care	having living arts
Patient decisions preference	Making a decision
Patient consent	Receiving an explanation
Accessibility to nurses	Requesting assistance of nurses

Note: Nursing service domains (left) are composition related to the quality of nursing service (Kobayashi et al. 2011), which can be perceived by questionnaire items for patients. In the study they are regarded as compensation by nursing services for shortage in achieving corresponding functionings (right) of patients. Nursing service domains and corresponding functioning are classified into well-being achievement and freedom

According to the structure of well-being achievement and freedom (Sen 1985), the patients functionings and corresponding nursing domains are classified into well-being achievement and freedom by the properties of the contents of functionings (Table 1.1) .Domains describing nursing care for well-being achievement are hypothesised to be *emotional support*, *essential care*, *pain management*, *courtesy*, *room odour*, and *disturbance*. *Essential care* for physical hygiene, eating, toileting, or rest and *pain management* improve the patients' current physical condition. *Emotional support* and *courtesy* support the patients' psychological comfort. *Room odour* and *disturbance*

concern environmental condition around the patients. On the other hand, the domains of support for freedom are considered to be *information*, *patient decision preference*, *post-discharge support*, *self-care*, *patient consent* and *accessibility to nurses. Information* provides patients with knowledge, which leads their activity and improves their opportunities. *Patient decisions preference*, *self-care* and *patient consent* respects patients' independent judgement. *Post-discharge support* improves opportunities in their lives after discharge from the hospital. *Accessibility to nurses* improves their opportunities during hospitalisation.

In accordance with the relationship between patient experience domains of nursing service and patients' functionings, individual perception score of care for well-being achievement and that of support for freedom were combined to give a mean of applicable domain scores. *Expertise and skill* and *standardised care* were not used in composing these scores, since the former is thought to describe nursing care for both well-being and freedom and to have an interaction effect, and the latter is not considered to be strongly related with patient position.

As stated above, functionings patients achieves and enjoys in their lives are listed by relating to nursing service domains. According to the capability approach, the relationship between functionings, capability and happiness is represented that functionings are transformed from resources, that opportunity set of functionings by using the person's resource and utilization ability is the capability, and that happiness is transformed from capability (Sen 1987). To verify the functionings listed above can be treated as functuionings in the capability approach, the relationships between functionings, capability and happiness is tested in this chapter. The hypothesized model to verify that the listed functionings are suitable for the capability approach is that

capability is composed of two spheres of well-being achievement and freedom, that each sphere of capability is related to corresponding fulfilled functioning achievements, and that happiness is transformed from both of two spheres of capability (**Fig. 1.1**). Therefor patients were divided to 4 (2 x 2) groups, namely totally (both well-being and freedom) fulfilled, well-being fulfilled, freedom fulfilled, and no fulfilled, in order to confirm the difference in the relationship between functioning achievement and overall satisfaction. As criteria for defining higher or lower in each perception score, means of these scores in each country was used (**Table 1.2**).

Effects of classified type of individual perception of capability care on overall satisfaction were examined by adjusting individual attributes in multiple regression analysis. Overall satisfaction was entered as a dependent variable. As independent variables, individual attributes were entered first, and then type of individual perception of capability care was additionally entered. Individual attributes entered were age (dummy variables for 61-80 years and more than 80 years), sex (male = 1, female = 0), dependence on self-care (1 = independent, 2 = partially dependent, 3 = totally dependent) and operation (1 = undergoing surgery during hospitalisation). EQ-5D score (as a continuous variable) was additionally entered in Sweden to control for health status. Score transforming of EQ-5D was carried out according to Dolan, Gudex, Kind and Williams (1995).

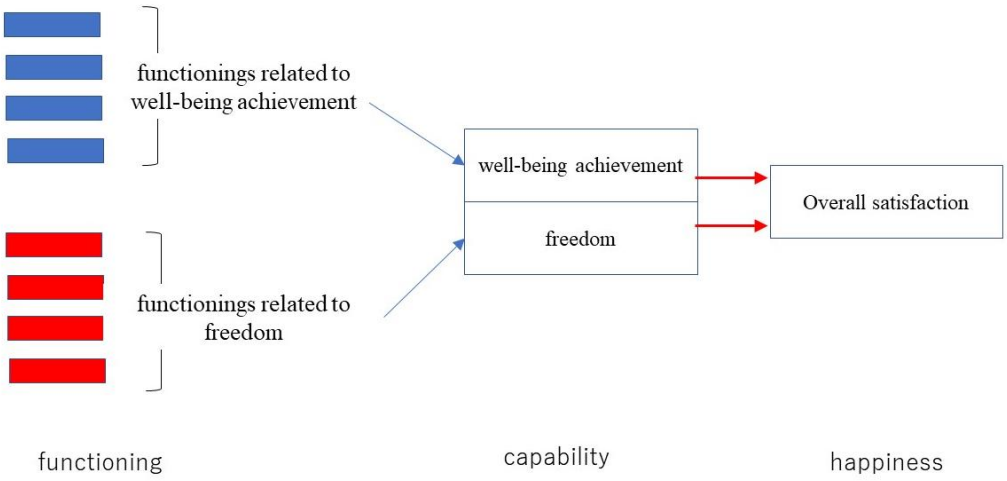

Fig 1.1 Functionings, capability and happiness: hypothesis model
Note: Functionings related to well-being achievement and freedom, fulfilled by nursing service, compose opportunity sets, well-being achievement and freedom, a sphere of capability. Capability is transformed into happiness, of which the proxy variable is patients' overall satisfaction.

Table 1.2 Types of capability fulfilment classified by functioning achievement related to well-being achievement and freedom

		Well-being achievement[a)]			
		Sweden		Japan	
		Upper mean 3.53 – 4.00	Lower mean 0.00-3.52	Upper mean 3.31 – 4.00	Lower mean 0.00-3.30
Freedom[a)]	Upper mean[b)]	Totally fulfilled 46%	Freedom fulfilled 14%	Totally fulfilled 48%	Freedom fulfilled 11%
	Lower mean[b)]	Well-being fulfilled 16%	Unfilled 24%	Well-being fulfilled 12%	Unfilled 29%

respondents distribution in Sweden and japan
a) mean of individual average score of corresponding functioning items
b) 3.67-4.00 in Sweden, 3.28-4.00 in Japan c) 0.00-3.66 in Sweden, 0.00-3.27 in Japan

Ethical approvals

The part of the study protocol carried out in Sweden was approved by the Ethics Committee of Department of Medical Research, Umeå University, (reference number: 08-134M), and the part carried out in Japan was approved by research ethics committees of the hospitals where the study was performed, and the Ethics Committee, Faculty of Medicine, The University of Tokyo (reference number: 817).

1.3. Results

Respondents' characteristics

Patients hospitalized in one of the 2 wards in a hospital in 2008 (Sweden) and in one of the 15 wards in 11 hospitals in 2006-2008 (Japan), and who met the inclusion criteria, were invited to participate in the study and given the final version of questionnaire. Of 1068 participants, 990 (92.7%) responded to the questionnaire. 158 questionnaires were excluded because they contained more than 7 missing values. In total, we analyzed 832 (77.9%) questionnaires. **Table 1.3** shows the attributes of respondents. Among them, 116 were collected in Sweden and 716 in Japan. Mean age was 64.2 years (SD = 13.5, range 18-96 years), 31% were female, 75% were married, 40% were independent in self-care, and 30% had a history of disease longer than 3 years. There were no statistically significant differences in age, sex, marital status, independence in self-care and disease history between Sweden and Japan. On the other hand, Sweden had more cardiac surgical respondents (55% in Sweden and 22% in Japan, respectively below),

Table 1.3 Respondents attribute

		Sweden (n = 116)	Japan (n = 716)	Statistics
Ward	Cardiac medical	52 (45%)	562 (78%)	
	Cardiac surgical	64 (55%)	154 (22%)	
Age	Mean (SD)	64.8 (10.8)	64.1 (13.9)	t= -0.642
Sex	male	78 (68%)	493 (69%)	
	Female	36 (32%)	222 (31%)	χ^2= 0.013
Length of stay	Mean (SD)	6.1 (4.4)	12.0 (7.1)	
	<= 7days	71 (70%)	226 (32%)	
	8 - 14 days	25 (25%)	262 (37%)	
	15 - 28 days	5 (5%)	228 (32%)	χ^2= 37.486
Waiting days	Mean (SD)	16.9 (40.7)		
History of the disease	< 3 months	50 (53%)	313 (45%)	
	3 month - 3 years	20 (21%)	170 (24%)	
	> 3 years	25 (26%)	213 (31%)	χ^2= 1.975
Dependence on self-care				
	Independent	44 (40%)	281 (40%)	
	Partly dependent	42 (38%)	263 (37%)	
	Totally dependent	24 (22%)	158 (23%)	χ^2= 0.033
Operation	Operation	71 (68%)	241 (35%)	
	Bedrest procedure	22 (21%)	197 (29%)	
	No	12 (11%)	247 (36%)	χ^2= 43.102
Room type	Single	17 (15%)	68 (10%)	
	Twin- triple	23 (21%)	55 (8%)	
	General	72 (64%)	557 (82%)	χ^2= 46.690

more with a stay shorter than 1 week (70%, 32%), more undergoing an operation (68%, 35%), and more staying in a single room (15%, 10%).

Item characteristics

The share of missing responses per item ranged from 0.2% to 4.7% in total. In Sweden, missing responses were highest for *information after discharge* (7.8%), *standardised*

care (6.0%), and *education for discharge* (5.2%). Those in Japan were *education for discharge* (4.6%), and *assist to independence* (4.5%).

Table 1.4 shows the mean, SD and share of distribution of each item. Responses of 0 and 1 were combined. More than 80% of respondents marked the highest category in 12 items of patient experience in Sweden, versus only 3 items in Japan. Due to the higher distribution in the highest category, the mean of 17 items in Sweden was more than 3.7 while that of 2 items exceeded 3.7 in Japan. When comparing Sweden and Japan, means in Sweden were statistically significantly higher than in Japan for 19 items (significance level: 5%), while the means of *standardized care* and *room odour* were statistically significantly lower in Sweden. Regarding items of overall satisfaction, means ranged from 3.64 to 3.84 (Sweden), and 3.17 to 3.44 (Japan). Means for all items were statistically significantly higher in Sweden than in Japan.

Table 1.4 Item scores; differences between Sweden and Japan

		Sweden						Japan							
				Distribution (%)						Distribution (%)					
Domains	Items	Mean	SD	0 or 1	2	3	4	Mean	SD	0 or 1	2	3	4	$X^{2\,a)}$	
Expertise and skill	Nurse's prompt action	3.90	0.30	0.0	0.0	9.6	90.4	3.46	0.89	4.6	4.7	27.7	62.9	b)	
	Qualified skill and knowledge	3.83	0.42	0.0	1.8	13.5	84.7	3.34	0.91	5.0	7.0	34.3	53.6	38.923	**
	Communication with physicians about me							3.38	0.96	6.1	7.1	26.4	60.4		
Education/ information support	Understandable answer	3.65	0.56	0.0	4.4	26.3	69.3	3.37	0.91	5.1	7.1	31.0	56.9	10.061	*
	Cure and care information	3.74	0.54	0.0	4.8	16.2	79.0	3.29	1.01	6.5	9.8	28.5	55.2	23.099	**
	Support in disease understanding	3.63	0.66	1.8	4.5	22.7	70.9	3.36	0.94	5.5	6.9	30.3	57.2	8.235	*
Peace of mind/ emotional support	Discuss worries, health, and care	3.75	0.56	0.9	3.7	14.7	80.7	3.24	1.11	9.1	7.8	26.9	56.2	25.119	**
	Trust in nurses	3.86	0.42	0.0	2.6	8.8	88.6	3.49	0.89	4.9	4.1	25.7	65.3	b)	
	Consideration	3.80	0.47	0.0	2.7	15.0	82.3	3.05	1.07	10.3	13.3	33.8	42.6	62.400	**
Essential care	Physical hygiene	3.21	1.01	7.4	10.6	31.9	50.0	3.01	1.10	9.2	17.5	31.0	42.3	3.616	
	Enjoy mealtime	3.07	0.97	8.2	16.4	34.5	40.9	2.89	1.23	14.9	14.9	29.4	40.8	3.867	
	Ample rest	3.70	0.73	2.9	3.9	12.7	80.4	3.32	0.96	5.7	9.0	29.7	55.7	21.981	**
	Comfortable with toileting assistance	3.10	1.35	15.2	10.1	13.9	60.8	3.23	1.10	8.8	10.0	26.1	55.2	7.235	
	Room cleanliness	3.70	0.64	1.8	4.4	15.8	78.1	3.39	1.02	7.6	3.6	26.6	62.3	13.421	**
Pain management	Pain consideration	3.65	0.65	0.9	7.1	17.7	74.3	3.49	0.98	5.7	5.4	18.4	70.6	5.174	
	Pain relief	3.79	0.43	0.0	0.9	19.6	79.4	3.24	1.00	6.2	10.5	32.7	50.6	34.223	**
Courtesy	Politeness	3.84	0.52	0.9	1.7	8.6	88.8	3.40	1.04	7.3	4.0	24.3	64.3	27.807	**
	Kindness	3.88	0.35	0.0	0.9	10.3	88.8	3.49	1.01	6.4	3.8	18.9	71.0	18.306	**
Post-discharge support	Education for discharge	3.72	0.61	1.0	5.2	14.4	79.4	2.92	1.27	14.7	14.3	26.4	44.6	40.757	**
	Information after discharge	3.59	0.76	2.1	7.4	18.9	71.6	2.95	1.23	13.5	14.6	28.1	43.8	27.541	**
Self-care	Watching over	3.81	0.44	0.0	1.9	14.8	83.3	2.79	1.28	16.5	16.2	29.1	38.2	74.750	**
	Assist to independence	3.34	0.98	5.9	8.2	28.2	57.6	2.94	1.11	10.8	18.3	32.6	38.3	12.654	**
Patient decisions preference	Patient preference	3.56	0.79	2.0	6.1	24.2	67.7	3.37	0.90	5.0	5.8	33.7	55.6	6.039	
	Decision support	3.54	0.75	2.1	6.3	26.0	65.6	3.18	0.99	6.6	12.2	34.8	46.4	12.927	**
Patient consent	Ignoring	3.80	0.45	0.0	1.8	16.8	81.4	3.76	0.83	4.4	1.7	3.7	90.2	b)	
	Mockery	3.69	0.60	0.9	1.7	24.3	73.0	3.70	0.85	4.5	2.4	8.2	85.0	b)	
	Patient consent lacking	3.81	0.55	1.1	1.1	12.6	85.3	3.56	1.06	7.8	4.9	6.3	81.1	12.916	**
Accessibility to nurses	Nurses choose time, pace	3.74	0.61	1.0	3.0	15.8	80.2	3.37	1.14	9.9	8.2	11.5	70.4	13.487	**
	Communication barrier	3.72	0.51	0.0	2.7	22.7	74.5	3.44	1.02	7.0	9.7	12.4	70.9	20.261	**
Standardized care	Standardized care	2.36	1.60	33.3	10.7	20.2	35.7	3.37	1.08	9.0	10.3	12.2	68.5	50.635	**
Room odour	Room odour	3.29	0.98	7.1	8.0	31.3	53.6	3.39	1.10	9.0	9.3	11.6	70.1	29.333	**
Disturbance	Disturbance	3.04	1.30	15.0	12.1	18.7	54.2	3.17	1.10	9.2	15.2	22.0	53.6	4.046	
Overall satisfaction	Preference in next hospitalization	3.76	0.50	0.0	3.5	16.8	79.6	3.43	0.88	3.7	8.8	26.4	61.1	16.415	**
	Recuperation by nursing	3.68	0.64	0.9	7.0	15.8	76.3	3.29	0.93	4.6	12.5	30.7	52.3	23.542	**
	Overall satisfaction to nursing	3.80	0.52	0.9	2.6	12.2	84.3	3.39	0.85	3.6	8.6	31.6	56.3	32.603	**
	Recommend to others	3.80	0.46	0.0	2.6	14.9	82.5	3.17	1.00	5.6	16.7	29.5	48.2	48.830	**
	Overall satisfaction with hospital	3.84	0.47	0.9	1.7	9.6	87.8	3.44	0.88	4.6	7.3	26.3	61.9	29.691	**

a) Pearson's goodness of fit statistics, degrees of freedom are 3

b) more than 20% of total cells with expected frequency less than 5

*p<0.05, **p<0.01

Patients' functioning achievement

Patient's functioning achievement, measured by patients' experiences with corresponding nursing service, is shown in **Table 1.5** and **Fig 1.2**. To confirm the test method of statistical difference between Sweden and Japan, Kolmogorov-Smirnov's test of normal distribution was carried out on domain scores in Swedish and Japanese cases, respectively. Results suggested that all domains did not show normal distribution. Therefore, Mann-Whitney's U test was performed to test statistical differences in domain scores between Sweden and Japan. U statistics are shown in **Table 1.5**. Mean of domain scores in Sweden were higher for 11 of 14 domains below. Swedish cases showed statistically significantly higher scores in domains of *expertise and skill*, *education*, *emotional support*, *essential care*, *pain management*, *courtesy*, *post*

Table 1.5 Patients' functioning achievement in Sweden and Japan

Domains[a)]	Sweden		Japan		U statistic[b)]
	mean	SD	mean	SD	
Expertise and skill	3.87	0.32	3.39	0.80	22411.0 **
Education	3.67	0.49	3.34	0.85	29219.5 **
Emotional support	3.80	0.40	3.27	0.86	22766.5 **
Essential care	3.35	0.70	3.19	0.85	25698.0
Pain management	3.71	0.48	3.39	0.88	31527.0 **
Courtesy	3.86	0.41	3.44	0.97	29223.5 **
Post discharge support	3.67	0.59	2.88	1.22	17790.5 **
Self-care	3.64	0.61	2.87	1.10	15369.5 **
Patient decision preference	3.55	0.68	3.29	0.89	22879.5 **
Patient consent	3.75	0.42	3.68	0.75	32847.5
Accessibility to nurses	3.73	0.49	3.41	0.94	31462.5 **
Standardised care	2.36	1.60	3.37	1.08	14192.5 **
Room odour	3.29	0.98	3.39	1.10	30005.5 *
Disturbance	3.04	1.30	3.17	1.10	33483.0
Overall satisfaction	3.77	0.42	3.34	0.81	26236.0 **

a) measured by patients' experiences on corresponding nursing service

b) Mann-Whitney's U test, *p<0.05, **p<0.01

discharge support, *self-care*, *patient decision preference*, *patient consent* and *accessibility to nurses*. On the other hand, the domain of *standardized care* was statistically lower in Sweden. *Room odour* and *disturbance* were also lower in Sweden although the differences were not statistically significant. *Overall satisfaction* was statistically significantly higher in Sweden.

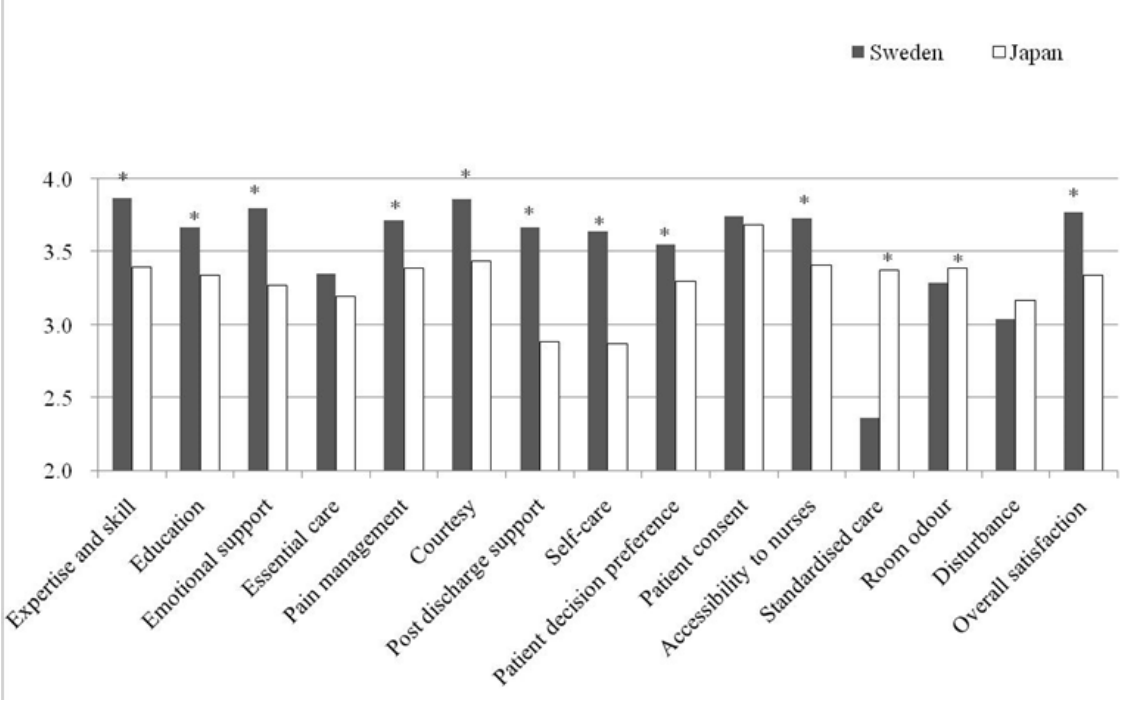

Fig 1.2 Functioning achievement [a)] in Sweden and Japan
a) measured with corresponding patients' experiences *p<0.05

Relation between type of capability fulfillment and overall satisfaction

Patients' functioning achievement related to well-being achievement and freedom were transformed from hypothesised domain scores. Mean (SD) of the scores were 3.53 (0.54), 3.67 (0.46) in Sweden and 3.31 (0.68), 3.28 (0.71) in Japan, respectively. Using the mean in each country, all cases was categorised into 4 types of capability fulfilment, namely totally fulfilled, well-being fulfilled, freedom fulfilled and unfilled (**Table 1.2**).

The respective proportions in Sweden were 46.1%, 15.7%, 13.9% and 24.3%, and those in Japan were 47.9%, 12.3%, 10.9%, 29.0%.

The difference in overall satisfaction between types of capability fulfilment is shown in **Fig. 1.3**. In Japan, overall satisfaction became higher in the order of unfilled (2.78), freedom fulfilled (3.27), well-being fulfilled (3.46) and totally fulfilled (3.66). In Sweden, in contrast, it became higher from unfilled (3.44), well-being fulfilled (3.74), totally fulfilled (3.90), to freedom fulfilled (3.98).

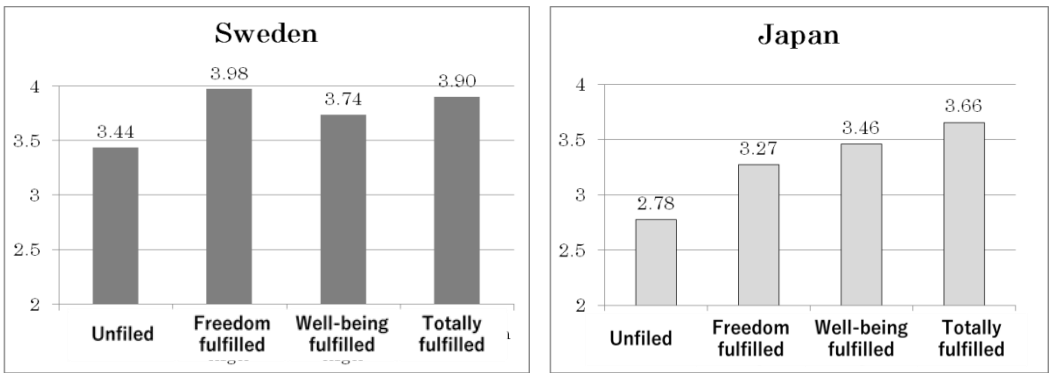

Fig. 1.3 Overall satisfaction of each type of capability fulfilment

Concerning unfilled patients in Sweden, when functionings related to well-being achievement became fulfilled, overall satisfaction is thought to have shifted from 3.44 to 3.74 by 0.30 points; and when that of freedom also fulfilled, overall satisfaction further improved to 3.90 points. In contrast, when functionings related to freedom initially became fulfilled, overall satisfaction improved to close to the maximum score (3.90 - 3.98 for the range up to 4) no matter whether the functionings related to well-being achievement was high or low. This suggests that the functionings related to well-being achievement and that of freedom had a particular influence on overall

satisfaction, and that overall satisfaction was more dependent on the functionings related to freedom than that of well-being achievement in Sweden. Concerning Japan, the difference between well-being fulfilled and unfilled (3.46 – 2.78 = 0.68) was greater than that between freedom fulfilled and unfilled (3.27 – 2.78 = 0.49). The functionings related to well-being achievement is suggested to have a stronger influence on overall satisfaction than that of freedom. Kruskal-Wallis testing of the results in each country showed that there were statistically significant differences amongst the types of capability fulfilment (χ^2 = 33.441, p-value = 0.000 in Sweden; χ^2 = 134.601, p-value = 0.000 in Japan).

From these results, the functionings related to well-being achievement and freedom are thought to have a positive influence on overall satisfaction. However, the influence was specific to the type of capability fulfilment in each country. Therefore, the difference in overall satisfaction amongst the types of capability fulfilment is examined hereinafter.

Determinant factors of overall satisfaction

Individual attributes might have particular effects on functionings related to well-being achievement and freedom, and their effects might not always be uniform in terms of direction, that is, whether positive or negative. Therefore these individual attributes had to be considered when examining the influence of the type of capability fulfilment on overall satisfaction.

The effect of the type of capability fulfilment on overall satisfaction was investigated in each country, with control of individual attribute variables such as age, sex, length of stay, taking operation and self-care dependence. **Table 1.6** shows the

results of multiple regression analyses for models in each country. Model 1 consisted of individual attributes such as sex, age, and length of stay. The other variables were not entered in the model since the adjusted R^2 decreased after entering them. In Sweden, EQ-5D score was entered additionally in Model 2. Then, types of capability fulfilment were entered in Model 3.

Table 1.6 Determinant factors of overall satisfaction

		Sweden			Japan	
		Model 1	Model 2	Model 3	Model 1	Model 3
Constant		3.723 **	3.674 **	3.407 **	3.264 **	2.595 **
Sex	Male	-0.090	-0.105	-0.025	0.013	0.026
	Female	-	-	-	-	-
Age	18 - 60	-	-	-	-	-
	61 - 80	0.241 *	0.180	0.172	0.114 **	0.154 **
	81 -	0.168	0.196 +	0.226 *	0.106 *	0.149 **
Length of stay	- 1 week	-	-	-	-	-
	- 2 week	-0.024	-0.011	-0.047	-0.040	-0.040
	- 1 month	0.053	0.047	-0.041	-0.089 *	-0.054
EQ-5D	> Median		0.211 +	0.238 *		
	< Median		-	-		
Type of capability fulfilled	Totally fulfilled			0.357 **		0.559 **
	Well-being fulfilled			0.091		0.279 **
	Freedom fulfilled			0.459 **		0.211 **
	Unfilled			-		-
Adjusted R^2		0.029	0.058	0.185	0.012	0.234

Standardised regression coefficients (β) in multiple regression analysis
+ p< 0.10, *p < 0.05, **p < 0.01

Compared to Model 2 (Sweden) or Model 1 (Japan), Model 3 showed greater adjusted R^2s, and statistically significant effects on overall satisfaction in all types of the capability fulfilment except well-being fulfilled in Sweden. It can be judged that the type of the capability fulfilment influenced overall satisfaction in spite of individual attributes such as sex, age, length of stay, or health status (in Sweden). In Sweden the type of totally fulfilled (β= 0.357) and freedom full-filled (β= 0.459) had strong positive

effects, although well-being fulfilled did not have a significant effect. In Japan, in contrast, totally fulfilled (β= 0.559) had a stronger positive effect, while well-being fulfilled (β= 0.280) and freedom fulfilled (β= 0.225) had approximately similar significantly positive effects. These results suggest that the types of well-being fulfilled and freedom fulfilled had similar effects on overall satisfaction, and that their effects were linear-structured; that is, effects were added when both aspects of functionings are fulfilled in Japan. On the other hand, the effect of well-being fulfilled was weak, while that of freedom fulfilled was significant in Sweden.

In Model 1 in Japan, length of stay (2 weeks to 1 month) had an effect on overall satisfaction, which was not significant in Model 3. This suggests that the effect of length of stay in Model 1 was a confounding factor with the types of perception of capability care. Age had a significant effect consistently in all models in both countries, and was thought to have had an effect other than that of confounding (ie. non-confounding effect) with the types of the perception of capability care.

In Sweden, the EQ-5D score was entered. On comparison of Model 2 to Model 1, the adjusted R^2 strongly increased, and EQ-5D was useful in improving the fitness of the model. Even after entering the type of capability fulfilment, its effect remained significant. Accordingly, it was suggested that individual health status had an identical effect on overall satisfaction from the type of the capability fulfilment.

1.4. Discussion

This chapter aimed to investigate how patients functionings was composed of in terms of well-being achievement and freedom based on the capability approach. To examine the structure amongst functioning, capability, and happiness, questionnaire items of

patient perception with nursing service, which was originally developed as quality indicator of nursing service, was applied to the capability approach, and an international comparison of inpatient perception of nursing service was conducted between Sweden and Japan. This study was carried out in cardiac medical and surgical wards, where patients experience acute problems due to losing the possibility or opportunity to move about and conduct their daily lives as usual. In such a situation, involving their heart function, patients faced capability loss individually, and nursing service is provided as compensation. Cardiac wards are therefore thought to be suitable settings in which to investigate individual functionings in terms of well-being achievement and freedom, which are dealt as two spheres of capability in the study. Capability depends on individual situations. To examine patients' perceptions derived from individual daily situations, the measurement scale used must be concrete and reflect various aspects of life. The questionnaire used for this study was therefore required to reflect various aspects of nursing service. In this respect, the original questionnaire was based on concrete situations during hospitalisation, and consisted of various domains of nursing service. For the reason maintaining the original domain structure was considered in the study on the process of composing domains of patients' perception of nursing care.

Comparison of domain scores between Sweden and Japan showed that most of the mean scores were higher in Sweden than Japan. Ward mean scores of overall satisfaction were distributed between 2.97 and 3.58 in Japan, with a ward mean (SD) of 3.31 (0.19). The Swedish ward scores, at 3.76 and 3.79, were higher by more than 2 SD than the mean of the Japanese ward mean scores. Although it is possible that the Swedish wards provided markedly better nursing care than any of the Japanese wards, it is also possible to represent that the level of individual judgement differed between the

two countries. It is a limitation of the study that the number of respondents is small especially in Sweden. For the study in Sweden, EQ-5D was included. Although not enough for compensating the limitation, including such an internationally comparable scale could improve the validity of international comparison.

The study investigated the effects of type of capability fulfilment on overall satisfaction amongst individuals who were facing problems of daily living due to their cardiac disease. This result can be thought to reflect the relation of well-being achievement and freedom as determined by the individual's judgement in each situation. For the Japanese patients in this study, individual overall satisfaction may have been affected by well-being achievement and freedom. On the other hand, for the Swedish patients, freedom appeared to have a strong effect on overall satisfaction, whereas well-being achievement had no significant effect. Comparing Swedish domain scores belonging to well-being achieving to those of Japanese, *emotional support* (+0.53 point), *pain management* (+0.32 point) and *courtesy* (+0.42 point) were significantly higher, and *room odour* (-0.10 point) was significantly lower. It can therefore be thought that the study hypothesized well-being in directions, and that more detailed examination of well-being is required. However, the results at least suggested that compensation of freedom had a strong relation to individual judgement in Sweden, while Japanese individuals approximately equated compensation for loss of freedom with that of well-being.

Swedish patients' higher satisfaction was suggested to result from a higher evaluation of both the well-being achievement and freedom related aspects of functionings. Nurses in clinical settings can improve their practice by defining their activity from this capability perspective. The items in the questionnaire express specific

scenes that patients experience, so it is easy for nurses to review their daily practice with patients' evaluations as shown through this questionnaire. For decision makers in the health services sector, information on patients' functioning achievement from the perspective of capability will be useful in decision making in equitable health service provision, and also in assuring that services are performed equitably.

1.5. Conclusions

To examine individual patients' functioning in terms of capability, this chapter focused on their perception of nursing service as a measure of functioning achievement by considering the shortage and compensation in functionings related to well-being achievement and freedom. The types of capability fulfilment - totally fulfilled, well-being fulfilled, freedom fulfilled and unfilled - had a significant effect on overall satisfaction. Swedish individual judgement was strongly affected by compensation for freedom, while Japanese individuals approximately equated compensation for both well-being achievement and freedom. Since some freedom-related domains were lower in Japan and absent in Sweden, it is suggested that freedom-weighted individual judgement is effective in improving patients functioning achievement, and in retaining the quality of nursing services related to compensation for the loss of capability, especially freedom, during hospitalization.

Chapter 2

Measuring the shortage in individual functionings: comparison between Japan and Sweden

Abstract

Background: As with disability, patients face physical, mental, and societal constraints in life because of suffering, social norms, etc. To capture the diversity of individual life, the capability approach was applied to a healthcare setting.

Aim: To capture the shortage in functionings during hospitalization through inpatients' experiences with nursing services in Japan and Sweden, and discuss the differences in terms of social or institutional settings.

Method: Cardiac patients (n=716 in Japan, 116 in Sweden) were survey by questionnaire with regard to specific nursing situations, which were classified into functionings related to well-being achievement and freedom. The shortage of functionings in life for a patient was transformed into scores and analysed to identify their effects on patients' subjective evaluation of recovery with multiple regression analysis.

Results: Japanese patients have a shortage in *emotional support*, *nurses' courtesy*, *pain management* (related to well-being achievement) and *post-discharge support* (related to freedom), while Swedish patients have a shortage in *standardized care* and *room odour* (related to well-being achievement). Bilateral comparison showed differences in type of functionings in terms of capability in which the shortage is observed, which supports that by measuring a shortage in individual functionings the loss of capability could be

captured which reflects the social or institutional context. Fulfilling the individual's functionings requires not only the regulation of social infrastructure and social customs, but also consideration of the shortage in individual functionings in terms of capability.

Key words: Capability approach, Measurement, Health, Patient experiences, Nursing

2.1. Introduction

Being hospitalised, and initially, being sick, represents the emergence of an unpredictable risk or unluckiness in a person's life, which restricts his or her living conditions (how he or she is), activities (what he or she does), and opportunities in daily life. Receiving medical treatment also increases his or her fatigue in one sense, which sometimes worsens the person's condition and restricts their activity. In this situation, society should consider the health condition itself and the disadvantages of the patient's worsened living condition and lost living opportunities consequent to the disease or hospitalisation. A norm for the former is given from the basic needs theory that an adequate health standard is an economic and social rights (Streeten 1980). For the latter, the citizenship theory asserts that individuals should be entitled to a standard living condition and opportunities (Commission in Social Justice 1993). We will discuss deeply on the achievement of these conditions and opportunities of the individual below.

Being hospitalised in itself imposes time and spatial restrictions on the patient. In addition, there is a social norm about 'how a patient ought to be'; namely, that the patient should be completely dedicated to their treatment and recovery, and refrain from usual activities during hospitalisation. In this way, the patient is placed under an obligation to be a 'good patient' who restricts their activities and opportunities.

However, the relationship between diseases and individuals has two aspects. One is that in many cases individuals have no responsibility for their developing a disease. As social epidemiology has clarified, it is not individuals, but rather the economic and social situations of the individual or their environment that have a strong impact on non-communicable diseases. Therefore the individual person ought not be obligated to having a disease. However, such social norms as the 'right patient' are shared in society under the misunderstanding of individual responsibility in the development of diseases. Here, the worsened conditions and lost opportunities that sick individuals face are not fair and ought to be compensated by society. The other aspect of disease is that disease emerges probabilistically, which means it will necessarily emerge in some individuals in the society. Therefore, a disease is not a problem of individuals, but of society, and society ought to compensate for the worsened conditions and lost opportunities suffered by individuals with diseases. Judging from these two aspects, although hospitalisation and disease emerge for a particular period in a particular person, the threats to the living conditions and opportunities of the individual life should be compensated by society from the perspective of social justice, since such disadvantages are not a consequence of the choices of the individual (Dworkin 2000).

To judge the diverse characteristics of the living conditions and opportunities of the individual patient, this study introduces the capability approach advocated by Amartya Sen (Sen, 1970) to healthcare evaluation. This approach is useful in measuring the lack of a reference level of capability of a person under a given social context (Sen 1970). The designated limitation of most utility measures which adopt unitary measure of individuals' subjective - mainly mental or emotional - responses to commodities (Culyer 1990) is that they do not consider other aspects of diversity than those measured. In this

respect, the capability approach deals directly with the possibility of various achievements of an individual (Gotoh 2009). Under this approach, the diverse states of an individual —'in particular the various things that he or she has managed to do or be in leading a life'(Sen, 1993) and 'has reason to value' (Sen, 1999) — is defined as 'functionings'. This point is one of the strength of the capability approach, namely that functionings are related to the person's personal characteristic and social arrangements (Sen 1992). Further, using the concept of functionings, the capability of a person is defined as 'a bundle of functionings' (Sen, 1987) which reflects the alternative combinations of functionings which the person can achieve' (Sen, 1993, p. 31), and the person has freedom to choose a functioning (Sen, 1987) amongst the alternative set. A functioning is converted from a resource the person is entitled to utilise by utilisation ability, which the person can realise. The second strength of introducing the capability approach is that it can capture the diversity of individual life directly as freedom to choose from a capability set. In addition, regarding health care settings, the capability approach has been suggested and supported with regard to measuring health-related quality of life (Verkerk 2000). Therefore, the capability approach has a sufficient basis to be applied to judging the living conditions and opportunities in life of an individual patient during hospitalisation. A research interest of the present study is how to evaluate the diversity of statuses among individual patients. The problem is that diversity of these statuses is unobservable. When the capability approach is applied, the capability and functionings of a person are also unobservable. To capture such unobservable aspects, this study focuses on nursing service. From the view point of nursing service, being sick weakens the individual patient's intrinsic 'vital power'. Nursing care seeks to minimise this 'expense of vital power' (Nightingale, 1860). This can be interpreted

based on the concept above, namely that the lack of an individual's living conditions and opportunities weakens their 'vital power', and that minimizing 'the expense of vital power' is compensation for patients to help them to enjoy their living conditions and opportunities in the way they usually do when healthy, and unaffected by disease. To accomplish the task of minimizing the expense of vital power, nurses capture the patient's situation and position through observation and communication, and judges the 'shortage in the patient's needs' based on nursing theory. One theory supporting this is the '14 basic human needs,' proposed by Virginia Henderson (Henderson 2004). Assuming that nursing care is provided to fulfil the shortage precisely and sufficiently, in accordance with the patient's status, the content (kind and volume) of nursing services reflects the unobservable lack in the living conditions and opportunities of the individual person through theory-based objective judgement by nurses. This is one reason why this study focused on nursing service. In attempting to evaluate the unobservable diversity of individuals, it is useful to introduce objective observation judged by professionals based on theory.

The next problem is how to obtain identical (subjective, but with objectivity, not mental nor emotional) evaluations from individuals themselves. For our objective, evaluation of the content of nursing services as evaluated by nurses is no use. However, since there is asymmetry in knowledge and information between patients and nurses, it is difficult for patients to evaluate the content of nursing services. Here, patients' experiences of nursing services are focused on. Patients can distinguish specific scenes between themselves and nurses during hospitalisation. Using this feature, patients' experiences, namely the frequency of scenes which specifically reflect the quality of nursing, are used as quality indicators of nursing service. (Jenkinson, 2002; Kobayashi

et al, 2011) Considering that nursing care is provided for the shortage of patients as discussed above, patients' experiences of nursing service reflect how they could really fulfil the lack of living conditions and opportunities and achieve their functionings with the compensation of nurses' support during hospitalisation.

Next, in order to capture the shortage of patients' capability in life which is not evident in a particular cultural or institutional setting, the real status of a shortage of living condition and opportunities in life for patients is compared to that in other social or institutional settings, as a bilateral comparison between Japan and Sweden. Both countries are well-known as having one of the most advanced health care systems and the longest life expectancy, and both are currently facing serious problems with demographic transition and economic recession. Due to the different health policies and social institutions in these countries, patients have different social circumstances surrounded by different social norms. Shortage because of social norms cannot be easily identified by inquiries limited to one society setting. Instead, comparison between counties will facilitate meaningful discussion of how an individual patient's functionings can be influenced by social norms and circumstances.

The aim of this chapter is to develop a way to capture the shortage in capability for individual patients through their experiences in nursing service, and to discuss how differences in social or institutional settings affect an individual patient's capability through bilateral comparison between Japan and Sweden.

2.2. Method

Patients' experiences with nursing services were investigated with a questionnaire, which was composed of items concerning situations specific to nursing services, and

validated in Japanese and Swedish by the authors. The questionnaire measures how frequently patients experienced different domains of nursing service. Among domains, this study analysed those thought to be related with patient functionings. In addition, the effect of capability on individual evaluation was also considered. The questionnaire has one item which is based on individual evaluation. The hypothesised model is that a patient's individual evaluation is affected by their capability, which is composed of functionings affected by their social positioning, such as age, sex, dependence on self-care and health status.

Domain classification in terms of capability approach

Capability can be approached with regard to the degree of well-being achievement and freedom (Sen, 1992). Hospitalized patients - the target of this study - face particular situations during particular periods. During hospitalisation, medical treatment and rest for recuperation are prioritised, especially in the acute phase, and nursing services mainly focus on achieving the well-being of patients. However, patients consider aspects other than well-being achievement (Sen, 1985), and such aspects can gradually appear as they approach being discharged, which is a point of return to their daily lives, which reflect their individuality and personality. Recently, the role of nurses has shifted from "doing for patients" to "being with patients" (Oudshoorn, 2005), such that a patient's own identity and volition are more respected. Therefore, in addition to the achievement of well-being achievement, the freedom should also be considered in terms of capability.

The domains of patients' functionings were derived from the questionnaire, confirmed as patients' experiences in a previous study (Kobayashi et al.2011), and

hypothetically classified as well-being achievement or freedom in Chapter 1. Functionings related to well-being achievement were *emotional support*, *essential care*, *pain management*, *nurses' courtesy*, *standardised care*, *room odour* and *disturbance*. *Emotional support* and *nurses' courtesy* are thought to support patients' psychological comfort. *Essential care*, which focuses on physical hygiene, eating, toileting and rest, and *pain management* improve patients' current physical condition. *Standardised care* improves the quality of nursing services. *Room odour* and *disturbance* concern environmental condition around patients. Therefore, these were hypothesised to be well-being achievement. On the other hand, functionings related to freedom were *information*, *post discharge support*, *functional improvement support*, *patient decision preference*, *patient consent* and *accessibility to nurses*. *Information* promotes patients' health. *Post-discharge support* improves patients' opportunities in their lives after their discharge. *Function improvement support* encourages patients' independence in their daily living activities. *Patient decisions preference* and *patient consent* are related to respecting patients' independent decision making. *Accessibility to nurses* improves their opportunities during hospitalisation. Therefore, these were hypothesised as freedom.

In terms of capability structure mentioned in Chapter 1, subjective well-being evaluation like happiness is transformed from capability (Sen 1987). In this chapter, the individual's subjective evaluation of their own condition in terms of recovery (subjective evaluation of recovery) was used. Subjective evaluation of recovery was measured by using the item "I am progressing favourably under the nursing care provided in the hospital".

Data

The patient survey was conducted at 13 cardiac-medical and four cardiac-surgical wards of 13 hospitals in 2006-2007 in Japan and at one cardiac-medical and one cardiac-surgical ward of a university hospital in 2008 in Sweden. Eligible subjects were patients hospitalized in the ward for three to 30 days in Japan or at least two days in Sweden, were scheduled for discharge within a few days, were lucid, were able to make decisions, and were able to fill in the questionnaire by themselves or with family assistance in reading and writing. Patient selection was not limited by diagnosis. Nurses of the wards determined whether a patient met the selection criteria. The nurses gave participants oral and written information about the purpose of the study and informed them that their responses were voluntary and independent of the medical services provided to them. When patients consented to participate in the study, they received a questionnaire and an envelope that could be sealed. After responding to the questionnaire and sealing the envelope, respondents handed it to a nurse or sent it directly to the researcher. The questionnaires were sent to the researchers sealed and were analysed by the researchers.

Respondents with seven or more missing items (more than 20% of total items in the questionnaire) were excluded from the analysis. Participant responses on patient experience items were scored as follows: *always*: 4, *often*: 3, *sometimes*: 2, *occasionally*: 1 and *not*: 0. Scores for negatively worded items were reversed. Hence, higher scores indicated a better experience reported by patients. Item scores were then converted to domain scores. When more than half of the applicable items were not missing, domain scores were calculated by averaging the scores of the applicable items without weighting, hence by transforming them from 0 to 4. Responses of *does not*

apply were not regarded as missing data, but were not substituted to calculate domain scores. On the item of subjective evaluation of recovery, the responses were converted from *strongly agree*: 4 to *not agree*: 0, i.e. higher scores indicated a better evaluation.

Effect of capability and social position on subjective evaluation of recovery

Individual scores for functionings related to well-being achievement and freedom were calculated as the average of applicable domain scores in the hypothesis without weighting. For each country, the effects of well-being achievement and freedom on subjective evaluation of recovery were examined by multiple regression analysis. First, functionings of well-being achievement and freedom were entered as independent variables (Model 1). Individual attributes of age, sex, and undergoing surgery were then additionally entered as independent variables (Model 2). Individual attributes entered were age (dummy variables for 61-80 years and more than 80 years), sex (dummy variable for male) and operation (dummy variable for undergoing surgery during hospitalisation).

Next, to investigate whether which domains of patients' functionings had an effect on individual evaluation, multiple regression analysis in stepwise manner was carried out. For each country, all of the domains of patients' functionings were used as independent variables, and the subjective evaluation of recovery was used as the dependent variable. All statistical analyses were carried out with SPSS 16.0 for Windows.

Ethical considerations

The part of the protocol of the study carried out in Sweden was approved by the Ethics

Committee of Umeå University, Department of Medical Research (reference number: 08-134M), while the other part, conducted in Japan, was approved by the research ethics committees of hospitals where the survey was conducted, and the Ethics Committee, Faculty of Medicine, The University of Tokyo (reference number: 817).

2.3. Results

Of 1068 respondents who met the criteria and were invited to participate in the study, 990 (92.7%) agreed to participate and responded to the questionnaire. Of these, 158 were excluded because they had more than seven missing items. In total, we analyzed 832 (77.9%) questionnaires. **Table 2.1** shows the characteristics of respondents. Of these, 716 were collected in Japan and 116 in Sweden. Mean age were ca. 65 years, ca. 30% were female, ca. 30% had a history of disease longer than three years, and ca. 40% were independent in self-care[2]. There were no statistically significant differences between the Japanese and Swedish participants with regard to age, sex, disease history or independence in self-care. In contrast, fewer respondents in Japan belonged to cardiac surgical wards (22% in Japan and 55% in Sweden, respectively, as shown below), more stayed longer than two week (32%, 5%), fewer underwent surgery (35%, 68%), and fewer stayed in single rooms (10%, 15%).[3]

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[2] Independence of self-care was chosen from 'independent,' 'partly dependent,' and 'totally dependent' for the four aspects of eating, toileting, bathing and mobility, and transformed to dependence on self-care in total, which includes *independent* (when all aspects were 'independent'), *partly dependent* (when at least one aspect was 'partly dependent'), and *totally dependent* (when at least one aspect was 'totally dependent').

[3] Statistical tests were performed using the t-test for age (t= -0.642 n.s.) and the chi-square test for sex (χ^2= 0.013 n.s.), length of stay (χ^2= 37.486 *), history of disease (χ^2= 1.975 n.s.), dependence in self-care (χ^2= 0.033 n.s.), operation (χ^2= 43.102 *) and room type (χ^2= 46.690 *).

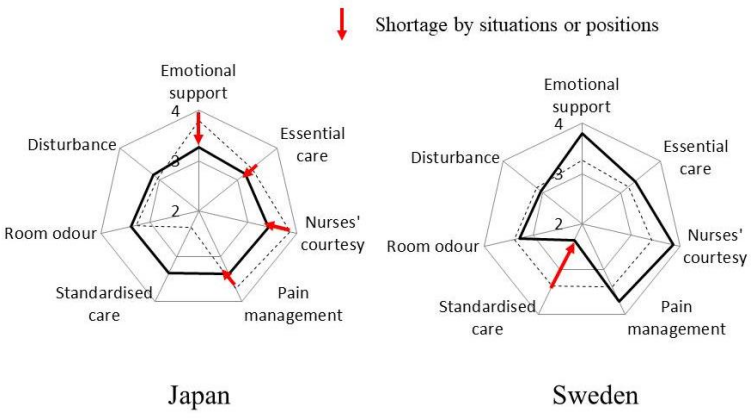
Table 2.1 Respondent characteristics

		Japan (n=716)	Sweden (n=116)
Ward	cardiac medical	562 (78%)	52 (45%)
	cardiac surgical	154 (22%)	64 (55%)
Age	mean, years (SD)	64.1 (13.9)	64.8 (10.8)
Sex	male	493 (69%)	78 (68%)
	female	222 (31%)	36 (32%)
Length of stay	mean, day (SD)	12.0 (7.1)	6.1 (4.4)
	<= 7days	226 (32%)	71 (70%)
	8 - 14 days	262 (37%)	25 (25%)
	15 - 28 days	228 (32%)	5 (5%)
History of disease	< 3 months	313 (45%)	50 (53%)
	3 month - 3 years	170 (24%)	20 (21%)
	> 3 years	213 (31%)	25 (26%)
Dependence in self-care			
	independent	281 (40%)	44 (40%)
	partly dependent	263 (37%)	42 (38%)
	totally dependent	158 (23%)	24 (22%)
Surgical operation	operation	241 (35%)	71 (68%)
	bedrest procedure	197 (29%)	22 (21%)
	no	247 (36%)	12 (11%)
Room type	single	68 (10%)	17 (15%)
	twin-triple	55 (8%)	23 (21%)
	general	557 (82%)	72 (64%)

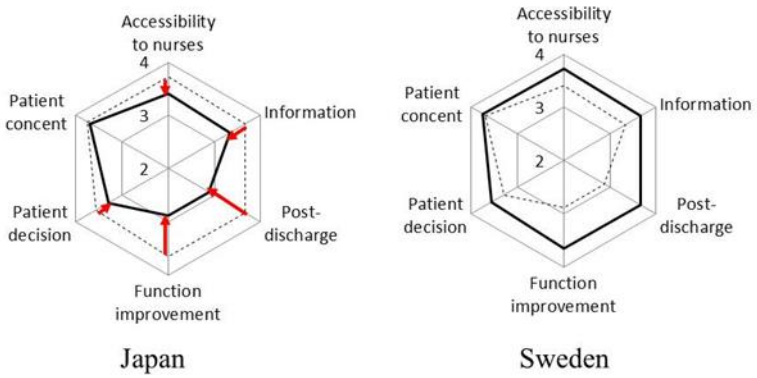
Scores of functionings are shown in **Fig 2.1**. Since Kolmogorov- Smirnov's test suggested that no domain showed a normal distribution, Mann-Whitney's U test was performed to test statistical difference in domain scores between Sweden and Japan. With respect to functionings related to well-being achievement, Japanese patients had a shortage in *emotional support*, *nurses' courtesy* and *pain management* compared to Swedish patients, while Swedish patients had a shortage in *standardized care* and *room odour* compared to Japanese patients, with these differences being significant. Concerning functionings related to freedom, Japanese patients had a shortage in all domains except *patient consent* when compared to Swedish patients. Subjective

n.s: no statistical significance, *: $p < 0.01$.

evaluation of recovery in Sweden (3.68 points) was statistically significantly higher than in Japan (3.29 points).



Functionings related to well-being achievement



Functionings related to freedom

Fig 2.1 Shortage in functionings of Swedish and Japanese inpatients
Score range of each functioning: 0-4. Mean of functioning related to well-being achievement (above) and freedom (below). Shortage in each functioning is represented with red arrow as the bilateral gap if the level of the functioning is lower than the other country.

Mean of individual average of well-being achievement domains was 3.32 (SD = 0.67) in Japan and 3.41 (SD = 0.54) in Sweden. That of freedom domains was 3.28 (SD = 0.70) in Japan and 3.67 (SD = 0.45) in Sweden. Using Mann-Whitney's U test, the difference in freedom was statistically significant ($p<0.001$), whereas that in well-being achievement was not. **Fig 2.2** shows the means of individual domain average of well-being achievement and freedom in each group divided by the scores of subjective evaluation of recovery (0, 1, 2, 3, 4 in Japan and 2, 3, 4 in Sweden). Since the number of Swedish respondents who scored this variable as 0 or 1 was too small, they were excluded. With a progressive gain in subjective evaluation of recovery, Japanese respondents rated freedom as well as well-being achievement monotonically better, whereas Swedish respondents rated freedom higher than well-being achievement when their subjective evaluation of recovery was relatively worse.

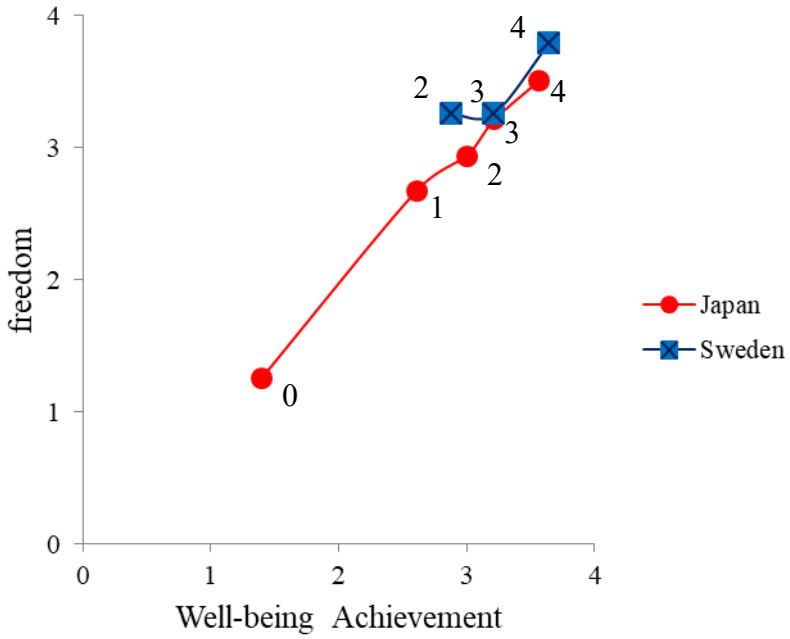


Fig 2.2 Well-being achievement and freedom in each group divided by score of subjective evaluation of recovery
The values 0, 1, 2, 3, 4 represents score of subjective evaluation of recovery

Multiple regression analysis of patients' functionings and individual attributes is shown in **Table 2.2**. For Japanese patients, Model 1 showed that both well-being achievement and freedom had significant positive effects on subjective evaluation of recovery. These effects remained after including individual attribute variables such as sex, age and operation in Model 2. Age higher than 60 years also had a positive effect on subjective evaluation of recovery. On the other hand, in Sweden, well-being achievement had a smaller positive effect on subjective evaluation of recovery than freedom. Although the effect of well-being achievement on subjective evaluation of recovery was significant at the 10% level in Model 1, the significance disappeared after considering individual attributes in Model 2. In Model 2, freedom and age between 61 and 80 years had significant positive effects on subjective evaluation of recovery. In contrast, sex was shown to have no significant effect on subjective evaluation of recovery in either country.

Table 2.2 Determinant factors of subjective evaluation of recovery

		Japan		Sweden	
		Model 1	Model 2	Model 1	Model 2
Constant		0.601 **	0.288	1.530 **	1.573 **
Well-being achievement		0.359 **	0.361 **	0.208 +	0.012
Freedom		0.238 **	0.247 **	0.248 *	0.339 *
Sex	male		0.016		0.042
	female		-		-
Age	18 - 60		-		-
	61 - 80		0.105 **		0.310 **
	81 -		0.115 **		0.119
Surgival	received		0.055 +		0.106
	no		-		-
Adjusted R^2		0.307	0.316	0.162	0.156

Standardised regression coefficients (β) in multiple regression analysis
+ p< 0.10, *p < 0.05, **p < 0.01

To investigate which functionings affected subjective evaluation of recovery, multiple regression analyses in stepwise manner were carried out (**Table 2.3**). In Japan, *nurses' courtesy,* belonging to well-being achievement, and *information*, *post-discharge support* and *patient decision preference,* belonging to freedom, affected subjective evaluation of recovery. However, in Sweden, only *information,* belonging to freedom, affected subjective evaluation of recovery.

Table 2.3 Effects of functionings on subjective evaluation of recovery

	Japan	Sweden
Well-being achievement		
Nurses' courtesy	0.228 **	
Freedom		
Information	0.224 **	0.407 **
Post-discharge support	0.157 *	
Patient decision preference	0.230 **	
Adjusted R^2	0.496	0.153

Standardised regression coefficients (β) in multiple regression analysis, stepwise method
*p < 0.05, **p < 0.01

2.4. Discussion

This chapter started from the view point of social justice, and the intention of orienting to the shortage of living condition and opportunities in life for individual patients. The problem is that living condition and opportunities in life for individual patients are closely coherent with daily life, which in turn reflects the diversity of personality. To capture such diversity, the capability approach can be applied to a healthcare setting, especially in situations where utility-based maximisation cannot be appropriately handled (Coast 2008). The advantage to focusing on patients' experiences in nursing services in the study is that situations in which patients experience nursing services

reflect the shortage and fulfilment of basic life needs, assuming that the nursing service is provided sufficiently and precisely. Since capability is associated with a cultural or societal context (Sen 1970; 1992), it can be considered that the differences in patients' functionings identified in the bilateral comparison shows that the results were able to capture the shortage in functionings and bundle of functionings, or in other words capability.

One limitation that should likely be considered here is the impact of differences in measurement criteria. In this study, functionings scores were based on patients' responses, selected from the five frequency adverb options of always, often, sometimes, occasionally and not. A possible limitation is that the sense of these words differs between Japanese and Swedish. However, the differences seen in the balance of the bundle of functionings of well-being achievement and freedom between the two countries shows meaningful context differences between them beyond language differences.

One of the differences evident between Japan and Sweden in the results is that Japanese respondents revealed shortages in all domains affecting subjective evaluation of recovery (*nurses' courtesy* [in well-being achievement], *information, post-discharge support* and *patient decision preference* [in freedom]), whereas Swedish respondents had no shortage in *information* (in freedom), the only item which affected subjective evaluation of recovery. Recently in Japan, the length of hospitalisation has decreased, which causes some patients to face uncertainty after discharge. For example, Japanese people have fewer sick leave privileges than Swedes, and nursing home supply is less. The result shows that patients' experiences with nursing services can capture the differences in capability consistent with institutional context.

When a person develops a disease, or in other words experiences an unpredictable risk, their need to receive social support increases, and finally they tend to feel isolated. In such a situation, participating in mutually provided systems institutes a sense of reciprocity based on individual relationships (Gotoh, 2009). In the Japanese setting, patients try to overcome the risk of well-being achievement by participating in a private, transient reciprocity system which he or she forms with a nurse. This is a reason why *nurses' courtesy*, a key to enter in the system, is necessary for Japanese patients, which means that patients share societal isolation with nurses. Meanwhile, since social services are widely available in Nordic welfare states (Gotoh, 2009), Swedish patients valued the opportunity to openly access nursing services, as shown in the finding of widely balanced freedom amongst Swedish patients (**Fig 2.2**).

In both countries, age was positively associated with subjective evaluation of recovery after adjustment for well-being achievement and freedom (**Table 2.2**). The finding that aged patients showed higher subjective evaluation of recovery independently of their reference level of well-being achievement and freedom might represent an effect of adaptive preference. Given that a capability set is regulated to enable a person to use freely in accordance with social infrastructure or social customs, a person can lose their capability set to a certain degree as a result of their position; for example, being an aged patient. Therefore, when evaluating a capability set for an individual person and trying to make up for a shortage, consideration of the individual's position is required.

2.5. Conclusion

The capability approach was applied to empirical analysis of hospitalised patients. A

shortage in patients' functionings was captured in terms of capability through patients' experiences with nursing service. Comparison between countries identified differences in bundle of functionings related with social or institutional context, which supports the idea that the shortage in individual capability could be captured in this study. Fulfilling the individual's capability set requires not only regulation of social infrastructure and social customs, but also consideration of the shortage in individual capability from the individual's position.

Chapter 3

Measuring capability compensated by nursing services

Abstract

Background: Although the capability approach aims to improve patients' well-being in their diverse lifestyles, the process of operational formulation of the capability approach has not been founded, in either theoretical of empirical studies.

Objectives: The chapter aimed to capture the differences in consistent levels of nursing care in hospital and homecare settings by care priority, through theoretical development and empirical data analysis based on the capability approach.

Methods: To develop a theoretical formulation, capability is considered by changing the distribution of goods and compensation by nurses between two functionings: '*being neat*' and '*having living arts*'. In our empirical analysis, the two functionings are captured by patients' experiences using questionnaire items. A capability set is captured by linear approximated lines on the functioning plane for each patient group in hospitalization and homecare settings.

Results: Responses of 505 patients were analyzed. For patients at home, a linear approximated line shows uniform substitutability between the two functionings in all areas, while for hospitalized patients, a kink is observed, suggesting a capability restriction in which many goods are distributed to '*being neat*' rather than '*having living arts*'.

Discussion: The finding that one of two functionings is socially preferred to the other in distribution of goods suggests that the capability set could be restricted to the

disadvantaged functioning. In these cases, a kink emerges in the shape of the capability set. This restriction on capability can be related to the social preference for '*being neat*' over '*having living arts*'.

Keywords: Capability Approach, Well-being, Resource Allocation, Patient Freedom of Choice

3.1. Introduction

Hospitalization is a period for patients to improve their impaired physical conditions toward well-being. Hospitalization includes medical procedures in the acute phase of a disease, taking rest for recovery, receiving knowledge and information on how to live with a disease, and planning for life following discharge. To support these purposes, nursing services are provided for patients for multiple aspects of their lives. Nursing services aim to improve patients' autonomy in their daily lives, which has been restricted by diseases or symptoms. Throughout hospitalization, nurses make assessments to determine what kind and how much nursing care is necessary for patients, which is reflected in their nursing plans for patients. Where nurses promote patients' independence in nursing services, the kind and volume of nursing care is decided by nurses through nursing assessments and plans. This means that the distribution of nursing time between patients and the distribution of nursing time in a patient between multiple kinds of care are controlled by nurses based on their assessment of the patient's conditions and care needs.

Nursing care consists of multiple kinds of care, which cover physical, mental, and societal aspects of patients' lives. Care needs are related to the severity of disease and

physical/mental condition, which change from day to day during hospitalization. Care related to medical procedures is emphasized in the acute phase of illness. As condition and symptoms improve, comfort during recuperation becomes important, in addition to respect for human dignity. Patients come to need support to acquire knowledge and skills and to arrange social services for daily living with their condition, in order for them to enjoy independent lives after discharge. When considering support for independence, the degree of required assistance is important. In the process of rehabilitation, provision of full assistance sometimes prevents patients from acquiring independence in their activities. In such situations, partial assistance or simply 'watching over and waiting' beside patients is important. 'Watchjing over and waiting' beside patients requires nurses to be always ready to provide assistance that just compensates for the exact limitation of the patient in performing the activity by themselves. This sometimes requires more time than providing full assistance. In deciding how to distribute their working time, nurses decide what type of care and the extent of assistance required based on their assessment of the degree of the patient's independence in daily activities and care needs.

It is often observed that nurses are busy, or feel busy. In wards where a percentage of patients are admitted and discharged daily, and where the health of patients sometimes suddenly worsens, requiring emergency treatment, it seems impossible for nurses to complete all that they are required to do for each patient in one working day. This means that nurses do not have enough time to compensate for deficiencies in the care needs of all of their inpatients. Under such circumstances, when nurses feel pressure to distribute their nursing time, nurses or care providers will differentiate between levels of care fulfillment in an individual patient, and between patients in a

ward. An example of the former differentiation occurs when care for the respect of human dignity is sometimes left out of medical procedures, especially during life-threatening periods of an individual's hospitalization. An example of the latter is observed between patients with more severe versus milder conditions. Activity support for patients in the recuperation phase is sometimes omitted in favor of medical procedures for more severe acute patients. Listening to a patient who requires emotional support is prioritized less than monitoring the blood pressure or glucose levels of those who need medication.

These instances are rationalized as priority of care. Nursing services consist, on one hand, of care procedures necessary to deal with collaborative medical problems and, on the other hand, of services for nursing diagnosis as judged autonomously from the nursing perspective (Carpenito-Moyet 2006). The former services are medical procedures, like monitoring, medication, wound care, and nutritional intake, and are prioritized over the latter services. One reason for this prioritization is that a lack of medical procedures causes clinical deterioration. Another reason is that inconsistency of medical procedures is apparent to all stakeholders. Thus, care that is judged necessary through nursing diagnosis is sometimes prioritized below that of medical problems, and is subsequently left to be dealt with within the daily circumstances of hospital wards, resulting in inconsistency.

At the same time, there are also differences in care priorities as judged by nursing diagnosis. The outcome of care that receives less priority is not apparent to stakeholders, and the care thus appears to be easily skipped without any complaints from patients, other staff, and stakeholders. For example, it is important to support patients who are learning about living arts in their own way to support their individual daily activities

after discharge, and for this purpose, nurses often provide partial care by 'watching over and waiting,' depending on the degree of independence of their activity. When this type of care is prioritized less, patients might practice an activity without being watched over by nurses. Although the patient might seem to perform the activity alone, they would lose the opportunity to learn to perform it in a more appropriate way, consistent with their condition. The need to have living arts is strongly related to achieving independent living, and patients should be entitled to such opportunities from the viewpoint of social justice (Commission on Social Justice 1993). Moreover, only a small fraction of patients are able to perform an activity without any support from nurses. With regard to the least able patients without physical and functional leeway, lack of support represents a loss of equally basic liberties and fair opportunities (Rawls 1993). On the other hand, care for *physical hygiene*, like bed–bathing or shampoo, does seem to be undertaken, since it is apparent to patients and other staff whether such care is provided, and patients would be expected to quickly develop such hygiene problems as itches or a sweaty odor if it is not provided.

The problem is that patients lose opportunities to be given nursing care to achieve independence, indicating that their individual diverse values for daily living are left behind as a care priority. Because this loss impacts the opportunity of the individual to achieve well-being, the capability approach, as proposed by Amartya Sen (Sen 1985), provides a theoretical basis for this study. Application of the capability approach to healthcare settings has been discussed in the literature with regard to conceptualization and operationalization (Al-Janabi et al. 2012; Coast et al. 2008; Ruger 2010). Moreover, its relationship to a person's personal characteristics and social arrangements (Sen 1992) are a great strength, considering that patient condition and degree of independence in

activities differ between individuals, in the same way as the nursing support required. This chapter focuses on differences in compensation for patients' needs due to prioritization of nursing care as judged by the nurses and care providers. The chapter aims to determine whether patients lose opportunities to achieve well-being by not being given consistent support for individual independence through theoretical and empirical evaluation based on the capability approach.

Through theoretical development and empirical data analysis based on the capability approach, this chapter aimed to formulate the restricted capability of patients, which can represent the lost opportunities of patients to be given consistent care to achieve well-being and independent living. In particular, this chapter aims to capture differences in consistent levels of care in healthcare settings by care priority.

3.2. Formulating patients' capability

Spaces of goods and goods distribution between functioning

To capture the differences in the consistency of level of care (i.e. the differences in compensation by nursing care for patients' needs) between more and less prioritized care in an individual, and between more prioritized care for an individual and less prioritized care for another individual, this chapter focuses on the distribution of goods between two kinds of care. In the study, nursing care for '*physical hygiene*' and 'watching over and waiting' for independence are dealt with as contrasting types of care in terms of two sphere of capability discussed in Chapter 1, the well-being achievement and freedom. '*Physical hygiene*' is related to well-being achievement, and one care type whose meaning and outcomes are obvious to patients and other staff, and is usually prioritized and almost always consistently provided. On the other hand, 'watching over

and waiting' care is related to freedom, and often tends to be inconsistent and left unfulfilled or postponed because it does not immediately cause a problem or patients could dispense with it, even though they may end up performing activities in an insufficient way and spend extra effort and time in doing so.

The outcome of nursing care corresponds to patients' functioning, which is useful for individuals in their achievement of well-being in daily living. The concept of a 'functioning' represents what a person manages to do or to be, and is thus an achievement of well-being (Sen 1987). Here, '*physical hygiene*' support by nurses improves patients' functioning of '*being neat*'; that is, having clean sanitary conditions and keeping themselves neat. 'Watching over and waiting' enhances patients' functioning of '*having living arts*'; that is, performing daily living activities in an individual way after discharge. Since capability is a bundle of functionings (Sen 1987), patients' capability here is formulated using '*being neat'* - as captured by nurses' '*physical hygiene*' support - and '*having living arts*' - as captured by nurses' 'watching over and waiting'. '*Physical hygiene*' care compensates for patients' deficiency in the functioning of '*being neat*', while 'watching over and waiting' compensates for that of '*having living arts*'. Achievement in the functionings of each patient is evaluated, and the achieved activities of each patient are shown on a coordinate plane with axes of '*being neat*' and '*having living arts*'. Capability formulation between two functionings can be developed by projecting the space of goods into the space of functionings (Gotoh 2014). Patients distributed their goods to '*being neat*' and '*having living arts*', and the goods distributed to each functioning are then transformed by patients' utilization ability into each functioning.

An individual patient $\boldsymbol{i}$ can freely choose the distribution of total goods $\boldsymbol{z^i}$ to two

functionings, namely z_N^i for '*being neat*' and z_L^i for '*having living arts*'. Here,

$$z^i = z_N{}^i + z_L{}^i$$

and the individual can choose a point $\boldsymbol{Z}^i$ ($z_N{}^i$, $z_L{}^i$) freely at any point in the space of goods, which is represented in the third quadrant in **Figure 3.1**. The space of goods is an area surrounded by a substitutable line and coordinate axes.

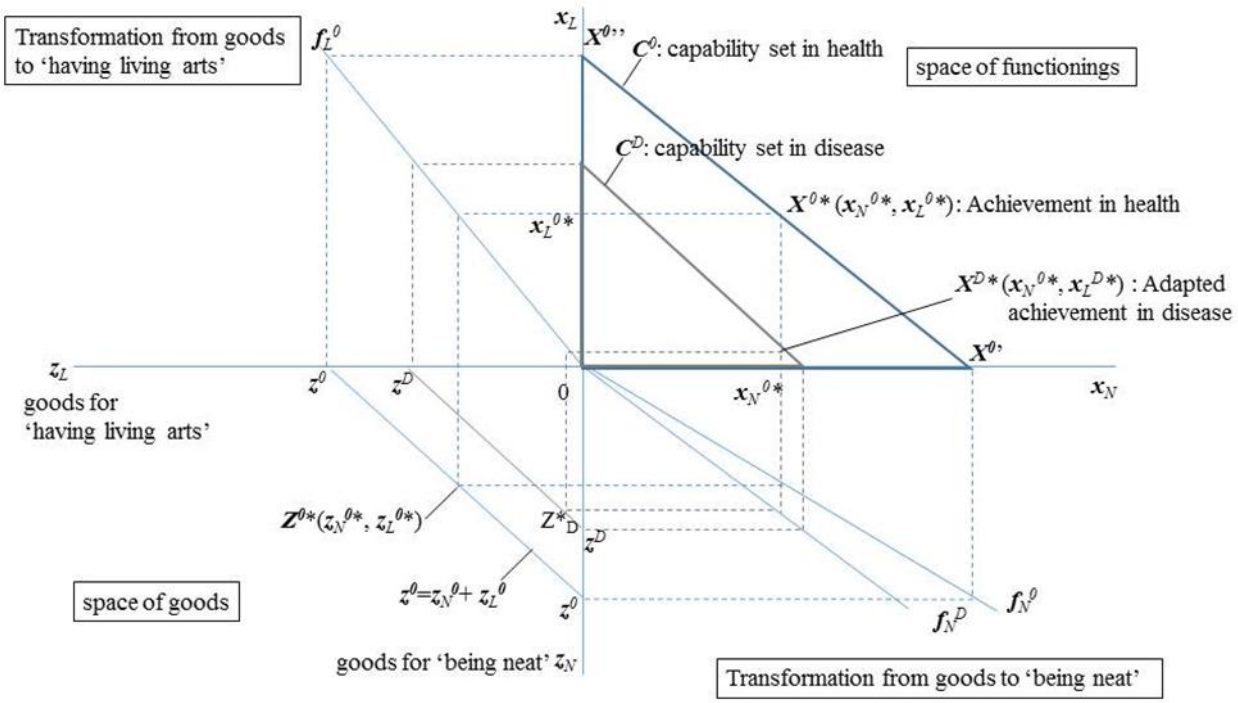


Figure 3.1. Capability set formulation of an individual in health (C^0) and in disease (C^D)

One goods in quadrant III is transformed by two utilisation ability of '*being neat*' (in quadrant IV) and '*having living arts*' (in quadrant II) to two functioning achievement (vector $\boldsymbol{X^0}$, $\boldsymbol{X^D}$) in quadrant I.

Capability sets according to goods and utilization ability

In the second and fourth quadrants, the individual $\boldsymbol{i}$'s utilization ability is represented. The amount of goods distributed to '*being neat*' is transformed by his or her utilization function $\boldsymbol{f}_N^i$ in the fourth quadrant to the functioning of '*being neat*', which is projected

into $x_N{}^i$ in the horizontal axis in the first quadrant. Similarly, the amount of goods distributed to '*having living arts*' is transformed by his or her utilization function $f_L{}^i$ in the second quadrant to the functioning of '*having living arts*', which is projected into $x_L{}^i$ in the vertical axis in the first quadrant. Here,

the achievement level of '*being neat*': $x_N{}^i = f_N{}^i (z_N{}^i)$,

the achievement level of '*having living arts*': $x_L{}^i = f_L{}^i (z_L{}^i)$,

and the achievement functionings of the individual can be represented as a vector $X^i (x_N{}^i, x_L{}^i)$, which is projected from a chosen point $Z^i (z_N{}^i, z_L{}^i)$ by his or her utilization ability $f_N{}^i$ and $f_L{}^i$.

Suppose the healthy individual *0* chose their goods distribution at the point Z^0* when they were healthy (in **Figure 3.1**). They achieved the two functionings at the vector X^0* ($x_N{}^0$*, $x_L{}^0$*). It is possible for them to distribute all of the goods to one of the functionings. If the individual chooses distribution to '*being neat*' only, (z^0, 0) in the third quadrant, then X^0' (x^0', 0) in the first quadrant would be achieved. Similarly, if the individual chooses distribution to '*having living arts'* only, (0, z^0) in the third quadrant, then X^0''(0, x^0'') in the first quadrant would be achieved. According to distribution in the space of goods Z^0, the individual would achieve the two functionings in the area surrounded by O, X^0', X^0'', which represents their capability set C^0.

Suppose the total goods the individual can spend for '*being neat'* and '*having living arts*' decreases owing to diseases or disabilities from z^0 to z^D (z^D<z^0). At this moment, their utilization ability for *being neat* $f_N{}^D$ would be lower than that when in health $f_N{}^0$ ($f_N{}^D < f_N{}^0$), since they lose self-care ability for *being neat,* like bathing or shampooing, because of tiredness from disease or difficulties from disability. At this moment, the chosen distribution of goods Z^D would be projected to achieved vector X^D, and the

capability set would be reduced to $\boldsymbol{C}^{\mathrm{D}}$ ($\boldsymbol{C}^{\mathrm{D}}<\boldsymbol{C}^{0}$) (**Figure 3.1**).

Adapted choice in diseases

Even when the individual has a disease or disability, they can choose an achieved vector from the capability set $\boldsymbol{C}^{\boldsymbol{D}}$ (**Figure 3.1**). Suppose '*being neat*' is preferred socially or by nurses over '*having living arts*'. Then, the achieved level of '*being neat*' would be chosen to maintain the individual as similarly as possible to that in health ($\boldsymbol{x}_{\boldsymbol{N}}{}^{\boldsymbol{0}}*$), and thus, the achieved vector $\boldsymbol{X}^{\boldsymbol{D}}*$ ($\boldsymbol{x}_{\boldsymbol{N}}{}^{\boldsymbol{0}}*$, $\boldsymbol{x}_{\boldsymbol{L}}{}^{\boldsymbol{D}}*$) would be chosen. At that moment, the achievement level of '*having living arts*' would be substantially lower than that when in health.

Extended capability set by compensation with nursing care

Since the decrease in total goods for '*being neat*' and '*having living arts*' was caused by disease, which an individual could not have been expected to know would occur and cannot be held responsible for, the decrease should be compensated for by nursing care provision. When the individual chose $\boldsymbol{Z}^{\boldsymbol{D}}*$ to achieve $\boldsymbol{X}^{\boldsymbol{D}}*$, the achievement level of '*having living art*' $\boldsymbol{X}_{\boldsymbol{L}}{}^{\boldsymbol{D}}*$ was substantially lower than that in health $\boldsymbol{X}_{\boldsymbol{L}}{}^{\boldsymbol{0}}*$, while that of '*being neat*' was the same as that in health. Therefore, it is rational for nurses to compensate for the decrease in goods by the disease, so that the individual can choose from the similar goods space, as $\boldsymbol{Z}^{\boldsymbol{0}}$, and $\boldsymbol{X}^{\boldsymbol{D}}*$ would shift to $\boldsymbol{X}^{\boldsymbol{C1}}$ ($\boldsymbol{x}_{\boldsymbol{N}}{}^{\boldsymbol{0}}*$, $\boldsymbol{x}_{\boldsymbol{L}}{}^{\boldsymbol{C1}}$) (**Figure 3.2**). Here, the achievement level of '*having living arts*' could be improved from $\boldsymbol{x}_{\boldsymbol{L}}{}^{\boldsymbol{D}}*$ to $\boldsymbol{x}_{\boldsymbol{L}}{}^{\boldsymbol{C1}}$ by compensation of goods with nursing care provision. Suppose the individual prefers to choose '*being neat'* instead of '*having living arts*'. Since '*being neat*' is now designated as socially preferred to '*having living arts*', it is still rational to compensate for the decrease in goods, and thus, the decrease would be compensated for completely

on the right of $\boldsymbol{Z^{C1}}$ in the goods space, and the individual can choose any point on the line between $\boldsymbol{Z^{C1}}$ and $\boldsymbol{Z}^{C}$' (z^0, 0). On the left side of $\boldsymbol{Z^{C1}}$ in the goods space, it is considered rational to be completely compensated for the decrease in goods until the achievement level of '*having living arts*' becomes similar to that when in health $\boldsymbol{x_L{}^0}$* at $\boldsymbol{Z^{C2}}$, since the achievement level of both functionings is lower than that in health; or, at the most, one of the functioning types is similar to that in health and the other is lower than that in health. When choosing $\boldsymbol{Z^{C2}}$, the achievement vector $\boldsymbol{X^{C2}}$ ($\boldsymbol{x_N{}^{C2}}$, $\boldsymbol{x_L{}^0}$*), and $\boldsymbol{Z}^{C2}$ are equal to $\boldsymbol{Z}^{0}$*. Therefore, in the intersection between $\boldsymbol{Z}^{C}$' (z^0, 0) and $\boldsymbol{Z^0}$* ($z_N{}^0$, $z_L{}^0$), it is considered rational for nurses to compensate completely for the decrease in goods.

On the left side of $\boldsymbol{Z^0}$*, the rationality judgment would change. At the intersection, compensation means improving 'having living arts' more than that in health, while the achievement level of '*being neat'* remains lower than that in health. Since '*being neat*' is designated as preferred to 'having living arts', it is not rational to compensate, not for '*being neat*', but for '*having living arts*'. However, this depends on patients moving their own goods from '*being neat*' to '*having living arts*', meaning that the individual decreases the distribution of their own goods $\boldsymbol{z^D}$ (before compensation) to '*being neat*' on the left side of $\boldsymbol{Z^0}$* until all of their goods are distributed for '*having living arts*' at $\boldsymbol{Z}^{C}$'' (0, $\boldsymbol{z^D}$). In the intersection between $\boldsymbol{Z^0}$* and $\boldsymbol{Z}^{C}$'', some of their own goods when suffering from disease remain distributed to '*being neat*', and thus it is rational for nurses to compensate for the decrease in goods according to the amount of distribution to '*being neat*'. Finally, at point $\boldsymbol{Z}^{C}$'', there is no distribution to '*being neat*', and thus there should be no compensation for goods. Therefore, the individual can choose on the line between $\boldsymbol{Z^0}$* and $\boldsymbol{Z^{C}}$'', and the achievement vector would move between $\boldsymbol{X^{C2}}$ and $\boldsymbol{X}^{C}$'' with rational compensation under the social preference for '*being neat*' over

'*having living arts*'.

Thus, in the event that '*being neat*' is socially preferred to '*having living arts*', the compensation by nurses for decreases in goods is reduced in '*having living arts*', the disadvantaged side, and a kink emerges in the capability set after compensation by nursing care, in which the achievement level of the disadvantaged side is restricted. In **Figure 3.2**, the space of goods of the individual after compensation by nursing care is represented by the area surrounded $\boldsymbol{O}$, $\boldsymbol{Z^{C,}}$, $\boldsymbol{Z^{0}*}$, and $\boldsymbol{Z^{C,,}}$, and this is projected to the capability set $\boldsymbol{C^{C}}$, which is represented by the area with a kink surrounded by $\boldsymbol{O}$, $\boldsymbol{X^{C,}}$, $\boldsymbol{X^{C2}}$, and $\boldsymbol{X^{C,,}}$.

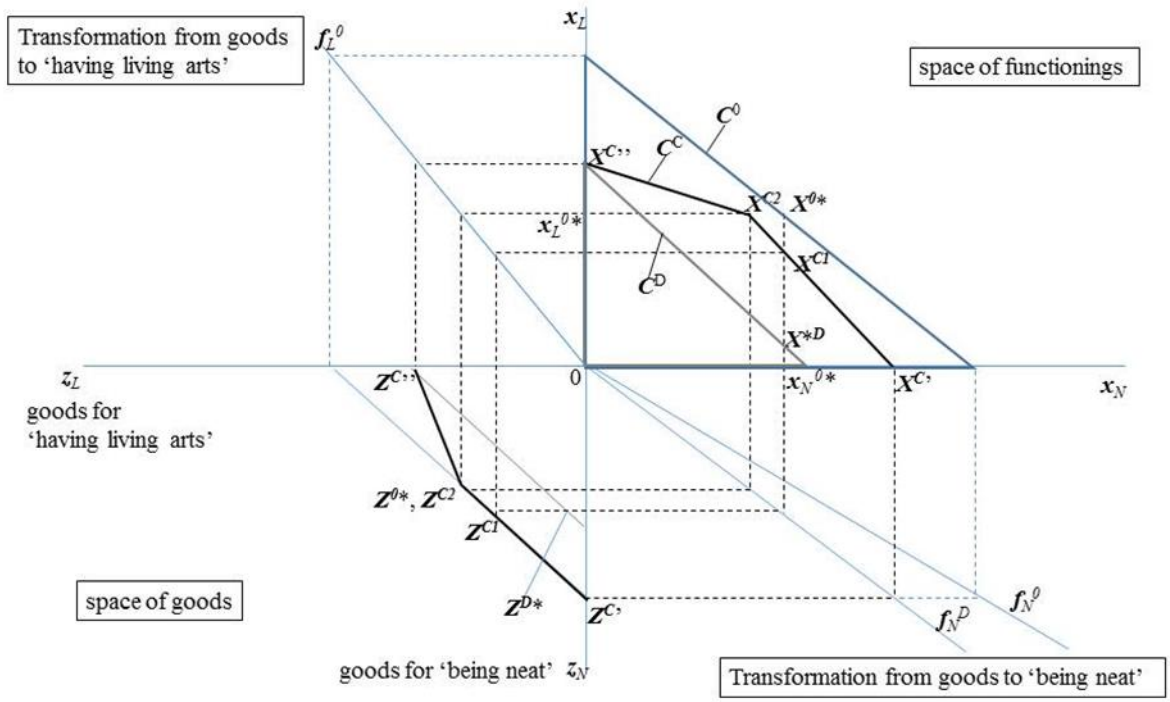


Figure 3.2 Extended capability set by compensation with nursing care
Extra distributed nursing care shifts budget line to $\boldsymbol{Z^{C,}}$ $\boldsymbol{Z^{0}*}$ $\boldsymbol{Z^{C,,}}$ in quadrant III, and the frontier of capability set is extended to $\boldsymbol{X^{C,}X^{C2}X^{C,,}}$ in quadrant I.

3.3.Methods

To capture a capability set which is affected by patients' situations, this study focused on nursing services concerning independence, especially care for '*being neat*' and '*having living arts*'. Since in general patients cannot evaluate the quality of nursing care, evaluation of nursing service quality has instead been done using patients' experiences with regard to concrete nursing practices (Jenkinson et al. 2002). The two items '*being neat*' and '*having living arts*' have been used (Kobayashi 2013; Kobayashi et al. 2011). The item '*being neat*' describes nurses' concern for keeping a patient's body and mouth in a sanitary condition, while the item '*having living arts*' describes nurses watching over the patient as the patient attends to his or her own needs. The respondents provided scores of five (always), four (often), three (sometimes), two (occasionally), and one (not) according to how frequently they had experienced a given situation during hospitalization. The category of "does not apply" was included for respondents who felt they had not experienced any situation corresponding to an item (Labarere et al. 2001).

The survey was carried out at 34 general hospitals and a visiting nursing station in Japan. For the hospital part of the survey, specialized wards, such as pediatrics, obstetrics, gynecology, and psychiatric wards, were excluded. The period of distribution of the questionnaire was adjusted for each ward according to the number of patients present. In principle, patients were invited to participate until 50 patients per ward had responded. Patients were eligible for participation if they were hospitalized in the ward for at least 2 nights (for the hospital part of the survey, data comparison was done by including only patients who were hospitalized for at least 1 month in the analysis, since respondents in homecare settings were not in the acute phase of their disease or condition), were scheduled for discharge within a few days, were at least 18 years old,

and were sufficiently lucid to be able to understand the questions and fill in the questionnaire by themselves or with the reading and writing assistance of a family member. Patient selection was not limited by diagnosis. For the visiting nursing station, patients were eligible for participation if they were at least 18 years old, had utilized visiting nursing services at the station for at least 1 month, were lucid, and were able to understand the questions and fill in the questionnaire by themselves or with the reading and writing assistance of a family member or third-party volunteer. Nurses determined whether a patient met the selection criteria. The nurses gave the patients oral and written information regarding the purpose of the study and informed them that their responses were voluntary and independent of the medical services provided to them. When patients consented to participate in the study, they received the questionnaire and an envelope that could be sealed. After responding to the questionnaire and sealing the envelope, respondents were given the options of mailing the envelope to the researchers free of charge, dropping it in a box in the ward (at the hospital), or handing it to a nurse who passed it on to the researchers (in homecare settings).

Ethical considerations

Since respondents were recruited by nurses in a clinical setting, patients may have felt forced to participate in the study. To prevent this, every patient was given a printed letter emphasizing that participation was voluntary, that patients could cease participation at any time, and that healthcare provision was independent from the study. To maintain the confidentiality of responses, completed questionnaires were kept anonymous and sealed in envelopes. The protocol of this survey was approved by the research ethics committees of The University of Tokyo and the participating hospitals.

3.4. Results

The inquiry was carried out at 239 general wards in 34 Japanese hospitals in 2005–2009 and a visiting nursing station in 2012–2013. Hospital care in Japan is organized under the universal public health care insurance system, and treatment and care procedures are standardized: patients pay the same standardized amount for the same standardized services regardless of whether they stay in a public or private hospital. In the surveys of hospitalized and homecare patients, 9,360 and 199 respondents, respectively, provided valid responses. For further comparison with homecare patients, respondents who stayed in a ward for at least 1 month (1,748) were included in the analysis. In addition, 192 at-home respondents provided valid responses for the two items. Because the following analysis deals with the need for care or a shortage in functioning concerning '*being neat*' and '*having living arts*', the following respondents were excluded from the analysis, as they responded that they had no need for the items (i.e. they chose 'does not apply' alternatives). In addition, respondents who provided high ratings (four or five) for both items were excluded, since they were thought to have been fully supported in both aspects, and had no shortage of either of the two functionings. Finally, the responses of 489 in-hospital and 16 at-home patients were included for further analysis. The process of exclusion and the attributes of the analysed respondents are shown in **Table 3.1**.

Table 3.2 shows scores for '*being neat*' and '*having living arts*' of patients in hospitals and at home. Patients who provided higher scores (five = always or four = often; coloured cells in **Table 3.2**) for both items accounted for 58% of the total in hospitals and 82% at home. The remaining respondents provided scores of three (= sometimes) or less; that is, they experienced inconsistent care in at least one of '*being*

neat' or '*having living arts*'. In such cases, it can be considered that the respondents could not achieve either of these two aspects fully, and that at least one of the functionings was left unfulfilled, which restricted their capability set, consisting of functioning types of '*being neat*' and '*having living arts*'. This study's further analysis attempts to capture whether the capability set of patients concerning '*being neat*' and '*having living arts*' was restricted.

Table 3.1 Attributes of respondents analysed

		Hospitalized patients (n=489)		Homecare patients (n=16)	
	Collected questionnaire	9,849		203	
	Without missing more than half of total items	9,360		199	
	Hospitalized at least 1 month	1,748			
	Without missing 'physical hygiene' nor 'watching over and waiting'	1,629		192	
	Without "do not apply"in the items	1,172		90	
	At least one of the two items was inconsistent	489		16	
Sex					
	male	322	66%	8	50%
	female	164	34%	8	50%
Age	mean (SD)	64.9	(13.1)	75.6	(16.5)
	18–59	146	30%	3	19%
	60–69	141	29%	0	0%
	70–79	143	29%	4	25%
	at least 80	57	12%	9	56%
Length of stay					
	> 1 month	362	74%		
	> 3 months	71	15%		
	> 6 months	36	7%		
	> 1 year	20	4%		

Nursing care for '*being neat*' and '*having living arts*' were provided for independence toward well-being. Inconsistent patient experiences of care rated at lower scores (three = sometimes or lower) on the questionnaire items by patients show that the

patient did not achieve the concerned functioning, that there was a need for the shortage in the type of functionings to be compensated for through the provision of nursing services, and that the shortage remained unfulfilled in the end. Given that there was shortage in at least one of the two functionings, it can be considered that an individual patient chose the balance of inconsistency in functioning between '*being neat*' and '*having living arts*'. This selection might have been affected by the patients' budget constraints concerning their situation or position.

Table 3.2 Score distribution of respondents

		'having living arts'				
	'being neat'	1	2	3	4	5
Hopspitalized patients (n=1,172)	1	23	8	6	6	7
	2	7	12	23	19	9
	3	12	21	59	66	26
	4	18	22	65	163	84
	5	37	13	30	114	322

		'having living arts'				
	'being neat'	1	2	3	4	5
Homecare patients (n=90)	1	0	0	0	0	1
	2	0	0	0	1	0
	3	0	0	5	4	0
	4	0	1	1	9	7
	5	1	1	1	8	50

Note: Colored cells was not included in the analysis since they were fully compensated

Figure 3.3 shows scatterplots and linear approximated lines of '*being neat*' and '*having living arts*' rated by patients in hospitals who were left uncompensated in at least one functioning (ie., one score of three or lower). An achieved point of each patient *i* in '*being neat*' ($\boldsymbol{x_N}^i$) and '*having living arts*' ($\boldsymbol{x_L}^i$) is shown on a coordinate plane.

Regression analysis was carried out to capture the distribution of achieved points in the $\boldsymbol{x_N x_L}$ plane for each group of patients in hospitals and at home. Considering structural change, a kink emerged in the capability set given in the theoretical development in section 3.4. The estimation expression is therefore written using a dummy variable $D_{Xa}{}^{i}$ as follows:

$$\boldsymbol{x_L}^{\boldsymbol{i}} = \beta_1 + \beta_2 \boldsymbol{x_N}^{\boldsymbol{i}} + \beta_3 \boldsymbol{D_{Xa}}^{\boldsymbol{i}} + \beta_4 \boldsymbol{D_{Xa}}^{\boldsymbol{i}} \boldsymbol{x_N}^{\boldsymbol{i}} + \varepsilon^{i}$$

$$= \begin{cases} (\beta_1 + \beta_3) + (\beta_2 + \beta_4) \boldsymbol{x_N}^{\boldsymbol{i}} + \varepsilon^{i}; & 1 \le \boldsymbol{x_N}^{\boldsymbol{i}} \le a \\ \beta_1 + \beta_2 \boldsymbol{x_N}^{\boldsymbol{i}} + \varepsilon^{i}; & a < \boldsymbol{x_N}^{\boldsymbol{i}} \le 5 \end{cases}$$

$$\boldsymbol{D_{Xa}}^{\boldsymbol{i}} = \begin{cases} 1\ ; & 1 \le \boldsymbol{x_N}^{\boldsymbol{i}} \le a \\ 0\ : & a < \boldsymbol{x_N}^{\boldsymbol{i}} \le 5 \end{cases}$$

After regression analysis, the estimated equation for the hospitalized patients is written as

$$\begin{cases} \boldsymbol{x_L} = -\ 0.768\ \boldsymbol{x_N} + 5.661\ (R^2 = 0.288) & (3 \le \boldsymbol{x_N} \le 5) \quad \ldots(1) \\ \boldsymbol{x_L} = 0.837\ \boldsymbol{x_N} + 1.482\ (R^2 = 0.091) & (\boldsymbol{x_N} = 1, 2) \quad \ldots(2) \end{cases}$$

Although the estimated linear approximated lines slopes up to the right on the '*having living arts*' side, a kink was observed in the capability set (**Figure 3**). For patients at home, no structural change was observed and '*having living arts*' is estimated as

$$\boldsymbol{x_L} = -\ 0.741\ \boldsymbol{x_N} + 5.645\ (R^2 = 0.665) \qquad (1 \le \boldsymbol{x_N} \le 5) \qquad \ldots(3)$$

Given that '*being neat*' and '*having living arts*' is one of the functioning types of an individual patient, the area surrounded by the approximated lines of each patient group shows a capability set that consists of these two functionings based on the capability approach. Although the number of respondents concerning the group of homecare patients is small, representing a study limitation, a difference in restriction in a capability set between patients in hospitals and those at home is observed in the interval

of lower '*being neat*' (x_N<3). Given that its approximated lines shifted, the solution of equations (1) and (2) is x_N=2.60. Let the points P_1, $P_{2.60}$, P_5 on the approximated line for hospitalized patients at x_N=1, 2.60, and 5, respectively (**Figure 3.3**). Next, let the points P'_1, $P'_{2.60}$, and P'_5 on the approximated line for homecare patients, shown in equation (3), at x_N=0, 2.60, and 5, respectively. The capability set among hospitalized and homecare patients are the areas $OP_1P_{2.60}P_5X_5$ and $OP'_1P'_5X_5$, respectively (**Figure 3.3**). Assuming no differences between $P_{2.60}$ (2.60, 3.66) and $P'_{2.60}$ (2.60, 3.72) or between P_5 (5, 1.82) and P'_5 (5, 1.94), the differences in the capability set between the hospitalized and homecare patients is derived from the area $P_1P'_1P_{2.60}$, which could be assumed to be the result of the restricted capability set of hospitalized patients caused in the interval at which patients distributed their goods more to '*having living arts*', and less to '*being neat*'.

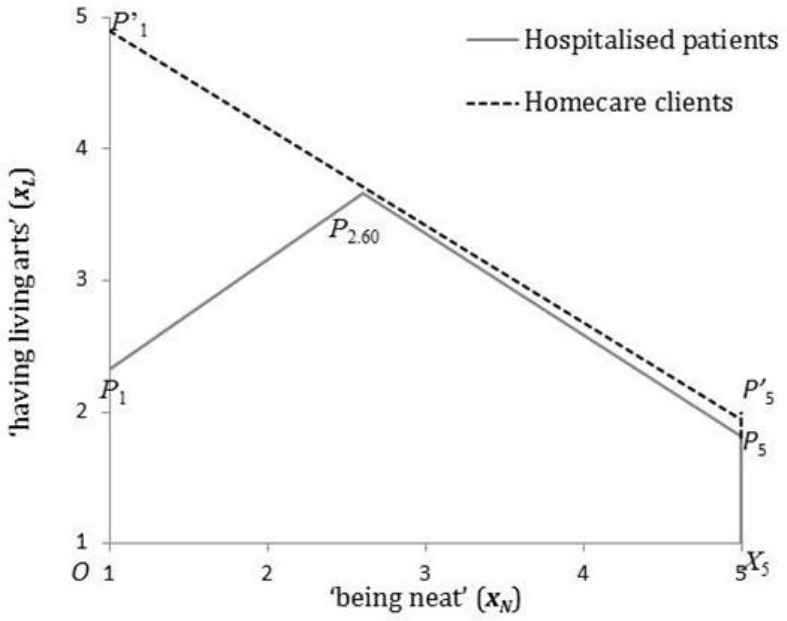


Figure 3.3. Estimation of a capability set between '*being neat*' and '*having living arts*' of hospitalized patients ($\mathbf{OP_1P_{2.60}P_5X_5}$) and homecare patients ($\mathbf{OP'_1P'_5X_5}$)
Note: The difference area ($\mathbf{P_1P'_1P_{2.60}}$) suggests a restricted capability set of hospitalized patients.

3.5. Discussion

The analysis in subsection 5.2 is a formulation of the capability set of patients treated in different situations (in hospitals or at home) to identify restrictions in the capability set. The results suggest that hospitalized patients have a restricted capability set compared to homecare patients. From the viewpoint of hospital care, care for '*being neat*' might be prioritized by nurses, since it is apparent to patients and other staff whether such care is provided, and since patients are expected to develop such problems as itches or a sweaty odor soon thereafter. In addition, care for '*having living arts*' could easily be postponed or skipped, since inconsistency in such care is not life-threatening and is not apparent to patients or other stakeholders. Under pressure to save healthcare costs, healthcare providers could be forced to decrease nursing care where possible. Therefore, '*being neat*' might be preferred to '*having living arts*' by nurses or under social circumstances. On the other hand, in home-care settings, *'having living arts*' is often emphasized as a means of achieving independence in daily living, and '*having living arts*' could be socially desirable to the same extent as '*being neat*'. In this situation, it is rational to compensate similarly for both '*being neat*' and '*having living arts*'; and accordingly, the capability set estimated for homecare patients would have no kink.

In the analysis the respondents who rated the higher score (score 4 or 5) for both 'being neat' and 'having living arts' were excluded. One reason is they seem to be facing no trade-off between the two functionings, and another reason is that there is a possibility that the difference in achievement level of those functionings cannot be observed by the questionnaire, especially higher intervals of the score. This is a limitation to use the questionnaire originally developed as a quality indicator of nursing service, although it is a merit of using the questionnaire that functioning achievement of patients is

measured.

Another limitation of the analysis is that the number of patients included in the sample is rather small. One reason for the small sample size is that 58% of hospitalized patients and 82% of homecare patients provided high scores (four or five) and thereby seemed to be fully compensated for both '*being neat*' and '*having living arts*'. A second possibility is that the better pattern observed among homecare patients should express a restricted capability set in a different way from the analysis in this subsection when referring to this fully compensated group.

3.6.Conclusion

After theoretical development, this study suggests that, in the event that one functioning type is socially preferred to another in the distribution of goods between two functionings, the capability set can be restricted on the side of the disadvantaged functioning, with a kink emerging in the shape of the capability set. In our empirical study, differences in capability sets were captured between patient groups in different situations (in hospital and at home). The shortage in and degree of compensation of functionings for independence in individual life were measured by patients' experiences using a questionnaire survey. In the plane of functionings, a capability set was drawn for each patient group, suggesting that the capability set of hospitalized patients was restricted when goods were more distributed to '*having living arts*', whereas homecare patients could choose either one of the two functioning types and be fully compensated, even if the other was inconsistent.

Chapter 4

Operational formulation of capability considering individual diverse position

Abstract

Background: The capability approach is a preeminent method for focusing on the wellbeing achievement and freedom of individuals who have diverse utilization ability. However, previous studies which applied capability studies to the healthcare field did not appropriately capture individual characteristics, since most of them measured achievement levels, not opportunity sets. The aim of the chapter is to formulate individual capability sets with consideration to their utilization ability using empirical data of hospitalized and home patients.

Methods: The study employed the one resource-two functionings model. In this chapter, the achievement level of two functionings were measured, namely '*having living arts*' (x_1) and '*accessing social services*' (home-care patients)/ '*keeping neat*' (hospitalized patients) (x_2), using a questionnaire for patients, with scores from 0 to 4.

In estimating a capability set, individuals with a similar utilization ability are assumed to be representative individuals, each of whom chooses different achievement points according to her own evaluation function from the identical capability set. The capability set of the representative individual is estimated by accumulating those achievement points of patients with the identical capability set. The frontier of their capability set is estimated with multi regression analysis. A questionnaire survey was carried out at 32 general acute hospitals and a visiting nursing station in Japan in 2012.

In the study, 586 hospitalized patients and 43 home patients were analysed.

Results: For both the hospitalized and home patients, the capability set was estimated with a statistically significant level. On regression analysis, the frontier of the capability set is statistically significantly different by degree of ADL (activity of daily living) in mobility for the hospitalized patients, and by usual activity for the home-care patients, with consideration to several attributes, like age and sex. In the x_1x_2 plane, the restricted group of home-care patients had a steeper frontier than the free group of home-care patients. The frontier of the restricted group of hospitalized patients included that of the free hospitalized group, who had no mobility problems in ADL. This suggests that larger resources were distributed to the restricted group both in hospitalized and home-care patients, and that hospitalized patients could not choose an achievement point based on their own evaluation function.

Conclusion: An individual capability is defined as a set of functioning vectors from which an individual can freely choose an optimal alternative, given her resources and her utilization ability. We can estimate the capability frontier by accumulating the functioning achievements of individuals, with regard to the similarity of utilization abilities. The capability approach is useful in evaluating what individuals can really do, given their own utilization abilities and resources. It is also useful in understanding what kinds of health care services are really effective for helping individuals to continue living well in society, keeping their own freedom

4.1. Introduction

The final aim of measurement and evaluation in health services is to conceptualize a social institution which leads to the development and distribution of healthcare and to

actualize a healthy life for individuals. Health service measurement and evaluation is inseparable from evaluation of the desirability of social institutions, which relates to many viewpoints concerning distributive justice and well-being. The type of normative principles of resource distribution applied to health service measurement and evaluation should be clarified. General equilibrium theory in economics has been applied from the viewpoint of the efficient or optimal distribution of resources, and used to explain the relationship between efficient outcomes and competitive markets (Arrow & Debreu, 1954). The exchange has focused on consumers, who are interested in maximizing their utility, and producers, who produce health services from resources with a given production function (Culyer 1971). Although interpersonal comparability has been noted (McGuire, 2001), cost-utility analysis and cost-benefit analysis have flourished. Such measurement methods in health services tend to aim at the utilitarian principle of distributive justice; that is, a net increase in total utility (Farley 1986).

It is true that the viewpoints of rationality and efficiency have an effect in health service measurement. However, considering interpersonal comparability, the measurement in the process of extending an incomplete ordering (like the Pareto optimality criterion, the Hicks-Kaldor criterion, the Lorenz gauge, etc.) to a complete one (Sen, 1979) would be subject to the influence of implicit judgements. This issue is background to the focus on the capability approach, which aims to extend its scope to incorporating justice and well-being while applying an economic framework based on rationality and efficiency. This chapter explores the possibility of formulating measurement based on the capability approach, with the aim of engendering a discussion on the distributive justice of health service resources with consideration to individuals' well-being and freedom. Specifically, the study focuses on nursing services

provided by professionals in accordance with patients' needs, and discusses how to formulate measurements and evaluations based on the capability approach with empirical data analysis. The problem revolves around how the unobserved frontier of a capability set can be estimated using information of observed functioning vectors.

The utilitarian approach, which is based on individual utility as an informational basis, has an implicit premise that individual utility reflects the interest of the person, and that utility maximization means self-interest maximization. In reality, however, individual utility does not always reflect the interest of the individual. For example, a rehabilitation programme which requires the endurance of heavy pain brings the patient a certain satisfaction despite long-term pain.

From such a motivation the capability approach was developed. If the same goods are used, and if the same level of utility is obtained, functionings (doings and beings) which an individual can realize with goods can differ in accordance with the utilization ability of the individual. To realize a certain functioning, some individuals require extra nursing service compared to others. It is also possible that some individuals have the opportunity to realize various combinations of diverse functionings, while others have only an excessively restricted opportunity.

A capability of an individual is defined as an opportunity set which can be chosen with a given goods set and a given set of utilization ability. Functionings include diverse acts and states of an individual, such as moving, communicating, feeling safe, being released from pain, etc. Extracting functionings should be done in accordance with context, and settling objective indicators to measure them can be done by conducting both intra- and interpersonal comparisons of achieved and changed individual levels.

Factors which influence individual choice of achievement vectors are the size and

shape of the capability set, which is defined by the resource and utilization ability of the individual – namely, the external restrictions the individual faces when making a choice; and her internal evaluation of achievement vectors which she can realize. When individuals have different evaluation functions, even if they have the similar resources and utilization ability and face the same restriction, they can choose different achievement points as optimal in accordance with their individual evaluation. Accumulating such achievement points realized by multiple individuals enables the estimation of a capability set which includes achievement points which are not realized.

To estimate an individual capability set empirically, this study focuses on hospitalized and home-care patients who are aiming toward independent daily living with nursing service provided. Patients appear to be one of valid objects to approach for estimating an individual capability, since they have stable utilization ability under medical treatment, and at the same time they face diseases and symptoms during living a daily life.

4.2. Definition of basic models and concepts

Basic models

An individual capability is defined using a relevant resource set and a relevant utilization ability set of the person. Here, the opportunity set of nursing service is regarded as a resource set. Nursing services are distributed to two types of functionings. The relative value between nursing services corresponding to the two functionings is assumed to be socially derived from the social general institution or the management policies of the service providers. For example, in a society where functioning for independence is preferred over that of social service utilization, service aimed at the

former functionings will be subsidized, and service providers can provide such type of service at a lower price.

An opportunity set of nursing service which is available for an individual is restricted by the resources of the individual (income, asset, public subsidies, etc.) and the relative value between the nursing service corresponding to the two functionings. An individual utilization ability is described as a function which converts a vector of nursing service to a functioning vector. Utilization ability here includes various factors which promote the utilization of nursing service in physical, mental, psychological characteristics. For simplification, the two types of utilization ability corresponding to each functioning are assumed to be separable and fixed.

Definition: a capability under one service, two skills and two functionings

Let functionings that the individual i realizes be x_{i1}, x_{i2}, the amount of nursing service corresponding to each functionings be z_{i1} ,z_{i2} (≥ 0), and individual skills corresponding to each functionings be a_i, b_i (≥ 0). Let the relative values of nursing service corresponding to each functionings be p_1,p_2 (≥ 0), and the total amount of resources that individual i has available to buy nursing service be y_{iz}(≥ 0). The capability of the individual i is then defined as follows:

$$z_{i1}=a_i x_{i1}$$

$$z_{i2}=b_i x_{i2}$$

$$p_1 z_{i1} + p_2 z_{i2} \leq y_{iz}.$$

That is, $p_1 a_i x_{i1} + p_2 b_i x_{i2} \leq y_{iz}$.

The equality part of the equation represents the frontier of the capability. Its slope

represents the marginal rate of substitution between the two functionings. The interpersonal difference in the slope shows the difference in objective individuality between individuals. The interpersonal differences in the x_1, x_2-intercepts represent an individual's advantage and disadvantage in realizability of the two functionings. **Figure 4.1** shows the difference in a capability by the difference in utilization ability under provision of the same amount of nursing service. **Figure 4.2** shows the changes in a capability under the compensative distribution of nursing service.

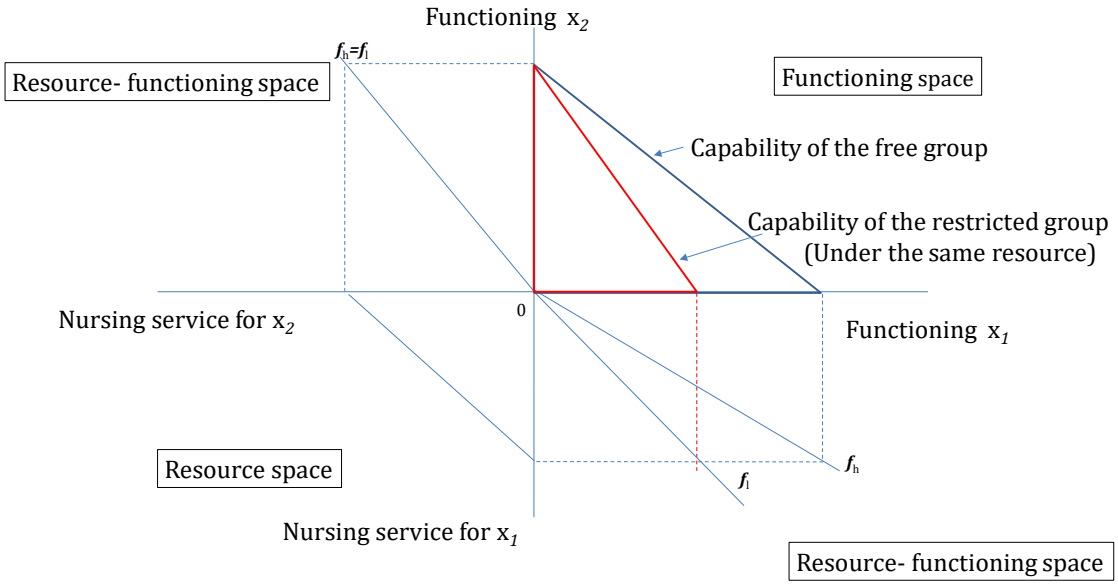


Figure 4.1 Difference in capability between the group due to differences in utilisation ability under the same resource

Note: Resource set, bounded by axes and budget constraint line in quadrant III, is transformed to the capability set, bounded by axes and the frontier line in quadrant I. Capability sets of two groups, free group and restricted group, are shown. Utilization ability transforming resource to functioning x_1 is a_F (free groiup) and a_R (restricted group) shown in quadrant IV. Utilization ability transforming resource to functioning x_2 is b_F (free groiup) and b_R (restricted group) shown in quadrant II.

In the figure the restricted group is inferior in utilization ability transforming to x_1 ($a_F > a_R$), although the other utilization ability is similar ($b_F = b_R$), then the transformed capability set of the restricted group (red coloured frontier) is dominated by that of the

free group (blue coloured frontier) in quadrant I.

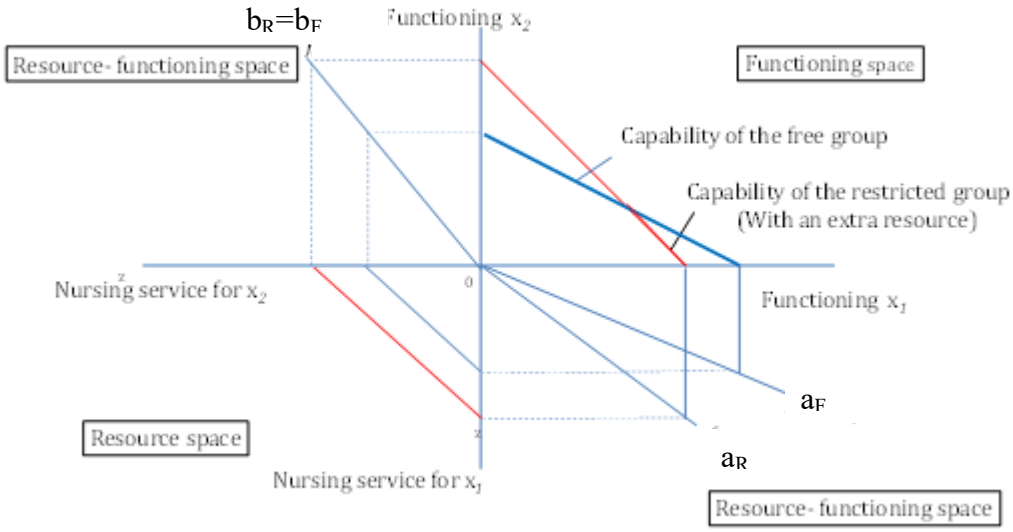


Figure 4.2 Fluctuating capability of the restricted group after resource transfer
Note: In the figure utilization abilities of the restricted and free group is similar as Figure 4.1 ($a_F > a_R$, $b_F = b_R$), while the resource set of the restricted group is extended compared to the free group due to resource compensation.
For the free group the resource set (blue coloured budget line in quadrant III) is transformed by utilization ability a_F in quadrant IV and b_F in quadrant II to capability set (bounded with blue coloured frontier in quadrant I). For the restricted group the resource set (red coloured set budget line in quadrant III) is transformed by utilization ability a_R in quadrant IV and b_R in quadrant II to capability set (bounded with red coloured frontier in quadrant I). Compared with Figure 4.1 the capability set of the restricted group is not dominated by that of the free group in quadrant I due to resource compensation.

Definition: functioning evaluation function

A 'functioning evaluation function' of an individual i, v_i, namely the subjective evaluation of recovery for the combination of multiple functionings (functioning vectors), is defined as follows:

$v_i = f_i(x_{i1}, x_{i2})$,

The partial differential coefficient of v_i is non-negative, and f_i satisfies strict quasi-concavity.

In addition, the optimization problem of subjective evaluation of recovery under restricted conditions of capability is represented as follows:

Max. $v_i = f_i(x_{i1}, x_{i2})$,

s.t. $p_1 a_i x_{i1} + p_2 b_i x_{i2} \leq y_{iz}$.

The first optimisation condition represents that the ratio of partial differential coefficients of each functioning (marginal rate of technical substitution) becomes equal to the marginal rate of transformation of utilization ability. Let functioning vectors and resource vectors which satisfy the condition x^*, $z_{i1}=a_i x^*_{i1}$, $z_{i2}=b_i x^*_{i2}$.

In empirical estimating of capability, such individual optimization behaviour is focused on.

4.3. Estimation method of individual capability

Constitution of measurement indicator: nursing service evaluation with patients' experiences

External restriction and problems caused by a restricted capability can be known only by individuals facing the problems. Therefore, autonomous evaluation process is required to consider these problems, which exert an influence on functioning achievement. Donabedian, who established quality assurance in healthcare, pointed out that patient satisfaction is the ultimate outcome in evaluating the quality of healthcare service (Donabedian 1966). On the other hand, it has been noted that patients' satisfaction can be biased to a higher evaluation (Fitzpatrick and Hopkins 1983).

Moreover, subjective value judgements of satisfaction can also confound measurements. In order to obtain an objective evaluation of the functioning achievement of patients, professional knowledge and experience with diseases and care are required, and it is difficult to capture states of functioning achievement by evaluations restricted to patients. In this regard, a method to obtain patients' own evaluation was developed by specifying patients' experiences in settings where nursing services are provided, which can be perceived by patients (Coulter and Cleary 2001, Radwin 2000, Kobayashi et al. 2011). The present study focuses on patients' experiences with nursing service which are related to functioning achievement and freedom in their daily life.

Nurses collect information about the physical and mental condition and societal situation of patients, and clarify problems and settle goals by referring to nursing theory, for example, basic needs (Henderson 2004) and functional health patterns (Gordon 1994). They provide nursing services aiming at achieving established goals. In addition, they provide feedback by evaluating the implementation process and modifying nursing plans and goals (called the 'nursing process') (Kenney 1995). Given that nurses provide nursing services based on the nursing process, the frequency of nursing service provision can be interpreted as approximately representing patients' achievement level of functionings corresponding to the nursing service provided. When the provision of nursing service is sufficient, patients' achievement level of functionings - corresponding to the nursing service provided - is also sufficient. On the other hand, when the provided nursing service is insufficient, then the achievement level of corresponding functionings can also be insufficient. From this viewpoint, the study applied patients' experiences with nursing service - that is, patients' autonomous evaluation of the degree of nursing service provision - as a measurement indicator of patients' functionings.

Data

Data analysis was carried out using patient responses to a questionnaire. The inquiry was carried out at 239 general wards in 34 Japanese hospitals in 2005–2009 for hospitalized patients, and a visiting nursing station in 2012–2013 for home-care patients. For comparison of hospitalized and homecare patients, respondents who stayed in a ward for at least two weeks were included in the analysis. To formulate capability between a functioning related to well-being achievement and another functioning related to freedom as well as chapter 3, items of '*having living arts*[4]' (*LA*), as a functioning related to freedom, and '*being neat*' (*neat*), one related to well-being achievement, were used for analysis of hospitalized patients, while the two items *LA*, as freedom, and '*accessing social services*[5]' (*SS*), as well-being achievement, were used for analysis of home-care patients[6]. The respondents provided scores of five (always), four (often), three (sometimes), two (occasionally), and one (not) according to how frequently they had experienced a given situation. The category of 'does not apply' was set for respondents who felt they had not experienced any situation corresponding to an item (Labarere et al. 2001). Respondents who chose 'does not apply' alternatives were excluded from the analysis. Respondents who rated the highest score (five) for both

[4,5] The " having living arts (ars vivendi)" here refer to the various independent activities that individuals devise under certain constraints. "Social services" is a general term for the support provided by others to these independent activities of individuals. Both are essential elements that support the independent and autonomous life of individuals.

[6] Functionings related to well-being achievement is different between hospitalized patients and home-care patients. During hospitalization in acute ward nursing care for fulfilling functioning is provided generally without patients' own decision since their self-care is restricted by diseases and treatments. On the other hand, home care patients have a certain self-care, and decides to use social service for fulfilling functioning. The difference is reflected to the functionings applied here for well-being achievement.

functionings were excluded as well as in Chapter 3. Finally, the responses of 1,037 hospitalized patients and 37 home-care patients were included for further analysis.

Based on the theoretical assumption described above that the frontier of a capability represents the substitutive relation between functionings, the pair of functionings for space settlement were chosen to meet the requirement that the two functionings are statically negatively correlated. The correlation efficient between *LA* and *neat* for hospitalized patients was -0.577 (p value < 0.001), and that between *LA* and *SS* for home-care patients was -0.693 ($p<0.01$); that is, statistically moderate negative correlations were observed. Functioning space was then constituted with *LA* and *neat* for the hospitalized patients, and with *LA* and *SS* for the home-care patients. The distribution of item scores of these functionings are represented in **Table 4.1**. Respondents who rated both functionings with the highest scores (five) were excluded from the analysis, since there is a possibility that their achievement levels of functionings were better than what the nurses judged as requiring nursing service, and it is thought to be difficult to compare achievement levels with the other respondents who have shortage in the functionings, and to discuss substitutability between the two functionings.

Table 4.1: Distribution of functioning achievement

		Hospitalized patients					Home-care patients				
		Keeping neat					*Accessing social service*				
		1	2	3	4	5	1	2	3	4	5
Having living arts	1	25	8	6	6	13					
	2	7	12	23	19	13	1	0	0	1	0
	3	12	22	59	66	54	0	2	1	2	0
	4	19	22	67	163	147	1	0	2	7	9
	5	55	21	47	151		4	2	2	3	

Note: Score of functionings is converted from the response to corresponding patients'

experiences with nursing service: always (5), often (4), sometimes (3), occasionally (2), and not (1). Two functionings, introduced to capability formulation below, are *having living arts* and *keeping neat* (hospitalized patients) or *having living art* and *accessing social services* (home-care patients). The respondents who rated the highest scores (5) for both functionings are excluded from the analysis since there is a possibility that their achievement levels of functionings were better than what the nurses judged as requiring nursing service, and it is thought to be difficult to compare achievement levels with the other respondents who have shortage in the functionings, and to discuss substitutability between the two functionings.

Definition of patient group facing similar restricted conditions

To specify factors which restricted hospitalized patients' achievements in functionings *LA* and *neat*, the degree of activity in daily living (ADL), especially ADL in mobility, was examined. Immobile patients face more difficulty when they participate in rehabilitation programmes to improve their living art. In addition, the need to self-care for *physical hygiene*, like taking a shower, places a heavier burden on immobile patients. Therefore the degree of ADL in mobility can be one of the factors which restrict hospitalized patients *LA* and *neat*. On the other hand, for home-care patients, functionings of *LA* and *SS* are a basis for actualizing a decent life. To capture items which restrict a decent life, the 'usual activity' item of the EuroQual questionnaire (EQ-5D-3L, Japanese version) was referred to. This item deals with problems in working, studying, family life, leisure activity, etc.

It is possible that patients who share a similar degree of mobility ADL or usual activity face the same restricting conditions. The study defines the 'restricted group' as hospitalized patients who have problems of ADL in mobility[7], and as home-care

[7] For hospitalized patients, a questionnaire item 'were you unable to do matter below for yourself during the hospitalization; walking' was asked, and respondents who chose 'need partial help'(36%) and 'need allover help'(25%) were classified into the restricted group. Those who chose 'no need of help' (39%) were classified into the free group.

patients who have little or severe problems in usual activity[9]. In contrast, the 'free group' was defined as hospitalized patients who have no problems of ADL in mobility, and as home-care patients who have no problems in usual activity.

Statistical estimation of a capability set

Functioning vector x^i: (x_1^i, x_2^i), constituted by *LA* function x_1 and neat (hospitalized patients) or SS (home-care patients) function x_2, is plotted on the x_1 x_2 plane. As mentioned above, given that an individual performs optimization behaviour under a given evaluation function, achievement point x^i which individual i chooses from her capability set is thought to be located on the frontier of the capability set. In addition, plural individuals who are in a similar position (with the same resources and the same utilization ability) are inferred to be located on the single frontier of the capability. Based on the assumption above, the study focused on those individuals whose functioning vector was not dominated in at least one functioning by other functioning vectors, excluding individuals who have a non-dominant functioning vector[10]. Then regression lines of their achievement points were derived by linear regression on the x_1x_2 plane as follows:

First, x_2 is regressed only with x_1 (Model 1). Next, dummy variable r (r = 1 for the restricted group; r= 0 for the free group) is added to the regression in order to examine

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[8] Unlike home-care patients in chronic phase, ADL condition of hospitalized patients are changing in acute phase, so the degree of ADL in motion is applied as a criterion of restriction.

[9] For home-care patients, 'usual activities' item of EQ-5D-3L was used, and respondents who chose 'I am unable to perform my usual activities'(12%) and 'I have some problems with performing my usual activities'(49%) were classified into the restricted group. Those who chose 'I have no problems with performing my usual activities' (39%) were classified into the free group.

[10] A non-dominant functioning vector here means a functioning vector which is dominated by another functioning vector in any functioning.

whether facing restriction influences the relation between the two functionings or not (Model 2). Assuming that the degree of restriction influences the achievement level of x_1, a cross term $x_1 * r$ is added (Model 3). Finally, to control for the effect of sex and age, dummy variables *male* (*male*=1 for men) and $age80_+$ ($age80_+$=1 for respondents who are at least 80 years old) are added in the regression analysis (Model 4).

$$\text{Model 1}: x_2^i = \beta_0 + \beta_1 x_1^i$$

$$\text{Model 2}: x_2^i = \beta_0 + \beta_1 x_1^i + \beta_2 r$$

$$\text{Model 3}: x_2^i = \beta_0 + \beta_1 x_1^i + \beta_2 r + \beta_3 x_1^i * r$$

$$\text{Model 4}: x_2^i = \beta_0 + \beta_1 x_1^i + \beta_2 r + \beta_3 x_1^i * r + \beta_4 male + \beta_5 age80_+$$

4.4. Results

For the hospitalized patients, coefficient β_2 of Model 2 was statistically significant, which means the x_1, x_2-intercepts of the regression line for the restricted group are greater than for the free group. In Model 3, statistical significance for the coefficients β_2 and β_3 is not observed, which means that there are no statistically significant differences in intercepts and slope of the regression lines between the restricted group and the free group. This is not changed if dummy variables of sex and age are added. There is little improvement in R squared between Model 2 and 3 or 4. Therefore, Model 2 was adopted for hospitalized patients. On the other hand, for home-care patients, regression coefficients β_1 and β_3 in Model 3 indicate that a statistically significant difference in the slope of the regression line is observed between the restricted group and the free group. When adding the controlling variables of sex and age, the result and the fit of the model do not change. Accordingly, Model 3 was adopted for the home-care patients. The regression lines of the restricted and free groups are shown in **Figure 4.3**. Based on the

assumption above that plural individuals who are in the same position choose functioning vectors which maximize their own purpose, the parts surrounded by the regressed line and the two axes are interpreted as approximating the capability set that individuals in a similar position commonly have (**Figure 4.3**). That is,

$x_2^i + Bx_1^i \leq Y$

Here, $B = -(\beta_1 + \beta_3 * r)$, $Y = \beta_0 + \beta_2 * r$

and $x_1 \geq 0$, $x_2 \geq 0$.

From the results of the regression analysis above (shown in **Table 4.2**), the capability sets of each group are estimated as follows:

The free group of hospitalized patients: $0.413x_1 + x_2 \leq 4.361$ and $x_1 \geq 0$, $x_2 \geq 0$

The restricted group of hospitalized patients: $0.413x_1 + x_2 \leq 4.607$, and $x_1 \geq 0$, $x_2 \geq 0$

The free group of home-care patients: $x_1 + x_2 \leq 8.25$ and $x_1 \geq 0$, $x_2 \geq 0$

The restricted group of home-care patients: $3x_1 + x_2 \leq 16.6$, and $x_1 \geq 0$, $x_2 \geq 0$

Table 4.2: Estimation of the frontier of capability

		Hospitalized patients (n=586)				Home-care patients (n=43)			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Objective variables	*neat*	*neat*	*neat*	*neat*	*SS*	*SS*	*SS*	*SS*
β_0	*Constant*	4.443** (0.074)	4.361** (0.078)	4.389** (0.090)	4.359** (0.103)	11.584** (1.427)	11.857** (1.438)	8.250** (1.596)	8.039** (1.615)
β_1	*LA*	-0.409** (0.023)	-0.413** (0.024)	-0.423** (0.029)	-0.418** (0.029)	-1.794** (0.325)	-1.820** (0.323)	-1.000** (0.361)	-0.894* (0.379)
β_2	*r*		0.246** (0.069)	0.159 (0.077)	0.167 (0.160)		-0.371 (0.316)	8.350** (2.471)	8.256** (2.471)
β_3	*LA*r*			0.031 (0.051)	0.029 (0.051)			-2.000** (0.563)	-1.977** (0.563)
β_4	*male*				0.042 (0.070)				0.007 (0.277)
β_5	*age 80+*				-0.061 (0.133)				-0.435 (0.283)
	R^2	0.332	0.345	0.344	0.344	0.465	0.471	0.612	0.617

Coefficients (standard errors) by multi-regression analysis

Note: Coefficients (standard errors) of multiple regression analysis. The objective variable are *keeping neat* (*neat*) for hospitalized patients or *accessing social services*

(*SS*) for home-care patients. Dependent variables are *having living arts* (*LA*), dummy variables of restricted group (*r*), sex (*male*), and age (at least 80 years old: *age80+*).
* p<0.05, ** p<0.001

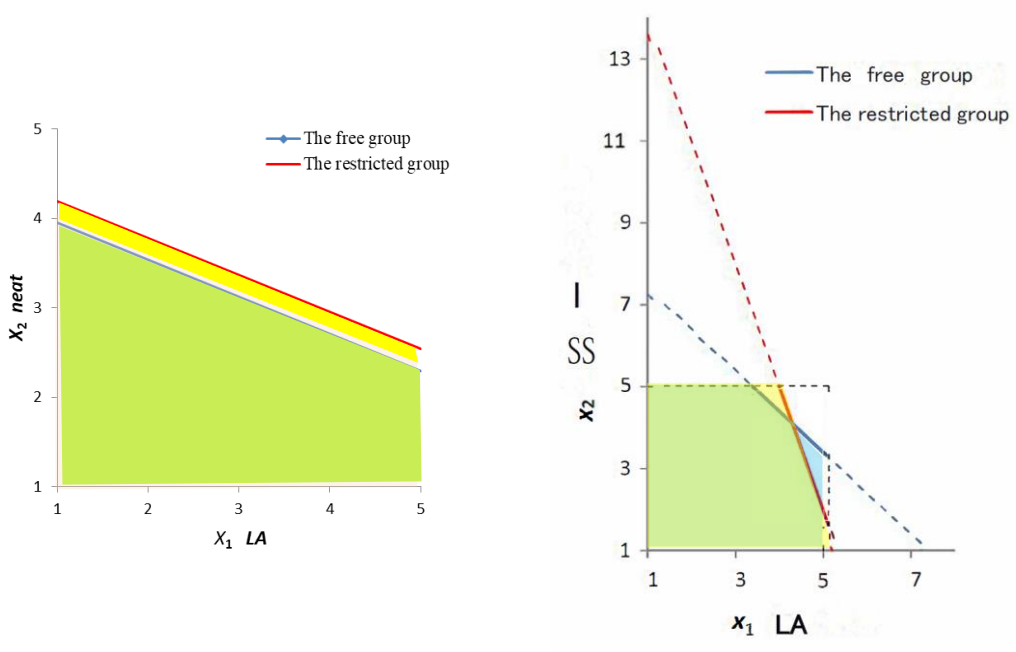

Figure 4.3: Estimation of the frontier of the capability of the restricted/free group
Note: Capability set is drawn between two functioning; *having living arts* (*LA*) and *keeping neat* (*neat*) for hospitalized patients, or *LA* and *accessing social services* (*SS*). Estimated lines of capability frontier of the free group (blue coloured) and the restricted group (red coloured) of hospitalized patients (left) and home-care patients (right). Since score range of the functioning items is 1 to 5, the observable area is inside the square ranged 5 at the highest, so that the estimated capability set is represented as the intersection of the observable square and insight the estimated frontier.
For the hospitalized patients (left) the capability set of the free group (green coloured area with blue coloured frontier line) is dominated by the restricted group (yellow and green coloured area with red coloured frontier line). For the home-care patients (right) the capability set of the free group (blue and green coloured area with blue coloured frontier line) and that of the restricted group (yellow and green coloured area with red coloured frontier line) are not dominated by each other.

From the results above, the following can be considered. First, comparing the shape (slope of the frontier) of the capability of each home-care group, x_1-intercept (*LA*) is

greater for the free group, while x_2-intercept (*SS*) is greater for the restricted group. The difference in the shape of capability can be interpreted to mean that the restricted group has an advantage in utilizing social services. On the other hand, there is no difference in the slope of the frontier for hospitalized patients between the restricted and free groups. Compared with the restricted home-care patients, the restricted hospitalized patients have an advantage in the neat side (use of hygiene care service), with a greater x_2-intercept. There is a possibility that the restricted hospitalized group cannot utilize their advantage of using nursing care, which is reflected in the flat, *LA*-biased shape of the capability.

Second, the capability of the home-care restricted and free groups is not included in that of the other group. Supposing that the same amount of nursing service is distributed, then the capability of the restricted group with lower utilization ability should be included in that of the free group (**Figure 1**). Concerning hospitalized patients, the capability of the restricted group fully includes that of the free group. Both cases suggest that a greater amount of nursing service is distributed to the restricted group than to the free group. This can be interpreted to mean that resource distribution to individuals who face restriction is performed in accordance with need.

4.5. Discussion

As mentioned in the Introduction, the number of previous studies on the capability approach applied to health service evaluation is not small. They have the strength of focusing on diverse purposes and the value of an individual life. However, they are apt to fix the indicator lists transcendentally, and were focused on the achievement vectors of functionings, not capturing a capability itself. For example, the ICECAP capability

indicator (Al-Janabi et al. 2012, Coast et al. 2008a), an established capability measurement in healthcare, please confirm that I have retained your meaning. Although each dimension was constituted using a highly universal concept based on focus group methodology, it is problematic to exclude the other items transcendentally and to focus only on achievement points[11].

On the other hand, the present study focuses on the structure between functionings; that is, the structure that individuals use to enhance their utilization ability to realize diverse functionings (main functionings) through achieving basic functionings (sub functionings) (Gotoh 2014). Under this assumption, the aim of public policy is to satisfy the needs on basic functionings of individuals. Since the functionings '*having living art*', '*keeping neat*' and '*accessing social services*' are basic functionings patients commonly require, objective autonomous measurement of patients' experiences was assumed to be possible.

The study also examined the estimation of an opportunity set of basic functionings which can be realized when individuals are willing to achieve, based on the basic functionings individuals have already realized. It captured characteristics of the capability of the different groups in utilization ability, and clarified societal factors which influence current policy in nursing service, and individuals' evaluation function.

In his article 'Equality of what' (Sen, 1979b), Sen presented the concept of capability for the first time. The background was that there exist individuals whom society should consider through public policy, even if their income or wealth is higher, and even if their disutility or dissatisfaction is lower. In order to pursue the social transfer of goods and services to such individuals, it is required that their individual

[11] This problem attracted attention as Sen's re-criticism (Sen 2004) against Martha Nussbaum's criticism (Nussbaum 2004).

states (capability) be recorded as correctly as possible, entering between individual quality differences hidden behind the aggregated amount. From this point of view, capability shares interests with many value indicators in health.

However, the capability approach has three features which different to the utilitarian approach, as follows. First, individual capability captures freedom. It measures how much substantive freedom an individual has, through which they which realize substitutive functionings (well-being freedom). Whether individual evaluation functions are autonomous refers to the individual's interest (agency freedom), etc. The need for capability of an individual represents evidence for public policy concerning health care.

Second, the capability approach does not fix indicators (lists) transcendentally. Well-being indicators, which exert an influence on life years, are extracted according to context, compared with QALY, which measures life years. As shown in this study, it is possible to make sub functionings common between individuals, and to individualize the lists and weights of main functionings.

Third, the capability approach captures an individual's opportunity set, not an individual's utilitarian evaluation functionings. An individual capability is defined as an opportunity set of objective functioning vectors which is determined, not with subjective well-being evaluations by the person, but with the available resources and realizable utilization ability of the person. In the study, patients' own subjective experiences captured in nursing services were dealt with as an approximate indicator[12]. Of note, an individual capability measured by public policy should be limited to those areas in which social intervention is allowed.

[12] The concept of subjective experiences is located between subjectivity and objectivity, and mediates them (Gotoh 2017, Section 4). For example, it focuses not on the discomfort of a pain, but an experience of pain and subjective experiences of pain (Kumazawa, Hatano 1999, Kumazawa 2006).

4.6. Conclusion

The chapter explored the estimation of individual capability; that is, a set of functioning vectors which becomes realizable by the person's choices under a given resource set and utilization ability set, based on observed function vectors actually achieved by plural individuals. The points of estimation are: (1) the assumption that a difference in achievement points of individuals under the same restrictive condition occurrs as result of the difference in evaluation functions of the individuals; and (2) the assumption that, given that individuals optimize their behavior in accordance with their own evaluation function, then the optimal points they choose constitute the frontier of the capability set.

Chapter 5

Comparison of patients' capability set by the difference in nurse distribution

Abstract

Background: The capability approach has been applied to health care, with the aim of improving patients' well-being in their diverse lifestyles, in which their sense of value is reflected. However, the process of operational formulation of the capability approach has received little investigation in empirical studies.

Purpose: As a step in formulating individual capability, this chapter aimed to capture how patients' capability set for individual well-being is restricted thorough empirical comparison of differences in the number of nurses per patient.

Methods: To capture patients' capability set for well-being, this chapter focused on patients' functionings of "*being neat*" and "*having living arts*". The two functionings were captured by nursing care of "*physical hygiene*" and "*watching over and waiting*", which were evaluated using patients' experiences with corresponding nursing care as revealed in responses to questionnaire items. A survey was carried out in 34 Japanese hospitals in the years 2005-2009. The two items were considered as patients' functionings for independence, and the area surrounding the estimated linear approximated lines on the functionings plane were considered as the capability set. The effect of an increase in the number of nurses allocated was also examined. The criterion for the number of nurses was whether at least one nurse per seven patients was allocated over a full 24 hours per day based on the criteria of Japanese healthcare insurance.

Results: Responses of 4802 patients were analysed. Of them, 41% were female, mean age was 60.9 (SD: 16.4) years, mode and median of length of stay were eight and 15 days, and 53% were given surgery. Estimated linear approximated line changed depending on score of "*being neat*". In the upper interval of "*being neat*", right-down linear approximated lines were estimated, which expected substitutability between "*physical hygiene*" and "*having living arts*". On the other hand, in the interval of lower "*being neat*", right-up linear approximated lines were estimated, which expected complementarity between the two care services. The capability set was restricted in the higher "*having living arts*". The difference in the number of nurses allocated was large in the lower interval of "*being neat*".

Discussion: Patients' "*having living arts*" was more easily restricted and deprecated than "*being neat*". It was suggested that nursing care for "*physical hygiene*" was prioritised and that patients had restricted opportunity to access nursing care for "*having living arts*" if facing a nursing care trade-off.

5.1.Introduction

Distribution of nursing time

Hospitalisation is a period for patients to maintain their impaired physical condition better toward well-being. It includes medical procedures conducted in the acute phase, rest for recovery, learning about diseases and information on living with diseases, and life planning following discharge. To support these purposes, nursing services are provided for patients in multiple aspects of their lives. Nursing services aim to improve patients' independence in their daily lives, which has been restricted by diseases or symptoms. Throughout hospitalisation, nursing assessment is made to judge what kind

and how much nursing care is necessary for patients, which is reflected in the nursing plan devised for them. Where nurses promote autonomy in the provision of nursing services, the kind and volume of nursing care is decided by nurses through nursing assessment and planning. This means that the distribution of nursing time between patients and the distribution of nursing time in a patient between multiple kinds of care are controlled by nurses based on their assessment of patients' condition and necessity of care.

Nursing care consists of multiple kinds of care which cover the physical, mental and societal aspects of a patient's life. The necessity of care relates with the severity of disease and with the patient's physical/mental condition, which changes with every day during hospitalisation. Care related to medical procedures is emphasised in the acute phase. As condition and symptoms become better, comfort for recuperation becomes more important, as does respecting human dignity. Patients come to need support for acquiring knowledge and skills and for arranging social services for daily life under their condition, so that they may expect to enjoy an independent life after discharge. When considering support for independence, the degree of assistance required is important. In the process of rehabilitation, full assistance provision sometimes prevents patients from acquiring independent activity. In such a situation, partial assistance or just "*watching over and waiting*" beside the patient is important. "*Watching over and waiting*" beside the patient requires the nurse to be always ready to provide just that amount of assistance which makes up the exact deficit in the patient's ability; or in other words only what they cannot actually do by themselves, and no more. Doing so will sometimes require more time than providing full assistance. Nurses decide in which care and to what extent of assistance they should distribute their working time based on

their assessment of the patient's degree of independent activity and their necessity for care.

It is so often observed that nurses are, or feel, busy. Generally it seems impossible for nurses to complete all that they consider necessary for every patient in one working day. This means that nurses face trade-offs in their provision of care in the form of nursing time distribution. One trade-off is seen between care provided an individual patient. Care in the respect of human dignity is sometimes forgone in medical procedures, since it is less life-threatening at a particular period in an individual. Another type of trade-off is seen between care for patients with more severe and that for patients with milder conditions. Activity support for patients in the recuperation phase sometimes takes second place behind medical procedures for a patients with a more severe and acute condition. In brief, trade-offs exist in both the intra- and inter-personal distribution of nursing time.

Prioritised care by trade-offs in nursing time distribution

When nurses are or feel too busy to complete all of the care they regard as necessary for patients, some care will be prioritised and the remainder will be postponed or left inconsistent. Nursing services consist of necessary collaborative care procedures for medical problems and services for nursing diagnoses judged autonomously from a nursing perspective (Carpenito-Moyet 2006). The former services are medical procedures like monitoring, medication, wound care, nutrition intake, etc., and these are prioritised over the latter. One reason is that the lack of these medical procedures causes clinical deterioration. Another reason is that inconsistency in medical procedures is very apparent for all stakeholders. For these reasons, care which is required by a nursing

diagnosis will sometimes be prioritised lower than care of medical problems, and then be delivered inconsistently after a trade-off in nursing time distribution.

At the same time, there are also differences in priorities among the care judged necessary by a nursing diagnosis. The outcome of such less prioritised care is not apparent to stakeholders, and as such it seems to be easily skipped without any claim from patients, other staff, or stakeholders. For example, it is important to support patients who are learning to conduct activities of daily living in their own way after discharge. For this purpose, nurses often provide "*watching over and waiting*" care with partial assistance, depending on the degree of independence of the patient's activities. When this type of care is less prioritised, patients might practice an activity without being watched over by nurses. Although they might seem to benefit from doing the activity themselves, they would lose the opportunity to learn to do the activity in a more appropriate way, consistent with their condition. The need to acquire daily living activity is strongly related to individual living, and opportunities to do so should be considered an entitlement from the viewpoint of social justice (Commission in Social Justice, 1993). Moreover, only a fraction of patients are able to do an activity without any support from nurses. Patients without physical or functional leeway experience an loss of basic liberties and fair opportunities (Rawls, 1993). On the other hand, care for *physical hygiene* like bed-bathing or shampooing seems to be certainly provided, since it is apparent to patients and other staff whether such care is done or not, and since patients who do not receive are expected to soon experience problems such as itch and body odour.

The problem is that the trade-off in nursing time distribution causes patients to lose the opportunity to be provided with the individualised nursing care they require to

achieve independence in daily living. Since this impacts the individual's opportunity to achieve well-being, the capability approach proposed by Amartya Sen (Sen 1985) would provide a theoretical basis for analysis. Application of the capability approach to healthcare settings has been discussed in terms of both its conceptualisation and implementation (Al-Janabi et al. 2012; Coast et al. 2008; Ruger 2011). Moreover, the relation of this approach to the person's personal characteristics and social arrangements (Sen 1992) is a particular strength, considering that patient condition and degree of independence in activity differ between individuals, and so the required nursing support also varies between patients.

This chapter focuses on differences in the prioritization of nursing care for patients via trade-offs in nursing time distribution in an inpatient setting, and aims to determine whether patients lose the opportunity to achieve well-being if they are not provided sufficient support to ensure individual independence, and if the restricted opportunity influences patients' capability, in an empirical analysis. The aim of this chapter is to determine the restricted capability set that patients need to be provided with to ensure sufficient support for individual independence via trade-offs in nursing time distribution thorough empirical data analysis.

5.2.Methods

To determine the restricted opportunity patients require to ensure they are provided with sufficient support to achieve well-being in individual daily living, this chapter focused on priority differences in the distribution of nursing time for patient care. Care services whose meaning and outcome are obvious to patients and other staff are usually prioritised and almost always fully completed. In contrast, other care services are often

left uncompleted or postponed because their lack does not immediately cause a problem, or they could possibly dispense with those care services although they may do in an insufficient way. In the study, care services for "*physical hygiene*" and "*watching over and waiting*" for independence are considered and analysed as contrasting types of care service.

Judgement of the necessity and outcome of nursing care which corresponds with patients' functioning is useful in their achievement of well-being in individual daily life. The concept of a functioning represents what a person manages to do or to be, and is thus an achievement of well-being (Sen, 1987). Here "*physical hygiene*" support by nurses improves patients' functioning of "*being neat*"; that is, being in a clean and sanitary condition and keeping themselves neat. "*Watching over and waiting*" enhances patients' functioning of "*having living arts*"; that is, conducting daily living activities in an individual way after discharge. Since capability is a bundle of functionings (Sen, 1987), here patients' capability was formulated using "*being neat*," as reflected by nurses' "*physical hygiene*" support, and "*having living arts*" as reflected by nurses' "*watching over and waiting*". Achievement in the functionings of each patient was evaluated, and an achieved point of each patient was shown on a coordinate plane with axes of "*being neat*" and "*having living arts*".

Achievement in the functionings of each patient was evaluated in terms of the fulfilment of nursing care for "*physical hygiene*" and "*watching over and waiting*". Since it is general considered that patients cannot evaluate the quality of nursing care, patients' experience of concrete nursing practices has been used as a proxy for the evaluation of nursing service quality (Jenkinson et al. 2002). The two items "*physical hygiene*" and "*watching over and waiting*" in Japanese were used (Kobayashi et al.

2011). The item for "*physical hygiene*" was expressed in terms 'that the nurses were concerned about keeping my body and mouth clean', and for "watching over and waiting" that the nurses 'watched over me while I did something for myself'. The respondents' responses were scored as five (always), four (often), three (sometimes), two (occasionally) and one (not) according to how frequently they had experienced the service with visiting nursing services. The category of "does not apply" was included for participants who felt they had not experienced a situation corresponding to an item (Labarere et al. 2001).

The survey was conducted among inpatients staying in Japanese hospitals. In the survey, specialized wards, such as paediatrics, obstetrics, gynaecology, and psychiatric wards, were not included. The period of questionnaire distribution was adjusted for each ward according to the number of patients present. In principle, patients in a ward were invited to participate until 50 patients in the ward had responded. Invited participants were patients hospitalized in the ward for at least two nights, scheduled for discharge within a few days, at least 18 years old, lucid, and able to understand the questions and fill in a questionnaire by themselves or with assistance in reading and writing by a family member. Patient selection was not limited by diagnosis. A ward nurse determined whether or not a patient met the selection criteria. The nurse gave participants oral and written information regarding the purpose of the study and informed them that their responses were voluntary and independent of the medical services provided to them. When patients consented to participate in the study, they received a questionnaire and an envelope that could be sealed. After responding to the questionnaire and sealing the envelope, respondents were allowed to either mail the envelope free of charge or drop it in a box at the ward.

Ethical consideration

Since respondents were recruited by the ward nurses, patients may have felt forced to participate in the study. To prevent this, every patient was given a printed letter emphasizing that participation was voluntary, that patients could cease participation at any time, and that health care provision was independent from the study. To maintain the confidentiality of responses, completed questionnaires were kept anonymous and sealed in an envelope. The protocol of this study was approved by the research ethics committees of the University of Tokyo and the participating hospitals.

5.3 Results

The inquiry was carried out at 239 general wards in 34 Japanese hospitals in the years 2005-2009. Health care in Japan is organized under a universal public health care system, and treatment and care procedures are standardized: patients pay the same standardized amount for the same standardized service whether they stay in a public or a private hospital. In the survey 4,802 patients made a valid response to the items. Of these, 41% were female, mean age was 60.9 (SD: 16.4) years, mode and median of length of stay were eight and 15 days, and 53% underwent surgery. There is a criterion for the number of nurses per patient on Japanese healthcare insurance, and 29% had at least one nurse per seven patients over the entire 24-hour day (**Table 5.1**).

Table 5.1. Respondent characteristics

		Total (n=4,802)		Included in trade-off analysis (n=1,972)	
Sex					
	male	2,630	55%	16	59%
	female	2,149	45%	11	41%
Age	mean (SD)	60.9	(16.4)	62.4	(15.3)
	18-59	1,893	40%	672	34%
	60-69	1,171	25%	547	28%
	70-79	1,218	26%	550	28%
	at least 80	479	10%	183	9%
Length of stay					
	< a week	1,056	23%	433	23%
	1-2 weeks	1,239	27%	477	25%
	< a month	1,195	26%	490	26%
	at least a month	1,159	25%	489	26%
Given surgery					
	Yes	2,553	53%	1,016	55%
Number of nurses					
	> a nurse per seven patients	1,376	29%	536	27%
	< a nurse per seven patients	3,426	71%	1,436	73%

Table 5.2 shows scores of "*physical hygiene*" and "*watching over and waiting*". The proportion who rated higher scores (5=always or 4=often) for both items was 61% (number of nurses: at least one nurse per seven patients) and 58% (less than one nurse per seven patients), respectively. The other respondents rated 3=sometimes or less; that is, they experienced inconsistent care for at least either "*physical hygiene*" or "*watching over and waiting*". In such a case it can be considered that the respondent could not achieve fully in both aspects, and nurses faced a trade-off in nursing time distribution between "*physical hygiene*" and "*watching over and waiting*". The chapter focuses on

these latter cases, and respondents who rated higher (4 or 5) in both items were exclude in the following analysis (**Table 5.2)**.

Table 5.2. Score distribution of respondents

		Watching over and waiting				
Number of nurses	Physical hygine	1	2	3	4	5
> a nurse per 7 patients (n=1,376)	1	23	4	6	11	13
	2	4	8	22	22	8
	3	14	13	64	59	30
	4	27	23	77	211	89
	5	54	16	38	124	416

		Watching over and waiting				
	Physical hygine	1	2	3	4	5
< a nurse per 7 patients (n=3,426)	1	80	31	20	31	27
	2	26	43	50	49	36
	3	33	49	167	165	79
	4	63	60	153	501	257
	5	140	44	90	275	957

An achieved point of each patient i of "*being neat*" (X_i) and "*having living arts*" (Y_i) as determined by fulfilment of "*physical hygiene*" and "*watching over and waiting*" was shown in a coordinate plane. Regression analysis was carried out to capture the distribution of achieved points in the XY plane for each group by nurse allocation (more or less than one nurse per seven patients). Considering structural change with the level of "*being neat*", the estimation expression was written using a dummy variable D_{Xai} as:

$$Y_i = \beta_1 + \beta_2 X_i + \beta_3 D_{Xai} + \beta_4 D_{Xai} X_i + \varepsilon_i$$

$$D_{Xai} = \begin{cases} (\beta_1 + \beta_3) + (\beta_2 + \beta_4) X_i + \varepsilon_i \,;\, 1 \le X_i \le a \\ \beta_1 + \beta_2 X_i + \varepsilon_i \,;\, a < X_i \le 5 \\ 1 \,;\, 1 \le X_i \le a \\ 0 : a < X_i \le 5 \end{cases}$$

Regression results are shown in **Table 5.3**. For both groups of nurse allocation, R^2 was smaller (0.06 – 0.12) in those with no structural change than in those with structural changes (0.234 – 0.251). On comparison of structural changing points (X_i = 2 or 3), values of R_2 were not particularly different. Estimated linear approximated lines crossed with structural change at X_i = 2, whereas they did not cross with structural change at X_i = 3. Therefore, structural change at X_i = 2 was considered plausible (**Figure 5.1**). The estimation equation was written as:

$$Y_i = \begin{cases} 2.20 + 0.57\, X_i + \varepsilon_i\,; & 1 \le X_i \le 2 \\ 5.81 - 0.81\, X_i + \varepsilon_i\,; & 3 \le X_i \le 5, \end{cases} \qquad \ldots.(1)$$

for a patient i who was allocated more than one nurse per seven patients, and

$$Y_i = \begin{cases} 1.75 + 0.69\, X_i + \varepsilon_i\,; & 1 \le X_i \le 2 \\ 5.84 - 0.83\, X_i + \varepsilon_i\,; & 3 \le X_i \le 5, \end{cases} \qquad \ldots(2)$$

for a patient i who was allocated less than one nurse per seven patients.

Table 5.3. Results of regression with and without interval estimation

Nurse allocation	Structural change	Lower Xi		Upper Xi		
		Constant	X_i	Constant	X_i	R^2
> one nurse per seven patients	No change			3.97	-0.36	0.124
				(0.15)	(0.04)	
	at Xi = 2	2.20	0.57	5.81	-0.81	0.247
		(0.32)	(0.20)	(0.25)	(0.07)	
	at Xi = 3	2.574	0.297	4.561	-0.542	0.251
		(0.20)	(0.08)	(0.63)	(0.14)	
< one nurse per seven patients	No change			3.54	-0.26	0.064
				(0.09)	(0.03)	
	at Xi = 2	1.75	0.69	5.84	-0.83	0.234
		(0.18)	(0.11)	(0.16)	(0.04)	
	at Xi = 3	2.05	0.47	4.36	-0.51	0.239
		(0.11)	(0.05)	(0.43)	(0.09)	

Note: Regression with interval estimation. Independent variable: "*having living arts*", dependent variable: "a *being neat*" (X_i). Results of 'No change' is regressed without interval estimation. Results of 'at X_i=2 (3)' is estimated for each interval bounded by 2 (3), lower X_i and upper X_i.

5.4. Discussion

The area surrounded by the estimated linear approximated lines and the coordinate axes in **Figure 5.1** is a capability set formed with the functionings of "*being neat*" and "*having living arts*". Structural change was suggested between 2 and 3 in the score of "*being neat*". In the upper interval of "*being neat*" (at least 3), the estimated linear approximated line between "*being neat*" and "*having living arts*" sloped down to the right. It can be interpreted that the nursing care for "*physical hygiene*" and "*watching over and waiting*" was substitutable. On the other hand, in the lower interval of"*being neat*" (1 or 2), the estimated linear approximated line sloped up to the right, suggesting that nursing care for "*physical hygiene*" and "*watching over and waiting*" were

complementary when they were inconsistent. In total, from the shape of the capability set formed with the two functionings, the following points can be considered: (i) When the functioning of "*being neat*" was fulfilled, patients could choose their achieved points by trade-off between "*physical hygiene*" and "*watching over and waiting*". In other words, patients' achieved position could be improved by shifting the nursing care distribution between "*physical hygiene*" and "*watching over and waiting*" to the optimal balance. (ii) When the functioning of "*being neat*" was inconsistent, the capability set formed with "*having living arts*" was restricted. (iii) Within the capability set, it was possible to gain fully *"being neat*" by decreasing "*having living arts*", whereas it was not impossible to gain full "*having living arts*" by shifting "*being neat*". Therefore "*physical hygiene*" was prioritised over "*watching over and waiting*" when a trade-off between them was required.

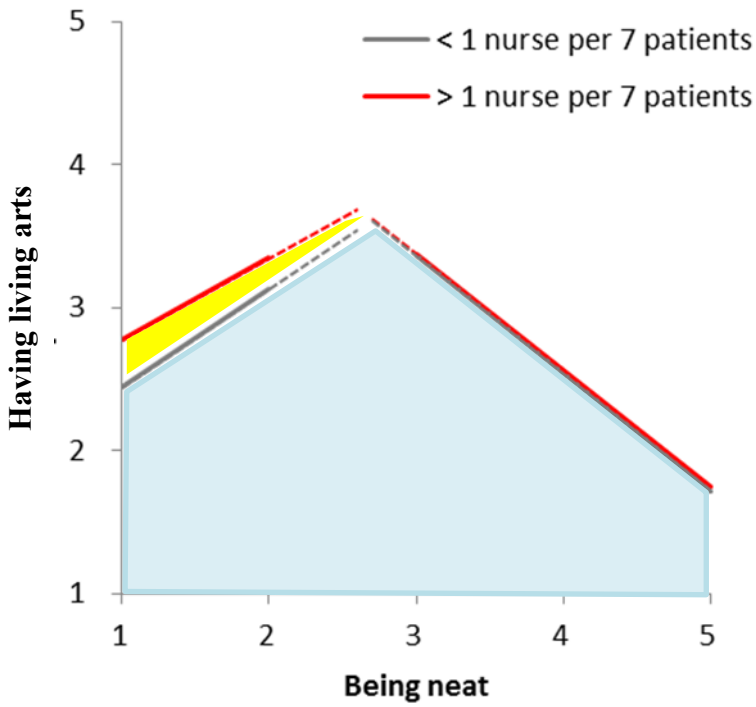

Figure 5.1. Estimation of linear approximated lines between "*being neat*" and "*having living arts*"

Note: The area surrounded by the estimated regression lines of each intervals and the coordinate axes showed a capability set formed by "*being neat*" and "*having living arts*" under a trade-off of nursing care distribution. The yellow and blue coloured areas with the frontier lines coloured red is the capability set of inpatients with at least one nurse per seven inpatients. The blue coloured area with block coloured frontier lines is the capability of inpatients with less than one nurse per seven inpatients. The inpatient group with less than one nurse per seven inpatients is dominated in terms of capability by the inpatient group with at least one nurse per seven inpatients.

When considering the number of nurses allocated, in the upper interval of "*being neat*", there was little difference in the right-down estimated linear approximated lines by the number of nurses. This could mean that (i') the increase in nurses at this level did not cause congestion in nursing care. In the lower interval of "*being neat*", the estimated linear approximated line for the group with the larger number of allocated nurses was located higher than that of the other group. This suggests that (ii') the increase in nurses

improved patients' functioning of "*having living arts*" and extended their capability set, albeit that it remained restricted. (iii') After the increase in the number of nurses, patients were still unable to achieve full "*having living arts*", and the prioritization of "*physical hygiene*" over "*watching over and waiting*" did not changed.

Focusing on the difference of equation in intervals $X_i \geq 3$ by the nurse staffing, the equation (1) and (2) suggests that the level of functioning achievement in *"having living arts"* increases 2% points given nurse staffing changes from less than one nurse per 7 patients to at least one nurse to 7 patients. It is suggested that the healthcare reform of increasing in nurse staffing in acute setting improves freedom sphere of patients' capability by fulfilling the functioning in "having living arts".

5.5.Conclusion

The capability set between patients' "*being neat*" and "*having living arts*" was estimated with empirical data obtained by determining patients' experiences with nursing care in terms of "*physical hygiene*" and "*watching over and waiting*". The estimated capability set showed that "*having living arts*" was easily restricted and forgone. It was suggested that nursing care for "*physical hygiene*" was prioritised and that patients had restricted opportunity to access nursing care for independence if a nursing care trade-off was present.

Chapter 6

Capture of interpersonal differences in capability compensation by nursing services

Abstract

Background: The capability approach has been applied to healthcare, with the aim of improving patients' well-being in their diverse lifestyles, and reflecting their sense of value. Recently nurse staffing has been increased for qualified nursing care, so it can be evaluated based on the capability approach. Care for 'buffer' patients is sometimes skipped or postponed as a means of controlling the uncertain balance between care needs and provision. This represents a problem of lost opportunity.

Aim: Through empirical data analysis and theoretical development based on the capability approach, this chapter aimed to capture the restricted capability of patients to achieve well-being and independent living which results from the discrepancy between nurse staffing levels and patients' care needs.

Methods: A questionnaire survey was carried out in 2005-2009. Using the responses of 1972 hospitalised patients, individuals' achievement in the functionings '*being neat*' and '*having daily life skills*' were analysed according to the differences in individual independence in mobility vis a vis nurse staffing of less than or at least '7 patients per nurse'. Next, based on the features of empirical estimation of the capability set according to mobility and nurse staffing, space of goods and utilisation ability were formulated based on the capability approach.

Results: A restricted capability set was observed for more independent patients under lower nurse staffing, and was extended toward the functioning '*having daily life skills*' by increasing nurse staffing. In contrast, both functionings '*being neat*' and '*having daily life skills*' among more dependent patients indicates that both functionings were suitably fulfilled even under lower nurse staffing, and that increasing nurse staffing did not result in the extension of capability set. The 'buffer' patients are suggested to shift from independent to dependent patients when nurse staffing is increased.

Keywords: capability approach, patients' opportunity, nurse staffing, uncertainty

Introduction

Previously, Japanese hospitals had a relatively large number of beds per population and accepted many patients, from those with severe to mild conditions, whose care needs varied from large to small. The inclusion of milder patients in a certain proportion in a hospital ward was useful for nurse managers, who face uncertainty in the balance between care needs and nurse provision. This uncertainty in bed control was ascribable to sudden exacerbation of hospitalised patients and emergency admission of severe patients. By pooling patients with severe and milder conditions, nurse managers could easily regulate the balance between care needs and nurse provision, since some kinds of care for milder patients could be postponed or skipped when nurses were excessively occupied with care for other patients. Previously, the length of hospital stay was longer, even for milder patients, so it was easy for nurses to find the time to postpone care to another day before discharge. In this way, milder patients acted as a buffer in controlling

the uncertain balance between care needs and nurse provision under relatively low nurse staffing levels.

This situation is changing under the increase in registered nurses promoted by changes in medical treatment fees of healthcare insurance: namely, Japanese medical fee revision in 2006 augmented the basic hospitalisation fee for acute care hospitals which employed registered nurses at a ratio of at least 7 patients per nurse. Subsequently, acute care hospitals shifted to an increased number of nurses, and care has been provided more intensively, and the length of hospital stay has shortened.

The approach of increasing nurse staffing is based on research findings directed toward qualified healthcare. The unending progress in medical knowledge and technology has improved patients' life, and people expect healthcare not only to improve life expectancy and treatment outcomes, but also to enhance the quality of life in terms of the diverse sense of values of individuals. Against this background, nursing care has attracted attention, since it emphasises individual agency in the daily life of individuals who face problems in performing their daily activities and in living their life, owing to the presence of disease and disability. Research on nursing care with regard to quality assurance has clarified that higher nurse staffing prevents the development of complications (Schreuders et al., 2015; Talsma et al., 2013), helps patients to acquire effectible knowledge and skills in managing life with a disease (McHugh et al., 2013), and shortens the length of stay of hospitalisation (Pitkäaho et al., 2016). One method of surveying nurse staffing levels is time study, which accumulate the time spent for care by care type and patient. This is based on the fact that individual nurses divides their working time into multiple parts, and then distribute these parts to a certain kind of care for a certain individual patient. This distribution of a nurse's total time to specific care

for specific patients is decided based on her assessment of the care needs of her patients. Nurses make this assessment based on the deficiency of basic needs (Henderson & Nite, 1978), which provides a fundamental concept of nursing, and consists of basic physical, mental and societal functions for daily life activities, like sleeping, eating, communicating, moving, learning, etc. Thus, nurses control their nursing time distribution to individual patients based on their assessment of care needs related to their overall patients' conditions and situations.

The current changes in nurse staffing make acute care more intensive and shorten the length of hospital stay, such that the proportion of patients with severe conditions increases, while that of patients with milder conditions decreases. However, this has the effect of weakening the buffer function of hospitalised patients, and the traditional buffer patients will disappear. Nevertheless, the uncertainty of balance between care needs and provision still exists. The research interest of this study was to investigate if patients' care needs are still left unfulfilled due to inconsistent care in regulating the balance between care needs and provision; that is, whether patients are forced to act as a buffer.

The problem with this scenario is that buffer patients lose the opportunity to receive the nursing care required to achieve well-being, indicating that their individual diverse values for daily living are not considered. Since this impacts the individual's opportunity to achieve well-being, the capability approach proposed by Amartya Sen (Sen, 1985) would provide a theoretical basis for this study. Application of the capability approach to healthcare settings has been discussed in the literature with regard to conceptualisation and implementation (Al-Janabi et al., 2012; Coast et al., 2008; Ruger, 2011). Moreover, the relationship of this approach to a person's personal

characteristics and social arrangements (Sen, 1992) is a particular strength, considering that patient condition and degree of independence in activities differ between individuals, and so the required nursing support also varies between patients.

This chapter focuses on differences in the care needs of hospitalised patients by capturing activity restriction, and aims to determine whether patients lose the opportunity to achieve well-being if they are not provided with consistent care, through theoretical and empirical study based on the capability approach.

Through empirical data analysis and theoretical development based on the capability approach, this chapter aims to capture the restricted capability of patients to achieve well-being and independent living, by the differences in nurse staffing and patients' care needs.

6.2. Methods

Data

To determine a capability set for the opportunity to be provided care for well-being, this chapter particularly focused on nursing care for '*being neat*' and '*having daily life skills*'. Since it is generally considered that patients are unable to evaluate the quality of nursing care, patients' experiences with concrete nursing practices has been used as a proxy to evaluate nursing service quality (Jenkinson et al., 2002). The two items '*being neat*' and '*having daily life skills*' are included in a questionnaire that was developed and verified in Japan (Kobayashi et al., 2011), and were used in this study. The item for '*being neat*' describes nurses' concern for keeping the patient's body and mouth in a sanitary condition, while the item '*having daily life skills*' describes nurses watching over the patient as the patient attends to his or her own needs. The respondents'

responses were scored as five (always), four (often), three (sometimes), two (occasionally), and one (not) according to how frequently they had experienced a given situation during hospitalisation. The category of 'does not apply' was included for respondents who felt they had not experienced any situation corresponding to an item (Labarere et al., 2001).

The inquiry was carried out at 239 general wards in 34 Japanese hospitals in 2005–2009. Hospital care in Japan is organised under a universal public health care insurance system, and treatment and care procedures are standardised: patients pay the same standardised amount for the same standardised services regardless of whether they stay in a public or private hospital. Specialised wards, such as paediatrics, obstetrics, gynaecology, and psychiatric wards, were excluded. Patients were eligible to participate if they were hospitalized in the ward for at least 2 nights, were scheduled to be discharged within a few days, were at least 18 years old, and were sufficiently lucid to be able to understand the questions and fill in the questionnaire by themselves or with the reading and writing assistance of a family member. Patient selection was not limited by diagnosis. Nurses determined whether a patient met the selection criteria. The nurse gave patients oral and written information regarding the purpose of the study and informed them that their responses were voluntary and independent of the medical services provided to them. When patients consented to participate in the study, they received the questionnaire and an envelope that could be sealed. After responding to the questionnaire and sealing the envelope, respondents were given the option of mailing the envelope to the researchers free of charge, or dropping it in a box in the ward.

In the analysis 1,972 respondents were included. The following analysis deals with the need for care or the shortage in functionings concerning '*being neat*' and '*having*

daily life skills'. Accordingly, respondents who responded that they had no need concerning the items (i.e. they chose 'does not apply' alternatives) were excluded from the analysis. In addition, respondents who provided high ratings (four or five) for both items were excluded, since they were thought to have been fully supported in both aspects, and had no shortage of either of the two types of functionings.

Formulation of capability set

Achievement in the functionings of each patient was evaluated by questionnaire, and the achieved level of each patient is shown on a coordinate plane with the axes of '*being neat*' and '*having daily life skills*'. Capability formulation between the two types of functionings can be developed by projecting the space of goods into the space of functionings (Gotoh, 2014). This study hypothesized that patients distributed their goods to '*being neat*' and '*having daily life skills*', and that the goods distributed to each functioning are transformed by patients' utilisation ability into each functioning.

An individual patient can freely choose the distribution of the total goods z to two types of functionings, z_N for '*being neat*' and z_L for '*having daily life skills*'[13]. Here,

$$z = z_N + z_L$$

and the individual can choose a point $\boldsymbol{Z}$ (z_N, z_L) freely at any point in the space of goods, which is represented in the third quadrant in **Figure 6.1**. The space of goods is an area surrounded by a substitutable line and coordinate axes.

[13] Here it is assumed that a patient can choose the distribution of goods, i.e. nursing time. In fact, nurses judge their patients' conditions and propose an appropriate distribution of nursing time. In some cases, only nurses decide the distribution, and patients do not choose. However, we formulate possible feasibility of distribution as a space of goods.

In the second and fourth quadrants, the individual's utilisation ability is represented. The amount of goods distributed to '*being neat*' is transformed by the patient's utilisation function $\boldsymbol{f}$ in the fourth quadrant to the functioning of '*being neat*', which is projected into $\boldsymbol{n}$ in the horizontal axis in the first quadrant. Similarly, the amount of goods distributed to '*having daily life skills*' is transformed by his or her utilisation function $\boldsymbol{g}$ in the second quadrant to the functioning of '*having daily life skills*', which is projected into $\boldsymbol{l}$ in the vertical axis in the first quadrant. Here,

achievement level of '*being neat*': $\boldsymbol{n} = \boldsymbol{f}(z_N)$,

achievement level of '*having daily life skills*': $\boldsymbol{l} = \boldsymbol{g}(z_L)$,

and the achievement functionings of the individual can be represented as a vector $\boldsymbol{X}(\boldsymbol{n}, \boldsymbol{l})$, which is projected from a chosen point $\boldsymbol{Z}(z_N, z_L)$ by his or her utilisation ability $\boldsymbol{f}$ and $\boldsymbol{g}$.

Suppose that the individual chooses their goods distribution at the point $\boldsymbol{Z}^*$ (in **Figure 6.1**). She achieved the two types of functionings at the vector $\boldsymbol{X}^*$ ($\boldsymbol{n}^*$, $\boldsymbol{l}^*$). It is possible for her to distribute all of the goods for one of the types of functionings. If she chooses distribution to '*being neat*' only, (z, 0) in the third quadrant, then $\boldsymbol{X}$' ($\boldsymbol{n}$', 0) in the first quadrant would be achieved. Similarly, if she chooses distribution to only '*having daily life skills*', (0, z) in the third quadrant, then $\boldsymbol{X}$'' (0, $\boldsymbol{l}$'') in the first quadrant would be achieved. According to this distribution in the space of goods z, the patient would achieve the two types of functionings in the area surrounded by $\boldsymbol{O}$, $\boldsymbol{X}$', $\boldsymbol{X}$'', which represents their capability set $\boldsymbol{C}$.

Suppose the total goods the individual can spend for '*being neat*' and '*having daily life skills*' decreases from z to z' ($z' < z$). At this moment, the chosen distribution of

goods ***Z'*** would be projected to achieved vector ***X'***, and the capability set would be reduced to ***C'*** (***C'*** $\subset$ ***C***) (**Figure 6.1**).

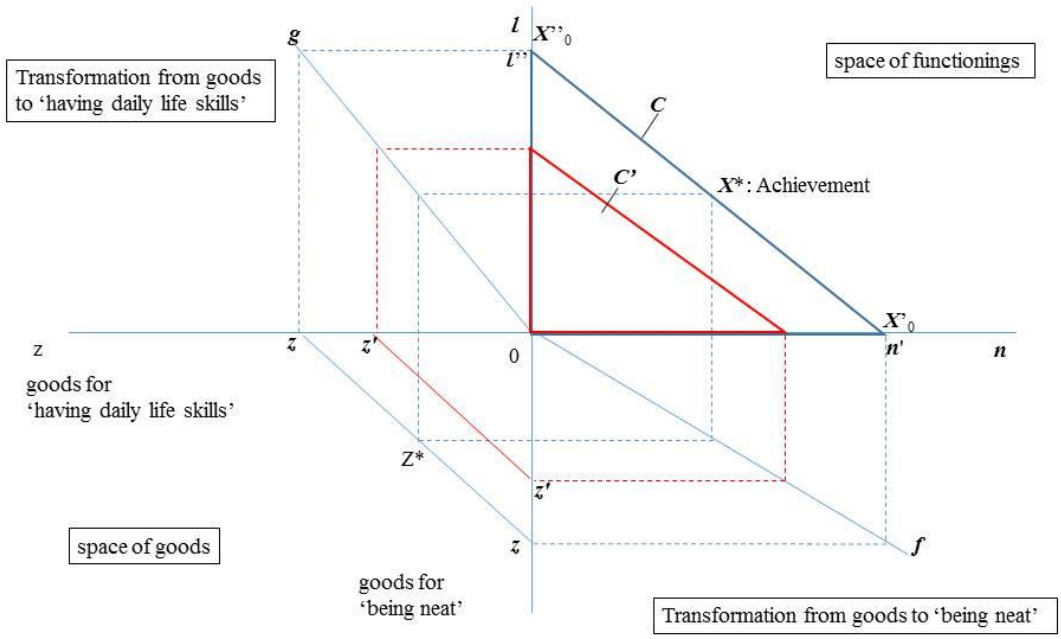

Figure 6.1 Capability set reduction (***C*** to ***C'***) by decrease in goods (z to z')
Note: The goods a patient has (z) is assumed to be distributed to two functionings "*being neat*" and "*having daily life skills*" inside the budget line (blue coloured in quadrant III), that is, the budget set. The budget set is transformed to the capability set ***C*** (inside the blue coloured line) in quadrant I by utilisation ability to "*being neat*" ***f*** in quadrant IV and that of "*having daily life skills*" ***g*** in quadrant II.
Given the budget set decreases to from z to z' (red coloured line in quadrant III), the capability set reduces from ***C*** to ***C'*** (inside the red coloured line in quadrant I).

In the analysis, capability sets are estimated by patient groups, as classified by the similarity in terms of goods and utilisation ability. For classification in terms of goods, nurse allotment to the ward (i.e. the number of patients per nurse) is used. One group is based on a higher nurse staffing level of '7 patients per nurse' or more, and the other is based on a lower nurse staffing level of less than '7 patients per nurse'. The classification in terms of utilisation ability is based on restriction in activity, especially

in movement. One group consisted of patients who can move without assistance, termed the 'independent mobility' group. The other group was the 'dependent mobility' group. Overall, capability set was estimated by four groups.

In this study, the capability set of an individual was captured by the set of achieved vectors of individuals whose attributes were similar. Achieved points of an individual patient *i* in '*being neat*' (X_i) and '*having daily life skills*' (Y_i) are shown on a coordinate plane. Regression analysis was carried out to determine the distribution of achieved points in the *XY* plane for each group of patients. The estimation expression[14] is written as follows:

$$Y_i = \beta_1 + \beta_2 X_i + \beta_3 X_i^2 + \varepsilon_i$$

Data analysis was carried out with SPSS 19.0.

Ethical considerations

Since respondents were recruited by nurses in a clinical setting, patients may have felt forced to participate in the study. To prevent this, every patient was given a printed letter emphasising that participation was voluntary, that patients could cease participation at any time, and that healthcare provision was independent from the study. To maintain the confidentiality of responses, completed questionnaires were kept anonymous and sealed in envelopes. The protocol of this study was approved by the research ethics committees of the University of Tokyo and the participating hospitals.

[14] In this chapter quadratic equations were estimated since regressions with linear expressions have problems in goodness of fit of the model.

6.3. Results

From the set of individual achievement vectors in '*being neat*' and '*having daily life skills*' in each group, the border lines of each capability set were estimated as follows:

i) Dependent mobility, lower nurse staffing

$$Y_i = 2.944 + 0.642\, X_i - 0.173\, X_i^2, \quad R^2 = 0.276$$

ii) Dependent mobility, higher nurse staffing

$$Y_i = 2.835 + 0.715\, X_i - 0.178\, X_i^2, \quad R^2 = 0.260$$

iii) Independent mobility, lower nurse staffing

$$Y_i = 1.867 + 1.159\, X_i - 0.242\, X_i^2, \quad R^2 = 0.262$$

iv) Independent mobility, higher nurse staffing

$$Y_i = 3.833 + 0.101\, X_i - 0.110\, X_i^2, \quad R^2 = 0329$$

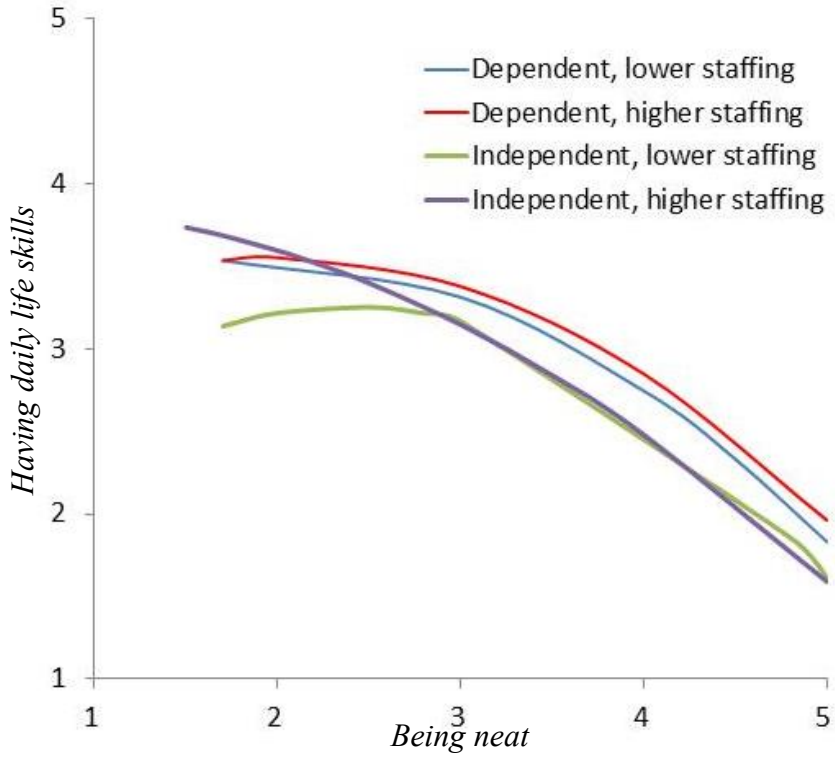

Figure 6.2: Capability set estimated by empirical data

Note: Estimated capability set is represented as area bounded by axes of "being neat" and "having daily life skills" and frontier curve estimated by regression. Regression

curve is regressed by the difference in nurse staffing and dependence in activities in daily living. Under lower nurse staffing, the capability set of independent inpatients (bounded by green coloured curve) is dominated by that of dependent inpatients (bounded by blue coloured curve). After increasing of nurse staffing, the capability set of independent inpatients (bunded by purple coloured curve), which is extended especially in the area of higher "having daily life skills", is not dominated by that of dependent inpatients (bounded by red coloured curve), which is extended slightly on the whole intervals of the frontier.

An area surrounded by each estimated line and coordinate axes represents the capability set of each group (**Figure 6.2**). First, a difference in capability set by nurse staffing is observed for patients with smaller care needs (independent mobility). Achievement of '*having daily life skills*' is increased by higher nurse staffing, as observed by comparing between 'independent mobility, lower nurse staffing' and 'independent mobility, higher nurse staffing'. In contrast, there was little difference in nurse staffing with regard to patients with larger care needs (i.e. between 'dependent mobility, higher nurse staffing' and 'dependent mobility, lower nurse staffing'). These results suggest that, particularly when '*having daily life skills*' is preferred to '*being neat*', patients with smaller care needs are left unfulfilled with '*having daily life skills*' under lower nurse staffing levels, and that this can be abrogated by higher nurse staffing.

Second, a difference by patients' care needs is observed under the same nurse staffing. Patients with fewer care needs are disadvantaged in '*having daily life skills*'. Under lower nurse staffing, their '*having daily life skills*' is disadvantaged all intersection of '*being neat*' level. This changed with increased nurse staffing. Under higher nurse staffing levels, although '*having daily life skills*' is still a disadvantage when compared with patients with larger care needs, the degree reaches a similar level

to that of patients with larger care needs. This suggests that patients with lower care needs are left unfilled with '*having daily life skills*' under lower nurse staffing, and that they can be fulfilled with regard to '*having daily life skills*' by increasing nurse staffing, but only when they prefer it to '*being neat*'.

6.4 Discussion

From the characteristics of empirical results for the estimation of patients' capability sets, it is possible to formulate patients' goods and utilisation ability in an inductive way based on the framework mentioned in subsection 3.3. First, consider a dependent mobility patient (*B*: bedrest) has goods z_B, which is transformed by her utilisation ability $\boldsymbol{f}_B$ and $\boldsymbol{g}_B$ to capability set $\boldsymbol{C}_B$ under a lower nurse staffing level. By increasing nurse staffing, suppose that her goods are increased from z_B to z'_B ($z_B < z'_B$), which is transformed by her utilisation ability $\boldsymbol{f}_B$ and $\boldsymbol{g}_B$ (these are not changed by nurse staffing, since utilisation ability is unique to the individual, not to goods) to capability set $\boldsymbol{C'}_B$ under higher nurse staffing. From the empirical results, the capability set of dependent mobility patients is not changed significantly by increased nurse staffing, meaning that $\boldsymbol{C}_B$ and $\boldsymbol{C}'_B$ cannot be distinguished. One possible reason is that the utilisation ability functions $\boldsymbol{f}_B$ and $\boldsymbol{g}_B$ are already diminishing at the amount of goods z_B under lower nurse staffing, and therefore an increased in goods greater than z_B does not extend the capability set (**Figure 6.3**).

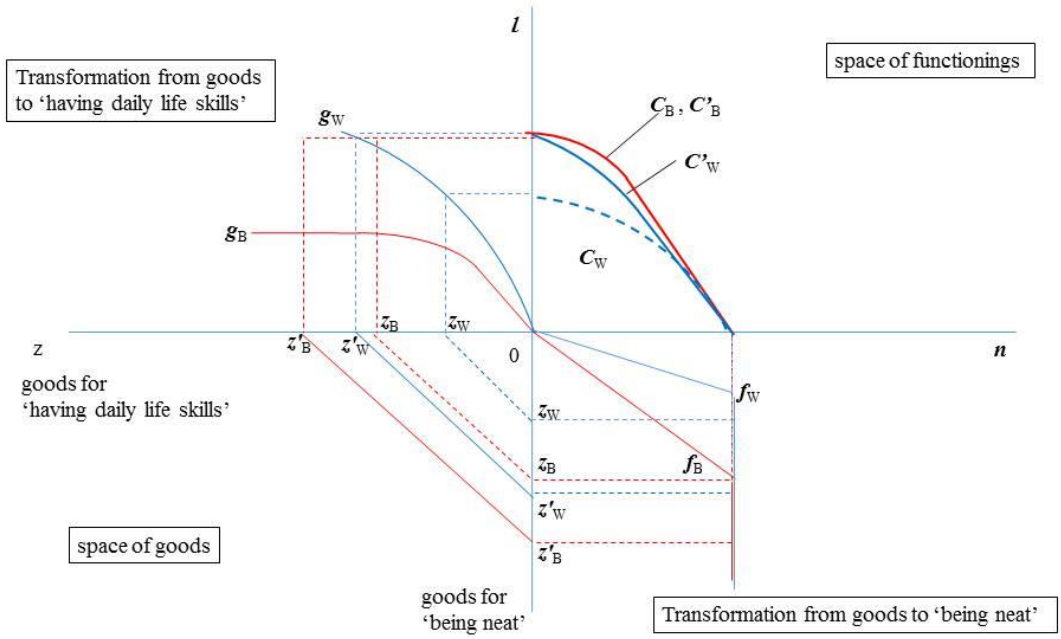

Figure 6.3 Goods and utilisation ability formulated from empirical capability sets

Note: This is a explanation model for the change in capability set observed in Figure 6.2. Assumption is; 1) utilization abilities of dependent inpatients to transform to being neat (red coloured curve in quadrant IV; f_B) and having daily life skills (red coloured curve in quadrant II; g_B) are inferior to those of independent inpatients (blue coloured curve in quadrant IV and II; f_W and g_W), 2) budget set for dependent inpatients under lower nurse staffing (red coloured dotted line in quadrant III) is dominated by that under higher nurse staffing (red coloured soled line in quadrant III), 3) budget set for independent inpatients under lower nurse staffing (blue coloured dotted line in quadrant III) is dominated by that under higher nurse staffing (blue coloured soled line in quadrant III), 4) budget set for independent inpatients is dominated by dependent inpatients under the similar nurse staffing.

From corresponding budget set and utilization abilities, the capability set in quadrant I is transformed. The capability set of independent under lower nurse staffing (blue coloured dotted curve; C_W) is extended under higher nurse staffing (blue coloured soled curve; C'_W). The capability set of dependent under lower nurse staffing (red coloured dotted curve; C_B) is slightly extended under higher nurse staffing (red coloured soled curve; C'_B).

Second, formulate independent mobility patients in the same way. Consider an independent mobility patient (*W*: walking) has goods ez_W, which is transformed by her utilisation ability $\boldsymbol{f}_W$ and $\boldsymbol{g}_W$ to capability set $\boldsymbol{C}_W$ under lower nurse staffing. By increasing nurse staffing, suppose her goods are increased from z_W to z'_W ($z_W < z'_W$), which is transformed by her utilisation ability $\boldsymbol{f}_W$ and $\boldsymbol{g}_W$ (these are not changed by nurse staffing, since utilisation ability is unique to the individual, not to goods) to capability set $\boldsymbol{C'}_W$ under higher nurse staffing. Judging from the empirical results in section 4, the capability set of independent mobility patients is extended toward '*having daily life skills*' (in the upper left of the first quadrant, **Figure 2**). Since the other functioning '*being neat*' is not increased in the result, it is possible that their utilisation ability of '*being neat*' $\boldsymbol{f}_W$ is already diminishing at the amount of z_W, and that the increase in goods does not increase the achievement level of '*being neat*'. On the other hand, it is suggested that the utilisation ability of *'having daily life skills*' $\boldsymbol{g}_W$ is gradually increasing at the amount of z_W, so that the achievement level of '*having daily life skills*' is improved by increasing nurse staffing. The features of changes in goods, utilisation ability and capability set are represented in **Figure 6.3**.

Through the formulation represented in **Figure 6.3**, it is suggested that functioning '*being neat*' reaches complete satisfaction for dependent and independent mobility patients even under lower nurse staffing levels. With regard to '*having daily life skills*', the utilisation abilities of independent mobility patients are superior to those of dependent mobility patients, and are not diminishing at the amount of goods distributed under lower nurse staffing. Therefore, the increased distribution of goods to independent mobility patients results in capability set extension. In contrast, the utilisation ability of

dependent mobility patients is thought to diminish even under lower nurse staffing, representing complete satisfaction.

Nurse staffing means total distributed nurse time for all hospitalised patients in the ward, and does not reflect allotment of nursing time to individual patients. Based on the formulated features in **Figure 6.3**, there are two possible types of distribution of goods (nurse time). The first is that the augmentation in goods by increasing nurse staffing is distributed equally to both dependent and independent mobility patients. That is,

$z_B > z_W$, and,

$z'_B - z_B = z'_W - z_W$

Here, independent mobility patients successfully obtain opportunities to have 'daily life skills', whereas dependent mobility patients achieve satisfaction in both functionings. This suggests that independent mobility patients can be forced to act as a buffer, and lose the opportunity for '*having daily life skills*'. That is, under lower nurse staffing, care for '*having daily life skills*' targeted towards more independent patients is sometimes skipped or postponed. The other possible type of distribution is the augmentation of goods which are distributed to independent mobility patients as a priority, since the expected increase in the achievement of functionings is greater for independent mobility patients, such that nurses will prefer to distribute goods to independent rather than dependent mobility patients. That is,

$z_B > z_W$,

$z'_B - z_B < z'_W - z_W$, since

$\sum \boldsymbol{X}'_B - \sum \boldsymbol{X}_B < \sum \boldsymbol{X}'_W - \sum \boldsymbol{X}_W$

In this circumstance, dependent mobility patients are forced to act as a buffer, and care targeted towards dependent patients can be skipped or postponed under higher nurse staffing.

A limitation of this analysis is that goods and utilisation abilities are dealt with as those of representative individuals in terms of independence in mobility and nurse staffing. The actual goods distribution and utilisation ability of each individual differs between individuals. The nurse staffing this study analyses represents the total number of patients divided by the total number of registered nurses in a ward averaged across the total number of wards, and so values are not the amount of distributed goods to an individual. However, when applied to a formulation based on the capability approach, it is suggested that more independent patients with smaller care needs lose the opportunity to be provided with care for '*having daily life skills*' under lower nurse staffing levels, namely less than '7 patients per nurse' criterion, and that after an increase to '7 patients per nurse', more dependent patients with larger care needs may lose the opportunity to be provided with care for both '*being neat*' and '*having daily life skills*'. With an increase in nursing staff, buffer patients, which serve to regulate the uncertain balance between care needs and provision, shift from independent to dependent patients.

6.5. Conclusion

Combining empirical survey and theoretical development, this study formulates hospitalised patients' capability, in terms of space of goods and utilisation ability to '*being neat*' and '*having daily life skills*'. There are differences in space of goods and utilisation ability by independence in activity or care needs of individuals and by nurse staffing, at least '7 patients per nurse' or not. After increasing nursing staff to at least '7

patients per nurse', the buffer patient, to regulate uncertain balance between care needs and provision, still exists, although shifted from independent to dependent patients.

Concluding remarks

Patient satisfaction had been regarded as an ultimate indicator of quality care (Donabedian 2003), since personal care is represented to be associated with higher levels of satisfaction (Cleary & McNeil 1988). Although it has been pointed out that its distribution has a tendency to be biased to higher evaluation, listening directly to the person concerned is essentially important to support patients to recover their own life. Functioning evaluation explored in this paper is derived from self-reported questionnaire of individuals. Through patients' experiences on nursing services the shortage and fulfilment of functionings is able to be measured. Evaluating functioning achievement provides a basis to estimate a capability set of individuals, which is primarily unobservable. Estimation of capability set was carried out by accumulating achievement vectors on functioning space of many individuals with similar utilisation ability.

One of the points which is not discussed sufficiently in the paper is how an individual choose an achievement vector from given opportunity set. A capability set is determined in accordance with the differences in utilisation ability and restriction under conditions the individual faces. How does the individual choose one achievement vector from determined capability set? It is considering an issue of agency freedom, which Sen emphasises on as well as well-being achievement in the context of the capability approach. It relates with achieving the person's own life and value and objectives of the person. From the viewpoint that it is reasonable to distribute societal compensation for the restriction individuals face due to diseases and disabilities, extension and compensation of restricted capability set with resource transfer is discussed in the paper,

however a problem is left unsolved whether the achievement vector an individual truly desire to realise for their own life and it is required is included in the extended capability set or not. It requires a formulation to evaluate agency freedom. The difference in the shape of capability set in accordance with utilisation ability clarified in this paper has a possibility to be a measure for the problem, and it can be a starting point to make an analysis about the relationship between shape of capability set and density distribution of achievement vectors.

Considering capability set of inpatients in Japan, no difference is represented in restriction in ADL, operation, age, and sex. They achieve similar capability set in spite of differences in utilisation ability, which suggests that the difference between achievement consequences and standardised objectives is strictly assessed, so that the resource transfer is just completed when they realise the standardised objective. That is, care service is provided 'equally' in a sense considering standard level of achievement. It should be discussed to make a normative evaluation for the 'equality' when considering differences in utilisation ability between individuals. Under the 'equality', a certain opportunity set is provided in spite of intrinsic characteristic of the person.

As estimated in the study, home-care patients realised opportunity sets in accordance with their strong and weak determined by their activity restriction. Transferring resource considering individual utilisation ability efficiently improves functioning achievement and well-being for the individual. If sufficient resource is transferred and capability set is fully compensated, the person can achieve as their intrinsic way, with extra spin-off beyond healthcare sector. It may contribute to overcome financial stringency in healthcare expenditure. Specifying the process and effect of compensation of opportunity set in accordance with the difference in utilisation ability will contribute to

clarify the relationship between healthcare resource transfer, opportunity guarantee for individuals, and societal effects. It will be useful to develop discussion on distributive justice of healthcare resource.

The paper explored to estimate a capability set, which can be realised by the person's choice, under condition of a certain resource and a certain set of utilisation ability, using achievement vector observations realised by multiple individuals. The point of estimation is as follows: (1) differences in achievement vectors of individuals facing the similar restricted condition is hypothesised to be caused by the differences in evaluation functions of individuals with the similar capability. (2) Given individuals show optimising behaviour referring their own evaluation function, the optimised vector they chose should be located on the frontier of the capability set.

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