

## Survey of the Nurse Staffing System Including the Patient Classification System and Issues in Nurse Resource Management in Japan

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### Abstract

**Introduction:** Appropriate deployment of nursing staff to secure quality nursing care has been a challenge for nurse managers. Japan's nursing staffing system is not as well developed as that in western countries.

**Aim:** To clarify topics of appropriate nursing staffing and find points of improvement for Japan's patient classification system.

**Methodology:** This qualitative cross-sectional study was conducted from December 2009 to February 2010. The authors surveyed three medical institutions in Japan which have adopted nursing staff deployment systems. We conducted semi-structured interviews with nurse administrators regarding nursing staff deployment at each medical facility. Content analysis was used to analyze the interview data.

**Results:** We identified 4 topics of nursing staffing: (1) "Improving the accuracy of the patient classification scale", (2) "Developing the staffing system", (3) "Circumstances causing staffing difficulties", and (4) "Staffing system for future needs".

**Conclusion:** Improvement of the scale of nursing necessity and the audit system is urgent in Japan. Developing the staffing system is also important, and nurse managers need to improve their ability to assimilate data. It is also necessary to visualize business aspects on a computer in real time, and nurse administrators should be willing to anticipate business systems in order to fulfill the needs of appropriate staffing.

**Keywords:** Nursing system deployment; Nursing necessity; Patient classification; Prototype evaluation

**Abbreviations:** DRG: Diagnosis Related Group; HCU: High Care Unit; HSSG: Hospital System Study Group; ICU: Intensive Care Unit; KNS: Kitasato Nursing System; NMDS: Nursing Minimum Data Set; TNS: Tranomon Nursing System

### Introduction

Appropriately deploying nursing staff to secure quality nursing care has been a challenge for nurse managers. In Japan, medical law already stipulates the required number of nursing staff (e.g., registered nurses and practical nurses) at a general hospital. Notwithstanding this guidance, actual nursing staff deployment is left to the discretion of each medical institution [1]. As a result, when institutions underestimate their revenues, they are too quick to implement profit-based temporary measures such as laying off nurses.

Under such circumstances, the quality of nursing care cannot be guaranteed to cope with advanced medical care, which is increasingly becoming more complicated, although a substantial number of nurses perform financial evaluations. Thus, as Japan's nursing staff deployment system moves away from financially-based evaluations, we still need to solve other problems affecting nursing staff deployment. Therefore, in Japan, a patient needs-based "scale of nursing necessity" has been developed to define the calculation standard for medical service remuneration [2]. However, some problems have been pointed out including the lack of guidance, education, and physiological support for patients, training of evaluators who assess patient needs.

Many studies on adequate staffing requirements have been done in Western countries [3-5]. The United States introduced the DRG (Diagnosis Related Group) to normalize increasing medical costs and clarify the required number of nursing staff needed around the clock. Nursing staff requirements are based on classification systems (e.g., the

Patient Classification System and Nursing Practice Index), which allow ward nurse managers to achieve staff placement based on patient needs [6].

Few researchers have studied Japan's staffing deployment system. Although many medical facilities in Japan have instituted nurse staffing need evaluations based on the scale of nursing necessity and patient classification, these systems are not yet fully utilized.

Thus, we are challenged to find a solution to clarify topics useful for the development of a nursing staffing system and patient needs classification based on the scale of nursing necessity.

### Aim

The aim of this study is to clarify topics appropriate to nurse staffing and to identify points of improvement for Japan's patient classification system.

### Methodology

This cross-sectional qualitative study was conducted from December 2009 to February 2010. Three acute care hospitals in

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Japan were selected through *Ichushi* (published by the Japan Medical Abstracts Society), and the number of hospital beds for each institution was calculated by snowball sampling. Each medical facility has led the way in adopting a resource deployment system. We asked each nurse managers at each institution to select 1 electronic system administrator for nursing staff placement, 1 system developer, 1 nurse manager (a senior nursing officer or ward director), and 1 ward team leader to serve as subjects.

### Data collection

We conducted semi-structured interviews of the subjects from each medical facility. The interview guide included six open questions: (1) summary of the resource deployment system, (2) the nursing care scale and the items used for the index, (3) the patient classification method, (4) the calculation method used to determine adequate nurse staffing, (5) resource deployment and support system, and (6) issues and challenges in resource deployment.

### Ethical considerations

This study obtained permission regarding clinical ethics from the target medical facilities and Yamanashi Prefectural University.

### Method of analysis

Content analysis was used to analyze subject interviews with word-for-word coding. In addition, to improve validity, we confirmed any questions we had about the interviews by asking interviewees to recheck their documentation.

### Results

The 3 university-affiliated target hospitals are located near a metropolitan area in Japan and have over 1,000 beds each. All are advanced treatment hospitals with an electronic medical record system.

Table 1 shows the characteristic of each hospital. Interviewees included 1 nurse director, 2 nursing service department sub-directors, 2 nurse managers, and 1 ward team leader. Table 2 shows the results of the staffing system at each target hospital, and table 3 illustrates the nursing necessity scale for the patient classification index used in Japan.

The nursing necessity scale is a patient classification index which follows an evaluation prototype. It contains several evaluation items, and the system estimates the deployment number of nursing services, combining options (e.g., 1 point for “yes,” or 0 points for “no”) for each item. Hospital C uses a factor evaluation method mainly for nursing staff deployment, and the nursing necessity scale to calculate medical service remuneration. The factor evaluation method [7] involves adding up points (e.g., 1 point for assisting with meals or 3 points for bed rest) and using the total score in the nursing necessity scale to evaluate nurse staffing needs. For example, the higher the total scores, the higher the number of required nursing staff. Regarding table 3, the Ministry of Health, Labor and Welfare took the initiative to develop the nursing necessity scale, which is the patient classification index used in Japan. Currently, this scale calculates remuneration for nurse staffing (1 nurse per 7 patients) used to obtain the basic hospitalization fee for remuneration of medical treatment.

### Patient classification scale

Hospitals A and B use “the scale of nursing necessity” (Table 3). Additionally, Hospital B uses the nursing necessity index as a reference for preparing its monthly outlook on special care/treatment, patient age ratio, and level of independence for daily living. Furthermore, it measures the level of independence for daily living of disabled seniors by ward; it facilitates patient discharge by comparing the ratio of inpatients over 90 days and their independence level using the total number of long-term inpatients. Nurse Managers also determine the needs to facilitate and coordinate patient discharge, provide support for

	Characteristic of hospital	ID	Position of Interviewee	Years of nursing experience	Years of experience in position
Hospital A	Cancer and HIV/AIDS base hospital/ Advanced critical care center	1	Sub director of nursing service department	11	2
		2	Nurse manager	21	2
		3	Team leader of ward nurses	7	
Hospital B	Advanced critical care center / Comprehensive perinatal period mother-and-child medical center	4	Director of nursing service department	27	7
Hospital C	Local cancer base hospital/ Advanced critical care center	5	Nurse manager	26	2
		6	Sub nurse manager	23	8

Table 1: Characteristics of target hospitals and interviewee.

	Hospital A	Hospital B	Hospital C
Patient classification scale (nursing care)	40 items in total under the categories of “severity,” “severity + nursing necessity” and “nursing necessity”	In addition to the indexes of “severity,” “severity + nursing necessity” and “nursing necessity,” other indexes are used, including information on patient transfer, out-of-bed sensors, and insulin for staff deployment.	Unique patient classification system determines patient care needs for each work zone by measuring the amount of direct nursing care. Patients are then classified into 6 categories according to certain rules based on comprehension.
Calculation of the required number of nurses	Patients are classified into 5 levels and by unit, such as ICU, HCU and General  The required number of nurses is calculated by multiplying the number of patients by the assignment coefficient specified for each level	Patients are classified into 5 levels, ICU, HCU, and General.  The required number of nurses is calculated and distributed by weighted assignment. Years of experience and position on the clinical ladder are taken into consideration.	Nursing care needs are converted into an index (hours) based on patient’s classification, and then the required total hours of direct care are calculated. Total hours are divided by standard values of direct nursing care per duty, from which the required number of nurses is obtained.
Staff assignment and support system	Transitioning to a uniform management system, covering both the outpatient department and hospital wards	Double shift system; the ratio of the average number of nurses working night shift in the general ward and the number of patients should be 10:1; the uniform management system covers both the outpatient department and hospital wards; a support nurse system	Support system with resource nurses

Table 2: Results of the staffing system in Japan.

Hospital ward of the subject	ICU	HCU	General ward (G/W)
Evaluation sheet (E/S)	E/S related to severity	E/S related to severity + nursing necessity	E/S for G/W related to severity + nursing necessity
Scoring	Not necessary: 0, Necessary: 1		
<b>[A] Monitoring and Treatment</b>			
Wound treatment		•	•
Resuscitation technique		•	
Taking blood pressure		0 to 4 times = 0 point 5 times or more = 1 point	0 to 4 times = 0 point, 5 times or more = 1 point
Urine checking for 24 hours		•	•
Respiratory treatment		•	•
3 or more IV lines at the same time		•	•
ECG monitoring	•	•	•
Infusion pump	•	•	
Arterial pressure determination	•	•	
Use of syringe pump	•	•	•
Measurement of central venous pressure	•	•	
Putting on a respirator	•	•	
Blood infusion and use of blood derivatives	•	•	•
Measurement of pulmonary artery pressure	•		
Special treatment (CHDF, LABP, assistant heart, ICP measurement)	•	•	
Technical treatment/arrangement (1) Use of antineoplastic drug, (2) Use of drug injection, (3) Radiation therapy, (4) Use of immune suppressor, (5) Use of vasopressor, (6) Use of antiarrhythmic drug, (7) drainage control			•
<b>[B] Patient conditions and others</b>			
Scoring	Able to do/without assistance = 0, Able to do if holding onto something/with partial assistance = 1 Unable to do/with total assistance = 2		
Bed rest instructed		•(0,1)	
Able to lift either hand up to chest height		•(0,1)	
Roll over	•(0,1,2)	•(0,1,2)	•(0,1,2)
Sit up	•(0,1)	•(0,1)	•(0,1)
Remain sitting up	•(0,1,2)	•(0,1,2)	•(0,1,2)
Transfer	•(0,1,2)	•(0,1,2)	•(0,1,2)
Transfer method		•(0,1)	
Mouth cleaning	•(0,1)	•(0,1)	•(0,1)
Meal intake		•(0,1,2)	•(0,1,2)
Dressing and undressing		•(0,1,2)	•(0,1,2)
Communication with others		•(0,1,2)	
Comprehend instructions related to medical care/cure		•(0,1)	
Dangerous behavior		•(0,1)	

• indicates an item involving measurement. The numbers in parentheses signify scoring range.  
※Cited from [8].

**Table 3:** Scale of nursing necessity in Japan.

resource nurses in cross-departmental activities, and deploy nurses to meet patient needs.

Hospital C uses the scored index as its patient classification scale (e.g., 5 points for hospitalization/urgent hospitalization; 0 points for discharge/separation, leaving the hospital/spending nights at home; 0 points for operation/delivery; 1 point for transfer; and 1 point for bed transfers within the ward). Other evaluation items include transfusion, resuscitation, and transfer/rehabilitation. Additional points are applied for hygiene, skin, and wound treatment, meal assistance, excretion, and breathing, based on time spent (2 categories; “over 21 minutes” or “within 20 minutes”). Six points are added for discharge by death, and extra points can be added for vital sign care according to frequency. Furthermore, the index considers other treatments, exams, or special

guidance, and special mental/psychological care. After calculating the score using the patient classification scale, patients are divided into categories based on evaluation of individual care needs. Thus, patients are classified according to the volume of nursing care needed for each patient during each work shift. More specifically, patients are classified into 5 types: Type 0 for 0 points, Type 1 for 1-4 points, Type 2 for 5-10 points, Type 3 for 11-20 points, and Type 4 for 21 points or more.

### Calculation method for the required number of nurses

Hospitals A and B use the same calculation to arrive at the required number of nurses: (1) Patients are classified into 5 levels using the Scale of Nursing Necessity; (2) the number of patients at each level in the ward are counted; (3) the patient total for each level is divided by the

coefficient (Level 4, 5=2, Level 3=4, Level 2, 1=10), and the results of the division process of each level are totaled. This final number is the number of nurses needed in a day.

Hospital C uses the resource deployment system based on the TNS method. To calculate the nurse value needed for each work shift: (1) patient type is converted into a time value representing nursing care needs for each type by work shift; (2) total minutes of direct care are calculated by adding the total hours (required for a given number of patients) to the value of care needs; and (3) the required total minutes of direct care are then divided by the ratio of direct care, which nurses provide, that is, the standard value.

### Staff assignment and the support system

Where Hospital A is shifting to a management system which unifies outpatient and ward staff, Hospital B has already adopted an integrated management system. Hospital B has also introduced a nurse support system that provides extra nursing services in response to the level of busyness in a ward. Hospital C provides 2 part-time nursing staff members to serve as resource nurses, especially at night. These experienced nurses are actively engaged in supporting busier wards as needed, and they provide support for 3 wards on the same floor. For long-term (>1 week) support, the head nurses discuss how to coordinate job assignments.

Table 4 shows issues related to appropriate nursing staffing and points of improvement for the patient classification system by context analysis. Four categories were identified: (1) “Improving the accuracy of the patient classification scale” with 3 sub-categories (“accuracy of evaluation”, “audit system”, and “reconsider components of the patient classification scale”), (2) “Development of the staffing system” with 2 subcategories, (3) “Circumstances causing staffing difficulties,” and (4) “Staffing system for future needs.” Category 2 implies the need to improve nurse manager capabilities in order to provide appropriate staffing, and that all nurses should have access to a patient nursing care needs scale displayed on a ward computer in real time. Category 3 identifies some of the difficulties relevant to appropriate staffing. Category 4 indicates the need to forecast patient care needs at the end of each week by using ward business data (e.g., number of discharged and hospitalized patients, and patient type).

## Discussion

### Patient classification scale and method for calculating the appropriate number of nurses

A patient classification tool that properly assesses patient care needs is important. A prototype evaluation approach has been adopted for patient classification indexes in Japan to assess the methods for the items in the scale of nursing necessity. However, the perspective and the number of measured items were significantly different between hospital A, B, and C. In Japan, the scale of nursing necessity is divided into two parts, based on the results of a preliminary survey that correlated the amount of nursing services with patient attributes. This survey first classified the encoded aspects of nursing services to measure the amount of nursing staff needed for appropriate patient care. Later, a 1998 survey disclosed time spent with patients in terms of nursing services/duties and abstracted those services that have a high incidence, those that accounted for a higher percentage of service hours, and those that required longer hours per task [2]. Hospital C’s patient classification method is based on TNS, which originated in 1981 from the patient classification system used in the US [2]. The Nursing Minimum Data Set (NMDS) was developed in the U.S. in 1988, and sets forth the minimum data set for nursing care. The NMDS has been used in many countries including Canada, Holland, Thailand, and Australia. In Belgium, its nursing data set of 23 items (e.g., such as care relating to hygiene, care relating to mobility, and tube feeding) was developed based on the NMDS and used as a patient classification index [8]. Although the patient classification index differs depending on its conception, other important considerations include the measuring accuracy of the nursing staff and the calculation method used to obtain nursing staff numbers. Additionally, differences in practical skills among nurses should be carefully considered during the actual deployment. Furthermore, the 2012 revised Japanese medical service remuneration system evaluated nursing assistants’ work, and adopted an additional point system for acute care assistance in order to reduce any excessive nursing staff services [9]. For more cost-effective nursing care, it is necessary to classify services which (1) only nursing staff could perform, (2) both nursing staff and nursing assistants could share, and (3) only nursing assistants could perform, and then adjust the number of required nursing staff accordingly.

### Staff assignment and support system

Among the institutions surveyed in this study, 2 medical facilities

Category	Sub-category	Case
Improving the accuracy of the patient classification scale	Accuracy of evaluation	• Correctly evaluating patient nursing needs is difficult.
	Audit system	• Although the audit system for accuracy of nurse evaluations works, it could be better.
	Reconsider components of the patient classification scale	• In particular, “[B] Patient conditions and others score” needs to be reconsidered.
Developing the staffing system	Develop nurse manager’s ability to utilize the staffing system	• The nurse manager’s skills need to improve in order to achieve appropriate staffing.
	Visualization of ward business in real time.	• Now, only the nurse manager has access to ward business matters. All nurses need access to this information to understand patient care needs.
Circumstances causing staffing difficulties	Patient’s age	• 30% of hospitalized patients are aged 75 years or older
	Severity of patient’s illness	• The average percentage of patients who meet the nursing necessity level exceeds 20%.
	Under-staffing	• Increase in the number of nurses who take child-care leave; not considering a full-fledged newcomer (independent).
	Increased indirect care	• Because the duties of indirect care are increasing, it is necessary to assess these duties during the patient classification review.
Staffing system for future needs	Predict patient’s future needs	• Data is needed to forecast ward matters such as the number of discharged and hospitalized patients, patient transportation needs, and patient treatment needs

**Table 4:** Results of issues related to appropriate nursing staffing and Points for improving the patient classification system.

in Japan consolidated their nursing staff to outpatient departments and wards. The advantage is it replenishes the number of nurses in response to busy hours in each section. Peak busy times occur in the morning for outpatient departments and around noon for inpatient wards. So, around noon, nurses move from the outpatient unit to the inpatient ward. However, the drawback is its possible effect upon nurse morale because the roles, specialization, and job descriptions for nursing services differ between outpatient departments and wards. Furthermore, it is difficult to secure adequate staffing because of the increase in the number of young nurses who take childcare leave at the expense of their work hours.

Maintaining a balance between patient care needs and nursing workload will become more important. Moreover, failing to do so would jeopardize patient safety. To facilitate the ward support system, standardization of hospital-based nursing services are essential. Furthermore, an elaborate ward support system will be required even for simple nursing services. Nurse managers in busy wards also need to give clear instructions for nurse assignment, timing of services, and needed nursing services.

Issues related to appropriate nursing staffing and points for improving the patient classification system.

To guarantee quality nursing care in the wards, nurse managers and nursing staff members should understand patient needs for nursing care in real time. Appropriate deployment of nursing staff in response to a change in a patient's condition is also important. Critical duties include consistently maintaining the accuracy of the patient classification index, and facilitating the nurse managers' use of the collected data to supervise staff deployment.

## Limitation

We collected data from only three hospitals with staff deployment systems in Japan. Therefore, these study results might not be representative of all hospitals in Japan. Therefore, future research based on a larger set of medical facilities is needed.

## Conclusion

We pointed out the need to improve the accuracy of the patient

classification scale as well as topics for appropriate nursing staffing such as "accuracy of evaluation", "audit system", and "reconsidering components of the patient classification scale". Refining the scale of nursing necessity in Japan is urgently needed. In addition, an audit system is needed to maintain accuracy of staff nurses' patient evaluations. Development of the staffing system involves improving the nurse manager's ability to assimilate data from the scale of nursing necessity for appropriate staffing. Then, nurse managers and nursing staff members should understand patient needs for nursing care in real time with access to a patient care needs scale displayed on a ward computer. Appropriate staffing also requires that nurse managers analyze ward affairs in order to forecast future patient needs.

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