

Effect of Staffing Level on the Quality of Service in a Long Term Care Facility

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(Abstract)

What transformation of services happens when the level of staffing in long term care facilities decreases? The authors carried out a time study at the same unit twice in a Japanese gerontology hospital. The burden (case-mix) of the unit at the first study and at the second study was similar, but the staffing level was different. When the staffing level decline, the staff in the unit gradually adjusted the services they provided and the allocation of their human resources to each service. A shift of role sharing between nurses and care-givers occurred voluntarily. Of particular note is that changing the level of resource will have different effects according to the services. This finding can be summarized with the new concept of " Task Reduction Rate (T.R.R) ", which is the quantitatively diminishing rate of the services, when the staffing level is decreased. The Low T.R.R services decrease almost not at all as spoon feedings, diaper changes, and some medical services. High T.R.R. services such as conversations are greatly reduced when a shortage of staff occurs.

(Key Word) Quality of service, Resource allocation, Staffing level, Case-mix, Burden, Management

Task Reduction Rate (T.R.R.)

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1. Introduction

The health care sections in most countries face financial difficulties and need to cope with an increase of elderly people at the same time. The swift expansion of the elderly population and very limited budgets often have resulted in the reduction of staffing levels in long term facilities for elderly people. What kind of transformation of services happens when the ratio of staff to long term care patient declines in a unit? How does the fluctuation of human resources affect the quality of care for the elderly? The objective of this study is to discuss the relationship between the staffing level and the quality of service with quantitative and qualitative data.

In the paper of 'Introduction a Typology of Aged Inpatients (TAI)' 1, we analyzed the relationship between the functional deterioration of the elderly people and the amount of the direct service required. Some previous works also introduces the effect of functional impairments on resource utilization²⁻⁵. We also discuss the mechanism of resource allocation in long term facilities⁶. But, a paper which quantitatively explains the relationship between the quality of service and the resource level has not been published. We can postulate several reasons.

One big reason is that quality is affected by many factors simultaneously. At least three factors, that is 'Resource (i.e. number of care staffs)', 'Burden (i.e. functional level of residents)' and 'Management (i.e. education to staffs, etc.)', may strongly affect the quality. When resources are drastically decreased, for example when many care-givers in a long term care facility suddenly resign, the remaining care-givers in the facility are unwillingly forced to give up or to cut corners on providing some services. The higher "burden", i.e. increase need for services, can increase rapidly in response to increased proportions of fragile elderly in a facility, and will similarly influences care-givers. Good management such as efficient education programs and well-organized protocols for providing services are expected to lead to high quality. When we compare quality levels among institutions without keeping the three elements constant (resource, burden, management), we cannot explain the variance of the quality levels with showing the contribution of three factors, because resolving quality into three factors is hopelessly complex. On the other hand, a study, which analyzes the relationship between the quality and

one of the factors (i.e. resource), requires that we hold the other two variables (i.e. burden and management) constant. Since we are usually studying operating units in hospitals and long term-care facilities, and not experimental units, it is also troublesome the researchers and management to hold variables constant or to change only one variable as required by research. For example, it is unlikely that a researcher can change the composition of a patient mix in order to carry out a study of quality.

2. Background

During the course of a study of patient services in 11 long term facilities, the authors had an opportunity to carry out two time studies seven month apart at the same unit in a Japanese gerontology hospital. While, the burden (case-mix) of the unit at the first study and at the second study was allowably similar, the staffing level was sufficiently different to permit the evaluation of the pure effect of the resource on the quality of the service while holding the burden constant. Because of this fortunate similarity of case-mix, we were able to evaluate the effect of the staffing on to the quality of service.

The first time study was done for a quality assurance, which requires the detailed information related to the services provided. The motivation of the second study was more urgent. Because of the drastic change of the " fee for service " list of the universal health insurance system in Japan, the hospital financially could not maintain the high number of care-givers. For providing better services with less human resources, some staff in the hospital and the author managed to develop the new working schedule for providing services. The working schedule indicated an approximate assignment of number of staff members and duration of minutes to major services required in the unit. A month long trial providing services in accordance with the new protocol using 20 % less human resources was carried out at the unit, where both the first and the second time sampling studies were performed. The second study was done for the purpose of the final evaluation of the new working schedule.

3. Method

The same protocol adopted in the time studies for developing TAI 1 was also used in this study. The first study was done in November 1992 at a unit of a gerontology hospital in Japan, whose characteristics were close to those of skilled nursing homes in the U.S. rather than of acute hospitals. Most of the patients in the unit, where the author was working as a physician and saw some patients twice a week, were functionally deteriorated and suffered from chronic disease. To record every service provided for 24 hours in the unit one by one, each caregiver and each nurse in the unit was followed by a time keeper from the start to the end of working time, who watched what kind of service were provided, measured the duration of time consumed for providing the services with a stop-watch, and recorded the items such as (i) the time (o'clock) when a service was provided, (ii) a patient's I.D. if a service was directly given to a patient, (iii) contents of service, and (iv) the duration of time. The contents of service were categorized by two points of view, that is "a purpose of service" and "direct service or indirect service". The purpose of service includes meal service, toilet support, hygiene service, environmental arrangement, mental service (i.e. observation and mental satisfaction), medical and rehabilitation service, transfer service, information task, and a rest and a waiting. Direct service is any service provided to face to face to a specific patient. Indirect service includes all services except Direct service not targeted at a particular patient.

The second study was performed at the same unit with the same protocol of the first study in June 1993. Both study days were selected because the conditions as listed below were satisfied.

- (i) There were no patients in the unit who were facing life threatening medical situations.
- (ii) Specific time consuming services such as taking bath support, changing sheets for every patient in the unit, and so on, were not provided.
- (iii) Special activities, which required huge amounts of human resources (i.e. monthly birthday party for patients), were not held.

The functional status was evaluated by TAI1, and the burden of patients and the unit were also estimated with TAI one day before the time-sampling study was performed.

Further, the author could fully observe the services during the trial period of the new working schedule and at the first and the second surveys from the view points of both a physician and the

developer of the new working schedule, and could repeatedly interview both caregivers and some cognitively intact patients. In addition to the quantitative data derived from the two time sampling studies, some subjective data could be obtained by the minute observations and the frequent interviews.

4. Objects and Results

4.1. Resource level

Tab. 1 shows the number of staff working in the unit and the duration of time recorded by timekeepers in both the first survey day and the second survey day. In this paper, the first study day is called the " High resource day" and the second survey day is called the " Low resource day", because the total consumption time recorded by time-keepers in the first survey day was 10,384 minutes and the one in the second survey day was 8,658 minutes. The number of care-givers working at the day shift in the Low resource day (the second survey) was 8, and the duration of consumed time recorded by timekeepers was 4630 minutes. The number of care-givers working at the day shift in the High resource day (the first survey) was 11, and the duration of consumed time recorded was 6673 minutes. Compared with High resource day, only 69% ($4630 / 6673=0.69$) of the duration of caregivers' time in the Low resource day was used for providing services.

Comparisons of the transitional changing pattern of duration of time consumed by nurses and care-givers in both the High resource day and the Low resource day (Fig. 1), are drawn by using the recorded time. This shows that the duration of time consumed by nurses and by the caregivers working in the night shift were almost identical. The duration of time consumed by the care-givers in the day shift in the Low resource day is 30% smaller than that in the high resource day. If only caregivers' duration of time were compared, the total consumed time in the low resource day was approximately 20% smaller. There was a 17% difference of total resource consumption (Nurses + Care-givers for 24 hours) between two days. This study examines the effects as expressed in the form of the size difference of the white area shown in Fig. 1 to the quality of services.

4.2. Burden Level (Characteristics of Unit)

Tab. 2 indicates the patients' change between the first study (High resource day) and the second study (Low resource study). During this 7 month interval, 26 patients left the unit, because of many discharges and some moves to the other unit in the hospital, and there were 26 new comers. 31 patients were continuously staying in the same unit. According to the total evaluation by using the functional evaluation with TAI and medical records, 4 cases of 31 improved functionally. The functional levels of 12 cases did not vary much. 7 cases deteriorated slightly in their functions. The functional level of 8 cases declined severely.

Fig. 2 shows the composition of the Elderly type of TAI in both study days. 31 out of 57 patients in the High resource day and 32 out of 57 patients in the Low resource day were classified into the Immobile group (I3, I2, I1), and 18 patients in the High resource day and 18 patients in the Low resource day belonged to the Medical group (M0, MA). Only 8 patients in High resource day and 7 patients in Low resource day were assigned to the Border group or the Confused group, who could walk. The CRI (Care Requirement Index) of TAI shown at the upper left corner indicates the burden of the unit (8.7 vs. 9.0). According to the estimation with the TAI, this burden difference (0.3) in the unit could be converted to be equivalence to approximate 6 working hours per day per unit where 57 patients were living 6. Table 3-1 demonstrates the Eating ability of patients. The number of the patients requiring spoon feeding in the High resource day (19=13+6) was significantly lower than that in the Low resource day (27=17+10). The higher ratio of spoon feeding in the Low resource day caused the higher CRI (9.0). Table 3-2 shows the Toilet ability of patents. 50 out of 57 patients in both days required diaper changes. These two tables suggest that the burden for providing Toilet service in the Low resource day was similar to the one in High resource day, although the burden for providing meal service in the Low resource day was estimated higher. Consequently,

- 1) Most of patients in the unit were severely deteriorated and they required a great deal of care services.
- 2) The case mix at the Low research day was similar to the one in the High research day.
- 3) The burden in the Low resource day was judge to be slightly heavier compared with the one in the High resource day.

4.3. Management

Between the first study and the second study, the number of routine diaper changes increased in order to improved quality. This had an important point on the work schedule. Most of the staff and a manager worked at the unit both during the first and the second study. Although the work schedule was revised greatly, the basic principle of providing high quality care and the high motivation of the staff for providing better services were maintained during the trial.

4.4. Subjective findings

During the one month trial, the following subjective findings were observed.

- #1) Remarkable changes related to typical outcome measures such as the morbidity rate, the occurrence rate of pressure ulcer, and so on, were not observed during the trial for a month.
- #2) The hygiene level of patients was down graded. During the high resource period, every patient in the unit was kept properly clean. As the trial went on, the cleanliness of the patients gradually declined and ended up at some lower level.
- #3) The trim and tidy circumstance of the unit in the high resource period could not be maintained after starting the trial.
- #4) The manners of care-givers in providing services to patients during the trial period became less gentle, and the quality in detail of the services was decreasing (i.e. trim and well-tighten sheet change).
- #5) Conversations and socializing with patients while providing other services were decreasing.

The summary of the interviews to caregivers are shown below.

- #1) The 20% decrease of the human resource during the trial period made the care-givers feel chased after by the many tasks required within their working hours.
- #2) The weariness of caregivers in the trial period was much greater than in the High resource period.
- #3) The caregivers in the Low resource period could not afford to make sufficient conversations with patients and to provide elaborate services.

#4) Although care-givers had tried to transfer and move patients with wheel-chairs as much as possible while using affordable time during the high resource period, they became too busy to give patients dispensable transfers in the trial period.

#5) Less conversations with patients, fewer services trimmed in detail, and abrupt mood while providing services caused by the lack of affordable time made caregivers feel guilty and unsatisfactory.

Although interviewing most of the patients in the unit was difficult because of severe cognitive deterioration, several interesting comments were obtained from some mentally intact patients.

#1) The appearance of caregivers working hard made the cognitively intact patients hesitate to make conversations with caregivers and personal requests.

#2) The atmosphere of the unit became more hasty and bustling.

#3) Some patients showed understanding of the severe situation of the hospital, but complained of the change of the services and the atmosphere of the unit at the same time.

Most subjective findings, which were difficult to prove by the quantitative data, suggest the decline of the quality of care in the unit. The implications of qualitative data obtained by detailed observations, the opinions of care-givers, and the comments of patients, matched quite well.

3.5. Objective findings

(Fig. 3) shows the proportion of consumed time for each service in the low resource day compared with those in the high resource day. Almost equal or excess time was used for providing meal service, toilet service, medical and rehabilitation service in the low resource day in spite of the 20 % less human resource. If the eating functional deterioration levels shown in Tab. 3-1 were more identical, the amount of time consumed for providing meal service might be lower. If the number of diaper change had not been increased, the duration of time consumed for the toilet support would not have increased. More than 50% of time for providing Hygiene and Environmental services was cut off. This result corresponds to the subjective findings, that is "the hygiene level of patients were down graded" and " the trim and tidy circumstance could not be maintained". Although the indirect mental services, which mainly indicate

observations, were almost maintained (409 min. vs. 492 min.), the direct mental services, which consisted most of conversations with patients, drastically decreased from 186 min. to 8 min. This objective finding can support some subjective opinions of caregivers, that they could not afford to make sufficient conversations with patients, and some opinions of patients that the appearance of caregivers working hard made them hesitate to make conversations with caregivers and claim their personal requests. The time for transfer was 76% discounted from 605 min. to 147 min. This finding parallels the opinions of caregivers that they became too busy to afford to give patients dispensable transfers. Information tasks were 23 % decreased, almost to equal to the total decrease rate (20%). As "rest and waiting time" are usually in proportion to the total working time, 17 % out of 27% of the decreasing of the rest and waiting time can be explained by the total resource decrease. The remaining 10% means that the staffs in the unit worked harder to keep the decline in the quality of services as small as possible.

Fig. 4-1 and Fig. 4-2 show the comparison of time consumption between nurses and care-givers. These figures indicates some findings as shown below.

#1) Nurses mainly concentrate on providing the medical and rehabilitation services and information tasks (i.e. charting).

#2) Most of daily life support services were provided by care-givers.

#3) The rest and waiting time in both nurses and care-givers were equally decreasing.

#4) Nurses were starting to provide direct meal services and direct toilet services in the low resource day to compensate for the lack of caregivers.

#5) The increase of the nurses time in the low resource day from 905 min. to 1,070 min. was mainly used for providing medical and rehabilitation services, which caused the decrease in time for provision of the medical and rehabilitation by caregivers.

The finding #4 and #5 show the mutual assistance between nurses and caregivers, and the role of nurses was enlarged, because the ratio of staffs (nurses vs. caregivers) in the unit was shifted.

Fig. 5 shows the comparison of the resource consumption for meal service. The time consumption for meal services was concentrated to correspond with breakfast, lunch, and dinner. The

altitude difference between the top of the total time and the peak of the meal area indicates the affordable time for providing other kinds of services during the hour of breakfast, lunch and dinner. Because of the heavier burden of provision of the meal service in the Low resource day as show in Tab. 2-1, it was difficult for staffs to cut off meal service time. It is a remarkable finding, that the indispensable services such as spoon feeding to patients who were suffering from difficult swallowing were hardly diminishing even if the number of care-givers was decreasing.

5. Discussion

If the trial during the low resource period was evaluated with only some outcome measures such as morbidity rate, the trial might perhaps be regarded as successful, because the unit could be run with 20% fewer caregivers without remarkable changes in outcome measures. But, some qualitative data obtained by three different perspectives such as minute observations, urgent care-givers opinions, and some unsatisfied patients' comments, were all indicative of a decline of quality of services in the low resource period. Additionally, the qualitative data could be supported by quantitative data. The synchronization among qualitative data and the mutual reinforcement between qualitative data and quantitative data were two of the most remarkable points in this study.

During the study period, we can observe some effects of staff reduction to patient care. These effects can be summarized with the " T.R.R. : Task Reduction Rate", as shown in Fig. 6. The " T.R.R " is the quantitatively diminishing rate of the services, when the number of the staff is decreasing. The " Low T.R.R services " are hardly lessening, although " high T.R.R. services" are vastly reducing in the case of the shortage of the staffs. The fact we have noted in this study is that the effect of changing the level of resource differs according to services. The duration of time for providing meal services, toilet services, and medical services were almost never changed in this study. Observation, the tasks related to information, and the rest and waiting were quantitatively decreased almost proportionately with the reduction of the total time. Environmental services, hygiene, transfer services decreased with greater proportion than that of the total time, but some level of these services were maintained. The quantity of conversation, and correspond to personal affairs were drastically curtailed. The 20% decrease of total

human resources also effected to some services which could be qualitatively observed but not quantitatively recorded such as the mood and gentleness of caregivers, the trimness of the service in detail.

The hypothesized relationship between services and further increases or further reduction in human resources in the unit is displayed in Fig. 7. In the high resource day (point C), the mood of caregivers was relatively gentle and the trimness in detail of every service was well maintained. In the low resource day (point B), some parts of Medium T.R.R. services and most of the High T.R.R. services were cut off. If the staffs are further reinforced (point D) compared with the high resource day (point C), what kind of transformation of services will occur? If the unit faced further reduction of personnel (Point A) compared with the low resource day (Point B), how would the provision of services change? Further increase of human resource from the point C to the point D may be used for more conversations, more correspondences to personal desires, more transfers, and the atmosphere of the unit will be more quiet and leisurely. These kinds of services can be called " premier service", because they are not indispensable, but they contribute significantly to the quality of service. At the same time, rest and waiting time will increase by a higher proportion than the increase of the total resource. When the amount of staff is deficient, they often utilize the waiting time for compensating insufficient services. As caregivers don't need to use waiting time, if the human-resource in a unit is affordable, the time consumed for non-specific purpose (waiting) and rest time tend to increase. The time consumed for the services categorized into Low T.R.R. services (Primary priority service) and Medium T.R.R. (Secondary priority service) may scarcely increase, because almost satisfactory level of initial and secondary priority services could already be provided in the Point C.

Further reduction from the point B to the point A may be not possible. Because of the difficulty of the further reduction of the secondary and premier services, the time available for critical services such as spoon feeding, diaper change, and some medical services would decrease. These reductions might lead to insufficient feedings, lack of time and impolite manner of diaper changes, and insufficient levels of medical services, which might affect some typical outcome measures such as morbidity, occurrence rate of pressure ulcers, and so on.

The disturbance at the initiation of the one month trial was the most intense. The staff in the unit gradually found the suitable allocation of their human resources to each services, and the shift of role sharing between nurses and care-givers voluntarily occurred. Finally, the human resource allocation arrived at some equilibrium point according to their allotted human resource level. Although staff members did not know the concept of "T.R.R.", nor any statistical data obtained by this study, they managed to find a suitable and practical level of service. Our working schedules were sometimes required to be rewritten according to opinions of staffs in the unit, and the second study was performed after arriving at some practical point.

The assessment for quality assurance regardless of the consideration of the resource level in the unit often cause complaints by staff, because they can understand the impracticability of the assessed plan without reinforcing staffs in the unit. When care plans for residents in long term facilities are made, they should be checked whether practical or not, from the standpoint of the resource level required for carrying out the plan. For making care-plans practical, care-planners should always pay attention to not only the characteristics of residents but also the characteristics of the unit, of course including the resource level of the unit.

Authors are grateful if this paper can promote mutual interactions between the resource study and the quality study, which have been separately performed, and if the T.R.R. can contribute a technique for improved management when managers want to aim at a higher level of quality of service.

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* Typology of Aged Inpatients (TAI) is a new multipurpose instruments for long term care for classifying patients by functional status and their resource consumption. TAI classifies elderly people into one of 12 elderly types. This classification explained 63.0% of the variance of Direct Service time. Compared with previous instruments, the framework of TAI emphasizes the longitudinal functional change of the elderly , and is a more dynamic model.