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Development of nursing time standards as a problem of optimalisation of health care system management. I. Evaluation of the correctness of patients' classification

Normowanie czasu opieki jako problem optymalizacji zarządzania systemem ochrony zdrowia. I. Ocena poprawności klasyfikacji chorych

During the period of health care system transformation, the development of optimum management procedures, including the improvement of methods for medical staff scheduling according to patients' needs and safety, is of primary importance. The value of new organisational solutions depends on the possibility of their application in actual conditions in an individual country. Until today, health care units in Poland did not have to calculate the cost of care being used for financing their activity from the State budget. Although there was awareness that the outlay on salaries was up to 70–80% of the budget of an individual institution, there was no interest in methods which would allow the scheduling of medical staff according to patients' actual demand for care. Hence, there appeared discrepancies between patients' needs and the number of medical staff in hospitals.

In West European countries and the United States medical staff scheduling has been applied for over 50 years, both in inpatient and ambulatory health service by methods called Patient Classification System (PCS). These methods enable a more precise staff management: doctors (5), nurses (6, 7, 9, 13), midwives (2), dentists (8) and in first aid (4), as well as home care of a patient (10). PCS methods are also useful for managers in the planning of expenditures in health care units (3) and working out a budget for insurance companies (1).

PCS methods consist of three parts:

1. Criteria of care which are specific for an individual type of services. Usually there are several main parameters which are supplemented by detailed criteria;

2. Time standards devoted to direct care (T_{dir}), provided for patients in individual groups (categories) of care. Several categories of care are quoted in literature; mainly Category I – minimum care, where patients are independent; Category II – moderate care, which covers patients who have a wider

programme of treatment and nursing; Category III – intensified care, bed–ridden patients who are conscious and assist in performing activities, and Category IV – intensive care, unconscious patients who require 24 hour monitoring, intensive care and nursing.

3. Time devoted to auxiliary activities (T_{aux}) associated with maintaining the readiness of a given post for performing tasks, documentation of medical activities, performing cleaning and supply tasks.

Despite their usefulness and common application abroad, PCS methods require verification and adjustment to the organisational conditions and the state of care in an individual country. These methods, when applied systematically for a certain period of time, allow us to determine into which categories of care fall the patients in a given ward with respect to the demand for particular types of services. In the future, this analysis will facilitate the planning of the proper number of medical staff, both on 24–hour scale within a weekly interval and during one year. The introduction of PCS methods into the hospital practice, even according to foreign patterns, enables the staff to become used to another method of staff scheduling. Moreover, it facilitates the understanding and acceptance of the fact that teams should not be permanent, and some of the employees should constitute a reserve–team for the reinforcement of wards which have increased demand for an individual type of service.

Nurses constitute the most numerous occupational group among the employees of health services. This also concerns hospitals. Furthermore, they are the group which for several years has been demanding from the Ministry of Health and Social Welfare the development of employment standards. Hence, with respect to these staff groups – the decision was made to verify PCS methods, adjust them accordingly to organisational conditions in Polish hospitals (11). One of the first stages of adjusting PCS methods to a particular organisational system is an evaluation of the correctness of classification of patients into individual categories of care.

Hence, the following problem was posed: *What is the correctness of patients' classification by PCS method in Polish hospital wards?*

MATERIAL AND METHODS

In 1993 and 1994 an analysis of the demand for nursing care was conducted in 27 wards of surgical and conservative treatment profile in the Military Hospitals in Lublin and Przemyśl and the Military Clinic in Cracow. The actual demand for care was evaluated by nurses and a research team from the Faculty and Unit for Organisation of Nursing at Lublin Medical University. Classification was carried out using a Patient Classification Form which covered seven main criteria of care, as well as detailed criteria, adjusted to the specific kind of patients hospitalised in individual wards (11). The patients were at various stages of hospitalisation and represented the full range of diagnoses and varied age groups. The majority of patients were subject to classification several times during various days of hospitalisation. The method applied for classification was a proposal by another author, because at that time the own verified PCS method was not available (12). According to this proposal patients were ascribed one of four categories of care. The nurses and the research team who applied this method were aware that it required verification with respect to nursing time, as well as the number of categories.

The collection of the research material consisted of three stages:

1. During the first stage, nurses who were previously prepared carried out daily over a period of three months the classification of patients in 27 hospital wards in three hospitals, (*Measurement 1*) thereby obtaining a total number of 53,640 classification records;

2. The second stage of classification was conducted by nurses during a four–week visit of the research team from the Department and Unit for Organisation of Nursing in the wards examined (*Measurement 2*), resulting in 6,104 records;

3. The third stage of collecting research material was carried out irrespective of the second stage by the research team, who, together with nurses from individual wards, performed the classification of patients in order to evaluate the correctness of classification conducted by the ward staff (*Measurement 3*), obtaining 6,104 records.

In general, over 65,000 classification records were obtained, which made up a sufficient sample for drawing conclusions concerning the correctness of the classification performed, and the number of categories ascribed to the patients. The correctness of classification in three measurements was evaluated by the single analysis of variance.

RESULTS

The correct application of the patient classification system is a starting point in the evaluation of the demand for nursing care, both during the 24 hour period and on the annual scale. In the part concerning the determination of direct nursing time (T_{dir}) this method enables the classification of patients into individual categories of care. The "error of method" while introducing a new system of staff scheduling into the hospital practice should be included into the calculation of the cost of organisational changes. However, the researchers wanted to know the objectivity of the demand determined for nursing care in individual wards, and whether there were differences between wards in the same hospital. It was also important to determine if, in case of differences observed in the determination of T_{dir} time, these differences would be statistically significant for an individual health care unit.

An analysis of the research material showed that the demand for nursing care was overestimated in all hospitals in the study. This especially concerned *Measurement 1* conducted by nurses during the preliminary period of the application of the method. An overestimation in the classification categories was also observed by staff nurses in hospitals in the study. They noted that in the beginning the data reported by individual wards showed that the patients state of health 'rapidly deteriorated'. Thus, while comparing the data from the Military Hospital in Lublin it was noted that the demand for direct care noted in the gynaecological ward in *Measurement 1* was over twice as high as in *Measurement 3*: 24.14 and 9.00 hour/day/ward respectively (Tab. 1). A similar regularity was observed in surgical and neurology wards: in *Measurement 1*: 64.19 and 23.73 and in *Measurement 3*: 34.74 and 12.22 hour/day/ward respectively. In orthopaedic and internal wards some differences to the advantage of *Measurement 1* were noted, compared to *Measurement 3*: (38.91 and 21.80 hour/day/ward and 41.57 and 36.30 hour/day/ward respectively).

A more precise analysis of the research material in the Military Hospital in Lublin revealed the reason for differences in individual wards. The greatest variation was observed while ascribing a number of patients into individual categories of care by the nurses. This concerned a frequent classification of patients into Category IV of care (*Measurement 1*) irrespectively of the objective condition of patients, with a low frequency of classification into this category according to the evaluation of patients' state of health within the criteria of care adopted (*Measurement 3*). In *Measurement 1*, nurses from the hospital in Lublin classified patients from gynaecology (10.20%), laryngology (2.91%) and neurology (4.77%) wards into Category IV of care, whereas the research team did not record any cases justifying classification into this category of care. The differences were also ob-

served in the classification of patients into the remaining categories of care in *Measurements 1 and 3*. According to the research team, patients in Category II of care constituted 84% in general (*Measurement 3*), whereas according to nurses' records – 27% (*Measurement 1*).

Slightly smaller differences in the records of time in individual measurements were noted in the Military Hospital in Przemyśl (Tab. 2). Only in the urology ward was the T_{dir} time in *Measurement 1* almost one and a half time higher (22.85) than in *Measurement 3* (15.08 hour/day/ward). In the remaining wards, the differences noted between *Measurements 1 and 3* were higher by 1/3rd to the advantage of *Measurement 1*. In *Measurement 3*, the research team significantly more often ascribed patients to Category I, compared to nurses in *Measurement 1*. A characteristic feature in *Measurement 3* was the percentage of patients decreasing from Category I to Catagory IV of care, with the highest values noted in Categories I and II. The records of the research team contained less patients in Category II than in those collected by nurses. A higher percentage of patients in Category II of care in the *Military Hospital in Przemyśl* resulted from the fact that, according to nurses, Category II prevailed over Category I, whereas an opposite situation was noted by the research team. According to nurses' records (*Measurement 1*) the differences between Categories I and II were not always clearly visible.

In the Military Clinic Hospital in Cracow an analysis of *Measurements 1 and 3* in the gynaecology ward showed that the time needed for direct care was over three times higher in *Measurement 1* than that determined in *Measurement 3* – 13.76 and 4.86 hour/day/ward respectively (Tab. 3). In the urology, neurology and orthopaedic wards the data recorded in *Measurement 1* were more than 1/3rd higher, compared to *Measurement 3*: 22.62; 39.53; 57.47 and 12.97; 27.48; 39.30 hour/day/ward respectively. An analysis of the number of patients ascribed to individual categories of care indicated that also in the Cracow Clinic nurses classified a significantly higher percentage of patients into Category IV of care, compared to the research team. With respect to the following wards: gynaecology, ophthalmology, tubercular and lung diseases patients were ascribed Category IV of care only by the team of nurses – 7.4%; 2.6%, and 4.76% respectively. In some wards of the Cracow clinic, similar to military hospitals in Lublin and Przemyśl, differences were also noted in the percentage of patients who were ascribed Category I of care.

Tab. 1. Demand for direct nursing care in the Military Hospital in Lublin (hour/day/ward)

No.	Ward	Measurement		
		1	2	3
1	Internal diseases	41.57	43.41	36.30
2	Gynaecology	24.14	15.30	9.00
3	Orthopaedic	38.91	33.09	21.80
4	Surgical	65.19	58.19	34.74
5	Infections diseases	14.73	11.83	10.54
6	Laryngology	18.10	11.85	11.94
7	Dermatology	15.08	10.45	12.67
8	Neurology	23.73	17.95	12.22
Mean		30.18	25.25	18.65
Test function		Probability		Significance
1.083		$p > 0.05$		lack

Tab. 2. Demand for direct nursing care in the Military Hospital in Przemyśl (hour/day/ward)

No.	Ward	Measurement		
		1	2	3
1	Urology	22.85	18.79	15.08
2	Laryngology	9.50	7.98	5.77
3	Orthopaedic	19.53	13.93	13.33
4	Dermatology	11.68	7.89	8.39
5	Surgical	34.39	21.02	22.26
6	Neurology	15.48	8.98	9.26
7	Internal diseases	28.95	21.26	18.19
Mean		20.34	14.25	13.18
Test function		Probability		Significance
2.034		$p > 0.05$		lack

Tab. 3. Demand for direct nursing in the Military Clinic in Cracow (hour/day/ward)

No.	Ward	Measurement		
		1	2	3
1	Internal diseases I	20.75	21.89	21.70
2	Internal diseases II	26.02	26.77	25.56
3	Neurology	39.53	26.14	27.48
4	Dermatology	10.15	10.53	10.05
5	Laryngology	14.22	13.03	13.10
6	Infections diseases	11.09	12.82	10.59
7	Surgical	32.32	34.43	25.06
8	Orthopaedic	57.47	44.03	39.30
9	Gynaecological	13.76	10.44	4.86
10	Urology	22.62	20.77	12.97
11	Ophthalmology	17.25	13.09	12.14
12	Tuberculosis and pulmonary diseases	16.28	9.67	9.13
Mean		23.45	20.30	17.66
Test function		Probability		Significance
0.735		$p > 0.05$		lack

Tab. 4. Analysis of variance for comparison of mean values from Measurements 1, 2, 3. In hospital wards in Lublin, Przemyśl and Cracow – in general

Measurement	Mean values	Test function	Probability	Significance
1	24.65			
2	19.93	2.823	$p > 0.05$	lack
3	16.49			

An analysis of *Measurement 2* carried out by individual wards of the three military hospitals was closest to the records obtained for *Measurement 3* by the research team. In both measurements the classification was conducted during the same period by nurses and researchers. This allowed the grasping and correction of the most frequent mistakes during the classification of patients by nurses, and also enabled providing them with information. The reason for the overestimation in ascribing patients to categories of a higher demand for care, was because of subjective evaluations by nurses and not by objective criteria. For example: a patient evaluated on a given day as "the most severe" obtained the highest category of care, although this was not justified by his condition. This fact was grasped while carrying out joint classification both by nurses and a member of the research team in *Measurement 3*.

The material collected was subject to statistical analysis in order to determine if the above – quoted differences between individual *Measurements* were statistically significant for individual hospitals. The method of single analysis of variance was applied in order to compare mean values obtained in *Measurements 1, 2, 3* for the Military Hospitals in Lublin, Przemyśl and Cracow, as well as the general data (Tab. 4).

A statistical analysis showed, with the probability of $p. > 0.05$, that no significant differences were observed between mean values from three *Measurements* for the military hospitals in Lublin, Przemyśl and Cracow, and between mean values for all the hospitals in the study.

DISCUSSION

Based on the analysis of research material in Polish hospitals, similar to the hospitals abroad, overestimation of data concerning the direct nursing time should be considered while introducing the classification of patients, especially during the preliminary period of functioning of this new planning method (11). For instance, according to nurses in surgical ward of the Military Hospital in Lublin 8 duties of 8–hour each should be provided only for the needs of direct care (*Measurement 1* – 65.19 hour/day/ward), whereas according to the research team – 4 duties of 8–hour (*Measurement 3* – 34.74 hour/day/ward). A similar situation, though on a smaller scale, was observed in gynaecological and neurology wards (*Measurement 1* – three 8–hour duties, *Measurement 3* one or one and a half 8–hour duty). In the Military Hospitals in Przemyśl and Cracow significantly smaller differences were noted in the data from nurses and the research team.

An analysis of the research material showed overestimation of demands for staff reported by nurses. This demand was highest during the preliminary period of application of the PCS method;

however, it decreased with time as the employees became used to this method of planning. Making nurses aware that the average time devoted to direct nursing in Polish hospitals constitutes about 30% of the working shift, helped to obtain more reliable results, and that actually the auxiliary time, depending on the number of beds, as well as the bed usage index, decides about the staffing. Overestimation of data may be counteracted by changes in the employment structure in the hospital, which would consider the position of an assistant for matters of quality of nursing care. Such a situation would allow the monitoring of the quality of services, as well as the verification of the demand for care as reported by individual wards.

CONCLUSIONS

1. In the preliminary period of its application, the introduction of the PCS method causes an overestimation of reported demands due to the fear of staff reduction in a ward.

2. Differences resulting from overestimation of the demand for staff are not statistically significant for a hospital as a whole. However, with reference to individual wards these differences may constitute an organisational problem in cases of great discrepancies between time reported by workers and actual needs.

3. In order to obtain reliable data the employment of assistants for nursing care quality should be considered, who would be subordinate to the staff nurse, and who would periodically verify data reported by wards.

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STRESZCZENIE

Optymalizacja zatrudnienia kadr medycznych wymaga stosowania metod pozwalających na planowanie obsad, stosownie do rzeczywistego zapotrzebowania chorych na opiekę. Metody te muszą być dostosowane do warunków organizacyjnych danego kraju. Weryfikacja zachodnich metod planowania, tzw. Patient Classification System, wykazała zawyżanie w krajowych szpitalach potrzeb kadrowych w początkowym okresie jej stosowania. Przeciwdziałaniem temu zjawisku może być zatrudnianie asystentów do spraw jakości opieki, okresowo weryfikujących dane zgłaszane przez poszczególne jednostki, niezależnych od osób kierujących oddziałami szpitalnymi.