

# Zapotrzebowanie na opiekę pielęgniarską pacjentów geriatrycznych hospitalizowanych na Oddziałach Intensywnej Terapii w oparciu o skalę NEMS

## Demand for nursing care from elderly patients hospitalised in Intensive Care Units, based on the Nine Equivalentents of the Nursing Manpower Use Score (NEMS scale)

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### Streszczenie

**Wstęp.** Zwiększanie się liczby pacjentów w podeszłym wieku hospitalizowanych na OIT stanowi podstawę do podejmowania prób związanych z oceną różnic w zakresie oceny zapotrzebowania na opiekę pielęgniarską tych pacjentów w odniesieniu do innych chorych. **Cel badań.** Celem badań była próba odpowiedzi na pytanie jakie jest zapotrzebowanie na opiekę pielęgniarską pacjentów w podeszłym wieku w porównaniu do pacjentów w młodszym wieku. **Materiał i metoda.** W badaniach wykorzystano metodę klasyfikacji pacjentów w oparciu o skalę NEMS. Badaniami objęto 170 kart oceny skali NEMS chorych hospitalizowanych na dwóch losowo wybranych oddziałach intensywnej terapii w Lublinie.. W tej grupie 110 dotyczyło osób w wieku powyżej 60 lat, a 60 były to osoby poniżej 60 roku życia. **Wyniki.** Wśród pacjentów w wieku podeszłym 100% miało wykonywane jedynie czynności zaliczane do kryterium: monitorowanie podstawowe, a u 81,82% realizowano czynności z zakresu leczenia lekami podawanymi drogą dożylną. Stwierdzono, że pacjenci w wieku podeszłym rzadziej wymagali opieki pielęgniarskiej w :leczeniu lekami podstawowymi drogą dożylną, mechanicznym wspomaganiu oddechu, dodatkowej terapii oddechowej i interwencjach specyficznych w OIT. Średnia punktacja skali NEMS dla osób w podeszłym wieku wyniosła 27,80 punktów. **Wnioski.** Zapotrzebowanie na opiekę pielęgniarską pacjentów w podeszłym wieku hospitalizowanych na OIT jest istotnie niższe niż w przypadku pacjentów młodszych. Stwierdzono występowanie istotnej statystycznie zależności pomiędzy zapotrzebowaniem na opiekę pielęgniarską w oparciu o skalę NEMS pacjentów w podeszłym wieku w zależności od wieku, płci, doby hospitalizacji, miejsca zamieszkania oraz rozpoznania lekarskiego. (Gerontol Pol 2015, 1, 143-58)

**Słowa kluczowe:** pacjent geriatryczny, Oddział Intensywnej Terapii, opieka pielęgniarska, skala NEMS

### Abstract

**Background.** An increase in the number of elderly patients admitted at Intensive Care Units induces attempts at assessing differences between evaluating such patients` demand for nursing care and evaluating nursing care demand in other patient groups. **Aims.** The research aimed at attempting to answer what elderly patients` demand for nursing care is in comparison with younger patients. **Methods.** The investigation made use of the patient classification method based on the Nine Equivalentents of Nursing Manpower Use Score [NEMS]. The research involved 170 NEMS assessment charts of patients ad-

mitted at two randomly selected intensive care units in Lublin. Within this research cohort, 110 charts were from patients over 60, whereas 60 patients were under 60 years of age. **Results.** 100% of elderly patients received medical treatment ascribed to the "basic monitoring" criterion, whereas 81.82% were provided with treatment classified within the scope of intravenous medication. Elderly patients were found to demand nursing care less often in: medical treatment with basic intravenous medication, mechanical breathing support, extra breathing support and specific interventions in Intensive Care Units. The mean Nine Equivalents of Nursing Manpower Use Score for elderly patients averaged out at 27.80 points. **Conclusions.** Demand for nursing care from elderly patients hospitalized at intensive care units was significantly lower than that from younger patients. A statistically significant difference was found in elderly patients' demand for nursing care based on the NEMS scale, depending on gender, days of hospitalization, patient's place of residence and a medical diagnosis. (*Gerontol Pol* 2015, 1, 143-58)

**Key words:** geriatric patient, Intensive Care Unit, nursing care, NEMS scale

## Introduction

A lack of systemic solutions for organising care for elderly people in modern healthcare systems is a cause for concern. Despite the common knowledge of demographic data indicating an increase in the proportion of people over 60 to the total number of people in contemporary populations, it is commonly felt that there are not enough hospital units taking care of the elderly. Unfortunately, this phenomenon has also occurred in Intensive Care Units, where the number of elderly patients has been systematically increasing [1-3]. Specific character of patient's cases resulting both from physiological and pathological changes occurring during the old age causes elderly patients' problems to stay unnoticed and Intensive Care Units make a good example of this phenomenon. Demand for healthcare services, including nursing care from elderly patients might differ for various patient cohorts. Patient classification method based on the NEMS scale naturally lends itself to the specification of such a demand for the sake of nursing care organisation [4,5]. This method allows to measure the workload on Intensive Care Unit nurses. It may also be used to plan a necessary number of nurses depending on patients' demand [5-9]. It was created as an improved version of the previously used TISS-28 scale [8]. The research administered by other authors confirmed a high correlation between these two scales [4,9].

## Aims

The research aimed at attempting to answer what elderly patients' demand for nursing care is in comparison with younger patients.

## Materials and method

The investigation used the patient classification method based on the NEMS scale. This involved the follow-

ing assessments: basic monitoring, treating with basic medicine, mechanical respiration support, extra respiration therapy, treatment with vascular active medicine, using dialysis techniques, specific interventions at ICUs and specific interventions outside ICUs [6,8]. Investigated patients could score from 3 to 12 points on the NEMS scale. The maximum score a patient can obtain within 24 hours is 63 points. According to the NEMS scale, a nurse may collect from 40 to 50 points during a single shift whereas at Polish ICUs the score averages at 53.2 points [4,10,11].

The study was administered at two randomly selected wards: i.e. the anaesthesiology unit of the Internal Affairs and Administration Ministry Hospital in Lublin and Intensive Care Unit of the District Railway Hospital in Lublin. The investigation took place after obtaining approvals from authorities of respective hospitals. Studies were conducted in compliance with the Declaration of Helsinki. Patients' state was assessed on a daily basis at regular intervals.

The average value, median and standard deviation were all used to present values of investigated measurable parameters in the statistical analysis, whereas the amount and proportion were used for non-measurable parameters. Distribution normality of investigated parameters was evaluated by means of the W Shapiro-Wilk test for measurable features. The U Mann-Whitney test was used to compare both independent groups. The Kruskal-Wallis test was used to compare more than two groups. The R Spearman correlation was used to investigate the correlation between the two variables. The  $\chi^2$  independence test was used to check whether there was a correlation between investigated features. The  $p < 0.05$  relevance level was adopted that indicated occurrence of statistically significant differences or correlations. The database and statistical research was administered on the basis of the STATISTICA 8.0 (StatSoft, Poland) computer software.

The investigation made use of 170 assessments of patients hospitalised at Intensive Care Units on the basis of the NEMS scale. Within this research cohort, 110 assessments were made for people over 60 years of age and 60 for patients younger than 60 (table I). As far as medical diagnosis is concerned that was the cause for a hospitalisation at an Intensive Care Unit, the most common diagnosis for those over 60 years of age was a cardio-respiratory insufficiency – 36.36% (40 cases). A state resulting from a cerebral stroke, sudden cardiac arrest, cardio-respiratory insufficiency following a surgery each caused the hospitalisation of 18.18% (each was responsible for 20 cases) of this cohort.

### Results

100% of the cohort comprised of elderly patients underwent actions ascribed to one of the basic monitoring criteria: i.e. hourly measurement of vital parameters and calculating the water balance. 81.82% were treated with intravenous medication, either in the form of a single injection or a continuous infusion. These patients had the fewest procedures belonging to the group of specific

ICU interventions, e.g. intra-tracheal intubation, electrical stimulation of the heart, etc. – 3.64%. 100% of younger patients had their basic functions monitored and they were treated intravenously with basic medications. Unlike in cases of elderly patients, procedures from the scope of specific interventions taking place outside an ICU were performed most rarely – in the 5.00% of the cohort. In result of administering the statistical analysis patients from the younger cohort were found to demand nursing care considerably more often in: intravenous treatment, mechanical respiration support, and additional respiratory therapy, as well as specific ICU interventions (table II).

Elderly people averagely scored 27.80 points on the NEMS scale and the median was 30.00. The younger group scored more highly averaging out at 34.32 points, their median being 34.00. Having analysed the data statistically, it was found that the demand for nursing care on the basis of the NEMS scale was significantly higher among patients below 60 years of age than in the cohort comprised of the elderly  $Z = 4.60$ ;  $p = 0.000004^*$ . Statistical analysis proved both males from the elderly group and females from the younger group to have si-

**Table I. Correlation assessment of average NEMS scores in investigated groups, taking account of respective variables.**

**Tabela I. Ocena zależności średniej oceny w skali NEMS w badanych grupach z uwzględnieniem poszczególnych zmiennych.**

Variable		Patients over 60 years of age				Patients under 60 years of age			
		Average numerical score	Median	N	%	Average numerical score	median	N	%
Patients' age	60-65 /to 30	30.98	33.00	40	36.36	36.67	34.00	15	25.00
	66-81/ 31 - 48	31.72	34.00	40	36.36	35.13	35.00	15	25.00
	Over 81/ 49-59	18.33	9.00	30	27.27	32.93	34.00	30	50.00
Statistical analysis		H = 9.18; p = 0.01*				H = 11.37; p = 0.003*			
Gender	Females	18.33	9.00	30	27.27	36.67	34.00	15	25.00
	Males	31.35	34.00	80	72.73	33.67	34.00	45	75.00
Statistical analysis		Z = - 2.82; p = 0.005*				Z = 2.49; p = 0.01*			
Number of hospitalisation days	1-7	34.55	34.00	20	18.80%	34.00	32.00	6	10.00
	8-14	32.24	34.00	25	22.73%	34.26	34.00	19	31.67
	15-21	30.37	27.00	27	24.55%	33.53	34.00	17	28.33
	22-28	30.86	30.50	14	12.73%	37.67	39.00	3	5.00
	Over 28	12.88	9.00	24	21.82%	35.13	35.00	15	25.00
Statistical analysis		H = 51.14; p < 0.0001*				H = 4.59; p = 0.33			
Place of residence	Urban dwellers	24.99	27.00	80	72.73%	35.90	34.50	30	50.00
	Rural dwellers	35.30	34.00	30	27.27	32.93	34.00	30	50.00
Statistical analysis		Z = - 6.52; p < 0.00001*				Z = 3.81; p = 0.001*			

Table II. Analysis of the occurrence of individual NEMS scale elements in individual patients

Tabela II. Analiza występowania poszczególnych elementów skali NEMS u badanych chorych.

No.	Position on the scale	Patients over 60 years of age		Patients under 60 years of age		Statistical analysis
		N	%	N	%	
1.	Basic monitoring: hourly measurement of vital parameters, calculating liquid balance.	110	100.00	60	100.00	–
2.	Intravenous treatment with basic medicines: either in the form of a single injection or a continuous inflow. This position does not include treating with vascular active medicines.	90	81.82	60	100.00	Chi2 = 12.36 p = 0.0004*
3.	Mechanical respiration support: all forms of mechanical ventilation/ supported / with or without the use of muscle relaxants.	60	54.55	45	75.00	Chi2 = 6.88 p = 0.009*
4.	Additional respiratory therapy: spontaneous breathing via an intra-tracheal tube, passive oxygen therapy (apart from procedures referred to in point 3).	23	20.91	22	36.67	Chi2 = 4.95 p = 0.03*
5.	Treatment with a single vascular active medicine: every type of vascular active medicine.	50	45.45	32	53.33	Chi2 = 0.97 p = 0.33
6.	Treatment with several vascular active medicines: more than one vascular active medicine (in any dose).	20	18.18	16	26.67	Chi2 = 1.67 p = 0.20
7.	Using dialysis techniques: all types of techniques.	10	9.09	5	8.33	Chi2 = 0.03 p = 0.87
8.	Specific interventions in ICUs: intra-tracheal intubation, electrical heart stimulation, endoscopy, sudden surgery performed within 24 hours, stomach rinse, this position does not include routine procedures, such as electrocardiography, dressing changes, an arterial or venous line.	4	3.64	19	31.67	Chi2 = 26.07 p < 0.00001*
9.	Specific interventions outside ICUs: surgeries or diagnostic procedures, undertaking treatment or diagnostic procedures related to a severity of patients' conditions and requiring an increased workload from the personnel.	11	10.00	3	5.00	Chi2 = 1.28 p = 0.26

gnificantly higher demand for nursing care, respectively  $p = 0.005^*$  and  $p = 0.01^*$ .

There was also a strong correlation between the number of elderly patients' hospitalisation days and their demand for nursing care. The longer their stay at ICUs the lower their demand ( $R = -0.66$ ;  $p < 0.000001$ ). Higher average NEMS scores were obtained by elderly patients from the rural background – 35.30, and for those below 60 years of age – 35.90. The highest average NEMS score was reported for elderly patients with acute renal insufficiency, (average = 37.00; median = 37.00) and with cardio-respiratory inefficiency, (average = 34.35; median = 34.00). Carrying out a statistical analysis allowed to discover statistically significant differences in the demand for nursing care between groups with various diagnosis among patients older than 60 years of age, ( $H = 101.45$ ;  $p < 0.001$ ). In the control group, the highest demand for nursing care was reported for patients with multi-organ injuries (average = 36.67; median = 34.00).

## Discussion

In case of patients hospitalised in Intensive Care Units, patients' advanced age for a long time used to be considered one of the key factors contributing to increased mortality. At the same time, one must remember that Intensive Care Units' resources are insufficient and the numbers of patients older than 60 hospitalised at ICUs has been systematically increasing [12-14]. This very often hinders making a decision to hospitalise such patients at ICUs. This is due to the fact that there is no guarantee that using extremely expensive and complicated procedures will bring expected results within the scope of decreasing patients' mortality rates. It was only in recent years that age per se turned out not to be a major factor increasing patients' mortality risk [15]. Survival rates for populations of elderly and young patients proved to be similar [12]. Research by other authors showed that some procedures were more rarely administered in the former group [13]. Hence, attempts were made to specify this phenomenon on the basis of the NEMS scale. Differences in the frequency of administering interventions which are within the focus of this scale

in cases of elderly and younger patients turned out not to be statistically significant within the scope of basic monitoring, treating with a single vascular active medicine, treating with several vascular active medicines, using dialysis techniques, and specific interventions administered outside ICUs. Such differences occurred in case of intravenous treatment with basic medicines, mechanical respiration support, additional respiratory therapy and specific interventions administered at ICUs. This means that people over 60 years of age have these procedures administered more rarely. This might be caused by improvements in their health state, or by resigning from undertaking certain actions because of difficulty in specifying their efficiency in a therapeutic process, or by decreasing elderly patients' quality of life [1,2]. Results obtained by other patients were not homogeneous when it comes to the frequency of undertaking basic interventions for elderly patients according to the OMEGA scale. According to some authors, this number is higher, however, others actually reported it to be lower [16]. At the same time, other research proves these patients not to be afraid of deteriorating their quality of life, on the contrary, they expect specific actions to be taken during their intensive care, moreover, the majority of such patients would decide to repeat their hospitalisation in an ICU if their health state required such actions [12,17].

Intensive nursing care is a key element in general intensive care. Hence it is crucial to recognise the demand for nursing care from elderly patients, which might allow these units to use human resources effectively and properly. The NEMS scale is a tool that makes it possible to assess this phenomenon. The demand for nursing care for elderly patients on the basis of this scale averaged out at 27.80 points. This is the score that is similar to those reported for the general population of patients hospitalised in other Polish ICUs, which range from 25.7 to even 37.17 points [11,18]. Patients of Western European healthcare systems also typically obtain scores within the aforementioned range, their scores ranging from 25.8 to 30.3 points [19,20].

Carrying out the statistical analysis allowed to discover a strong correlation between the number of hospitalisation days of elderly patients and their demand for nursing care based on the NEMS scale. The longer their stay at ICUs, the smaller their demand for nursing care [3]. Other authors observed similar phenomenon while they were using the OMEGA scale within the scope of therapeutic activities in ICUs [13].

Higher average NEMS scores were obtained by elderly patients with the rural background – 35.30 and by people younger than 60 than those with urban background (35.90). In both research cohorts, a statistically significant correlation was found between the place of residence and their demand for nursing care, respectively  $p < 0.000001^*$  and  $p = 0.001^*$  (table I).

Similarly to research results obtained by other authors investigating elderly patients hospitalised at ICUs, the majority were males [8,15]. They exhibited significantly higher nursing care demand than females. Such a phenomenon might result from the fact that male population suffers from more conditions that might prove ICU hospitalisation necessary. Nevertheless, other authors report an increased demand to be rather typical of elderly females [14]. The greatest average NEMS scores were reported for elderly patients with acute renal insufficiency. According to research by other authors major hospitalisation causes for elderly patients include cardiovascular and respiratory conditions [14,16]. Authors are aware of their findings' constraints that might result from a limited research range and their choice of the research tool. Nonetheless, one may hope this work to start or contribute to a discussion on assessing a demand for nursing care for this specific care group in Polish healthcare institutions.

## Conclusions

1. Demand for nursing care from elderly patients hospitalised at ICUs is significantly lower than that from younger patients.
2. Procedures which are most often administered for elderly patients on the basis of the NEMS scale include basic monitoring and intravenous treatment with basic medicines either in a form of a single injection or a continuous infusion.
3. A statistically significant correlation was found between the demand for nursing care based on the NEMS scale from elderly patients depending on their gender, number of hospitalisation days, their place of residence and a medical diagnosis.

## Conflict of interest

None

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