

FIGHT AGAINST MALNUTRITION (FAM). SELECTED RESULTS OF 2006 - 2012 NUTRITION DAY SURVEY IN POLAND

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ABSTRACT

Background. Prevalence of malnutrition among hospitalized patients is a common issue increasing the morbidity and mortality rate. In response to the aforementioned problem the European Society for Clinical Nutrition and Metabolism (ESPEN) stated an action plan to fight malnutrition and created in 2004 the global health project named NutritionDay (nD) - a single-day, population based, standardized, multinational cross-sectional audit which is performed worldwide in hospitals and nursing homes.

Objectives. To present selected NutritionDay (nD) results from Poland describing the nutritional situation of hospitalized patients in 2006 – 2012 compared to other countries participating in nD study.

Material and Methods. Data were collected in nD study through voluntary participation all over the world during seven years - from 2006 to 2012. Data collection was performed on ward level by staff members and patients using standardized questionnaires. The data were analyzed by the Vienna coordinating centre using the Structured Query Language ("my SQL") - an open source relational database management system as well as the Statistical Analysis System version 9.2 (SAS).

Results. In Poland 2,830 patients were included in the study during a 7-year survey, while 5,597 units recruited 103,920 patients in the world (nD reference). About 45% of the patients had a weight loss within the last 3 months prior to admission (same for nD references); 58.34% reported a decrease in eating during last week (54.85% in case of nD references). Food intake at nD illustrated that 60.55% of the patients ate half to nothing of the served meal (58.37% in the case of nD references). For both Poland and other countries participated in audit at the time of detection of malnutrition on the half of hospital wards wasn't reported any action aimed at combating this phenomenon.

Conclusions. Malnutrition of hospitalized patients in Poland was found comparable to the rest of the world. These results reflects the fact that malnutrition is a common issue among hospitalized patients all over the world and it would be recommended to continue the action plan to fight against malnutrition commenced by the European Society for Clinical Nutrition and Metabolism (ESPEN) on international and national level.

Key words: *malnutrition, disease-related malnutrition, fight against malnutrition*

STRESZCZENIE

Wprowadzenie. Występowanie niedożywienia wśród hospitalizowanych pacjentów jest zjawiskiem powszechnym, przyczyniającym się do zwiększenia stopnia powikłań i śmiertelności. W odpowiedzi na ten problem, Europejskie Towarzystwo Żywności Klinicznej i Metabolizmu (ESPEN) w 2004 roku utworzyło ogólnoświatowy projekt zdrowotny NutritionDay (nD), będący jednodniowym, dobrowolnym i wystandaryzowanym badaniem przeprowadzonym na całym świecie.

Cel. Celem pracy było zaprezentowanie wybranych wyników badania NutritionDay (nD) przeprowadzonego w Polsce w latach 2006 - 2012, obrazujących występowanie czynników ryzyka niedożywienia szpitalnego na tle innych krajów uczestniczących w projekcie.

Material i metody. Dane do projektu nD zbierane były na całym świecie w okresie od 2006 do 2012 roku. Udział w tym badaniu był dobrowolny i polegał na wypełnieniu wystandaryzowanych kwestionariuszy przez pacjentów oraz personel medyczny oddziału uczestniczącego w badaniu. Wszystkie dane uzyskane podczas badania zostały przeanalizowane w biurze projektu nD znajdującym się w Wiedniu, przy pomocy systemu SAS wersja 9.2.

Wyniki. W Polsce do badania nD przystąpiło 2.830 pacjentów z 5.597 jednostek medycznych, natomiast na świecie badaniem objęto 103.920 respondentów. Zarówno w Polsce jak i w innych krajach uczestniczących w badaniu ok. 45% pacjentów zgłaszało utratę masy ciała w ciągu ostatnich 3 miesięcy, a w przypadku ok. 60% respondentów z Polski oraz ok. 55% z całego świata odnotowano zmniejszoną podaż pożywienia w tygodniu poprzedzającym badanie. W dniu przeprowadzania badania nD odnotowano, że 60,55% pacjentów hospitalizowanych na polskich oddziałach szpitalnych spożyło mniej

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niż połowę podanego posiłku, z kolei w pozostałych krajach uczestniczących w projekcie odnotowano ten fakt w przypadku 58,37% respondentów. Zarówno w polskich oddziałach szpitalnych jak i w innych krajach, w momencie rozpoznania niedożywienia, na około połowie z nich nie zostały podjęte żadne kroki mające na celu przeciwdziałanie temu zjawisku.

Wnioski. Skala niedożywienia pacjentów hospitalizowanych na polskich oddziałach szpitalnych jest porównywalna z innymi państwami uczestniczącymi w badaniu. Wynik ten zwraca uwagę na fakt, że niedożywienie jest zjawiskiem powszechnie występującym w środowisku szpitalnym na całym świecie. Dlatego też konieczna jest kontynuacja prowadzenia badań w ramach projektu nD powstałego z ramienia Europejskiego Towarzystwa Żywienia i Metabolizmu.

Słowa kluczowe: niedożywienie, niedożywienie związane z chorobą, walka z niedożywieniem

INTRODUCTION

Disease-related malnutrition is a critical public health concern in Europe costing the EU governments up to 120 billion Euros every year [5, 15]. Malnutrition is caused primarily by poor nutrient intake when patients in hospitals or people in the community settings fail to meet their daily need for energy, protein and micronutrients and is further frequently observed in chronic and acute diseases. Malnutrition significantly increases morbidity, mortality, hospital readmissions' rate and length of hospital stay. The prevalence of malnutrition reaches 20-60% of hospitalized patients but it may deteriorate during hospital stay – this phenomena is called 'hospital malnutrition' (7-16%).

[1, 3, 6, 7, 9 10]. Nutritional risk may not only vary due to medical or geographical settings but also because of the different patient population admitted to the hospital and different criteria for diagnosing malnutrition [5].

Unfortunately, the problem of malnutrition often passes unnoticed or untreated. The European Society for Clinical Nutrition and Metabolism (ESPEN) stated an action plan to fight malnutrition. The first step was the organization of the nutritionDay (nD) annual audit in 2006. It soon became a worldwide event which resulted in gathering of unique data about the nutritional status of over 140,000 patients on almost all continents. It is to be emphasized that the major part of the results is obtained from Austria, Germany, Hungary and Belgium (Figure 1).

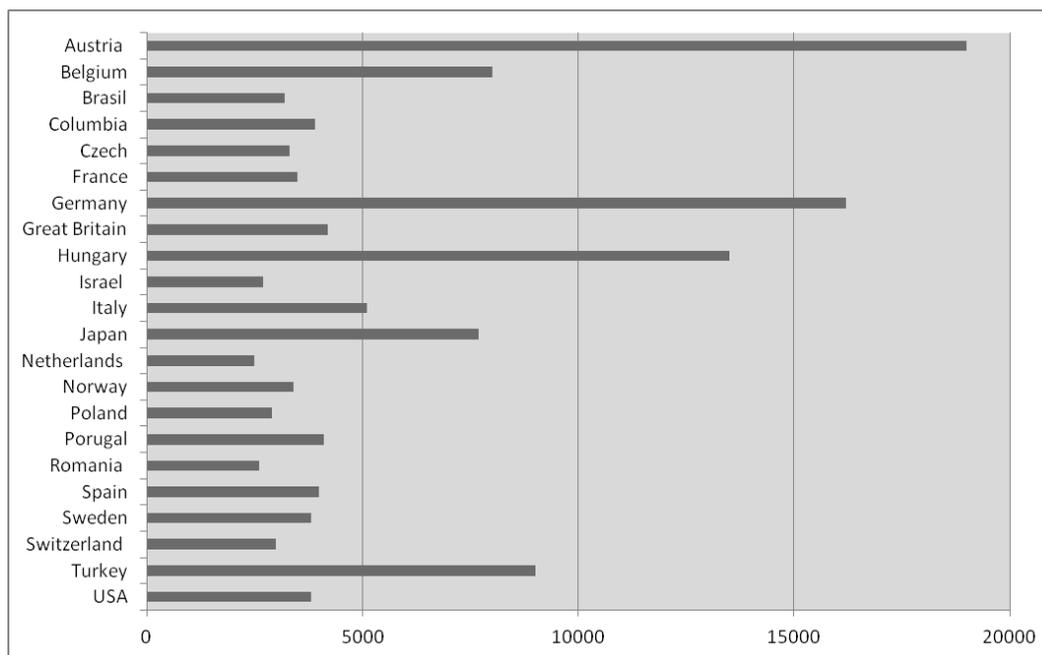


Figure 1. Number of patients from countries participating in the "NutritionDay" study in the subsequent years of the project [11]

The nutritionDay study is a single-day, population based, standardized, multinational cross-sectional audit which is performed worldwide. The nD collects and systematically assesses data of hospitals, nursing homes and ICU units, while audit for hospitals is designed for all types of hospital wards, including intermediate care, high dependency and specialized units. The project was created in close collaboration

with the European Society for Clinical Nutrition and Metabolism (ESPEN), the Austrian Society of Clinical Nutrition (AKE) and the Medical University, Vienna.

The aim of the following study was to analyse selected results from the NutritionDay survey from Poland describing the nutritional situation of hospitalized patients in 2006 – 2012 compared to other countries participating in nD study.

MATERIAL AND METHODS

This study was based on data collected in nD study all over the world during seven years - from 2006 to 2012. Participation in nD survey was voluntary and anonymous – all hospital units which has registered on the nD website were provided anonymous codes enabling participation. Data collection was performed on ward level by staff members and patients using four standardized questionnaires. During time of data collection all patients should be included in the audit and were informed via oral or written informed consent depending on local regulations. After data collection units received individual reports comparing their unit results to an international reference. The coordinating center in Vienna gained ethical approval for multicenter data collection. All unit data was accepted as reference apart from units without patient data entries and units with only one patient included. In the following the nD international reference database is referred to as “nD reference”.

The questionnaires included domains about unit structure and patients’ medical status. Structural information comprises information on unit staff, nutritional procedures applicable in the unit, screening for malnutrition on admission to the unit, type of screening tools used, weight assessment and actions in case of malnourished patients. Patients’ information comprises a demographic profile of the patient’s medical status, medical interventions and the patient’s actual diet/nutrition therapy. The patients themselves report on unintended weight loss, previous and actual food intake, social situation, physical function, drug intake and perceived health status.

In this paper selected NutritionDay results from 2006 to 2012 are presented in division on five groups: (1) General results; (2) Results regarding characteristics of patients; (3) Results concerning nutrition care structure; (4) Results regarding malnutrition risk profile; (5) The impact of selected risk factors for malnutrition on length of hospital stay.

The database management system used for nD is named “My SQL” which is a widely used open source relational database management system. Data is analyzed using the SAS. Statistical modeling is performed using descriptive statistical analysis and different regression models depending on the type of outcome. To adapt for clustering by hospitals generalized estimating equations (GEE) with exchangeable covariance structure are used. Where necessary model selection and estimation is done using p-value thresholding, bootstrapsampling and bagging.

All data analysis is done at the Department for Medical Statistics, Medical University in Vienna.

RESULTS

General results

Overall participation rates

The one-day cross-sectional nD audit in 2006 - 2012 consisted of 103,920 patients treated in 5,597 units in almost 60 countries. Most of all patients have participated in survey in 2010 (n = 16,467), while the least in 2007 (n = 10,386) (Figure 2).

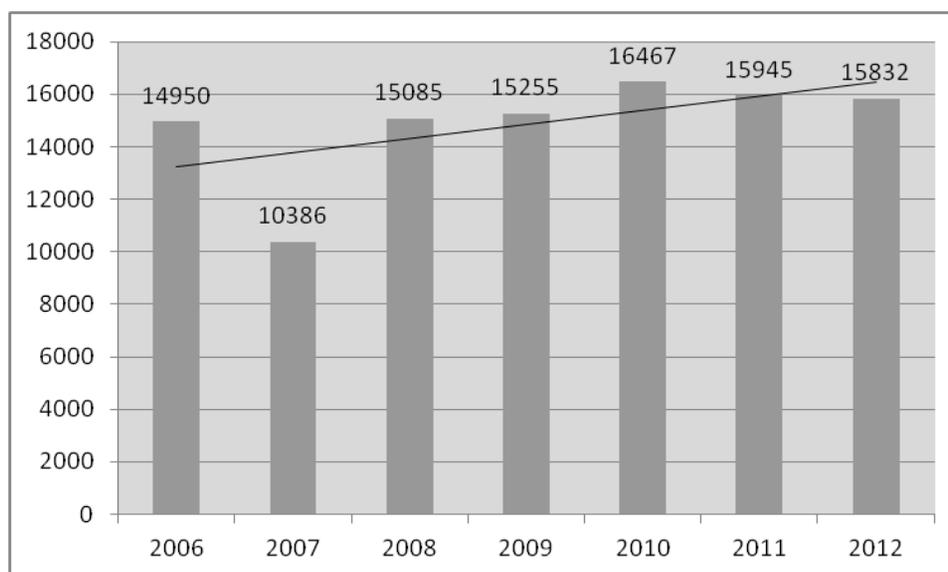


Figure 2. Number of patients participating in the NutritionDay study all over the world in 2006-2012

The national audit in Poland included a total of 2,830 patients treated in 164 units. The greatest number of respondents was recorded in 2007 (n = 599), and the lowest in 2011 (n = 54) and 2012 (n = 137) (Figure 3).

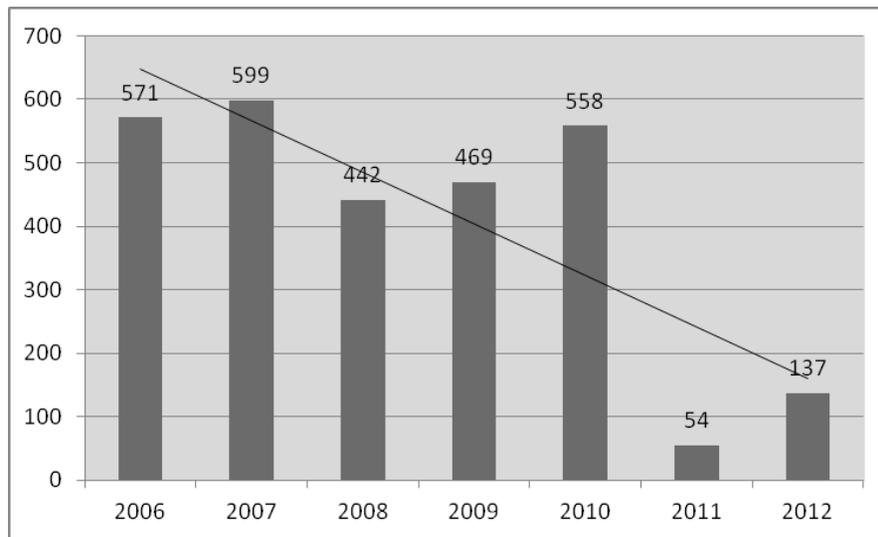


Figure 3. Number of patients participating in the NutritionDay study in Poland in 2006-2012

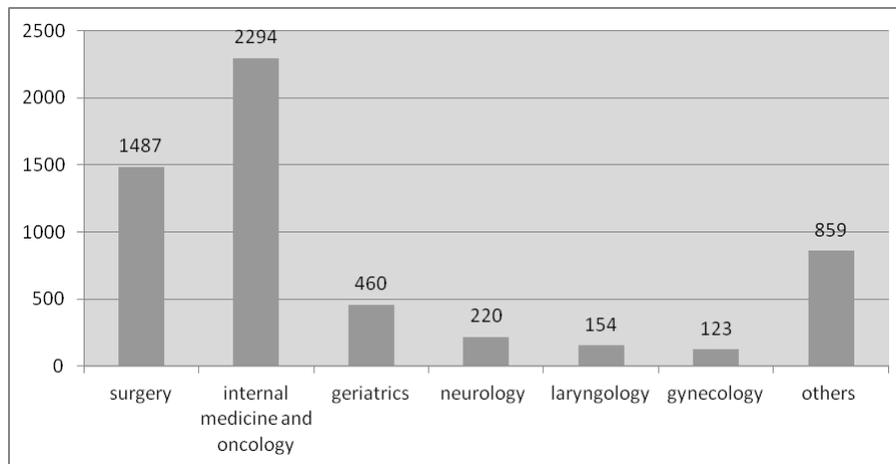


Figure 4. Types of hospital wards participating in the NutritionDay study all over the world in 2006-2012

Specialties represented in the audit

Between 2006 and 2012, 5,597 wards across the world participated in the NutritionDay survey. The participation in the project was most often reported by the general medicine and oncology wards (n = 2,294) and general surgery wards (n = 1,487) (Figure 4).

Among 164 Polish wards involved in the study in 2006-2012, the greatest number of respondents was also recorded at general surgery wards (n = 63) as well as general medicine and oncology wards (n = 54) and (Figure 5).

Results regarding characteristics of patients

Patient’s demographics was presented in Table 1.

Table 1. Basic information about the patients participating in the NutritionDay study in 2006-2012

| | NutritionDay survey in Poland in 2006-2012 | | NutritionDay survey all over the world in 2006-2012 “nD reference” | |
|-------------------------------|--|--------------------|--|--------------------|
| | N | all patients (%) | N | all patients (%) |
| Number of women | 1,432 | 50.57 | 52,168 | 50.29 |
| Number of men | 1,398 | 49.43 | 51,752 | 49.71 |
| | Median | Range | Median | Range |
| Age | 61 | 50-72 | 66 | 52-88 |
| | Mean | Standard deviation | Mean | Standard deviation |
| Average body mass Index (BMI) | 25.80 | ± 6.50 | 25.50 | ± 5.90 |

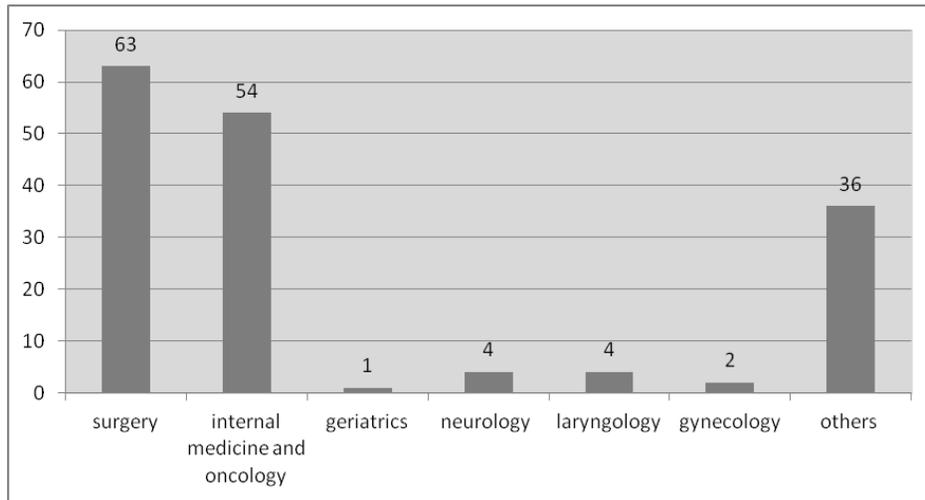


Figure 5. Types of hospital wards participating in the NutritionDay study in Poland in the years 2006-2012

Affected organs

In the case of Polish patients participating in the survey the most numerous group consisted of patients with a one affected organ (45.34%). This referred also to all respondents participating in the survey (59.89%) (Table 2).

Table 2. General health condition of patients participating in the NutritionDay study in 2006-2012

| | NutritionDay survey in Poland in 2006-2012 | | NutritionDay survey all over the world in 2006-2012 "nD reference" | |
|-------------------|--|------------------|--|------------------|
| | N | all patients (%) | N | all patients (%) |
| 1 affected organ | 1,283 | 45.34 | 62,242 | 59.89 |
| 2 affected organs | 612 | 21.63 | 23,564 | 22.68 |
| 3 affected organs | 389 | 13.75 | 13,226 | 12.73 |

Results concerning nutrition care structure

Amount of patients per unit staff

In the case of the Polish wards participating in the survey the median of patients per one doctor amounted to 2.5 and 2.9 per one nurse. The nD reference (all respondents participating in the survey) amounted to 5 patients for each doctor and 3.5 patients for each nurse (Table 3).

Person or team dedicated to nutritional care in the unit

The study conducted in Poland revealed that a dietician was present at 64% of hospital wards, whereas in the nD reference the presence of the dietician at the ward was noticed in the case of 69.38% units. Further, the study confirmed that 74.07% of all

Polish units involved in the project and 71.64% units in the nD reference had its own nutrition team.

Table 3. Number of patients per individual members of the medical staff. Based on results of the NutritionDay study in all over the world and Poland in 2006-2012

| | NutritionDay survey in Poland in 2006-2012 | | NutritionDay survey all over the world in 2006-2012 "nD reference" | |
|---|--|-------------|--|-------------|
| | Median | Range | Median | Range |
| Number of patients per one doctor | 2.50 | 1.60 – 3.80 | 5.00 | 2.50 – 9.70 |
| Number of patients per one nurse | 2.90 | 1.70 – 4.40 | 3.50 | 2.00 – 5.60 |
| Number of patients per one nursing aide | 8.50 | 5.00-14.00 | 6.80 | 4.00-12.00 |

Written guidelines or standards existing in the unit

In 25.61% units in our country nutritional care was performed according to national guidelines which was also in the case of 37.70% units in the nD reference. While in Poland local guidelines were used routinely in 42.07% units, they were applicable in 42.70% in the nD reference. Nutritional care was performed according to individual patient nutritional care plans in 58.54% units in Poland and in 63.21% units worldwide.

Nutritional screening on admission and screening tool which is used

In 2006 – 2012 nutritional screening for risk of malnutrition on patient's admission was performed in 60.37% units in Poland and in 53.81% units in the nD

reference. In Poland nutritional screening was most often performed using locally developed tools whereas the Malnutrition Universal Screening Tool (MUST)

was used least often. In the worldwide nD reference nutritional screening was most often conducted using locally developed tools (Figure 6 and Figure 7).

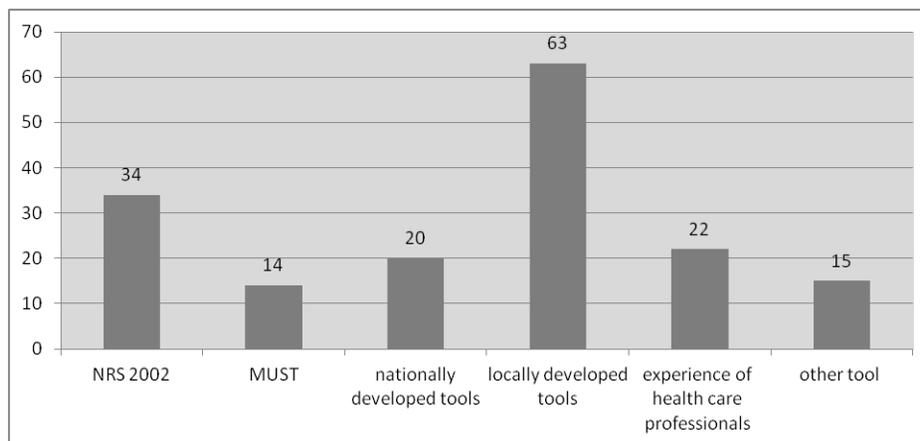


Figure 6. Number of hospital wards depending on the screening tools used to assess nutritional status. Based on the results of the NutritionDay study in Poland in 2006-2012

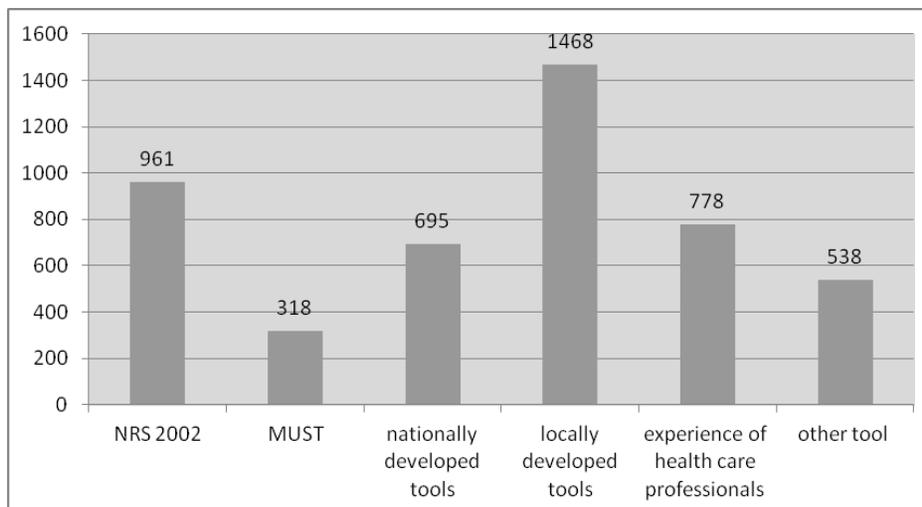


Figure 7. Number of hospital wards depending on the screening tools used to assess nutritional status. Based on the results of the NutritionDay study in all over the world in 2006-2012

Involvement of nutrition related staff in case of malnutrition

In case a patient was at nutritional risk in our country nutrition related staff was involved in 50.37%. Thus, still in 49.63% cases nutritional staff was not involved. In this period in our country units most often developed an individual nutrition care plan. The nD reference showed that 47.00% hospital units called nutrition related staff when the patient was at nutritional risk. Consequently, in 53.00% of all units nutrition related staff was not involved. In this period in the case of all countries participating in the survey, on a hospital wards most often were developed an individual nutrition care plan.

Weight assessment

In Poland 71.95% of all units indicated that the mass of the patients was registered on admission to the hospital. The above mentioned action was applied also by 65.41% units in the nD reference. Moreover, in Poland, 31.01% units declared that patients were weighed on a weekly basis, 14.02% recorded the patient's mass occasionally and 36.59% units only when it was requested. Nonetheless, in Poland 1.83% of all units indicated that the mass of the patients has never been recorded, whereas in the nD reference the above mentioned referred to 2.54% (Table 4).

Table 4. Number of hospital wards depending on measurement frequency of patients' body weight. Based on results of the NutritionDay study in all over the world and Poland in 2006-2012

| | NutritionDay survey in Poland | | NutritionDay survey all over the world "nD reference" | |
|--|-------------------------------|------------------------|---|------------------------|
| | N | all hospital wards (%) | N | all hospital wards (%) |
| Number of hospital wards in which patient is weighed on admission | 118 | 71.95 | 3,661 | 65.41 |
| Number of hospital wards, in which patient is weighed once a week | 51 | 31.10 | 1,950 | 34.84 |
| Number of hospital wards, in which patient is weighed occasionally | 23 | 14.02 | 631 | 11.27 |
| Number of hospital wards in which patient is weighed on demand | 60 | 36.59 | 2,969 | 53.05 |
| Number of hospital wards in which patient is never weighed | 3 | 1.83% | 142 | 2.54 |

Nutritional support

In our country ordinary hospital food without additional nutritional support was served to 57.92% patients according to the caregivers. 14.03% patients received hospital food but modified according to a special diet, 3.78% were taking only supplements and 20.18% were on enteral, parenteral nutrition or both.

In the nD reference ordinary hospital food without additional nutritional support was served to 60.74% patients. 19.26% patients received hospital food but modified according to a special diet, 8.03% were taking only supplements and 14.56% were on enteral, parenteral nutrition or both.

Results regarding malnutrition risk profile

In the nD audit nutritional risk can be assessed by analyzing the parameters: Body Mass Index (BMI),

weight loss within the last 3 months, nutritional intake in the previous week, nutritional intake on NutritionDay and patients not allowed to eat (Table 5).

Body weight loss

In Poland the prevalence of unintentional body weight loss within the last 3 months was 42.47% while significant body weight loss was reported in 69.52% patients. Mild or insignificant weight loss was observed in 30.48%. In the nD reference data unintentional weight loss within the last three months was stated by 45.38% of all patients while significant weight loss was reported in 48.45% patients. Mild or insignificant weight loss was observed in 41.55% (Table 5).

Table 5. Indicators for nutritional risk of patients participating in the NutritionDay study in 2006 – 2012

| | NutritionDay survey in Poland | | NutritionDay survey all over the world "nD reference" | |
|---|-------------------------------|------------------|---|-------|
| | N | all patients (%) | N | (%) |
| Body mass index (BMI) < 18,5 | 14 | 5.12 | 7,524 | 7.24 |
| Body weight loss | 1,122 | 42.47 | 43,061 | 45.38 |
| Insufficient intake last week (less than half nearly nothing) | 832 | 31.88 | 25,463 | 27.18 |
| Eat less on nD (a half to nothing) | 1,492 | 60.55 | 53,410 | 58.37 |
| Not allowed to eat | 514 | 19.44 | 9,574 | 10.04 |

Patient's food intake one week before nD

Nutritional intake was indicated by 92.23% patients in Poland for the week before nD. 16.33% ate less than half of normal and 13.07% ate less than a quarter to nearly nothing. 41.66% ate normal while 21.17% reported to eat a bit less than normal. Most often reasons for eating less were loss of appetite 13.14% patients in the nD reference ate less than half of normal and 11.36% ate less than a quarter to nearly nothing in the week before nD. 45.15% ate normal while 20.49% indicated to eat a bit less than normal. Most often patients ate less because they lost appetite (Table 5).

Food intake on nD

20.95% of the patients in our country ate the complete meal served on nD. 60.55% indicated to eat half to nothing of the served meal, while 28,18% reported to eat

quarter to almost nothing. The most frequently mentioned reasons for eating less were: "I was not hungry" and "I was not allowed to eat" (Table 5).

Impact of selected risk factors for malnutrition on length of hospital stay

The reduced food intake of a quarter to nearly nothing of the served meal on nD was observed in case of 28.18% of all patients in our country and 5.12% were additionally associated with having the BMI < 18,5. Decreasing food supply within last week was connected with increasing the average number of days in hospital - from 12 days on normal supply to almost 14 days on supply at a quarter of the usual supply (Table 6).

Table 6. Mean length of hospital stay (in days) depending on the amount of food consumed over the last week. Based on results of the "NutritionDay" study in all over the world and Poland in 2006-2012

| Food intake within last week | Time from admission to the hospital (in days) | | |
|---------------------------------------|---|--------------------|--------------------|
| | Average number of days | Standard deviation | Number of patients |
| normal | 11.99 | 19.38 | 45, 867 |
| a bit less than normal | 12.25 | 17.44 | 20, 973 |
| less than half of normal | 12.84 | 16.91 | 13, 446 |
| less than a quarter to nearly nothing | 13.93 | 18.19 | 11, 656 |
| TOTAL | 12.42 | 18.46 | 91, 942 |

Patients who reported weight loss during last three months stay in hospital on average 5 days longer compared with patients who did not report weight loss or declare its growth (Table 7).

Table 7. Average length of hospital stay (in days) depending on the body weight loss of patients in the past three months before the survey

| Body weight loss | Time from admission to the hospital (in days) | | |
|------------------|---|--------------------|--------------------|
| | Average number of days | Standard deviation | Number of patients |
| yes | 14.96 | 20.46 | 42,394 |
| no | 9.73 | 15.55 | 36,047 |
| weight gain | 10.85 | 19.31 | 8, 053 |
| it is not known | 14.92 | 20.07 | 6,601 |
| Total | 12.58 | 18.75 | 93, 095 |

Based on results of the "NutritionDay" study in all over the world and Poland in 2006-2012

DISCUSSION

Malnutrition is a major global and national health concern and most commonly affects patients with chronic and acute diseases. It could be shown that nutritional structures and screenings do not exist routinely on a world wide scale and in some cases differ to a major extent internationally.

First step to recognize the malnutrition among the hospitalized patients is the screening test focused on detecting deficiencies of nutritional status. In 2011 Poland introduced the obligatory assessment of nutritional status of each patient carried out at the admission to the hospital, that has been established in Ordinance of Minister of Health from 15 September 2011 [13]. Whereas in the nD survey in Poland nutritional screening for risk of malnutrition on patient's admission was performed only in 60.37% units. This may prove the shallow knowledge of hospital personnel on the importance of carrying out the screening assessment of nutritional status and its legal regulations. However, not only in Poland such a low results of filling in the nutrition screening questionnaires has been obtained. In the nD survey conducted all over the world nutritional screening for risk of malnutrition on patient's admission was performed only in 53.81% of units. This lack of knowledge of unit staff has been endorsed by some others studies. In Norwegian research *Tangvik et al.* [16] from year 2010, carried out with screening assessment method, the nutritional status has been noted only in 27% of cases of admitted patients. In Denmark, in 2006 [12] carrying out of the assessment has been noted only at 15% of patients and in China in research *Liang et al.* [8] it has been proved that 97.7% of patients admitted to the hospital departments have not been subjected to screening assessment of nutritional status.

The result of measurement of patient body weight is one of the most important information required for a proper determination of the nutritional treatment. That is why this process should be included in standard procedure conducted with every admission of the patient to the hospital. Knowing the actual body weight and height of the patient, the Body Mass Index (BMI) can be calculated, which has very important meaning both diagnostic as well as therapeutic. To assess changes in nutritional status by determining the direction of changes in BMI at least two measurements should be carried out in succession, e.g. 4 months [14]. Despite all the advantages in favour of the strict control of patients body weight, it has been shown that in Poland not everyone has been weighted at the time of hospital admission - only 71.95% of all responders. Comparable results have been noted in research *Jensen et al.* [4], where 65.7% of patients have been weighted at the admission to the hospital, while among the patients not weighted 67% declared that they had never been asked

about current body weight. Much more pessimistic results have been obtained in the research *McWhirter and Pennington* [9], where it has been stated that only 23% of patients had been weighted at the admission to the hospital, and in less than 50% cases in medical history any information about change in appetite and body weight had been noted.

Malnutrition of hospitalized patients in Poland was found comparable to the rest of the world. These results reflect the fact that malnutrition is a common issue among hospitalized patients all over the world and it would be recommended to continue the action plan to fight against malnutrition began by the European Society for Clinical Nutrition and Metabolism (ESPEN) on international and national level to further decrease the prevalence of malnutrition of patients in the hospital setting. Hence, structural changes have to be implemented but also awareness of malnutrition and interest in tackling the problem of malnutrition as such has to be increased continuously. Therefore it is important to perform simple audits regularly in the country to monitor the status of nutritional risk and nutritional care habits and create a solid database for health care actions. The nD project is a suitable starting point as it provides a snapshot of the actual nutritional care situation on hospital unit level and benchmarks unit data to an international reference. Thus, nD compares local and national nutrition risk profiles and associated treatments in a standardized and actual format. ESPEN recommends the nD audit project to identify and implement change in local practice.

CONCLUSIONS

1. Above results reflect the fact that malnutrition is a common issue among hospitalized patients, both in Poland and in the rest of the countries participating in the study.
2. The reason for such poor percentage of Polish patients participating in the study "NutritionDay" - in contrast to most of the countries, covered by the project - may result from the low interest of Polish government and hospitals in implementation of prevention nutrition programs.
3. Results which reveal failure to take steps aimed at combating hospital malnutrition may prove a lack of knowledge of medical and management staff about the importance of proper nutrition in the treatment of diseases and not developed adequate procedures in this issue.
4. Such variables as reducing supply of food in the week preceding the survey and weight loss in the last three months, seem to be a significant factors in extending the time patients hospitalization.

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Conflict of interest

The authors declare no conflict of interest.

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