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Original article

Fight against malnutrition: The results of a 2006–2012 prospective national and global nutritionDay survey

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SUMMARY

Background: The nutritionDay (nD) initiative has been promoted by the European Society for Clinical Nutrition and Metabolism (ESPEN) to assess and audit the nutritional status of hospitalized patients, as well as to promote awareness. Israel has been participating annually in this project since 2006.
Objectives: To evaluate the proportion of malnourished patients in Israel in comparison with the rest of the world.
Methods: Data were collected by staff members and the hospitalization outcomes were followed up at day 30. The data were analyzed by the Vienna coordinating center, using "my SQL" (**S**tructured **Q**uery **L**anguage), an open source relational database management system and analyzed, using SAS (Statistical Analysis System) version 9.2.
Results: In Israel, 2303 patients (in 114 various medical specialty units) were included in the study during a 7-year survey, while 4316 units recruited 91,351 patients in the world (W), between 2006 and 2012, The median age of patients was 68 years, with 44% of females and BMI of 27 ± 6 (25 in W). Israel had a higher proportion of nutrition care teams per patient (in 88% of the units) than W (71%) ($p < 0.05$). 43% of the patients had a weight loss within the last 3 months prior to admission (same for W); 36.7% described a decrease in eating more than 50% of their normal food intake (21.3% in W). Food intake at nD showed that 51.4% of the patients ate half to nothing of the served meal (56.2% in W). In Israel, more patients received hospital modified diets (13% vs. 8.2% in W), but less supplements (5.7% vs. 8.3% in W) or enteral/parenteral nutrition (9.0% vs. 13.5% in W, $p < 0.05$). Length of hospital stay was shorter in Israel (11 days vs. 14 days in W, $p < 0.05$) and mortality was similar (3.9% vs. 3.8% in W).
Conclusion: Malnutrition of hospitalized patients in Israel was found comparable to the rest of the world. However, in Israel in spite of the higher nutrition staff member/patient ratio there was no increase in the administration of supplements or artificial nutrition to malnourished patients in the surveyed units. Also, the length of hospital stay was shorter and was not associated with an increase in mortality.

1. Introduction

Disease-related malnutrition is a critical public health concern in Europe, costing EU governments up to 120 billion Euros every year [1,2]. Malnutrition is caused primarily by poor nutrient intake when patients in hospitals or people in the community setting fail to meet their daily requirements for energy, protein and micronutrients. Malnutrition is further frequently observed in both acute and chronic diseases. This may be related to the patients' health status, their economic situation or other problems. Malnutrition significantly increases morbidity, mortality, length of hospital stay and hospital readmission rate. The prevalence of malnutrition reaches 20–60% of hospitalized patients, but it may deteriorate or develop during the hospital stay – a phenomena called 'hospital malnutrition' [3–6]. Nutritional risk may vary, not only due to medical or geographical settings, but also because of the different patient populations admitted to the hospital, as well as the differing

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criteria used for diagnosing malnutrition [2]. Unfortunately, the problem of malnutrition often goes unnoticed or untreated. The European Society for Clinical Nutrition and Metabolism (ESPEN) defined an action plan to fight malnutrition, the first step of which was the organization of the nutritionDay (nD) annual audit in 2006 [7]. It soon became a worldwide event, which resulted in the gathering of unique data about the nutritional status of over 150,000 patients in almost all continents [8]. The project had been created in close collaboration between ESPEN, the Austrian Society of Clinical Nutrition (AKE) and the Medical University of Vienna. The Israel Society for Clinical Nutrition was an active partner in this initiative and recruited patients during the entire period.

The aim of the following manuscript is to evaluate the proportion of malnourished patients in Israel in comparison with the rest of the world.

2. Methods

The nD study was a single-day, population-based, standardized, multinational, cross-sectional audit and was performed worldwide in hospitals, nursing homes and intensive care units.

The nD annual audit collected and systematically assessed data from hospitals, nursing homes and ICU units and had been designed for all types of hospital wards, including intermediate care, high dependency and specialized units. Participation of units was voluntary and anonymous. All the patients hospitalized in these units at the time of the nD audit were available for inclusion in the study and oral or written informed consent had been obtained from them, depending on local regulations. Units registered online and were provided with anonymous codes. Data collection was performed on the ward level by staff members and patients using four standardized questionnaires. Hospital outcomes were collected 30 days after the date the questionnaire had been filled out. Units received individual reports comparing their unit results to an international reference. The coordinating center in Vienna received ethical approval for multicenter data collection. All units' data were accepted as reference, apart from units without patients' data entries and units that included only one patient. Apparently, implausible data found by data cleaning had been highlighted in a separate feedback report and were corrected where possible. In case correction was not possible, these data were excluded. In the following description, the nD international reference database has been referred to as "nD reference".

The questionnaires included domains relating to the unit's structure and to patients' medical status. Structural information comprised information about the unit's staff, the nutritional procedures applied in the unit, the screening process for malnutrition on admission to the unit, the type of screening tools used, as well as weight assessment and actions taken where malnourished patients were recognized.

Patients' information comprised a demographic profile of their medical status, medical interventions and their actual diet/nutrition therapy. The patients themselves reported on unintended weight loss, previous and actual food intake, social situation, physical function, drug intake and perceived health status.

In Israel, the study had been approved by the local Helsinki Committee in each of the hospitals that participated in the survey. Before each annual nD survey, the different units were instructed on how to fill out the forms, how to collect the data and how to insert them in the computer. Prior to data collection there was some cooperation between the units regarding the technical aspects of the survey, in order to be able to carefully follow the protocol of the nD audit described above.

Table 1
Patients' demographics.

	Israel 2006–2012	nD reference 2006–2012
Age Median and range	68 (11–105)	67 (1–113)
Gender: female Total number and %	980 (44.4%)	44,191 (49.1%)
Gender: male Total number and %	1,323 (55.6%)	47,160 (50.9%)
BMI (kg/m^2) Mean and standard deviation	27 ± 6.0	25.4 ± 5.9

3. Statistical analysis

All data analysis was performed at the Department for Medical Statistics, Medical University of Vienna. The database management system used for nD was termed "My SQL" (**s**tructured **q**uery **l**anguage) which is a widely used open source relational database management system. Data were analyzed using SAS (Statistical Analysis System) Version 9.2. Statistical modeling was performed using descriptive statistical analysis and various regression models depending on the type of outcome. To adapt for clustering by hospitals, generalized estimating equations (GEE) with exchangeable covariance structure were used. Where necessary, model selection and estimation had been done using p-value thresholding, bootstrap sampling and bagging.

4. Results

The one-day cross-sectional nD audit in 2006–2012 consisted of a total of 2303 patients who were treated in 114 units from 20 hospitals in Israel. (The estimated annual hospital occupancy is around 15,000 beds.) All in all, 4.316 units with 91,351 patients met the quality criteria and therefore served as the nD reference database. The outcome and the outcome date were recorded upon hospital discharge or at day 30 after nD, for 91,351 patients. In Israel, the outcome data were available for 2303 patients (2.52% of all the patients). Patients' demographics were summarized in Table 1 expressing age (median and range), gender (total number and %), and BMI (mean and SD), showing that the BMI of patients in Israel is somewhat higher that that of the patients in the nD reference group. The reported diagnosis, described by "organ affected" in the patients screened during the nutrition Days, were

Table 2
Patients' affected organs – nDay survey 2006–2012.

Affected organ	Israel 2006–2012		nD reference 2006–2012	
	number	%	number	%
Brain, nerves	357	15.50	12,135	13.30
Eye, ear	53	2.30	1972	2.16
Nose, throat	133	5.78	2994	3.28
Heart, circulation	465	20.20	17,545	19.20
Lung	346	15.00	11,937	13.10
Liver	78	3.39	5745	6.29
Gastrointestinal tract	461	20.00	19,439	21.30
Kidney, urinary tract, female genital tract	289	12.50	10,655	11.70
Endocrine system	156	6.77	6022	6.59
Skeleton, bone, muscle	386	16.80	14,473	15.80
Blood, bone marrow	84	3.36	4205	4.60
Skin	91	3.95	2876	3.15
Cancer	334	14.50	16,332	17.90
Infection	103	4.47	5905	6.46
Pregnancy	12	0.52	436	0.48
Others	126	5.47	5780	6.33
No affected organ	212	9.21	6104	6.68