

**International cross-sectional audit & registry:  
nutritionDay express in worldwide hospitals**

**Local coordinator/s:** .....

**National coordinator/s:** .....

**Country:** .....

**International scientific and planning team:**

Univ. Prof. Dr. Michael Hiesmayr, project director 1

Univ.-Prof. Dr.med.univ. DPhil. MSc. BA. BSc. FFPH Judit Simon, senior researcher 2

Sigrid Moick, MA, researcher & project coordination 1

Lara Maier, BSc, Project Assistance 1

Em.Univ.-Prof. Dipl.-Ing. Dr. Peter Bauer, senior researcher 3

Isabella Sulz, Statistics, 3

1 Division. of Cardiac- Thoracic- Vascular Anaesthesia & Intensive Care, Medical University Vienna

2 Dept. of Health Economics, Medical University Vienna

3 Dept. of Medical Statistics

**Sponsors:**

Medical University Vienna (MedUniWien)

European Society for clinical nutrition and metabolism (ESPEN)

**Address international coordinating centre:**

Dept. of Cardiac- Thoracic- Vascular Anaesthesia & Intensive Care, Medical University Vienna,

Waehringer Guertel 18-20, A-1090 Vienna

Email: michael.hiesmayr@meduniwien.ac.at

Tel: +43-1-40400-41090

Fax: +43-1-40400-41100

URL: [www.nutritionday.org](http://www.nutritionday.org)

## ***Introduction:***

Malnutrition at hospital admission is a risk factor for an unfavourable outcome, prolonged hospital stay and delayed recovery. In these patients the incidence of complications such as nosocomial infections, poor ventilatory function, prolonged bed rest is increased[1]. In addition a relevant proportion of patients have a nutritional intake below their needs during hospitalisation[2-4]. Mortality has been shown to be up to 8 times higher and dependency at discharge up to 3 times more frequent [5,6] when actual food intake was below 25% of calculated needs.

The extent of the problem has been assessed in 2001 at the European level [7,8] and 5 major barriers for proper nutritional care in hospitals have been identified. These barriers are no clear definition of responsibility, insufficient education of hospital staff, lack of influence of patients, lack of co-operation between staff members and lack of involvement of hospital managers. Based on this information a resolution of the European Council has been taken in November 2003 (<https://wcm.coe.int/rsi/CM/index.jsp>). This resolution was signed by 18 countries and implied a specific political action to prevent, identify and treat malnutrition in health care facilities.

In 2003 several malnutrition scores such as MUST[9] and NRS-2002[3] had recently been introduced to ease the identification of patients that are either malnourished or at risk for malnutrition. These scoring systems were simpler to apply than the previous golden standard method SGA ("subjective global assessment") that could only be applied by trained staff[10-13]. None of these scores had been validated through a robust outcome such as death or length of stay.

Several risk factors such as age, type of disease, severity of disease, degree of functional impairment, social background, nutritional awareness and structural factors have been proposed but never systematically assessed in an unselected group of hospitalised patients.

In 2004 the European Society of Clinical Nutrition and Metabolism (ESPEN) decided to support actions that aim at reducing health care and disease associated malnutrition. In this action plan the project nutritionDay was initiated and developed by an international team at the Medical University of Vienna with a continuous support of ESPEN[14]. Since 2006 the nutritionDay project has recruited more than 120 000 patients and found that the prevalence of several nutrition-related risk factors is higher than expected for recent weight loss (45%), not eating normally in the previous week (49%) or less food intake in hospital than served (60%). In addition the proportion of patients with BMI lower than 18.5 was only slightly higher (8.1%) than in the normal age-matched population. Thus many patients may appear normal or obese but have several other risk factors for malnutrition.

This prevalence of risk factors is highly variable between specialties but much more within each specialty. This finding is important because each of these risk factors could be associated with mortality within 30 days with odds ratios up to 8. The association was maintained in a multivariate analysis [14]. Thus the actual prevalence of nutritional risk factors is an important information to know for each unit in order to develop a strategy to tackle disease-related malnutrition[4]. Moreover it is known that screening and monitoring for malnutrition is not systematically used in hospitals worldwide [15].

Recently the PANDORA scoring system for hospitalised patients was developed on the basis of nutritionDay data and has quantified the contribution of individual risk factors to predict mortality within the next 30 days. Actual food intake, BMI and mobility are important nutrition related contributors to the risk of death[16].

This knowledge about the association between nutrition related risk factors and mortality raise several new questions:

First it is important to know how these risk factors are associated with resource utilisation such as length of stay in hospital. Actually this possible association is not known for a large unselected group of hospitalised patients. If present such an association needs a systematic health economic evaluation to be able to estimate what benefit may be obtained if measures to identify malnutrition early and start effective treatment are routinely implemented.

Second it is not clearly known which systemic factors such as nutrition related hospital structures and processes are associated with improved nutritional care. In order to provide optimal nutritional care to patients it is important to continuously assess and improve the quality and effectiveness of nutritional care and nutrition care services. In the past years it has been pointed out that addressing quality indicators in nutrition care such as early definition of patients at risk of malnutrition, early nutritional screenings, defining responsibilities or increasing knowledge nutritional knowledge in the units may be useful to contribute to improved nutritional care. Associations of hospital structures and processes on quality of nutrition care thus needs further assessment.

The aim of this international cross-sectional multicentre audit is to generate a risk and level of nutritional intervention profile for an individual unit/ward based on case-mix, nutrition care and available structures and processes. This profile should give a snapshot on the relation of risk to resource allocation. The audit is unit centred. Each unit gets as a feedback anonymously its position compared with all other participating units. Risk adjustment for selected patient groups, social environments and structures is planned.

In conclusion this audit will serve five distinct aims:

- Generate a precise map of the prevalence of malnutrition before admission and of decreased nutrient intake according to risk factors, medical specialty, organisational structures and countries.
- Increase in awareness for clinical nutrition in patients, caregiver and hospital managers.
- Enlarge and maintain a reference database for hospitalised patients
- Provide individual unit benchmarking
- Allow the study of nutrition risk associated resource utilisation

### **Methods:**

One day international cross-sectional audit in all types of hospital wards. Intensive care units are excluded.

Data are collected with the help of questionnaires. Anonymised data entry into the audit database is done with individual and anonymous center- and unitcodes.

The data collected consist of four parts:

1. **Unit organisation and structures:**  
Structural information about the unit and the capacity of the hospital (1 sheet/unit) to be filled by the unit supervising physician together with the nursing head.  
(see Unit structure sheet)
2. **Patient's demographics & medical/nutritional information:**  
Demographic profile, diagnostic category based on ICD-10 and nutritional interventions for all patients (1 sheet/patient) to be filled by a responsible person from the medical staff.  
(see Unit caregiver sheet).
3. **Patient questionnaire:**  
Unit staff should ask questions about food intake, possible weight loss, mobility and general health status directly to the patients (1 sheet/patient).
4. **Individual patient outcome:**  
at hospital discharge or day 30, whatever comes first: date of unit discharge, date of hospital discharge, site of discharge (1 line/patient)

All questions of these questionnaires have been selected from and previously used in the "*nutritionDay in hospitals worldwide*" study. Through the development of this "express version" for *nutritionDay in hospitals* we aim to enable units with too little time resources to fulfil a participation in the regular *nutritionDay in hospitals* study to still be part of nutritionDay and receive feedback on their nutritional practices.

**Patient inclusion:**

All patients present within the unit from 7H00 to 7H00 (e.g.) from first nursing shift start to first nursing shift the following day, including admissions and discharges within the period. Patients younger than 7 are excluded. Patients may accept to participate only for the medical documentation part from the caregiver sheet (sheet 2) and individual patient outcome (sheet 4), but refuse to fill the individual patient questionnaire (sheet 3).

**Patient exclusion:**

Patient with an age < 7 a.

Patients unable to understand and answer questions because none of the available languages is understood.

Patient's refusal to answer the patient specific questionnaire or refusal of medical data use for auditing and research.

Patients admitted and discharged during the same calendar day.

**Participation rules:**

1. A user needs to register to nutritionDay as a member to the nutritionDay network. Each may choose a personal username. Each user needs to provide a valid email address. After responding to a validation email the user is registered with the chosen username. User details are stored on a system that is not connected to the nutritionDay registry at any time. One user may serve as contact for several units and centers.
2. A user may order codes for participation for one or several centers and units. Access to the registry is only possible with a center code and unit code. These codes are selected from a list of random numbers.

***Audit/registry recruitment plan:***

Participation to the registry is voluntary. There is actually no participation fee. All necessary information can be obtained from a dedicated website ([www.nutritionday.org](http://www.nutritionday.org)). Participation can be promoted via international and national scientific societies, universities, health care organisations or governmental agencies as well as via advertisement at international and national congresses. The target would be all types of hospital wards within hospitals of different sizes and level of care.

***Risk and benefit assessment:***

The benefit for each patient is that awareness and knowledge about nutrition related factors and treatment options in the treating unit is increased. There is no individual risk since the audit is purely observational.

The benefit for the individual unit is to receive a benchmarking report displaying the unit data in comparison with all units from the same specialty from the previous 3

years immediately after the end of data entry and a validation step. Units or groups of units may request specific reports that can be obtained only after a case by case agreement and financial coverage. All data used as a reference for benchmarking purpose are from units where a minimum of 60% of actually present patients have been recruited and the outcome at day 30 is available in more than 80% of these patients. There is no risk for the unit since anonymity of unit is structurally strictly maintained.

The benefit for the registry up-to-date data enabling benchmarking in pace with medical and care evolution. Moreover the registry data are used for research of the scientific community.

The aim is to recruit a minimum of 10-50 units with 20-30 beds per participating country. A minimum of 10 units per medical specialty will be necessary to allow specialty adjustment.

### ***Data security:***

On the datasheets the unit and the hospital/center are identified by a numeric code delivered after application to the nutritionDay coordinating center by an automatic system. The only requirement is a valid email address for direct communication with the unit.

Patients are usually identified on the locally used questionnaires by initials and age, but use of initials is not mandatory. Consecutive numbering is also possible. Only the participating unit has to trace patients identifier to be able to collect hospital outcome at day 30 after nutritionDay and to answer automatic requests for data clarification during the data quality feedback.

During data entry into the electronic registry only anonymous codes for center, unit and patients are possible. Thus the data handling centre cannot trace data back to an individual patient. The access to data entry is protected by anonymous centercode and unitcode.

Typically all data are collected via the internet.

The protected data server is run by the Center for Medical Statistics Informatics and Intelligent Systems (CEMSIS) of the Medical University Vienna. The data server is mirrored and backedup. The data server is protected within the University Firewall against external access.

### ***Data feedback and individual unit report***

All participating units are entitled to receive a benchmarking report from the registry. The report generator is started by the participating unit, when data entry has been

completed. After stating that all data are correctly entered the final report can be generated. This final report offers complete descriptive statistics of the unit data compared to the reference data from the previous 3 years of the corresponding specialty. Only data from units fulfilling a high data quality standard are used for the reference. More than 60% of the patients present in the unit need to participate and 80% of these patients need to have their outcome recorded. Optionally the period used for comparison can be extended until 2006. All descriptive statistics represent prevalent data and are not corrected for cross-sectional sampling to allow direct data control and interpretation.

All downloaded reports of a unit are consecutively numbered and stored for documentation purpose.

### ***Data analysis and modelling:***

The first aim of the project is to serve local specialty specific and up-to-date benchmarking with regard to nutrition and feeding status, risk profile and nutrition care. Given the typical cross-sectional sample of 20-30 patients frequent risk factors can be easily compared because such risk factors as recent weight loss or less than normal eating are observed in one third to half of the patients.

The second aim is scientific data analysis. The actual research questions are:

- Identifying the risk factors associated with decreased eating.
- Analysing the impact of risk factors for increased length of hospital stay
- Analysing time-trends in risk profile and nutrition care
- Analysing the economic impact of nutrition risk factors on the health care system
- Analysing the impact of hospital and unit structures and processes on quality of nutrition care
- Updating the PANDORA score if major change in performance is identified

For the scientific data analysis we use COX-regression or general linear model with proper weighting of observations to account for the effect of cross-sectional sampling for events such as discharge or death and linear regression models to analyse length of stay. Whenever several events can occur in a patient a competing risk analysis is performed.

All data analysis will be done at the Dept. for Medical Statistics, Medical University Vienna. After publication of the multinational results, all national datasets will be available for national publication based on a research plan, if the number of wards is large enough to ensure anonymity for the individual ward within the country.

### **Data elements:**

1. Unit organisation & nutrition related processes: (1 sheet/patient)
  - a. Bed capacity of hospital
  - b. Bed capacity of unit
  - c. Number of registered patients on nDay
  - d. Unit specialty
  - e. Number of medical doctors and nurses present on unit
  - f. Availability of dietician, nutritionist or dietetic assistant on unit
  - g. Screening and monitoring practice
  - h. Weighing practice
  - i. Mealtime practices
2. Patient medical information: (1 sheet/patient)
  - a. Sex
  - b. Year of birth
  - c. Weight & height
  - d. Background of hospital admission
    - i. Duration since hospital admission
    - ii. Reasons for admission
    - iii. Comorbidities
  - e. Severity of illness (terminally /not terminally ill)
  - f. Fluid status
  - g. Type of feeding or artificial nutrition used
3. Patient questionnaire: (1 sheet/patient)
  - a. Weight loss during the last 3 months
  - b. Eating during the week before hospital admission
  - c. Food intake on nutrition day
  - d. Mobility in the hospital
  - e. Subjective quantification of the health status
4. Hospital outcome until day 30 after nutritionDay
  - a. Discharge date
  - b. Discharge status
  - c. Readmission to the same/different hospital

All questionnaires are self-explaining and in addition a detailed explanation file with definitions for each data item is provided. A hotline or email contact allows further clarification with the international project manager that is typically supported by national coordinators.

All questionnaires have been translated by the national representative for over 30 languages (English, German, French, Italian served as master languages) within the country and checked for consistency after back translation.

## **Project team**

### **Project management**

Univ. Prof. Dr. Michael Hiesmayr,  
Division of Cardiac- Thoracic- Vascular Anaesthesia & Intensive Care, Medical  
University Vienna, Währinger Gürtel 18-20, A-1090 Vienna  
Mail: [michael.hiesmayr@meduniwien.ac.at](mailto:michael.hiesmayr@meduniwien.ac.at)  
Tel: +43-1-40400-4109  
Fax: +43-1-40400-4110  
URL: [www.nutritionday.org](http://www.nutritionday.org)

### **International coordinating and planning team**

*Univ.-Prof. Dr.med.univ. DPhil. MSc. BA. BSc. FFPH Judit Simon*, Dept. of Health  
Economics, Medical University Vienna

*Em.Univ.-Prof. Dipl.-Ing. Dr. Peter Bauer*, Dept. of Medical Statistics, Medical  
University Vienna

*Sigrid Moick, MA*, International coordinating office nutritionDay worldwide, Division  
of Cardiac- Thoracic- Vascular Anaesthesia & Intensive Care

*Lara Maier, BSc*, International coordinating office nutritionDay worldwide, Division  
of Cardiac- Thoracic- Vascular Anaesthesia & Intensive Care

*Em.Univ.-Prof. Dipl.-Ing. Dr. Peter Bauer*, Dept. of Medical Statistics

*Isabella Sulz*, Statistics, Dept. of Medical Statistics

### **International Advisory Board**

*Univ. Prof. Dr. Alessandro Laviano*, Department of Clinical Medicine, Sapienza  
University, Rome, Italy,

*Univ. Prof. Dr. Pierre Singer*, Intensive Care Department, Rabin Medical Center,  
Beilinson Campus, Petach Tikva, Israel

*Marian de van der Schueren*, PhD Department of Nutrition and Dietetics, Internal  
Medicine, VU University Medical Center, Amsterdam, The Netherlands

*Marília Cravo*, Diretora do Serviço de Gastreenterologia do Hospital Beatriz Ângelo

National coordinators

URL: <http://www.nutritionday.org/en/network/teams/national-coordinators/index.html>

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