

ORIGINAL ARTICLE

Nutritional care routines in Italy: results from the PIMAI (Project: Iatrogenic MAInutrition in Italy) study

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Background/Objectives: Disease-related malnutrition is a common comorbidity at hospital admission. The purpose of the present report was to describe the data on nutritional care routines collected during the Project: Iatrogenic MAInutrition in Italy (PIMAI) study, as these may be helpful to avoid iatrogenic malnutrition and improve nutritional policies.

Subjects/Methods: Standards of nutritional care were assessed on the basis of (1) adherence to study protocol (completeness of data collected); (2) attitude in assessing the nutritional status; (3) prescription of nutritional therapy (within 3 days) at least in patients presenting with overt malnutrition (body mass index (BMI) < 18.5 kg/m² or significant weight loss (≥ 10% in 3 months and/or ≥ 5% in the last month)), regardless of its adequacy, and adherence to current guidelines and (4) attitude in monitoring nutritional status during the stay (number of weight measurements performed compared with those expected).

Results: In total, 1583 subjects were assessed. A minimum data set for performing the Nutritional Risk Screening 2002 tool was available in 1284 patients (81.1%), but nutritional screening was possible in every patient by alternative analytical criteria related to food intake, anthropometry and biochemistry. However, several missing values were recorded, particularly in biochemical parameters due to lack of prescription by admission wards. According to ward practices, only 38.2% of the patients had the BMI calculated. A nutritional support was prescribed only to 26/191 patients (13.6%) presenting with overt malnutrition. Finally, we recorded that only 21.6% of the patients (207/960 were randomly selected) had their weight monitored on a scheduled basis. This reality was worse in surgical rather than medical departments (17 vs 26%; $P < 0.001$).

Conclusion: Present results confirm that in Italy, nutritional care routines are still poor and need improvements.

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Introduction

Nutritional risk is commonly reported at hospital admission (Norman *et al.*, 2008). Despite the prognostic role of disease-related malnutrition in negatively affecting the patient's outcome (mortality, morbidity, length of stay (LOS), health-care costs, functional status and quality of life), recent surveys suggest that nutritional care routines by healthcare professionals are still poor (Mowe *et al.*, 2006; Singh *et al.*, 2006; Bavelaar *et al.*, 2008). As a consequence, the nutritional status of the patient may even worsen during the

hospital stay with patients experiencing further weight loss and a slower recovery (McWhirter and Pennington, 1994; Norman *et al.*, 2008; Cansado *et al.*, 2009). This phenomenon was called 'iatrogenic malnutrition' (Butterworth, 1974). Thus, it seems likely that the resolution produced by the Council of Europe in 2002 (Beck *et al.*, 2002) has not reached the target to improve the awareness about and the treatment of malnutrition through timely screening and adequate nutritional support.

We have recently performed in Italy (2005) a nationwide survey on nutritional risk and disease-related malnutrition at hospital referral: the Project: Iatrogenic MALnutrition in Italy (PIMAI) study. The prevalence of these conditions was reported on 28.6 and 30.7% of the patients assessed, respectively (Lucchin *et al.*, 2009a,b). These results were consistent with the others recently reviewed (Norman *et al.*, 2008). The purpose of the present report was to describe the data collected on the attitudes towards nutritional care in Italy, as the discovery of undesirable practices will allow improving nutritional policies and avoiding the deterioration of nutritional status during the hospital stay.

Materials and methods

A detailed description of the study design, the protocol, inclusion and exclusion criteria, randomization of the patient for study entry and the assessments performed are provided elsewhere (Lucchin *et al.*, 2009a,b). Briefly, from 1 December 2004 to 15 September 2005, patients were recruited in 13 large hospitals (>400 beds), characterized by the presence of a Clinical Nutrition Unit and a nutrition team (doctors, dieticians and nurses), who was also responsible of data collection. Every hospital was planned to recruit 100–150 patients during 10 months.

Standardization of the operating methodology was achieved through frontal lessons and practical working sessions. All the centres involved received an identical kit of calibrated instruments. The study excluded some settings, such as pediatrics, obstetrics and acute emergencies.

Data were collected on:

- anthropometric measurements: body weight (by flat scale or a hoist provided weighting device or a chair scale), height (standing or knee height), mid-upper anthropometry (arm circumference and triceps skinfold thickness) and history of unintentional weight loss. The body mass index (BMI) was also calculated.
- biochemical parameters: serum albumin, pre-albumin and total lymphocytes count.
- food intake: defined as the percentage of food consumed (approximate daily energy intake in the last week) compared with estimated requirements (according to the Harris–Benedict equation adjusted for an activity factor).

Nutritional risk was diagnosed by the Nutritional Risk Screening 2002 tool (Lucchin *et al.*, 2009a) and disease-related

Table 1 Analytical criteria of malnutrition (Lucchin *et al.*, 2009b)

1.	BMI < 18.5 kg/m ²
2.	18.5 ≤ BMI < 20 + at least 1 indicator ^a
3.	Unintentional weight loss ≥ 5% + at least 1 indicator ^b
4.	Two or more indicators ^a

Abbreviation: BMI, body mass index.

^aUnintentional weight loss ≥ 5%, albumin < 35 g/l, pre-albumin < 15 mg/100 ml, arm muscle area < 25th percentile, triceps skinfold < 25th percentile, total lymphocytes count < 1500/mm³, oral intake ≤ 50% of normal habits.

^bAlbumin < 35 g/l, pre-albumin < 15 mg/100 ml, arm muscle area < 25th percentile, triceps skinfold < 25th percentile, total lymphocytes count < 1500/mm³, oral intake ≤ 50% of normal habits.

malnutrition by analytical criteria (Table 1) related to food intake and both anthropometric and biochemical parameters (Lucchin *et al.*, 2009b).

We evaluated the standards of nutritional care on the basis of:

- adherence to the study protocol (completeness of data collected) by the nutrition teams; physical and dietetic assessments were performed directly by the nutrition team that was responsible of suggesting to nurses the prescription of biochemical analyses (to be included among those prescribed for the following day). Patients screened as being at nutritional risk or malnourished were drawn to the attention of the nurses;
- attitude of ward's staff towards nutritional assessment at referral. In regard with this, we asked every patient recruited to report whether they had their weight and height measured or at least been asked by the personnel to report them;
- prescription by ward's staff of nutritional treatment (special diet or sip feeding or tube feeding or parenteral nutrition) during the stay at least in patients presenting with overt malnutrition (BMI < 18.5 kg/m² or weight loss ≥ 10% in the last 3 months or weight loss ≥ 5% in the last month), regardless of its adequacy and adherence to current guidelines;
- the attitude of ward's staff towards the monitoring of nutritional status during the stay. We randomly selected 24 medical and 24 surgical wards from the hospitals participating into the study, and we retrospectively evaluated the clinical registers for the number of weight measurements performed compared with those expected: $n = 1$, LOS 0–6 days; $n = 2$, LOS 7–16 days; $n = 3$, LOS 17–30 days; + 1 every 20 additional days.

According to these issues, optimal nutritional cares were set to be:

- maximal adherence to the study protocol (100% of data collected).
- 100% of the patients having the BMI calculated, at least on the basis of reported weight and height.
- 100% of the patients malnourished (according to the afore-indicated criteria) receiving a nutrition support.
- full-weight monitoring during the stay.

The study was performed in agreement with the International Ethical Guidelines. We obtained the approval by local Ethics Committee and written informed consent for every patient (or relatives or legal guardians).

Results

In total, 1583 subjects were assessed. A minimum data set for performing the Nutritional Risk Screening 2002 tool was available for 1284 patients (81.1%), but all the patients underwent exhaustive nutritional screening using alternative analytical criteria. However, several missing values were recorded during statistical analyses, mainly in biochemical parameters due to the lack of prescription by the admission ward (Table 2) (Lucchin *et al.*, 2009a, b). The few failures in anthropometric assessment were secondary to the unavailability of the patient (mid-upper arm anthropometry) or that of a weighting device specific for bedridden patients (weight). Moreover, food intake has not been investigated in many cases (18.9%). Missing data were mainly related to restrictions in staff availability (39.8%; $n=119$) and lack of assessment due to underestimated importance of such information (50.5%; $n=151$).

When looking to in-ward practices towards nutritional assessment, we observed that only 38.2% of the patients had the BMI calculated according to the measured or reported weight and height.

At admission, 45 (2.8%) and 146 (9.2%) patients presented with a BMI < 18.5 kg/m² and a significant weight loss, respectively. Surprisingly, during the hospitalization, a nutritional support was prescribed only to 26 patients (13.6%— $n=5$, special diet; $n=9$, sip feeding; $n=5$, tube feeding; $n=4$, peripheral parenteral nutrition; $n=3$, total parenteral nutrition).

Finally, concerning with weight monitoring during the stay, we recorded that only 26% (n , 125/480) and 17%

(n , 82/480; $P<0.001$ by proportion test) of the patients, recruited from the 24 medical and 24 surgical departments respectively, had their weight monitored on a scheduled basis. This desirable practice occurred more frequently in relation to ward routines rather than nutritional risk or malnutrition.

Discussion

The primary aim of the PIMAI study was to estimate the dimension of the malnutrition problem in the Italian country and to identify its major determinants to design *ad hoc* nutritional policies (Lucchin *et al.*, 2009a, b). Data on actual practices may be helpful in regard to this purpose. Although >30 years passed since Butterworth introduced the concept of 'iatrogenic malnutrition' (worsening of nutritional status during the hospital stay due to the lack of adequate nutritional support) (Butterworth, 1974), it seems likely that disease-related malnutrition still goes underdiagnosed and undertreated. The results from the present survey agree with those previously obtained in other countries and highlight that the lack of knowledge, interest and responsibility and the difficulties in making a nutrition plan are clearly the target for future improvements (Mowe *et al.*, 2006; Singh *et al.*, 2006; Bavelaar *et al.*, 2008). The consequence is the deterioration of nutritional status. A poor energy intake is frequently due to disease-related hyporexia, but it may be also secondary to clinical (diagnostic or therapeutic) priorities as the patient may be ordered to nil by mouth (Norman *et al.*, 2008). Several undesirable practices, having effect on the nutritional health, have been identified (for example lack of feeding assistance or training and awareness, unpleasantness or inadequate texture of food) and a resolution was designed accordingly (Beck *et al.*, 2002). International societies have focused the attention on this issue. Global guidelines have been defined 'a true

Table 2 Summary of the gaps in nutritional care routines

Routine	Missing data or failures (%)
Minimum data set to complete the Nutritional Risk Screening 2002	18.9
BMI (by the nutrition team)	6.5
Full mid-upper arm anthropometry (arm muscle area)	2.0
Unintentional weight loss	2.5
Albumin	33.3
Pre-albumin	78.8
Total lymphocytes count	16.2
Oral intake (percentage of estimated requirements)	18.9
Drugs	0.6
Data collection on weight and height (BMI) by the wards' staff	61.8
Prescription of nutritional support during the stay ^a	86.4
Adequate weight monitoring during the stay ^b	78.4

Abbreviation: BMI, body mass index.

Percentages refer to the overall study sample ($n=1583$) except where otherwise indicated:

^a $n=191$, patients with overt malnutrition (BMI < 18.5 kg/m² or weight loss $\geq 10\%$ in the last 3 months or weight loss $\geq 5\%$ in the last month).

^b $n=960$, patients recruited from 24 surgical ($n=480$) and 24 medical ($n=480$) wards randomly selected among those involved in the survey.

partnership' (30th ESPEN Congress; Florence, Italy; September 2008) of all those involved in healthcare assistance. Accordingly, standardized screening and treatment procedures are now enforced (Kondrup *et al.*, 2002; ESPEN Guidelines on Enteral Nutrition, 2006; ESPEN guidelines on Parenteral Nutrition, 2009).

Unfortunately, our study suggests that the nutritional management of hospital inpatients is largely inadequate. About 61.8% of the patients did not have their BMI measured according to in-ward practices and 76.4% of those with a diagnosis of overt malnutrition were left untreated. Although we did not investigate the real determinants of these practices, there appeared that the most logical reasons were the lack of awareness about what a BMI can say and how nutrition support can improve the outcome. It could be argued that nurses played a major role in negatively affecting the patient's management as they were responsible to communicate to in-ward medical directors both the advice to provide nutrition support and to deeper investigate nutritional status through biochemical parameters. However, we cannot say that this has not been done. It is also possible that the same doctors failed to prescribe tests, nutrition therapies or at least to request a nutritional counseling. Thus, several steps in current practices should be considered.

In regard with the lack of food intake assessment, we were surprised about the poor adherence to the study protocol. We recognize that in some cases, the patient may be intrinsically unavailable to the assessment. However, about 50% of missing data were due to the low awareness of dieticians about the importance of such information in guiding clinical practice and treatment. A logical even if unacceptable explanation is that in Italy, the figure of the dietician has changed in the last two decades with a shift of skills from economical to those clinical.

The efficacy of nutritional support on health outcome has been consolidated (Norman *et al.*, 2008), and some experiences have also demonstrated the importance from an economical point of view (Darmon *et al.*, 2008; Norman *et al.*, 2008). These aspects are extremely important in an era in which Governments strongly recommend the highest quality and adequacy of healthcare assistance and continuously balance them with money saving.

Poor nutritional status or moderate-to-severe nutritional risk results in about 50% prolongation of hospital stay (Norman *et al.*, 2008). Along with this, it has been demonstrated that early screening and intervention allow reducing the LOS of at least 1 day per patient (Kruizenga *et al.*, 2005).

It can be argued that the prevalence of iatrogenic malnutrition was about 12.0% (95% confidence interval, 10.5–13.7%). Accordingly, an economical projection of our data in a single non-university hospital (for example, Bolzano Hospital; 30 204 patients/year) suggests that disease-related malnutrition (reported prevalence: 30%) (Lucchin *et al.*, 2009b) is responsible for an increase in healthcare costs of

about 2 000 000 € per year, whereas the treatment (mean cost of 9-day nutrition support: 410 €), at least in patients presenting with overt malnutrition (prevalence 12%), can result in a money saving of 800 000–1 000 000 € per year (mean cost of 1-day stay: 603 €). It is worth mentioning that this evaluation does not take into account the additional indirect costs deriving from the possibly overlapping nutrition-related complications, such as infections or pressure ulcers. Moreover, patients being not at nutritional risk may be likely to have insufficient energy intake, and it can be hypothesized that the prevalence of iatrogenic malnutrition is up to 30% of those admitted. The consequence on health and economic outcome can be imagined, but studies focusing on the real prevalence of this adverse condition has never been performed.

Thus, much work still needs to be done to increase the standards of nutritional care. However, in our study, patients were recruited only in those hospitals in which a clinical nutrition unit still exists. We do not know anything about the practices of those institutions in which the role of nutrition has not been yet recognized by hospital medical directors.

According to the present picture, education should involve both nutrition and non-nutrition specialists and professionals. This will reduce overall healthcare costs. Significant positive changes have been recently occurred (Lindorff-Larsen *et al.*, 2007). This evidence supports the efforts of those involved in the improvement of nutritional practices. The ESPEN, together with all the other joined national societies, such as the Italian Società Italiana di Nutrizione Parenterale ed Enterale (SINPE), have a common project: 'Fighting Hospital Malnutrition'. Several initiatives have been designed, and appropriate guidelines for clinicians have been edited, starting from those for nutritional risk screening at hospital admission (Kondrup *et al.*, 2002) and proceeding with those for guiding clinicians in delivering nutritional support (ESPEN Guidelines on Enteral Nutrition, 2006; ESPEN guidelines on Parenteral Nutrition, 2009). The former are very recent, whereas the latter are now about 8 years old. This fact should be highlighted, as also our data are 4.5 years old and it appears that practices were not changed accordingly. It is not known whether and eventually how the things have changed in the following years. Perhaps, other surveys are needed. Indeed, several courses continuously take place both under and out of the Società Italiana di Nutrizione Parenterale ed Enterale supervision. Nonetheless, present data could be clearly considered a further milestone for proceeding with the improvement of nutritional policies through the direct involvement of the Public Health System.

Conclusion

Present results from the PIMAI study confirm that in Italy, nutritional routines towards the management of disease-related malnutrition are still poor and need improvements.

Conflict of interest

The authors declare no conflict of interest.

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Appendix

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