Luís Rego Costa Matos

A DESNUTRIÇÃO ASSOCIADA À DOENÇA NA ADMISSÃO HOSPITALAR: UM CONTRIBUTO PARA O RASTREIO

U.PORTO
FACULDADE DE CIÊNCIAS DA NUTRIÇÃO E ALIMENTAÇÃO
UNIVERSIDADE DO PORTO

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Tese de Dissertação de Candidatura ao Grau de Mestre Apresentada à Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto

Orientação: Prof. Doutora Teresa Freitas do Amaral

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Índice página

Agradecimentos iii

Resumo vii

Abstract xiii

1. Introdução 1
2. Menções sobre o estado nutricional nos registos clínicos de doentes hospitalizados. (*artigo submetido*) 11
3. *Handgrip Strength as a Hospital Admission Nutritional Risk Screening Method*. (*Eur J Clin Nutr. 2007 Jan 31; [Epub ahead of print] doi:10.1038/sj.ejcn.1602627*) 35
4. *Insufficient voluntary intake of nutrients and energy in hospitalized patients*. (*Nutrición Hospitalaria – in press*) 59
5. Discussão e Conclusão 77

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Para a minha Mãe

Resumo

Introdução

Está descrito que a frequência de Desnutrição Associada à Doença (DAD) afecta cerca de 20 a 60% dos doentes no momento da admissão hospitalar e cerca de 10% dos indivíduos na comunidade. A DAD tem vindo a ser associada a graves consequências, como ao maior risco de infecções e de disfunção de órgãos e a um aumento significativo, não só da morbilidade e mortalidade, como da frequência e dos custos com os cuidados de saúde. A falta do reconhecimento e da monitorização dos aspectos relacionados com o estado nutricional têm sido apontados como factores que contribuem para o aumento da frequência de DAD, durante o internamento hospitalar.

Foram objectivos deste estudo:

- avaliar a relevância que é dada a aspectos relacionados com o estado nutricional dos doentes (peso, ingestão alimentar) e saber se os doentes em risco nutricional ou desnutridos serão alvo de maior atenção por parte dos profissionais de saúde (Estudo 1);

- investigar se a Dinamometria da Força Muscular (DFM) pode ser usada como uma ferramenta de rastreio na identificação de doentes em risco nutricional, na admissão hospitalar (Estudo 2);

- avaliar a inadequação de ingestão voluntária de nutrientes e de energia, no primeiro dia da admissão hospitalar (Estudo 3).

Metodologia

Foi realizado um estudo multicêntrico de tipo transversal, com uma amostra probabilística de 50% dos doentes admitidos em cada hospital, obtida por amostragem sistemática. A gravidez, a idade pediátrica e a doença crítica foram critérios de exclusão, tal como a incapacidade em se completar o protocolo de rastreio nutricional e o tempo de internamento inferior a 24h. Foram recolhidos dados sócio-demográficos e antropométricos e foi aplicado o *Nutritional Risk Screening* 2002 (NRS-2002).

Calcularam-se os parâmetros de localização e de dispersão para as variáveis contínuas e as frequências absolutas e relativas para as variáveis categóricas. Usou-se a prova de Levene para avaliar a homogeneidade da variância. Quando a distribuição dos parâmetros estudados era normal, compararam-se as médias pela prova *t* de Student. Quando as distribuições não eram normais e/ou as variâncias não eram homogéneas, utilizaram-se provas não paramétricas. Compararam-se as distribuições de frequências pela prova de Qui-quadrado, ou pela técnica exacta de Fisher quando o valor esperado em 20% (ou menos) das células era inferior a 5. O nível de significância utilizado foi de 5%.

Menções sobre o estado nutricional nos registos clínicos de doentes hospitalizados

Foram estudados 1152 doentes provenientes de seis hospitais Portugueses. Foram recolhidas as notas médicas e de enfermagem (como, por exemplo, sobre o peso e a ingestão alimentar/nutricional) dos processos dos doentes. Foram calculadas frequências absolutas e relativas das menções relevantes e testadas as diferenças entre doentes desnutridos e bem nutridos (Estudo 1).

A Dinamometria da Força Muscular como Ferramenta de Rastreio do Risco Nutricional na Admissão Hospitalar

Foram estudados dois hospitais do Porto, um distrital e um universitário. Foi estudada uma amostra de 314 doentes (idade compreendida entre 18 e 96 anos). A dor/deficiência nos membros superiores, a incapacidade de execução de medições de força muscular e a incapacidade em fornecer o consentimento informado, foram factores de exclusão adicionais. A DFM foi avaliada no segundo dia de internamento hospitalar e os resultados foram comparados com o NRS-2002. Os dados de DFM foram distribuídos em quartis (1º quartil = menor força muscular), utilizando diferentes pontos de corte consoante o sexo. A mediana do tempo de internamento foi de 7 dias. Foram calculados os *Odds Ratios* (OR) e respectivos intervalos de confiança a 95% (IC a 95%) (Estudo 2).

Insuficiente ingestão voluntária de energia e nutrientes em doentes hospitalizados

Foram estudados 258 doentes provenientes de dois hospitais do Porto, um distrital e um universitário. A ingestão alimentar foi avaliada através da recordação das 24h precedentes. A incapacidade em fornecer o consentimento informado foi um factor de exclusão adicional. A frequência de inadequação da ingestão nutricional/energética foi estimada utilizando as *Dietary Reference Intakes*. A ingestão alimentar foi convertida em nutrientes utilizando o software MicroDiet 1.1, 2000 (Estudo 3).

Resultados

Menções sobre o estado nutricional nos registos clínicos de doentes hospitalizados

Em 1152 doentes estudados, a frequência de risco nutricional variou entre os 28,5% e 47,3%, enquanto que a frequência de desnutrição antropométrica oscilou entre 6,3% e 14,9%. Dois em cada três doentes tinha menções sobre os cuidados alimentares/nutricionais prestados nos processos clínicos, mas apenas um em cada três tinha o seu peso medido e registado. Os doentes desnutridos foram pesados com menor frequência mas a sua alimentação e problemas a ela associados foram monitorizados com maior regularidade (Estudo 1).

A Dinamometria da Força Muscular como Ferramenta de Rastreio do Risco Nutricional na Admissão Hospitalar

Os doentes identificados como estando desnutridos pelo NRS-2002 (37,9%) eram mais velhos, mais baixos e menos pesados, apresentaram menor capacidade funcional, menor força muscular ($p<0,001$) e maior tempo de internamento. Ao comparar os doentes com menos força muscular (1º quartil) com os que foram classificados no 4º quartil, a DFM revelou boa sensibilidade (86,7%) e especificidade (70,2%) e um *kappa* de Cohen de 0,56. A análise multivariada demonstrou que os doentes com maior força muscular (4º quartil) têm um menor risco independente de se encontrarem em risco nutricional (*p* para

tendência <0,001) OR = 0,19 (IC a 95% = 0,08-0,48). A força muscular dos doentes incluídos na presente amostra, quando comparada com a distribuição de DFM para indivíduos saudáveis, ficou classificada com valores de *z-score* inferiores a *z-score* = -1,96 (Estudo 2).

Insuficiente ingestão voluntária de energia e nutrientes em doentes hospitalizados

A ingestão energética e nutricional dos 258 doentes foi muito baixa em ambos os sexos. Não se encontraram diferenças significativas para ingestão energética e nutricional entre grupos de idade (<65 anos e >64 anos). Quando foi avaliada a proporção de doentes com ingestão inferior às recomendações, esta foi muito elevada, tendo sido superior para fibra, niacina, folatos, vitamina B12, magnésio e zinco. Não se encontraram diferenças para energia e nutrientes estudados, nos indivíduos que estavam abaixo de 1/3 das recomendações, entre doentes bem nutridos (n = 89) e desnutridos (n = 169) (Estudo 3).

Conclusões

A frequência de DAD, no momento de admissão hospitalar, é muito elevada (29-47%), enquanto que a de menções relevantes para o estado nutricional é muito escassa. A presente investigação reforça a necessidade de investir na sensibilização dos profissionais de saúde, sobre a importância do rastreio e da prescrição/monitorização da alimentação e do peso dos doentes, na admissão e durante todo o internamento hospitalar. A DFM identifica uma elevada proporção de doentes em risco nutricional e pode ser utilizada como uma primeira ferramenta de rastreio do risco nutricional em hospital. A ingestão nutricional e energética, nas primeiras 24h de internamento hospitalar, é muito inadequada. Não foram encontradas diferenças entre grupos etários nem entre doentes desnutridos e bem nutridos.

Palavras-chave: Rastreio, desnutrição associada à doença, risco nutricional, processos clínicos, peso, ingestão alimentar, registos clínicos, dinamometria da força muscular; admissão hospitalar.

Abstract

Introduction

The prevalence of Disease-related Malnutrition (DRM) is described to be of 20-60% on admission to hospital, and of 10% in the community. It has been associated with worse clinical outcomes, namely higher morbidity and mortality as well as higher frequency of health care and its associated costs. The lack of screening and monitoring of nutritional status have been said to be risk factors for the increased prevalence of DRM during hospital stay. The aims of this study were to:

- evaluate the importance given by health care professionals to certain aspects related with nutritional status (weight, food/nutrient intake) of hospital patients and to see if there were any differences between the under and non undernourished ones (Study 1);
- investigate if Hand Grip Strength (HGS) could be used as a single screening procedure in identifying patients who are classified as being undernourished or nutritionally at risk at hospital admission (Study 2);
- evaluate the inadequacy of voluntary energy and nutrient intake on the first day of hospital admission (Study 3).

Methodology

A multicentric cross-sectional study was carried, with a probabilistic sample of 50% of in-patients, obtained with systematic sampling. Pregnancy, paediatric age and critical illness were exclusion criteria as well as incapacity to fulfil nutritional risk screening protocol and length-of-stay less than 24h. Socio-demographic and anthropometric data were collected and Nutritional Risk Screening 2002 (NRS-2002) protocol was applied.

Mean and standard deviations and frequencies were calculated respectively for continuous and categorical variables. Levene's test was used to evaluate variance homogeneity. When variable distribution was normal, means were compared using Student's t test. Non-parametric tests were used to compare variables with non-simetric

distributions. Frequencies distributions were tested using Chi-squared test, or Fisher exact test. Significance level was attained at a p level of 0.05.

Nutritional status recording in hospitalized patient notes

One thousand and fifty-two patients from six Portuguese public hospitals were studied. Clinical notes (e.g. weight, food/nutrient intake) from medical records were collected. Absolute and relative frequencies were calculated for all relevant notes and differences were statistically tested between undernourished and well nourished patients (Study 1).

Handgrip Strength as a Hospital Admission Nutritional Risk Screening Method

Two public hospitals in Porto, Portugal, a university and a district one, were studied. A sample of 314 patients (age range of 18 to 96) was studied. Hand pain, upper limb deformities, incapacity to perform muscle strength measurements and inability to give informed consent were considered further exclusion criteria. In the second day of hospital admission HGS was evaluated and results were compared with NRS-2002. HGS quartiles cut-offs were calculated by sex according to total sample distribution. Lower and higher HGS values are represented by the 1^{st} and 4^{th} quartiles respectively. The median of the entire sample distribution was used to establish the cut off for LOS – 7 days. Odds Ratios (OR) and 95% Confidence Intervals (95%CI) were calculated for grip strength (Study 2).

Insufficient voluntary intake of nutrients and energy in hospitalized patients

Two hundred and fifty-eight patients from two public hospitals in Porto, Portugal, a university and a district one, were studied. Dietary intake was evaluated by a 24-hour dietary recall. Inability to give informed consent was considered further exclusion criteria. The overall frequency of inadequate energy and nutrient intake was estimated using Dietary Reference Intakes. Food intake was converted into nutrients for each patient using Microdiet software version 1.1, 2000 (Study 3).

Results

Nutritional status recording in hospitalized patient notes

A total of 1152 patients were included in this study. The prevalence of nutritional risk varied between 28.5% and 47.3% while undernutrition classified by anthropometrical parameters was considerably lower (6.3% to 14.9%). Two thirds of the patients had their food intake monitored and registered in medical records but only one third were weighted. Undernourished patients had their food intake more frequently monitored but their weight was less frequently measured, than the well-nourished ones (Study 1).

Handgrip Strength as a Hospital Admission Nutritional Risk Screening Method

Patients identified as undernourished by NRS-2002 (37.9%) were older, shorter and lighter, with a lower functional capacity, a longer length of stay and a lower HGS ($p<0.001$). When comparing patients with lower HGS (1^{st} quartile) with those with the highest HGS (4^{th} quartile), this parameter revealed good sensitivity (86.7%) and specificity (70.2%) and a $k=0.56$. Multivariate analysis showed that patients with higher HGS had an independent decreased risk of being at nutritional risk (p for trend <0.001) OR = 0.19 (95%CI = 0.08-0.48). Our entire sample of hospitalized patients was -1.96 Z-score below the HGS cut-off of distribution data for healthy individuals (Study 2).

Insufficient voluntary intake of nutrients and energy in hospitalized patients

Energy and nutrient intakes from 258 patients showed very low values for both men and women. No significant differences were found for energy and nutrient intakes across age groups (<65 years and ≥65 years). When the proportion of study subjects with inadequate nutrient intakes was analysed, a high degree of inadequacy was found. The degree of inadequacy was higher for fibre, niacin, folate, vitamin B12, magnesium and zinc. No significant differences were found for energy and nutrients studied and for intakes

below 1/3 of dietary recommendations from nutritionally-at-risk (n = 89) and well nourished (n = 169) patients (Study 3).

Conclusions

DRM prevalence amongst hospital patients on admission is significantly high (29-47%). Clinical notes regarding nutritional status is rather infrequent on medical records. This study showed that urges the need to empower health care providers of the importance of the screening and monitoring of weight and food intake, on admission and during hospital stay. HGS identifies a high proportion of nutritionally-at-risk patients and can be a reliable first screening tool for nutritional risk in hospitals. Voluntary nutrient and energy intakes in the first 24 hour of hospital admission are highly inadequate. No differences were found between undernourished and well-nourished patients or patients <65 years and ≥65 years.

Key words: Food/Nutrient Intake; Handgrip Strength Dynamometry; Screening; Disease-related Malnutrition; Nutritional Risk; Medical Records; Weight; Hospital Admission; Clinical Notes.

CAPÍTULO 1

Introdução

Introdução

Definição e Prevalência

Recentemente definida pelo Conselho da Europa[1], a Desnutrição Associada à Doença (DAD) é um "estado de insuficiente ingestão, utilização ou absorção de energia e de nutrientes, devida a factores individuais ou sistémicos, que resulta na perda de peso rápida e na disfunção de órgãos e que poderá estar associada a um pior resultado da doença ou do seu tratamento". Deve ser identificada como um diagnóstico clínico e deve ser distinguida do termo "malnutrição". Este termo é utilizado principalmente na nomenclatura anglo-saxónica e traduz um desequilíbrio, quer por excesso quer por defeito, de energia e nutrientes[2]. Este último é caracterizado pelo risco de ter complicações associadas a aspectos nutricionais, que afectem a doença e/ou o tratamento[1]. Neste caso, pode não ser evidente ainda através dos habituais marcadores de estado nutricional (antropometria, exame físico e dados bioquímicos) uma deterioração do estado nutricional, mas este pode já estar presente. Convém, portanto, utilizar uma nomenclatura coerente, correcta e uniforme.

A DAD é uma condição que permanece bastante prevalente nos hospitais e na comunidade. São cada vez mais os estudos desenvolvidos a nível mundial e todos eles revelam que a prevalência de DAD é elevada e que oscila entre os 20-60% na admissão hospitalar[3-16] e cerca de 10% na comunidade[15,16], dependendo da ferramenta utilizada e do tipo de doentes analisados. Este problema não está limitado a áreas geográficas específicas ou às regiões economicamente desfavorecidas. Em Portugal não se conhece a sua magnitude.

Rastreio e Avaliação

As recomendações da *European Society for Clinical Nutrition and Metabolism* (ESPEN)[17] e da *American Society of Parenteral and Enteral Nutrition* (ASPEN)[18] propõem algumas ferramentas que poderão ser utilizadas no rastreio e avaliação nutricional, com vista à identificação e monitorização dos indivíduos identificados em risco nutricional ou com DAD.

As primeiras propõem a utilização de três ferramentas diferentes consoante se trate de rastreio ao nível hospitalar (*Nutritional Risk Screening 2002 – NRS-2002*)[15], comunitário (*Malnutrition Universal Screening Tool*)[29] ou específico para idosos (*Mini Nutritional Assessment*)[20]. Para os doentes em idade pediátrica não recomenda o rastreio mas sim a avaliação nutricional por rotina, com base na monitorização do peso e da altura. As recomendações da ASPEN referem a utilização de apenas uma ferramenta (*Subjective Global Assessment – SGA*)[21] para aplicação em todas as instituições prestadoras de cuidados de saúde e a qualquer tipo de indivíduos, excepto para os que se encontram em idade pediátrica (faixa etária sobre a qual não recomendam nenhuma ferramenta de rastreio específica). Apesar do SGA ser mais subjectivo do que as outras recomendadas pela ESPEN, demonstrou-se recentemente[22], que identifica sensivelmente a mesma proporção de indivíduos desnutridos que o NRS-2002.

Elia e Stratton[23], numa revisão recente, descreveram muitas outras ferramentas para a identificação da DAD. Estas utilizavam maioritariamente os parâmetros antropométricos: o peso, o índice de massa corporal, os perímetros totais e musculares e as pregas cutâneas sem, no entanto, haver consenso quanto aos pontos de corte mais sensíveis e específicos para a identificação de DAD.

Em Portugal não há recomendações específicas sobre esta matéria, pelo que os profissionais de saúde e os hospitais devem-se reger pelas recomendações internacionais. Actualmente, os processos de acreditação das instituições de saúde exigem a implementação de um protocolo de rastreio/avaliação nutricional na admissão[8].

Causas e Consequências

A doença *per si* parece ser o determinante mais importante da DAD, contribuindo conforme a gravidade e localização da patologia[15,16]. A resposta metabólica à doença traduz-se na diminuição da ingestão alimentar, na má absorção ou no aumento das perdas de nutrientes e também no aumento do gasto energético[15,16,24,25]. Também a idade está directa e independentemente associada a um aumento da DAD/risco nutricional[4-6,15,26], assim como o baixo nível educacional e o facto de se viver sozinho[10].

O primeiro sinal de desnutrição é a perda de peso[3,16,24,27], devida à diminuição de massa muscular e de massa gorda[16,24]. Estas perdas conduzem a um *turnover* metabólico, com alteração da maioria das funções fisiológicas, incluindo o sistema imune[28]. A DAD também poderá conduzir a alterações psicológicas, como a modificação da função cognitiva e como o desenvolvimento de ansiedade e de depressão[16,29].

Por afectar a capacidade funcional, a função mental e a qualidade de vida, por resultar em maior risco de infecções e disfunção de órgãos[17] e por conduzir a um aumento significativo, não só da morbilidade e mortalidade, como da frequência e dos custos com os cuidados de saúde (maior tempo de internamento[1,30]), a DAD tem enormes consequências individuais e económicas.

Objectivos do estudo

O objectivo geral desta tese de dissertação foi conhecer o panorama de alguns hospitais Portugueses no que diz respeito ao rastreio da DAD. Tendo em conta todos os aspectos até agora discriminados, foram objectivos específicos:

1. Avaliar a relevância que é dada a aspectos relacionados com o estado nutricional do doente, no início do internamento hospitalar (Capítulo 2):
    a. saber se o rastreio da DAD é realizado por rotina;
    b. avaliar a frequência de menções nos processos clínicos sobre o estado nutricional do doente, como o peso ou aspectos relacionados com este, e sobre os cuidados alimentares/nutricionais, prestados nas primeiras 48h de internamento;
    c. saber se os doentes que estão em risco nutricional ou desnutridos serão alvo de maior atenção por parte dos profissionais de saúde.
2. Avaliar se a Dinamometria da Força Muscular (DFM) pode ser utilizada como uma ferramenta única de rastreio nutricional na identificação de doentes desnutridos, em ambiente hospitalar (Capítulo 3).
3. Avaliar o grau de inadequação da ingestão nutricional e energética voluntária, no primeiro dia de internamento hospitalar (Capítulo 4).

Organização da tese

Esta tese de dissertação, subordinada ao tema da desnutrição associada à doença, englobou dados recolhidos em seis hospitais portugueses.

Os capítulos 2, 3 e 4 dizem respeito a artigos submetidos para publicação em revistas científicas e pretendem responder aos objectivos 1, 2 e 3, respectivamente. O capítulo 5 compreende uma discussão e conclusão genéricas sobre a temática abordada.

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CAPÍTULO 2

Menções sobre o estado nutricional nos registos clínicos de doentes hospitalizados

Artigo submetido para publicação.

Foram publicados resultados parciais e preliminares do presente estudo, relativos a dois hospitais (Matos LC, Tavares MM, Pichel F, Senra D, Amaral TF. Desnutrição associada à doença na admissão hospitalar. Boletim da APNEP 2006; 35:2-14.).

Menções sobre o estado nutricional nos registos clínicos de doentes hospitalizados

Nutritional status recording in hospitalized patient notes

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- Hospital da Senhora da Oliveira E.P.E., Guimarães
- Hospital Pedro Hispano, Unidade Local de Saúde de Matosinhos E.P.E.
- Centro Hospitalar de Vila Real/Peso da Régua E.P.E., Vila Real
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Contribuição:

LM, MAT, AH, MMT, LA, AA e TFA contribuíram para o desenho do estudo. Os dados foram recolhidos por LM, MAT, AH, MMT, LA e AA. LM e TFA completaram a análise estatística. O manuscrito final foi redigido por LM e TFA e revisto por LM, MAT, AH, MMT, LA e TFA.

Menções sobre o estado nutricional nos registos clínicos de doentes hospitalizados

Resumo

Está descrito que a frequência de desnutrição associada à doença (DAD) afecta cerca de 30 a 60% dos doentes no momento da admissão hospitalar e cerca de 10% dos indivíduos na comunidade. A DAD tem vindo a ser associada a graves consequências, como ao maior risco de infecções e de disfunção de órgãos e a um aumento significativo, não só da morbilidade e mortalidade, como da frequência e dos custos com os cuidados de saúde. A falta do reconhecimento e da monitorização dos aspectos relacionados com o estado nutricional, têm sido apontados como factores que contribuem para o aumento da frequência de DAD, durante o internamento hospitalar. Foi objectivo deste estudo avaliar a relevância que é dada a aspectos relacionados com o estado nutricional dos doentes (peso, ingestão alimentar) e saber se os doentes em risco nutricional ou desnutridos serão alvo de maior atenção por parte dos profissionais de saúde.

Foi recolhida uma amostra sistemática, representativa de seis hospitais portugueses, correspondente a 40-50% do total de camas de cada serviço de internamento. Foram critérios de exclusão a doença crítica, a gravidez, a idade inferior a 18 anos, a incapacidade de aplicação do protocolo de rastreio nutricional e o tempo de internamento inferior a 24h. Recolheram-se dados sócio-demográficos, antropométricos, sobre as menções dos processos clínicos respeitantes ao peso, cuidados alimentares/nutricionais prestados e ingestão alimentar/nutricional dos doentes e aplicou-se uma ferramenta de rastreio nutricional (*Nutritional Risk Screening* 2002).

Em 1152 doentes estudados, a frequência de risco nutricional variou entre os 28,5% e 47,3%, enquanto que a frequência de desnutrição antropométrica oscilou entre 6,3% e 14,9%. Dois em cada três doentes tinha menções acerca de cuidados alimentares/nutricionais prestados nos processos clínicos, mas apenas um em cada três tinha o seu peso medido e registado. Os doentes desnutridos foram pesados com menor

frequência mas a sua alimentação e problemas a ela associados foram monitorizados com maior regularidade.

A frequência de DAD, no momento de admissão hospitalar, é muito elevada, enquanto que a de menções relevantes para o estado nutricional é muito escassa. A presente investigação reforça a necessidade de investir na sensibilização dos profissionais de saúde, sobre a importância do rastreio e da prescrição/monitorização da alimentação e do peso dos doentes, na admissão e durante todo o internamento hospitalar.

Abstract

The prevalence of disease-related malnutrition (DRM) is described to be of 30-60% on admission to hospital, and of 10% in the community. It has been associated with worse clinical outcomes, namely higher morbidity and mortality as well as higher frequency of health care and its associated costs. The lack of screening and monitoring of nutritional status have been said to be risk factors for the increased prevalence of DRM during hospital stay. The aims of this study were to evaluate the importance given by health care professionals to certain aspects related with nutritional status (weight, food/nutrient intake) of hospital patients and to see if there were any differences between the under and non undernourished ones.

A systematic sample of patients from six hospitals was collected. Pregnancy, paediatric age and critical illness were exclusion criteria as well as incapacity to fulfil nutritional risk screening protocol and length-of-stay less than 24h. Socio-demographic, anthropometric data and clinical notes (e.g. weight, food/nutrient intake) from medical records were collected and Nutritional Risk Screening 2002 protocol was applied.

A total of 1152 patients were included in this study. The prevalence of nutritional risk varied between 28.5% and 47.3% while undernutrition classified by anthropometrical parameters was considerably lower (6.3% to 14.9%). Two thirds of the patients had their food intake monitored and registered in medical records but only one third were weighted.

Undernourished patients had their food intake more frequently monitored but their weight was less frequently measured, than the well-nourished ones.

DRM prevalence amongst hospital patients on admission is significantly high. Clinical notes regarding nutritional status is rather infrequent on medical records. This study showed that urges the need to empower health care providers of the importance of the screening and monitoring of weight and food intake, on admission and during hospital stay.

Palavras-chave:

Rastreio, desnutrição associada à doença, risco nutricional, processos clínicos, peso, ingestão alimentar, registos clínicos.

Key-words:

Screening, disease-related malnutrition, nutritional risk, medical records, weight, food intake, hospital admission, clinical notes.

Introdução

Embora haja um crescente reconhecimento de que a Desnutrição Associada à Doença (DAD) se trata de um problema significativo, esta não é comummente reconhecida[1]. A sua frequência mantém-se inaceitavelmente elevada, estando descrito que afecta cerca de 30 a 60% dos doentes no momento da admissão hospitalar e cerca de 10% dos indivíduos na comunidade[2]. A DAD tem vindo a ser associada a graves consequências, como ao maior risco de infecções e de disfunção de órgãos[3] e a um aumento significativo, não só da morbilidade e mortalidade, como da frequência e dos custos com os cuidados de saúde[4].

Em alguns países, o rastreio nutricional realizado a todos os doentes admitidos nos hospitais é um procedimento padrão, necessário para a acreditação e até usado como critério da avaliação da qualidade do serviço hospitalar[5]. De acordo com a Resolução ResAp (2003)3 do Conselho da Europa, todos os doentes devem ser regularmente submetidos à avaliação do risco nutricional, desde o período prévio à admissão hospitalar até ao final do seu internamento[4].

Apesar do interesse crescente sobre a importância da atenção que deve ser dada ao estado nutricional dos doentes internados, McWhirter e Pennington[6] revelaram que menos de 50% dos 200 doentes identificados como desnutridos tinham tido o seu estado nutricional previamente documentado nos processos clínicos. Alguns trabalhos realizados posteriormente confirmaram estes dados[7, 8].

A falta do reconhecimento e da monitorização dos aspectos relacionados com o estado nutricional têm sido apontados como factores que contribuem para o aumento da frequência de DAD durante o internamento hospitalar[1,7,9,10]. Está descrito que na ausência de um rastreio formal, mais de metade dos doentes em risco nutricional não é identificada e não é assim referida para tratamento[5]. De acordo com o nosso conhecimento, não está ainda documentada a frequência com que o rastreio nutricional é efectuado no momento da admissão hospitalar. O conhecimento desta situação em hospitais Portugueses

possibilitará também adequar e optimizar as estratégias preventivas, já delineadas pelo Conselho da Europa[1,4].

Do conjunto de parâmetros que constituem as ferramentas recomendadas para o rastreio nutricional em meio hospitalar[3,11], a perda de peso não intencional prévia ao internamento é referida como o critério mais discriminativo para a avaliação da presença de DAD[7]. Foi também demonstrado que a perda de peso durante o internamento é um indicador bastante fidedigno da readmissão hospitalar[12,13] e está associada a piores resultados clínicos[3,7,9,14,15].

O presente estudo teve como objectivo avaliar a relevância que é dada a aspectos relacionados com o estado nutricional do doente, como o peso, no início do internamento hospitalar. Deste modo, pretendeu-se saber se o rastreio do risco nutricional é realizado por rotina e também avaliar a frequência de menções nos processos clínicos sobre o estado nutricional do doente e sobre os cuidados alimentares/nutricionais, prestados nas primeiras 48h de internamento. Pretendeu-se ainda saber se os doentes que estão em risco nutricional ou desnutridos serão alvo de maior atenção por parte dos profissionais de saúde.

Material e Métodos

Realizou-se um estudo descritivo e transversal em seis hospitais Portugueses: o Hospital Geral de Santo António (HGSA) E.P.E. – Porto, o Hospital Central do Funchal (HCF), Serviço Regional de Saúde E.P.E., o Hospital Pedro Hispano (HPH) da Unidade Local de Saúde de Matosinhos E.P.E., o Hospital da Senhora da Oliveira (HSO), E.P.E. – Guimarães, o Centro Hospitalar de Vila Real/Peso da Régua (CHVR/PR) E.P.E. e o Instituto Português de Oncologia Francisco Gentil (IPO-FG) E.P.E. – Porto. A escolha destas unidades hospitalares residiu em razões de conveniência.

Amostra

Com o objectivo de obter uma amostra representativa dos doentes internados em cada hospital, utilizou-se como método de amostragem a selecção sistemática do primeiro de cada dois doentes mencionados nas listagens hospitalares da admissão diária dos doentes. Usaram-se como critérios de inclusão a idade igual ou superior a 18 anos e o período de internamento superior a 24h no serviço onde iriam ser inquiridos, excepto no IPO, em que se entrevistaram os que seriam sujeitos a cirurgia nas 24h de admissão. Definiram-se como critérios de exclusão a gravidez, a incapacidade de aplicação do *Nutritional Risk Screening* 2002 (NRS-2002) e o estado crítico. Como estado crítico, considerou-se a falência de pelo menos um dos órgãos vitais, necessitando de cuidados intensivos[11]. Foram inquiridos os doentes dos Serviços de Internamento em cada hospital abrangidos pelos critérios de inclusão, excluindo-se os Serviços de Pediatria, de Neonatologia, de Urgência, de Cuidados Intensivos e de Cuidados Continuados. Os doentes foram admitidos consecutivamente no estudo, de acordo com os critérios de inclusão, até se completar o número correspondente a 50% do número de camas dos serviços hospitalares, excepto no HCF, em que se optou por incluir apenas cerca de 42% do total de camas em cada serviço, dado o seu elevado número.

Apesar deste estudo incluir apenas informação de natureza observacional, todos os doentes que cumpriam os critérios de inclusão que estavam conscientes ou em alternativa, os seus familiares, foram informados sobre os objectivos do estudo, os métodos a usar e sobre o seu direito à recusa, de acordo com o expresso na última revisão da Declaração de Helsínquia[17]. Foi obtido então o consentimento informado, após explicação do estudo e de que a participação era voluntária, sendo garantida a protecção e a confidencialidade das informações recolhidas em todos os casos. Este protocolo foi aprovado pela comissão de ética de cada hospital.

Todos os doentes identificados como estando em risco nutricional ou desnutridos, foram referenciados para tratamento ao nutricionista ou médico assistente.

Recolha de Dados

Utilizou-se um inquérito de aplicação indirecta constituído por grupos de questões fechadas e abertas e um formulário com locais para registo das informações obtidas.

Recolheram-se do processo clínico informações sobre a prescrição dietética e sobre a existência de problemas relacionados com a ingestão de alimentos/suplementos, sobre os cuidados alimentares/nutricionais prestados e também informações sobre o peso do doente no momento de admissão (e da alta clínica no HSO). No HGSA e no HCF, obteve-se ainda informação das menções registadas pelos médicos do Serviço de Anestesia sobre o peso nos processos clínicos.

Utilizou-se como ferramenta de rastreio do risco nutricional o NRS-2002. Este é o método recomendado pela *European Society for Clinical Nutrition and Metabolism* (ESPEN) para o rastreio nos doentes hospitalares[3]. Detecta a presença de DAD ou o risco de a desenvolver, durante o internamento hospitalar. Classifica os doentes internados segundo a deterioração do estado nutricional e a gravidade da doença, podendo defini-las como normal, ligeira, moderada ou grave, com um total de pontuação de 6. Se a idade for superior a 70 anos, adiciona-se mais 1 valor à pontuação final. Um doente com uma pontuação final igual ou superior a 3 é considerado em risco nutricional

ou desnutrido[17]. Quando os doentes se encontravam incapacitados de fornecer as informações necessárias, completou-se o NRS-2002, através de informações fornecidas pelos familiares e/ou técnicos de saúde.

Realizaram-se as medições antropométricas de acordo com procedimentos previamente descritos e padronizados por Lee *et al.*[18]. Nenhum dos serviços em que este trabalho decorreu se encontrava equipado com balanças próprias para doentes acamados. Quando os doentes se encontravam nesta situação, usou-se o peso mencionado no processo clínico ou o referenciado pelo doente/familiares ou então o estimado pelo inquiridor. A altura, o perímetro do meio-braço (PMB) e a prega cutânea tricipital (PCT) foram medidos com o doente de pé ou no leito, de acordo com os procedimentos descritos para doentes acamados[18]. Nos casos em que o braço não dominante se encontrava lesionado, paralisado ou com acessos vasculares periféricos, foi utilizado o braço dominante, para medição do PMB e da PCT. Calculou-se o Índice de Massa Corporal (IMC)[19] e a Circunferência Muscular do Braço (CMB)[20]. Com o objectivo de classificar os doentes com desnutrição antropométrica, utilizou-se uma associação[21] dos valores de PCT ou de CMB, com o IMC: IMC <18,5kg/m^2; IMC <20,0kg/m^2 e valores de PCT ou CMB inferiores ao percentil 15. Nos indivíduos que apresentavam idades até aos 65 anos, compararam-se os dados provenientes das medições da PCT com a população de referência de Frisancho[22], e da CMB com a de Bishop *et al.*[23]. Para os doentes com idades iguais ou superiores a 65 anos, foram utilizadas como referência os dados de Corish *et al.*[24]. Na análise dos resultados dos parâmetros antropométricos, excluíram-se os indivíduos que apresentavam edemas e/ou ascite.

De forma a uniformizar os procedimentos de recolha de dados em cada hospital, foi criado previamente um manual de procedimentos. Os dados foram recolhidos pelos autores, que tinham sido previamente treinados para o efeito.

A escolaridade de cada inquirido foi definida como o número de anos de ensino completados. Calculou-se o tempo de internamento através da diferença entre o dia de admissão e o dia de alta clínica, no respectivo serviço de internamento.

Análise Estatística dos Dados

Calcularam-se os parâmetros de localização e de dispersão para as variáveis contínuas e as frequências absolutas e relativas para as variáveis categóricas. Usou-se a prova de Levene para avaliar a homogeneidade da variância. Quando a distribuição dos parâmetros estudados era normal, compararam-se as médias pela prova *t* de Student. Quando as distribuições não eram normais e/ou as variâncias não eram homogéneas, utilizaram-se provas não paramétricas. Compararam-se as distribuições de frequências pela prova de Qui-quadrado, ou pela técnica exacta de Fisher quando o valor esperado em 20% (ou menos) das células era inferior a 5. O nível de significância utilizado foi de 5%. O software estatístico utilizado para a análise dos dados foi o SPSS (versão 14.0).

Resultados

A presente amostra compreende 1152 doentes, 578 mulheres e 574 homens, com média de idades de 57,6±18,0 anos, compreendidas entre os 18 e os 99 anos. A escolaridade média corresponde à conclusão do primeiro ciclo de ensino básico, com 4 anos completados.

A maioria dos doentes apresentava como diagnóstico principal patologias do foro médico (50%), enquanto que 30% manifestava patologias cirúrgicas e 20% apresentava diagnósticos oncológicos e/ou hematológicos. A mediana do tempo de internamento, nos serviços em estudo, foi de 7 dias.

Os dados analisados, não perfazem a totalidade da amostra para alguns parâmetros apresentados, pela necessidade de não considerar os dados antropométricos em doentes que apresentavam edemas/ascite (n=103) e a não obtenção de dados resultantes do depoimento de doentes sem aptidão cognitiva, conjugada com a impossibilidade de os obter a partir de respondentes alternativos. Dada o seu pequeno número, a diversidade dos aspectos focada no presente estudo e a importância de se manter a representatividade da amostra, optou-se por não excluir os participantes com valores omissos.

Quadro I – Descrição dos hospitais incluídos no estudo.

Nome	Tipo de Hospital	N	Tipo de Doentes
Hospital Geral Santo António E.P.E., Porto	Central	241	Médicos/Cirúrgicos
Hospital Central do Funchal, Serviço Regional de Saúde E.P.E.	Central	262	Médicos/Cirúrgicos
Hospital da Senhora da Oliveira E.P.E., Guimarães	Distrital	159	Médicos/Cirúrgicos
Hospital Pedro Hispano, ULS Matosinhos E.P.E.	Distrital	231	Médicos/Cirúrgicos
Centro Hospitalar de Vilar Real/Peso da Régua E.P.E., Vila Real	Distrital	129	Médicos/Cirúrgicos
Instituto Português de Oncologia Francisco Gentil E.P.E., Porto	Central	130	Oncológicos

Quadro II – Características da amostra estudada, por hospitais.

	HGSA	HCF	HSO	HPH	CHVR/PR	IPO-FG
Sexo, *n (%)*						
Feminino	112 (46,5)	131 (50,0)	85 (53,5)	121 (52,4)	72 (55,8)	57 (43,8)
Masculino	129 (53,5)	131 (50,0)	74 (46,5)	110 (47,6)	57 (44,2)	73 (56,2)
Idade (anos) *	58,2±18,3	56,4±19,3	54,6±17,9	57,1±18,7	63,8±16,3	57,1±13,5
Escolaridade (nº anos completados) §	4 (0-23)	4 (0-17)	4 (0-15)	4 (0-18)	4 (0-17)	3 (0-13)
Índice de Massa Corporal *(kg/m^2)						
Feminino	26,3±6,1	28,2±7,3	26,5±4,9	27,6±5,8	25,8±5,2	26,1±5,2
Masculino	24,3±4,6	25,6±4,1	25,8±4,5	24,7±4,1	26,0±4,9	24,3±4,2
Patologias, *n (%)*						
Médicas	152 (63,1)	135 (51,5)	77 (48,4)	110 (47,6)	76 (58,9)	0 (0,0)
Cirúrgicas	70 (29,0)	97 (37,0)	59 (37,1)	88 (38,1)	43 (33,3)	0 (0,0)
Oncologia/Hematologia	19 (7,9)	30 (11,5)	23 (14,5)	33 (14,3)	10 (7,8)	130 (100,0)
Em risco nutricional (NRS-2002), *n (%)*	114 (47,3)	89 (34,0)	46 (28,9)	87 (37,7)	43 (33,3)	37 (28,5)
Com desnutrição antropométrica #**,** *n (%)*	31 (14,9)	18 (7,7)	9 (6,3)	18 (8,3)	14 (12,2)	12 (9,5)
Tempo de Internamento (dias) §	7 (2-51)	8 (2-130)	4 (2-73)	7 (2-75)	7 (2-128)	7 (2-53)

* Média ± desvio-padrão.

§ Mediana (mínimo-máximo).

Excluídos os indivíduos que apresentavam edemas e/ou ascite (n=103).

Encontram-se descritas as características de cada hospital e da amostra estudada, estratificada por hospital, nos Quadros I e II. A frequência de doentes em risco nutricional variou entre 28,5 e 47,3%, enquanto que a frequência de desnutrição antropométrica variou entre 6,3 e 14,9%. Apenas foi necessário estimar o peso em 14,1% dos doentes e em 71% dos casos, este foi medido ou referido. Tanto os doentes que se encontravam em risco nutricional como os desnutridos, eram mais idosos, maioritariamente internados devido a patologias do foro médico, com menor escolaridade e com tempos de internamento superiores, comparativamente com os doentes que não se encontravam desnutridos e com os que não estavam em risco nutricional (Quadro III).

Quadro III – Características da amostra estudada segundo a classificação pelo NRS-2002 e por desnutrição antropométrica.

	Desnutrição antropométrica [¥]			**Risco nutricional** (NRS-2002)		
	Sem	**Com**	*p*	**Sem**	**Com**	*p*
Sexo, *n (%)*						
Feminino	479 (50,8)	46 (45,1)	n.s. [¤]	379 (51,5)	199 (47,8)	n.s. [¤]
Masculino	463 (49,2)	56 (54,9)		357 (48,5)	217 (52,2)	
Idade (anos) *	56,5±17,8	59,8±20,7	n.s. [¤]	52,8±16,8	66,0±16,9	<0,001
Escolaridade (nº de anos completos) [§]	4 (0-23)	3 (0-21)	0,017	4 (0-23)	3 (0-21)	<0,001
Índice de Massa Corporal *,[¥,#] (kg/m^2)						
Feminino	-	-	-	27,8±5,6	25,2±6,6	<0,001
Masculino	-	-	-	26,2±3,8	23,0±4,6	<0,001
Patologias, *n (%)*						
Médicas	414 (43,9)	60 (58,8)		283 (38,5)	267 (64,2)	
Cirúrgicas	319 (33,9)	17 (16,7)	0,001	295 (40,1)	62 (14,9)	<0,001
Oncologia/Hematologia	209 (22,2)	25 (24,5)		158 (21,5)	87 (20,9)	
Tempo de Internamento (dias) [§]	6,0 (2-130)	9,0 (2-128)	<0,001	5,0 (2-128)	10,0 (2-130)	<0,001

[¥] Excluídos os indivíduos que apresentavam edemas e/ou ascite (n=103).

[¤] Não significativo (p>0,05).

* Média ± desvio-padrão.

[#] Não contabilizado por constituir um critério de classificação da desnutrição antropométrica.

[§] Mediana (mínimo-máximo).

Em nenhum dos hospitais estudados, existia rastreio formal do estado nutricional. Descrevem-se as menções registadas nos processos clínicos, em termos de risco nutricional e desnutrição antropométrica, no Quadro IV.

Quadro IV – Proporção de doentes que apresentava registos de menções relevantes para o estado nutricional, nos processos clínicos e de enfermagem, segundo a classificação do NRS-2002 e de desnutrição antropométrica.

	Desnutrição antropométrica *			**Risco nutricional** (NRS-2002)		
	Sem	**Com**	*p*	**Sem**	**Com**	*p*
Registos de peso, *n (%)*						
Admissão	355 (37,8)	21 (20,6)	<0,001	303 (41,2)	98 (23,7)	<0,001
Alta ¥	5 (3,7)	0 (0,0)	n.s. ¤	4 (3,5)	1 (2,2)	n.s. ¤
Anestesia #	54 (45,0)	2 (20,0)	n.s. ¤	38 (38,8)	22 (51,2)	n.s. ¤
Registos de problemas relacionados com o peso, *n (%)*						
Admissão	87 (9,3)	15 (14,7)	n.s. ¤	70 (9,5)	43 (10,4)	n.s. ¤
Alta ¥	9 (6,7)	1 (11,1)	n.s. ¤	5 (4,4)	7 (15,2)	0,040
Prescrição alimentar, *n (%)*	629 (66,8)	83 (81,4)	0,002	479 (65,1)	317 (76,4)	<0,001
Registos de cuidados alimentares prestados (Enfermagem), *n (%)*	710 (75,5)	79 (77,5)	n.s. ¤	539 (73,3)	345 (82,9)	<0,001
Registos de problemas de ingestão alimentar, *n (%)*	154 (19,1)	39 (41,9)	<0,001	97 (15,6)	115 (31,1)	<0,001

* Excluídos os indivíduos que apresentavam edemas e/ou ascite (n=103).

¤ Não significativo (p>0,05).

¥ Valores disponíveis apenas para o HSO.

Proporção de registo de peso efectuados pelo Serviço de Anestesia (valores disponíveis apenas para o HGSA e HCF).

Encontraram-se menções sobre o peso nos processos clínicos de apenas 34,9% dos doentes e sobre os aspectos relacionados com o peso (obeso, emagrecido, etc.) em apenas cerca de 10% dos processos estudados. Dos registos de peso realizados nos HCF e HGSA, no primeiro hospital 8,3% destes registos foram efectuados pelo Serviço de Anestesia, enquanto que no segundo hospital este número ascendeu aos 60,2%. Curiosamente, os registos de peso foram menos frequentes nos processos dos doentes que estavam desnutridos e/ou que se encontravam em risco nutricional (p<0,001). Contudo, estes doentes apresentaram mais registos de problemas relacionados com a ingestão alimentar e a prescrição dietética foi realizada com maior frequência (p<0,001).

Os registos nos processos clínicos relacionados com a alimentação dos doentes, como a prescrição dietética e os problemas de ingestão de alimentos foram mais frequentes (cerca de 70%) do que os registos de peso.

No HSO, apenas cerca de 3% dos doentes tinha sido pesado durante o internamento hospitalar, e encontraram-se menções relacionadas com o peso, em apenas 7,5% dos casos. No momento da admissão hospitalar, os registos de peso foram mais frequentes nos doentes sem risco nutricional. Durante o internamento estas menções foram mais frequentemente referidas nos doentes em risco nutricional.

Discussão

Com a participação dos doentes abrangidos pelos critérios de inclusão, representando entre 42% e 50% do total de camas dos serviços de internamento, esperámos ter obtido uma amostra representativa em cada um dos seis hospitais envolvidos no presente estudo.

A elevada frequência de doentes em risco nutricional no momento de admissão, (entre 28,5% e 47,3%), é comparável à de estudos prévios[5,21]. De acordo com o esperado, identificámos menor proporção de doentes com desnutrição antropométrica, entre os 6,3% e os 14,9%[6,8,10]. A execução deste trabalho permitiu que estes doentes fossem alvo de um rastreio nutricional na admissão, uma vez que nenhum dos hospitais tinha um protocolo implementado. Outros trabalhos também referiram a inexistência do rastreio do risco nutricional no momento da admissão hospitalar[5,25].

A ferramenta utilizada para a identificação dos doentes em risco nutricional nesta amostra, o NRS-2002[17], foi de fácil utilização e aplicável à diversidade de patologias existentes nestes hospitais. Para além de descrita previamente como tendo validade preditiva em relação ao resultado clínico[3] e dado que é a ferramenta actualmente recomendada pela ESPEN[3], a sua utilização no presente trabalho permitirá futuras comparações. Ao contrário de outros trabalhos prévios[2,6,21] e na tentativa de não subestimar a prevalência da DAD, foram incluídos no presente estudo os doentes que estavam inconscientes e/ou não colaborantes.

Este estudo apresenta como limitação o facto de o peso ter sido obtido por diferentes métodos, embora se saiba que este é recordado com uma fiabilidade razoável[7]. O registo da medição do peso no processo clínico poderá ser uma ajuda importante na avaliação e na monitorização do doente durante do internamento.

Nesta amostra, tal como o descrito em trabalhos prévios[26-28], encontrámos uma baixa frequência de registos do peso nos processos (de 34,9%), não se constatando diferenças entre os doentes com e sem DAD, sendo menos frequentes nos doentes em

risco nutricional; p<0,001; Quadro IV). Singh *et al.*[8], após uma revisão dos registos hospitalares, encontraram menções sobre o estado nutricional em apenas 2 de 69 doentes avaliados (3%). Já nos estudos de Thorsdóttir *et al.* e Rasmussen *et al.* são encontradas frequências de registo mais elevadas, de 17% e de 8%, respectivamente[25,29]. Num trabalho que abrangeu os países escandinavos, Mowe *et al.,* embora referissem que a amostra estudada incluía profissionais de saúde mais interessados sobre esta problemática, revelaram que médicos e enfermeiros afirmavam registar o peso do doente no momento de admissão em 45% dos casos[30].

Cerca de 43% dos registos de peso mencionados nos processos clínicos, foi efectuado pelo Serviço de Anestesia. Resta saber se estes doentes, não sendo submetidos a intervenção cirúrgica posterior, iriam ser pesados nos restantes dias do seu internamento. No HSO, em que os doentes foram seguidos durante o seu internamento, apenas uma pequena percentagem foi pesada durante a permanência no hospital.

Kondrup *et al.*[9] concluíram que os cuidados alimentares/nutricionais prestados aos doentes internados pelos técnicos de saúde eram insuficientes. Neste estudo, encontrámos frequências aceitáveis de prescrições alimentares. Os doentes em risco nutricional foram alvo de maior atenção, em termos de registos/menções de enfermagem, enquanto que não se encontraram diferenças significativas entre os doentes com desnutrição antropométrica e os doentes bem nutridos.

Assim, a presente investigação reforça a necessidade de investir na sensibilização dos profissionais de saúde, sobre a importância do rastreio nutricional e da prescrição/monitorização da alimentação e do peso dos doentes, na admissão e durante todo o internamento hospitalar[8,27].

Conclusões

Do presente estudo, poderemos concluir que a frequência de doentes em risco nutricional no momento da admissão hospitalar é muito elevada, de 29 a 47%, bem como a de desnutrição antropométrica (6-15%). As menções referentes ao peso, ou aspectos relacionados com este, constantes dos processos clínicos, são muito escassas. Os doentes em risco nutricional/desnutridos foram pesados com menor frequência do que os restantes. As menções relacionadas com a alimentação foram consideravelmente mais frequentes do que as relacionadas com o peso dos doentes, devido ao grande contributo da equipa de Enfermagem.

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CAPÍTULO 3

Handgrip Strength as a Hospital Admission Nutritional Risk Screening Method

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Handgrip Strength as a Hospital Admission Nutritional Risk Screening Method

Short title: **Handgrip Strength as a Nutritional Screening Method**

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LCM, MMT and TFA all contributed to the study design. Data collection was performed by LCM and MMT. LCM, MMT and TFA completed data analysis. The paper was written by LCM and TFA and edited by LCM, MMT and TFA.

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Abstract

Objective: To investigate if Hand Grip Strength (HGS) could be used as a single screening procedure in identifying patients who are classified as being undernourished or nutritionally at risk at hospital admission.

Design: Cross-sectional study. In the second day of hospital admission HGS was evaluated and results were compared with Nutritional Risk Screening (NRS-2002).

Setting: Two public hospitals in Porto, Portugal, a university and a district one.

Subjects: A probabilistic sample of 50% in-patients from each hospital of 314 patients (age range of 18 to 96), was studied. Patients were considered eligible if they were ≥ 18 years old of and able to give informed consent. Hand pain, upper limb deformities, incapacity to perform muscle strength measurements and pregnancy were considered further exclusion criteria.

Results: Patients identified as undernourished by NRS-2002 (37.9%) were older, shorter and lighter, with a lower functional capacity, a longer length of stay and a lower HGS ($p<0.001$). When comparing patients with lower HGS (1^{st} quartile) with those with the highest HGS (4^{th} quartile), this parameter revealed good sensitivity (86.7%) and specificity (70.2%) and a $k=0.56$. Multivariate analysis showed that patients with higher HGS had an independent decreased risk of being at nutritional risk (p for trend <0.001) Odds Ratio=0.19 (95% confidence interval=0.08-0.48). Our entire sample of hospitalized patients was -1.96 Z-score below the HGS cut-off of distribution data for healthy individuals.

Conclusions: HGS identifies a high proportion of nutritionally-at-risk patients and can be a reliable first screening tool for nutritional risk in hospitals.

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Descriptors: Handgrip Strength, Screening, Disease-related Malnutrition, Hospital

Introduction

The burden of Disease-related Malnutrition (DRM) has been persistently high and the reported frequency when patients are admitted to hospital, has varied between 20% and 50%, depending on the sample and tools used (Stratton *et al.*, 2003). Undernutrition, amongst these patients, develops further while in hospital (McWhirter & Pennington, 1994). DRM has been consistently associated with adverse clinical outcomes and with a detrimental effect on physical and psychological health (Elia & Stratton, 2000; Stratton *et al.*, 2003). DRM is common, under-recognised and under-treated in many health care settings (Elia *et al.*, 2005).

Although routine screening is widely recommended (ASPEN, 2002; Kondrup *et al.*, 2003a; Elia *et al.*, 2005), there is no agreement concerning the most appropriate criteria to be used. Because of the large number of people at-risk of DRM, traditional nutritional assessment is considered to be time consuming and expensive as a first line strategy for screening. A variety of tools have been developed and are recommended for adults under hospital care, leading to different types and proportions of individuals as being at risk of DRM. The Subjective Global Assessment (SGA) (Detsky *et al.*, 1984; Detsky *et al.*, 1987) is recommended by the American Society of Parenteral and Enteral Nutrition (ASPEN) to screen undernutrition. The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends the Nutritional Risk Screening (NRS-2002) tool not only to screen undernutrition but also to assess the risk of developing undernutrition in the hospital setting (Kondrup *et al.*, 2003b). Despite the fact that these assessment tools have shown high validity, low inter-observer variation as well as high practicability, they rely on nutritional parameters that require skilled and trained technicians and stretch resources. Thus, their routine use in many centres may not be accessible due to budget restraints.

Several studies demonstrated that handgrip strength (HGS) can be used as a nutritional assessment technique HGS is also sensitive in evaluating short-term changes in nutritional status (Lopes *et al*., 1982; Windsor & Hill, 1988; Webb *et al.*, 1989; Ades *et*

al., 2002; Humphreys *et al.*, 2002). Muscle strength, measured by handgrip dynamometry, has been shown to be both sensitive and specific in predicting outcome in surgical patients (Klidjian *et al.*, 1982; Hunt *et al.*, 1985; Kalfarentzos *et al.*, 1989; Webb *et al.*, 1989; Pieterse *et al.*, 2002; Bunout *et al.*, 2004; Mahalakshmi *et al.*, 2004), and cirrhotic patients (Álvares-da-Silva & Silveira, 2005), as well as being associated with higher long-term mortality (Newman *et al.*, 2006). HGS is also useful for the detection of functional status (Humphreys *et al.*, 2002) and in the onset of Activities of Daily Living (ADL) dependence in the elderly (Rantanen *et al.*, 2002). Furthermore, the nutritional supplementation in stable chronic obstructive pulmonary disease patients (Planas *et al.*, 2005), resulted in a tendency to increase body weight and HGS.

The rationale for using HGS as a screening procedure is supported by other different arguments. A loss of body cellular mass causes an unequal decrease of muscle strength, which implies that a higher loss of functionality than a corresponding loss of skeletal muscle mass occurs (Vaz *et al.*, 1996). These changes in muscle function such as contractility, relaxation rate and endurance may anticipate body composition changes and may help detect functional impairment at sub clinical levels (Lopes *et al.*, 1982). HGS could offer several advantages as a nutritional screening method. The handheld dynamometer is non-invasive, quick and easy to use, portable and rather inexpensive, and does not require skilled technicians. Another advantage of HGS, in comparison, to other nutritional screening tools is that patients do not need to be weighed and therefore allowing the screening of patients with fluid retention. An additional characteristic that makes the dynamometer an appealing method for screening nutritional status is that it has proved to have a relatively low observer and intra-individual variability (Lopes *et al.*, 1982; Bohannon & Schaubert, 2005).

The aim of our study was to analyze if HGS could be used as a single screening procedure in identifying patients that are classified as being undernourished in a hospital setting.

Methods

Study sample

Three hundred and thirty-three patients were recruited in a cross-sectional study, between January and December 2004, from two public hospitals in Porto, Portugal: Hospital Geral de Santo António SA, a teaching unit and a district one, Hospital Pedro Hispano (ULS, SA). Aiming to obtain a probabilistic sample of 50% in-patients, we used a systematic sampling method selecting the first in every two admitted patients. Patients were considered eligible if they were ≥18 age years, able to give informed consent and with a Length of Stay (LOS) longer than 24 hours. Hand pain, upper limb deformities, incapacity to perform HGS measurements, pregnancy and critical care were considered further exclusion criteria. Nineteen patients were not included because they were unable to provide the necessary information to complete the NRS-2002. Three hundred and fourteen patients (157 males and 157 females) with an age range of 18 to 96 completed the protocol and were included in this analysis.

Data collection

After explaining the procedure to each patient, HGS was performed. Patients were sitting in a chair or bedridden, with the arm by ther side of the body and the forearm stretched to an angle of 90°, with elbows unsupported (Vaz *et al.*, 1996). The maximal value of three consecutive measurements, in the non-dominant arm using a mechanical handgrip dynamometer (Eisenhut dynamometer, Eisenhut Instruments GmbH, Germany, reference 02.140.01), was registered to the lowest kilogram (kg). Brief pauses were taken between measurements. Patients used their dominant hand when they were unable to perform HGS with their non-dominant hand.

Nutritional risk was evaluated using NRS-2002 (Kondrup *et al.*, 2003b). This method was developed based on the results of several randomized controlled trials

showing the specific population where nutritional support is beneficial and, therefore, recommended. This tool has proved to have a high predictive validity, a low inter-observer variation (k=0.67) and a high practicability (Kondrup *et al.*, 2003a).

*Table 1 – Nutritional Risk Screening (NRS-2002)**

Impaired nutritional status		**Severity of disease (≈ increase in requirements)**	
Absent **Score 0**	Normal nutritional status	Absent **Score 0**	Normal nutritional requirements
Mild **Score 1**	Weight t loss > 5% in 3 months or Food intake below 50-70% of normal requirement in preceding week	Mild **Score 1**	Hip fracture, chronic patients, in particular with acute complications: cirrhosis, chronic hemodialysis, diabetes, oncology.
Moderate **Score 2**	Weight loss > 5% in 2 months or BMI 18.5 – 20.5 + impaired general condition or Food intake 25-60% of normal requirement in preceding week	Moderate **Score 2**	Major abdominal surgery, stroke, severe pneumonia, hematologic malignancy
Severe **Score 3**	Weight loss > 5% in 1 months (>15% in 3 months) or BMI < 18.5 + impaired general condition or Food intake 0-25 % of normal requirement in preceding week.	Severe **Score 3**	Head injury, Bone marrow transplantation, Intensive care patients (Apache > 10)
Impaired nutritional status Score + Severity of disease Score: = Total score			
Age: if ≥ 70 years: **add 1 to total score above**			
Score ≥ 3: the patient is nutritionally at-risk and a nutritional care plan is initiated **Score < 3:** weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.			

* From Kondrup *et al.*, 2003b.

Information regarding age, sex, number of completed years of schooling, functional ability, clinical diagnosis and dominant arm was obtained for overall description of this sample. Functional ability was measured through the Katz Index (Katz *et al.*, 1963) for ADL such as moving/walking, dressing, eating, bathing, personal hygiene and urinary/faecal incontinence. The patient was considered totally dependent if he or she was unable to perform more than 2 of these activities; partially dependent if able to perform 3-5 activities; totally independent if he performed 6 activities. LOS was determined between the date of admission and discharge from the ward where the questionnaire was fulfilled.

Anthropometric data were collected applying standard procedures described by Lee & Nieman (Lee & Nieman, 1996). Patients were weighed wearing light clothes using a mechanical scale to the nearest 0.1 kg. Height was measured with a fixed tape to the nearest 0.1 cm. If the patient was bedridden, height was measured with the patient stretched lying in bed (Lee & Nieman, 1996). Weight and height were used to calculate BMI (weight [kg] / [height (m)] ^{2}).

All the screening and assessment procedures were performed by two nutritionists (one in each hospital) who were not involved in the patients' care. In order to improve between-interviewer agreement, the nutritionists trained together, before the beginning of the study, working on grip strength and anthropometry measurements.

The study was designed in accordance with the Declaration of Helsinki (World Medical Association, 2004) and was approved by the institutional review board of the two hospitals. This protocol was submitted and approved by Hospital Pedro Hispano (ULS Matosinhos, SA) ethics committee. Patients were advised about the aims and procedures of the study, as well as their right of refusal. They all gave informed consent and those identified as nutritionally-at-risk were referred to their doctors and clinical nutritionists.

Analysis

Frequencies, means and standard deviations were calculated to describe the sample's most important characteristics.

Because HGS values were higher for men, quartiles cut-offs were calculated by sex according to total sample distribution. Cut-off values for HGS distribution values in quartiles (25th, 50th and 75th percentiles) were respectively for men 10.0, 19.0 and 26.0kg and for women 0.0, 6.0 and 11.5kg. A high number of women reported HGS values of zero kg (n=48, 30.6%), which exceeded the cut offs of the 1st quartile and were therefore included in the 1st quartile. Lower and higher HGS values are represented by the 1st and 4th quartiles respectively.

The median of the entire sample distribution was used to establish the cut off for LOS – 7 days. A LOS ≥7 days was considered as a long LOS. The severity of illness was defined according to NRS-2002 as absent, mild, moderate and severe (Kondrup *et al.*, 2003b).

The variables' normal distribution was examined with the Kolmogorov-Smirnov test. Means and median values, respectively for normal and non-normal distributed data, are presented and were compared with Student's T test or Mann-Whitney U test, as appropriate. Frequencies were compared using Chi-square test. Sensitivity, specificity, positive and negative predictive values were estimated. Agreement percentage and Cohen's kappa coefficient were also assessed. Z-scores for grip strength were calculated using as a reference, recently published data by Frederiksen *et al.* (Frederiksen *et al.*, 2006)

Odds Ratios (OR) and 95% Confidence Intervals (95%CI) were calculated for grip strength. When comparing higher *vs.* lower quartiles (4^{th} *vs.* 1^{st} quartile) we further adjusted for age and height, using unconditional logistic regression. To estimate the weight of HGS on LOS, OR was adjusted for sex, age, height and disease severity. Significant results were considered when $p<0.05$. All analysis were carried out by using Statistical Package for Social Sciences for Windows, version 13.0; SPSS Inc., Chicago.

Results

The baseline characteristics of our sample of 157 males and 157 female patients are summarised in Table 2.

Table 2 – Sample's characteristics.

	Female (n=157)	**Male** (n=157)	*p*-value
Age (years, mean ± SD[1])	56.0 ± 19.1	58.5 ± 18.4	0.232
Education[2] (mean ± SD[1])	6.7 ± 4.7	7.1 ± 4.2	0.476
Pathology groups (n (%))			
Internal Medicine	90 (57.3)	105 (66.9)	
Surgery	67 (42.7)	52 (33.1)	0.103
Activities of Daily Living (n (%))			
0-2 ADL	42 (26.8)	39 (24.8)	
3-5 ADL	38 (24.2)	35 (22.3)	0.795
6 ADL	77 (49.0)	83 (52.9)	
NRS-2002 ≥ 3 (n (%))	52 (33.1)	67 (42.7)	0.103
Grip Strength (kg, means ± SD[1])	7.1 ± 6.5	18.3 ± 11.9	< 0.001

[1]SD – Standard Deviation.

[2]Number of completed school years.

The age range of the 314 patients was 18-96 years (mean age 57.3±18.7 years). No significant differences were observed between genders with relation to age, education, main pathology group, number of ADL or proportion of patients being nutritionally-at-risk, but the HGS values are higher among males ($p<0.001$). The HGS had a high acceptability, with no refuses to participate.

Table 3 – Characteristics of the sample according nutritional status classified by NRS-2002.

	Well nourished NRS< 3	**Nutritionally-at-risk NRS≥ 3**	*p-value*
N (%)	195 (62.1)	119 (37.9)	
Sex n (%)			
Female	105 (53.8)	52 (43.7)	0.103
Male	90 (46.2)	67 (56.3)	
Age (years, mean ± SD[1])	50.4 ± 16.5	68.5 ± 16.8	< 0.001
Weight (kg, mean ± SD[1])			
Female	70.1 ± 15.2	63.5 ± 19.2	0.021
Male	76.7 ± 11.3	64.6 ± 14.8	< 0.001
Height (m, mean ± SD[1])			
Female	1.58 ± 0.07	1.55 ± 0.07	0.012
Male	1.70 ± 0.07	1.66 ± 0.07	< 0.001
BMI (kg/m^2, mean ± SD[1])			
Female	28.1 ± 5.5	26.8 ± 7.2	0.215
Male	26.5 ± 3.8	23.3 ± 4.6	< 0.001
Functional ability - Katz Index (n (%))			
0-2 ADL	25 (12.8)	56 (47.0)	
3-5 ADL	44 (22.6)	29 (24.4)	< 0.001
6 ADL	126 (64.6)	34 (28.6)	
Length of stay (days, mean ± SD[1])	8.0 ± 8.0	12.8 ± 9.8	< 0.001
Grip Strength (kg, mean ± SD[1])	15.4 ± 11.3	8.3 ± 9.3	< 0.001

[1]SD – Standard Deviation.

Description of characteristics of the sample according to nutritional status as classified by NRS-2002 in Table 3 revealed a high proportion of nutritionally-at-risk patients (37.9%). This group of patients was older, shorter and lighter, performed fewer activities in their day to day lives, and had a longer LOS and lower HGS. All these differences had statistical significance ($p<0.001$). When parameters evaluated in Table 2 and Table 3 were stratified by hospital, no major changes in results or associations were observed (data not shown).

Table 4 – Handgrip strength according to NRS-2002 classification (percentiles and extreme values).

	Well nourished NRS< 3				**Nutritionally-at-risk NRS≥ 3**			
	Female		*Male*		*Female*		*Male*	
	< 65 years	≥ 65 years	< 65 years	≥ 65 years	< 65 years	≥ 65 years	< 65 years	≥ 65 years
Dynamometry (kg)								
Minimum	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
P_{10}	0.0	0.0	14.0	1.5	0.0	0.0	0.0	0.0
P_{25}	3.5	0.0	18.0	11.3	1.5	0.0	9.0	0.0
P_{50}	10.0	5.0	25.0	17.5	7.0	0.0	20.0	8.0
P_{75}	14.0	10.8	33.0	25.0	12.5	6.0	27.3	14.0
P_{90}	18.6	14.0	40.6	30.0	21.4	9.0	34.7	21.4
Maximum	25.0	16.0	48.0	39.0	23.0	10.0	39.0	26.0

Table 4 reveals a high proportion of patients with zero or extremely low HGS values, with lower values for women and patients with age ≥ 65 years. Additionally, well nourished women under 65 had similar HGS as nutritionally-at-risk older men. Despite differences between gender and age groups, nutritionally-at-risk patients showed lower HGS values than the well nourished ones.

The diagnostic value of HGS compared with NRS-2002 is shown in Table 5. When comparing patients with lower strength values (1st quartile) with those who had the highest HGS (4th quartile), HGS revealed better sensitivity (86.7%) than specificity (70.2%) and a good k (0.56). We obtained worse results for the 2nd and 3rd quartiles compared with the 4th quartile, although values were higher for sensitivity than specificity (Table 5). The best sensitivity was achieved when the 1st, 2nd and 3rd quartiles were analyzed together against the 4th quartile, with a very high sensitivity and negative predictive value and low specificity and positive predictive value. When analysing surgery and internal medicine patients separately, diagnostic value of HGS was similar for both groups, with 75% of agreement and also a higher sensitivity (75.0%) than specificity (68.0%) (data not shown).

Table 5 – Diagnostic value of handgrip strength comparing with NRS-2002.

	Sensitivity	**Specificity**	**PPV**[1]	**NPP**[2]	**Agreement**	**K**
	%	*%*	*%*	*%*	*%*	
1st vs 4th quartile	86.7	70.2	69.9	86.8	77.4	0.56
2nd vs 4th quartile	69.7	57.4	31.9	86.8	60.1	0.19
3rd vs 4th quartile	67.7	56.4	28.8	86.8	58.4	0.16
1st+2nd+3rd vs 4th quartile	91.5	30.8	45.8	86.8	55.7	0.21

[1] Positive predictive value.

[2] Negative predictive value.

Table 6 – Handgrip strength and risk of being nutritionally-at-risk, according with NRS-2002.

		Nutritionally-at-risk (NRS≥ 3)		
Handgrip Strength	**Well nourished** (n)	**Nutritionally-at-risk** (n)	**Crude OR** (95% CI)	**Adjusted OR**[1,2] (95% CI)
1st quartile (lower)	28	65	1.00	1.00
2nd quartile	49	23	0.20 (0.10-0.39)	0.30 (0.15-0.61)
3rd quartile	52	21	0.17 (0.09-0.34)	0.33 (0.16-0.69)
4th quartile (higher)	66	10	0.07 (0.03-0.15)	0.19 (0.08-0.48)

[1]Odds ratio (OR) and 95% confidence intervals (CI) calculated from logistic regression, adjusted for age and height.

[2]*p* for trend < 0.001.

Multivariate analysis (Table 6) showed that patients with increasing HGS had an independent decreasing risk of being nutritionally-at-risk (NRS-2002≥ 3). This risk reduction is visible among all quartiles and is stronger as HGS increases (*p* for trend< 0.001).

In univariate analysis each additional kg of HGS was associated with a 4% reduction of risk of a LOS≥ 7 days (Table 7), although not reaching statistical significance in multivariate analysis when adjusting for age, sex, disease severity and height.

Table 7 – Handgrip strength and length of stay.

	High LOS (LOS ≥ 7 days)	
	Crude OR (95% CI)	**Adjusted OR**[1] (95% CI)
Grip Strength (kg)	0.96 (0.94-0.98)	0.98 (0.95-1.01)

[1]Odds ratio and 95% confidence intervals (CI) calculated from logistic regression, adjusted for sex, age, height and disease severity.

Z-scores were calculated using Frederiksen *et al.* (Frederiksen *et al.*, 2006) recently published HGS reference data. For all gender-, age- and height-specific subsets of patients the estimated mean Z-score was lower than -2.00. The lowest Z-score was -9.93 and the highest was -1.98. The mean value for all groups was Z-score = -4.15. Our entire sample of hospitalized patients was 2.5% below grip strength cut-off of distribution data for healthy individuals.

Discussion

Since a gold standard for identifying undernutrition does not exist, the performance of screening systems in identifying undernourished patients has been compared with more detailed nutritional assessment tools. In this cross-sectional study, the data obtained from handgrip dynamometry were compared with the NRS-2002, the tool recommended by the ESPEN to screen nutritional risk and also to assess nutritional status in the hospital setting (Kondrup *et al.*, 2003a).

One of the main reasons for the strong resistance in implementing nutritional screening is that screening is one of the growing numbers of procedures that health professionals are asked to perform in their busy schedules (Elia *et al.*, 2005). The simplicity and ease required to apply HGS as a nutritional screening method, contrasts with other screening tools, which require skilled personnel. Previous studies carried out amongst restricted groups of patients showed that HGS has one main requirement of a nutritional status screening test, the ability to detect undernutrition (Klidjian *et al.*, 1980; Klidjian *et al.*, 1982; Lopes *et al.*, 1982; Windsor & Hill, 1988; Kalfarenntzos *et al.*, 1989; Webb *et al.*, 1989; Vaz *et al.*, 1996; Humphreys *et al.*, 2002). The absence of previous reports about the performance of HGS as an undernutrition screening tool in a wide range of diagnosis, justified the evaluation of its effectiveness. The present study provided the opportunity to evaluate the screening value of HGS in a teaching and district hospital probabilistic samples, with a high proportion of undernourished patients (38%), ensuring a wide spectrum of nutritionally relevant pathologies. It also gave the opportunity to search for differences of handgrip strength between medical and surgical patients and to evaluate the independent prognostic value of HGS using LOS as outcome in hospitalized patients.

Our data shows that HGS identifies a high proportion of undernourished patients with 23 to 44% of patients being misclassified, depending on the level of grip strength distribution. As expected, improved performance of HGS as a screening method was found for the patients with lower strength (allocated in the 1st quartile) with higher

sensitivity than specificity and also with higher negative predictive values, than when higher cut off values for HGS (second and third quartiles) were used. This diagnostic value of HGS against NRS-2002 was comparable with some studies carried out in surgical patients using HGS *vs* more detailed nutritional assessment (Klidjian *et al.*, 1980; Klidjian *et al.*, 1982; Hunt *et al.*, 1985; Kalfarentzos *et al.*, 1989; Webb *et al.*, 1989). The diagnostic value of HGS against NRS-2002 was comparable to that of NRS-2002 and other tools for nutritional screening and assessment at hospital admission (Kyle et al., 2005a; Valero *et al.*, 2005). Contrary to other non-nutritional screening methods, it is unfeasible to establish an exact diagnostic value of nutritional screening, *i.e*. tests sensitivities, specificities and predictive values, as there is no universally accepted gold standard for diagnosing DRM.

The HGS results observed in our sample are considerably lower than those reported in other studies carried out with hospital patients (Klidjian *et al.*, 1980; Klidjian *et al.*, 1982) and healthy subjects (Luna-Heredia *et al.*, 2005; Frederiksen *et al.*, 2006). Grip strength distribution of our sample, shows a large proportion of patients with zero or extremely low values. They were more likely to be female and older, as previously described (Luna-Heredia *et al.*, 2005; Frederiksen *et al.*, 2006). When compared with Danish reference data, (Frederiksen *et al.*, 2006) values for HGS below -1.96 Z-scores (2.5%) for standardized sex, age and height were found in all patients. It is unclear whether this could represent a high level of poor muscle function associated with undernutrition, functional impairment and disease in our sample patients or if revised standardized values are required for HGS in hospitalized patients. Available preliminary data suggests that mean HGS may vary across countries, regardless of height (Frederiksen *et al.*, 2006) and therefore highlights the need for Portuguese reference data. Another possible explanation for the lower HGS values found in the present study is the choice of the non-dominant hand for grip strength measurements, as lower values were previously described for HGS measurements made with the non-dominant hand (Hillman *et al.*, 2005; Hornby *et al.*, 2005; Luna-Heredia *et al.*, 2005). Furthermore, the

characteristics of the hand dynamometer used could have contributed to the results. The mechanical handgrip dynamometer used is a simple steel instrument; it may not be as ergonomic and comfortable as more sophisticated models. If this was true, there could have been a tendency for all these measurements to be systematically biased downward, although it did not lead to misclassification. The low values found for handgrip strength, advocate the use of more sensitive and ergonomic dynamometers in the hospital setting.

As the entire sample showed HGS values under -1.96 standardized for sex, age and height Z-scores (Frederiksen *et al.*, 2006), the question whether to establish screening cut-off points to separate findings, that were considered to be positive or negative, has emerged. The best sensitivity was achieved when we took into consideration 4th quartile cut-offs of our sample distribution by gender, corresponding to patients with higher HGS. Lowering the threshold for considering a HGS result to be negative (classifying the patient as well nourished) will increase the level of false-negatives thus reducing sensitivity. As DRM has been shown to be very prevalent, a very sensitive screening procedure will be preferable. Further research is needed in order to confirm those screening cut points.

This was to our knowledge the first study to evaluate the independent association between HGS and LOS as outcome in hospitalized patients. We found that higher handgrip strength at admission was related with a shorter LOS, although not significantly after statistical adjustments. As undernutrition and other comorbidities have been shown to have cumulative effects on LOS (Correia *et al.*, 2003; Kyle *et al.*, 2005b), we tried to account for this eventual confounding factor by adjusting for illness severity. The possibility of having residual confounding cannot be ruled out, by incompletely accounting for all the confounding effects of disease on LOS.

Although the findings of the high agreement between HGS and NRS-2002 corroborate the use of NRS-2002 as a nutritional screening and assessment method, the possibility that HGS could be a better tool than NRS-2002 for nutritional screening at admission cannot be ruled out. Even though both have been validated as nutritional

assessment tools, this question can only be answered once they have been compared together against a gold standard.

Fourteen out of three hundred and fourteen patients had a BMI< 18.5 kg/m^2. Approximately one tenth (n=12) of those classified as nutritionally-at-risk and one hundredth (n=2) of those classified as well nourished by NRS-2002, had a BMI in this category. This confirms that both nutritionally-at-risk and well nourished patients can have a normal BMI status and even so, being the object of a depletion process, stretching the need of a screening procedure related to functional status.

When measuring handgrip strength there is an optimal grip span at which the standard dynamometer should be set. In women, the optimal grip span has been shown to be influenced by hand size (Ruiz-Ruiz *et al.*, 2002). In the present study that has not been taken into account in the study design in order to simulate the *in loco* screening procedure.

It was first suggested that HGS relies on the motivation of the patient (Fettes *et al.*, 2002). This was further confirmed in a study carried out in healthy young volunteers that quantified the effects of instruction type, verbal encouragement and visual feedback on static and peak grip strengths and verified that these three factors had significant but independent effects (Jung & Hallbeck, 2004). In order to minimize the possibility that interviewers could involuntarily introduce an external influence in grip strength measurements, procedures on grip strength data collection were trained by the two interviewers prior to the beginning of study.

The limitations of this study include those inherent to its design. A constraint of HGS use as a screening method is that subject cooperation is required, thus limiting the scope of this study to patients that were able to perform muscle strength measurements. Nevertheless, the exclusion criteria considered patients that should always be monitored for nutritional status, as critical care patients, paediatric patients and pregnant women.

In conclusion, zero or extremely low values obtained for dynamometry, advocates the use of a more sensitive dynamometer in the hospital setting. Despite some limitations

associated to the technique itself, HGS identifies a high proportion of nutritionally-at-risk patients, being strongly and inversely related with nutritional risk. These data suggests that HGS can be a reliable first hospital screening tool for nutritional risk. Further research is needed in order to confirm the screening cut points.

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CAPÍTULO 4

Insufficient voluntary intake of nutrients and energy in hospitalized patients

Artigo em publicação na revista *Nutrición Hospitalaria*

Insufficient voluntary intake of nutrients and energy in hospitalized patients

Short Title: **Inadequate nutrient intake in hospital patients**

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LCM, MMT and TFA all contributed to the study design. Data collection was performed by LCM and MMT. LCM, MMT and TFA completed data analysis. The paper was written by MMT and TFA and edited by LCM, MMT and TFA.

Abstract

Aim: The aim of our study was to evaluate the inadequacy of voluntary energy and nutrient intake on the first day of hospital admission.

Patients and Methods: *A* cross-sectional study was carried out in two primary care hospitals, with a probabilistic sample of 50% of in-patients. Dietary intake was evaluated by a 24-hour dietary recall, and undernutrition was screened through the Nutritional Risk Screening 2002 tool. The overall frequency of inadequate energy and nutrient intake was estimated using Dietary Reference Intakes.

***Results*:** Energy and nutrient intakes from 258 patients showed very low values for both men and women. No significant differences were found for energy and nutrient intakes across age groups (<65 years and ≥65 years). When the proportion of study subjects with inadequate nutrient intakes was analysed, a high degree of inadequacy was found. The degree of inadequacy was higher for fibre, niacin, folate, vitamin B12, magnesium and zinc. No significant differences were found for energy and nutrients studied and for intakes below 1/3 of dietary recommendations from nutritionally-at-risk (n = 89) and well nourished (n = 169) patients.

***Conclusion*:** Voluntary nutrient and energy intakes in the first 24 hours of hospital admission are highly inadequate. No differences were found between undernourished and well-nourished patients or patients <65 years and ≥65 years.

Key words: Disease-related malnutrition; inadequate nutrient intake; estimated average requirements, hospital food, dietary reference intakes.

Introduction

There has been a wide incidence of Disease-related Malnutrition (DRM) amongst hospitalized patients, with figures ranging between 10 and 60%[1]. Studies have demonstrated that nutritional status deteriorates after hospital admission if nutritional support is absent[2,3]. Although the effect of underlying disease and inadequate food provision could be important contributors, reduced food intake is regarded as one of the most important components of a causal pathway leading to DRM and is the most important avoidable risk factor. Poor food intake results not only in an inadequate energy intake, but also in low intake of essential nutrients, which increases the risk of undernutrition. The measurement of daily energy and the full spectrum of nutrient intake at the beginning of hospital stay is an important part of the patient evaluation, because it helps to predict changes in nutritional status during hospitalization and provides nutritional support teams benchmarks to optimize subsequent nutritional care.

Although most hospital diets provide sufficient energy and nutrients, previous studies examining food consumption in hospitalized patients showed mean daily energy and protein intakes in general patients failing to meet the Estimated Average Requirements (EAR)[4,5]. The assessment of energy and protein intakes in hospitalized elderly patients and specific disease groups showed similar results[6]. However, only a small number of studies analysed dietary components other than energy and protein. Many of these studies were limited to evaluating the adequacy of nutrient intakes. The nutritional analysis that was performed, with a handful of nutrients, showed that hospitalized patients had inadequate nutrient intake[6].

The amount of food consumed by each patient and food wastage is not usually monitored or of concern to hospital staff[3,7]. Patients with cognitive impairment or in poor health as well as those receiving artificial nutritional support are more likely to have their amount of feeding carefully monitored as opposed to patients on a hospital diet who do not need feeding assistance.

The **aim** of our study was to evaluate voluntary energy and nutrient intake inadequacy on the first day of admission to hospital.

Materials and methods

Study Design

This study was carried out as a cross-sectional study in two primary care hospitals in Porto, Portugal: Hospital Geral Santo António, S.A, a teaching unit and Hospital Pedro Hispano S.A., a district unit. A probabilistic sample of 50% of in-patients was obtained by systematically selecting one of every two consecutively admitted patients, between 24 and 48h from admission to each hospital. Patients were considered eligible if they were 18 or over and with a Length of Hospital Stay (LOS) longer than 24 hours. Exclusion criteria were nothing *per os* (NPO) prescription, cognitive impairment, artificial nutritional support and pregnancy. Cognitive impairment was defined as a Folstein's mini-mental state examination test result <24 points or <20 in illiterate patients[8].

Dietary intake was evaluated by a single 24-hour dietary recall performed in the first 48 hours of admission. Patients were asked, through a systematic repetition of open-ended questions, to recall and describe type and portion size of all food and drink consumed in the 24 hours prior to the interview[9]. Food portion size was ascertained using the catering company's portion size book, patients described their food consumption as part of portion served (nothing; ¼; ½; ¾; all).

Functional status was evaluated using Katz index of the ability to be independent in the Activities of Daily Living (ADL´s)[10]. Patients were scored depending on their performance in 6 categories of activities, from 0 if completely dependent in bathing, dressing, toileting, transfer, continence and feeding, to 6 if totally independent in all categories. Independence was defined as being able to perform the activity without the assistance of another person.

The height and weight measurements were carried out using techniques described by Lee & Nieman[11]. Weight was measured by a mechanical calibrated scale until 0.1kg. Height was measured with individuals standing, until 0.1cm. When patients could not

stand, measurements were made with them lying on a bed as described by Lee & Nieman[11]. The Nutritional Risk Screening 2002 (NRS-2002) tool was used to screen undernutrition and to assess the risk of developing undernutrition in the hospital setting[12]. NRS-2002 classifies patients' nutritional status based on Body Mass Index (BMI), percentage of recent weight loss and recent change in food intake and severity of disease in four categories: absent, mild, moderate and severe, which corresponds to a score between 0 and 3, respectively. The score obtained in each component is then added together and for patients older than 70 years or older an extra point is added to the total score. Any patient with a total score ≥ 3 is considered nutritionally-at-risk. This tool has a high predictive validity, a low inter-observer variation (k=0.67), a high practicability[12] and is recommended by the European Society of Clinical Nutrition & Metabolism (ESPEN) for hospital nutritional screening[13].

Data was collected using a structured questionnaire to record the following: social-demographic and clinical information, result of screening tool for nutritional risk, anthropometric data and dietary intake. Two nutritionists (one in each hospital) who were not involved in the patients' care carried out all the interviews and assessments. In order to improve between and intra-interviewer agreement, they trained together on the 24-hour recall and the anthropometric measurements procedures.

Despite the observational nature of the present research, the study was designed in accordance with the Declaration of Helsinki[14] and was approved by Hospital Pedro Hispano S.A's Ethics Committee. Informed consent was obtained from all subjects and the protocol approved by the institutional review board of the two hospitals.

Data analysis

Food intake was converted into nutrients for each patient using Microdiet® software version 1.1, 2000[15]. This database was completed with traditional Portuguese food composition information[16-18].

Results are presented for the entire sample, by sex and age. Mean values of energy and nutrient intake for the entire sample distribution and standard deviations were determined.

The overall frequency of inadequate energy and nutrient intake was estimated using Dietary Reference Intakes (DRI). The Estimated Energy Requirements (EER) from the Food and Nutrition Board (FNB) formulas were used for energy[19]. The EAR, the nutrient quantity estimated to meet the requirement of half of all healthy people within a specific life stage and gender group, was used to evaluate the inadequacy of nutrient intake for vitamins C, E, B1, B2, niacin, B6, folate, B12, iron, magnesium and zinc. The minimal lipid recommendation was considered as 15% of EER for women and 20% of EER for men[20]. Because the EAR´s did not include a recommendation for fibre, Adequate Intakes (AI's), a category of DRI[19] were used. Minimum protein needs were estimated using 0.8g protein by each kg of body weight per day[21].

Frequencies, mean values and standard deviations were calculated to describe the sample's most important characteristics. Mann-Whitney U and qui-square tests were used as appropriate to compare sample's characteristics between age and sex groups and nutrient intake between age, sex and nutritional risk groups. Statistical significance was set at $p<0.05$. Data were analysed with SPSS statistical software version 13.0, 2004[22].

Results

Compliance was excellent, with a response rate of 100%. The characteristics of the 258 patients are shown in Table 1, where sex-specific distributions of age, marital status, education level, smoking habits and BMI are described.

Table 1 – Characteristics of the sample[1] by gender.

	Women (*n* = 117)		Men (*n* = 141)	
	n	(%)[2]	*n*	(%)[2]
Age group (years)				
<65	80	(68.4)	93	(66.0)
≥65	37	(31.6)	48	(34.0)
Marital status				
Single	22	(18.8)	23	(17.3)
Married	70	(59.8)	99	(70.2)
Divorced	6	(5.1)	12	(8.5)
Widow	19	(16.2)	7	(5.0)[4]
Education level[3] (years)				
Low (≤6)	90	(76.9)	82	(58.1)
Medium (7-12)	13	(11.1)	49	(34.8)
High (>12)	14	(12.0)	10	(7.1)[4]
BMI categories (kg/m^2)				
Underweight (< 18.5)	5	(4.3)	5	(3.5)
Normal weight (18.5-24.9)	41	(35.0)	72	(51.1)
Overweight (25-29.9)	39	(33.3)	42	(29.8)
Obese (≥30)	32	(27.4)	22	(15.6)[4]
Current smoking habits				
No	105	(89.7)	99	(70.2)
Yes	12	(10.3)	42	(29.8)[4]

[1] *n* = 258

[2] Because of rounding, group totals may not add to 100%.

[3] Number of completed school years.

[4] Significantly different from women: p<0.05.

Significant sex differences (p<0.05) were observed for marital status, with a higher proportion of widows among women who also had lower levels of education and tended to be non-smokers. The distribution of the sample's functional ability, diagnosis and nutritional risk by age groups (<65 years and ≥65 years) is presented in Table 2. As

expected, older patients have lower functional ability, with a proportion of undernourished patients that roughly doubles that of the <65 years (p<0.001).

Table 2 – Characteristics of the sample[1] by age group.

	Age Group			
	<65 years		≥65 years	
	n	(%)[3]	*n*	(%)[3]
Functional ability – Katz Index				
0-2 ADL[2]	13	(7.5)	12	(14.1)
3-5 ADL	30	(17.3)	34	(40.0)
6 ADL	130	(75.1)	39	(45.9)[4]
Diagnosis				
Internal medicine	98	(56.6)	58	(68.2)
Surgery	59	(34.1)	17	(20.0)
Malignant disease	16	(9.2)	10	(11.8)
NRS-2002				
Well nourished (<3)	130	(75.1)	39	(45.9)
Nutritionally-at-risk (≥3)	43	(24.9)	46	(54.1)[4]

[1] *n* = 258.

[2] ADL – Activities of Daily Living.

[3] Because of rounding, group totals may not add to 100%.

[4] Significantly different from age <65 years: p<0.001.

Energy and nutrient intakes stratified by sex and age group are described in Table 3, showing very low values for both men and women. No significant differences were found for energy and nutrient intakes across age groups (<65 years and ≥65 years). When the group with inadequate nutrient intakes was analysed (Table 4), a high degree of inadequacy was found, being highest for fibre, niacin, folate, vitamin B12, magnesium and zinc.

Table 3 – Energy and nutrient intakes by sex and age group[1].

		< 65 years *(mean±SD)*	≥ 65 years *(mean±SD)*
Energy (Kcal)	Women	779.1± 564.2	882.0 ± 515.3
	Men	1111.8 ± 757.5	1191.8 ± 685.1
Protein (g)	Women	33.0 ± 29.2	38.8 ± 26.6
	Men	45.5 ± 35.5	47.4 ± 33.3
Lipids (g)	Women	32.2 ± 24.3	38.2 ± 22.8
	Men	47.1 ± 34.2	47.3 ± 26.4
Fibre (g)	Women	6.5 ± 6.0	8.0 ± 5.9
	Men	9.0 ± 6.3	9.8 ± 6.7
Vitamin C (mg)	Women	48.1 ± 51.7	62.2 ± 68.3
	Men	56.8 ± 74.1	69.4 ± 78.3
Thiamin (mg)	Women	0.7 ± 0.6	0.8 ± 0.5
	Men	0.9 ± 0.7	0.9 ± 0.6
Riboflavin (mg)	Women	0.6 ± 0.8	0.7 ± 0.5
	Men	0.7 ± 0.5	0.8 ± 0.5
Niacin (mg)	Women	6.9 ± 7.6	8.4 ± 7.0
	Men	10.2 ± 8.5	9.4 ± 7.3
Vitamin B6 (mg)	Women	0.8 ± 0.7	1.0 ± 0.7
	Men	1.1 ± 0.8	1.1 ± 0.7
Folate (μg)	Women	98.3 ± 111.2	119.4 8 ± 9.4
	Men	115.8 ± 94.6	126.1 ± 81.3
Vitamin B12 (μg)	Women	2.6 ± 9.8	2.5 ± 4.1
	Men	2.3 ± 2.8	2.8 ± 3.3
Iron (mg)	Women	4.0 ± 3.8	4.8 ± 2.9
	Men	5.2 ± 3.7	5.8 ± 3.7
Magnesium (mg)	Women	94.0 ± 72.7	117.6 ± 69.5
	Men	126.4 ± 90.0	132.9 ± 79.7
Zinc (mg)	Women	3.6 ± 3.8	4.0 ± 3.0
	Men	5.0 ± 4.4	4.9 ± 3.7

[1] $p>0.05$.

Table 4 – Proportion of study subjects with inadequate nutrient intakes.

		< DRI		< 2/3 DRI		< 1/3 DRI	
		n	%	*n*	%	*n*	%
Energy[1] (Kcal)	Women	110	(94.0)	82	(70.1)	46	(39.3)
	Men	129	(100.0)	91	(64.5)	46	(32.6)
Protein[2] (g)	Women	79	(67.5)	63	(53.8)	46	(39.3)
	Men	86	(61.0)	61	(43.3)	43	(30.5)
Lipids[3] (g)	Women	71	(60.7)	49	(41.9)	29	(24.8)
	Men	58	(41.1)	43	(30.5)	25	(17.7)
Fibre[4] (g)	Women	115	(98.3)	104	(88.9)	73	(62.4)
	Men	141	(100.0)	134	(95.0)	95	(67.4)
Vitamin C (mg)	Women	64	(71.8)	67	(57.3)	47	(40.2)
	Men	116	(82.3)	81	(57.4)	47	(33.3)
Thiamin (mg)	Women	79	(67.5)	59	(50.4)	29	(24.8)
	Men	87	(61.7)	55	(39.0)	29	(20.6)
Riboflavin (mg)	Women	85	(72.6)	61	(52.1)	37	(31.6)
	Men	103	(73.0)	70	(49.6)	47	(33.3)
Niacin (mg)	Women	87	(74.4)	66	(56.4)	51	(43.6)
	Men	81	(57.4)	63	(44.7)	52	(36.9)
Vitamin B6 (mg)	Women	82	(70.1)	70	(59.8)	42	(35.9)
	Men	84	(59.6)	59	(41.8)	37	(26.2)
Folate (μg)	Women	116	(99.1)	102	(87.2)	69	(59.0)
	Men	140	(99.3)	122	(86.5)	73	(51.8)
Vitamin B12 (μg)	Women	78	(66,7)	67	(57.3)	54	(46.2)
	Men	80	(56.7)	72	(51.1)	54	(38.3)
Iron (mg)	Women	105	(89.7)	65	(55.6)	43	(36.8)
	Men	102	(72.3)	57	(40.4)	35	(24.8)
Magnesium (mg)	Women	115	(98.3)	93	(79.5)	61	(52.1)
	Men	141	(100.0)	117	(83.0)	64	(45.4)
Zinc (mg)	Women	104	(88.9)	75	(64.1)	51	(43.6)
	Men	130	(92.2)	93	(66.0)	60	(42.6)

[1] Estimated Energy Requirements (FNB, 2002).

[2] Minimum protein needs were estimated using 0.8g protein by each kg of body weight per day (Dupertuis et al., 2003).

[3] Minimal lipids intake was considered as 15% of EER for women and 20% of EER for men (FNB, 2002).

[4] Total fibre was compared with Adequate Intakes (AI's) (FNB, 2002).

No significant differences were found for energy and nutrients in regards to proportions of high level of inadequacy, and intakes below 1/3 of dietary recommendations from nutritionally-at-risk (n=89) and well nourished (n=169) patients (Table 5).

Table 5 – Proportion of subject with nutrient intakes <1/3 DRI according with NRS-2002 status.

< 1/3 Dietary Recomendations		NRS 2002				*p*
		Well nourished		At risk		
		n	%	*n*	%	
Energy[1] (Kcal)	Women	37	(80.4)	9	(19.6)	0.027
	Men	30	(65.2)	16	(34.8)	0.853
Protein[2] (g)	Women	33	(71.7)	13	(28.3)	0.550
	Men	29	(67.4)	14	(32.6)	0.571
Lipids[3] (g)	Women	24	(82.8)	5	(17.2)	0.067
	Men	19	(76.0)	6	(24.0)	0.174
Fibre[4] (g)	Women	54	(74.0)	19	(26.0)	0.105
	Men	60	(63.2)	35	(36.8)	1.000
Vitamin C (mg)	Women	35	(74.5)	12	(25.3)	0.312
	Men	30	(63.8)	17	(36.2)	1.000
Thiamin (mg)	Women	24	(82.8)	5	(17.2)	0.067
	Men	21	(72.4)	8	(27.6)	0.286
Riboflavin (mg)	Women	24	(64.9)	13	(35.1)	0.670
	Men	33	(70.2)	14	(29.8)	0.268
Niacin (mg)	Women	37	(72.5)	14	(27.5)	0.428
	Men	31	(59.6)	21	(40.4)	0.588
Vitamin B6 (mg)	Women	34	(81.0)	8	(19.0)	0.038
	Men	25	(67.6)	12	(32.4)	0.557
Folate (μg)	Women	49	(71.0)	20	(29.0)	0.545
	Men	46	(63.0)	27	(37.0)	1.000
Vitamin B12 (μg)	Women	36	(66.7)	18	(33.3)	0.842
	Men	36	(66.7)	18	(33.3)	0.591
Iron (mg)	Women	35	(81.4)	8	(18.6)	0.240
	Men	22	(62.9)	13	(37.1)	1.000
Magnesium (mg)	Women	45	(73.8)	16	(26.2)	0.234
	Men	39	(60.9)	25	(39.1)	0.726
Zinc (mg)	Women	36	(70.6)	15	(29.4)	0.692
	Men	36	(60.0)	24	(40.0)	0.597

[1] Estimated Energy Requirements (FNB, 2002).

[2] Minimum protein needs were estimated using 0.8g protein by each kg of body weight per day (Dupertuis et al., 2003).

[3] Minimal lipids intake was considered as 15% of EER for women and 20% of EER for men (FNB, 2002).

[4] Total fibre was compared with Adequate Intakes (AI's) (FNB, 2002).

Discussion

The inadequacy of voluntary energy and nutrient intakes at hospital admission was evaluated in a teaching and district hospital's probabilistic samples, representing a wide spectrum of pathologies and giving the opportunity to identify high risk groups for lower intakes. Voluntary nutritional intakes were found to be highly inadequate in the first 24-hours of hospital admission, as previously described[3,5,23,24] and no differences were found between studied age groups and nutritional status.

The institutional menus were developed to provide adequate micronutrients, enabling patients to achieve nutritional needs when the full diet of 2400 Kcal is consumed. Despite sufficient food provision, it is described that most of the patients did not achieve this goal, showing lower intakes of essential nutrients[25]. This has lead to the present investigation, which can be regarded as an insight into the enormous problem of insufficient food intake by hospital inpatients. The 24-hour recall only provides estimates about the preceding day, which may not be representative of patient's usual intake, due to day-to-day variation, so these results could not be generalized to the entire hospitalization.

There were several reasons that led to the decision to opt for the 24-hour recall in evaluating diet intake. The high level of illiteracy in the sample made the use of food diaries impossible. In addition, the recall did not burden the patient with the additional task of a time-consuming interview – a requirement of food frequency questionnaires or diet history. The main disadvantage of the 24-hour recall is its heavy reliance on memory, and it can exhibit the "flat-slope" syndrome, i.e., subjects with low intakes tend to report higher than usual intakes, and those with high intakes tend to report lower than usual intakes[26], leading to misleading results. Nevertheless, all efforts, regarding previous training of interviewers and interview questions, were made in order to minimise recall bias. Furthermore, the present investigation was confined to patients with cognitive ability, as cognitive impaired patients were excluded, because they were more likely to have feeding

assistance or dietary supplements.

Whilst interpreting the estimated proportions of energy and nutrient inadequacy, it is important to highlight the fact that DRI are set to cover the requirements of 97.5% of the population[19]. Consequently, intakes below this level do not necessarily indicate that patients are not meeting their nutritional requirements. Otherwise, these guidelines are set to meet nutritional needs of healthy people, which is not the case with hospitalized patients. Some of these patients could have increased metabolic requirements resulting from the disease that also widens the gap between requirements and intake and if so, the inadequacy of their intake should be higher than the estimated.

One implication of these findings is that all inpatients were likely to require energy, protein, full-spectrum vitamin and mineral supplements. As there are no substitutes for the adequate provision of “normal” food[23] the second implication is that a number of strategies need to be urgently implemented, given the importance of nutrition screening and timely nutritional interventions to treat and prevent further deteriorations in nutrition status.

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CAPÍTULO 5

Discussão e Conclusão

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Prevalência e caracterização da DAD

Dos dados recolhidos nos seis hospitais portugueses incluídos nesta tese de dissertação, pode-se concluir que a prevalência de doentes em risco nutricional na admissão hospitalar é semelhante à descrita noutros estudos[1-14], tendo variado entre 28,5 e 47,3%. No entanto, utilizando critérios antropométricos, a prevalência de desnutrição é consideravelmente mais baixa, de 6,3-14,9%[1,15,16].

Os doentes que se encontram em risco nutricional, tal como os doentes com desnutrição antropométrica, em comparação com os que não apresentam nenhuma destas situações, são indivíduos com menor grau de escolaridade, com menor capacidade funcional, que apresentam maioritariamente de patologias do foro de medicina interna e que têm um tempo de internamento mais longo. Os doentes em risco nutricional apresentam ainda um índice de massa corporal mais baixo, idade superior e menor força muscular, quando comparados com os indivíduos sem risco nutricional.

DAD e menções de estado nutricional nos processos clínicos

Alguns estudos[17,18] demonstram que os cuidados alimentares/nutricionais prestados aos doentes internados, pelos técnicos de saúde, são insuficientes e que a DAD não é, por rotina, reconhecida na admissão hospitalar. Ainda, do conjunto de parâmetros que constituem as ferramentas recomendadas para o rastreio nutricional em meio hospitalar[19,20], a perda de peso não intencional prévia ao internamento é referida como o critério mais discriminativo para a avaliação da presença de DAD[14]. A falta do reconhecimento e da monitorização dos aspectos relacionados com o estado nutricional têm sido apontados como factores que contribuem para o aumento da frequência de DAD durante o internamento hospitalar[14,15,17,18].

Neste estudo, encontrámos frequências baixas (cerca de 33%) de menções de peso ou aspectos relacionados com este e frequências mais aceitáveis (cerca de 66%)

de aspectos relacionados com a ingestão alimentar. Ao avaliarmos as diferenças de tratamento dadas aos doentes com risco nutricional ou com DAD, concluiu-se que estes doentes tinham a sua alimentação monitorizada e registada com maior frequência do que os restantes doentes. No entanto, em relação ao peso o mesmo não aconteceu.

DAD e dinamometria da força muscular (DFM)

A DFM é um método que reúne algumas das características essenciais numa ferramenta de rastreio nutricional: é simples, rápido, de aplicabilidade elevada e identifica com boa sensibilidade os indivíduos desnutridos[21-25]. Os presentes dados mostraram que a DFM identifica uma elevada proporção de indivíduos em risco nutricional e que apresenta um valor diagnóstico comparável ao encontrado para outras ferramentas[23,26,27]. Também ficou demonstrado que a DFM está inversamente relacionada com o risco nutricional.

As limitações deste estudo prenderam-se com as inerentes à técnica de medição da DFM: a influência do tamanho da mão[28], a motivação do doente[29] e o encorajamento verbal e instruções prévias fornecidas[30]. A não existência de dados de referência de DFM para a população portuguesa, nem para indivíduos hospitalizados, limita a comparação dos dados obtidos e categorização segundo os *z-scores*. Pretende-se então, no futuro, criar dados de referência de DFM para a população portuguesa (saudáveis e doentes).

DAD e ingestão alimentar/nutricional

As dietas hospitalares são definidas, nos manuais de dietas hospitalares, de tal modo que possam fornecer quantidades adequadas de energia e nutrientes à maioria dos doentes internados nessas instituições de saúde. No entanto, estudos demonstram que a maioria desses mesmos doentes não satisfaz as suas necessidades energéticas e nutricionais através da dieta hospitalar[9,18,31,32]. O nosso estudo também identificou uma elevada proporção de doentes que não supriam as suas necessidades energéticas (>94%) nem nutricionais (>55% para todos os nutrientes analisados). Poder-se-á colocar

em questão o modo de avaliação da ingestão alimentar (recordação das 24h precedentes)[33] e o facto de os valores de referência utilizados (*Dietary Reference Intakes*) dizerem respeito às necessidades de 97,5% da população saudável (50%, no caso das *Estimated Average Requirements*)[34]. No entanto, este último critério só vem agravar ainda mais a discrepância, pois na maioria dos casos, as necessidades dos doentes poderá estar aumentada, em relação aos indivíduos saudáveis.

Conclusão

Embora haja um crescente reconhecimento de que a DAD se trata de um problema significativo, esta não é comummente reconhecida, através de protocolos de rastreio nutricional, no momento de admissão hospitalar[6,18,35].

Em alguns países, o rastreio nutricional realizado a todos os doentes admitidos nos hospitais é um procedimento padrão, necessário para a acreditação e até usado como critério da avaliação da qualidade do serviço hospitalar, pois está descrito que na ausência de um rastreio formal, mais de metade dos doentes em risco nutricional não é identificado e não é assim referido para tratamento[6]. A execução deste trabalho permitiu que estes doentes fossem alvo de um rastreio nutricional na admissão, uma vez que nenhum dos hospitais estudados tinha um protocolo implementado.

Assim, a presente investigação vem reforçar a necessidade de investir na sensibilização dos profissionais de saúde, sobre a importância do rastreio nutricional e da prescrição e monitorização da alimentação e do peso dos doentes, na admissão e durante todo o internamento hospitalar[16,36]. O conhecimento desta situação em hospitais Portugueses possibilita também adequar e optimizar as estratégias preventivas, já delineadas pelo Conselho da Europa[18,37].

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