DIRECT COSTS OF MALNUTRITION IN INSTITUTIONALIZED AND COMMUNITY OLDER ADULTS: SYSTEMATIC REVIEW

Abizanda P.1, Rodríguez-Mañas L.2, Barcons N.3, Paz S.4
1Geriatrics Department, Hospital Universitario Nuestra Señora del Perpetuo Socorro, Albacete, Spain; 2Geriatrics Department, Getafe University Hospital, Madrid, Spain; 3Nestlé Health Science, Barcelona; 4Outcomes ’10, Castellón, Spain.

INTRODUCTION
Malnutrition is associated with a lower quality of life, and increased morbidity, mortality, hospital admissions and readmissions and medical visits. In Spain, 20.8% (IC 95% 6-62) of the institutionalized older adults and 6.9% (IC 95% 0-16,6) in community-dwelling older adults are malnourished, assessed by the Mini Nutritional Assessment (MNA)².

OBJECTIVES
The objective was to appraise the literature on malnutrition costs in institutionalized or community-dwelling older adults.

METHODS
A systematic review of the literature, until December 2013, was carried out by searching international and national electronic databases [MedLine/PubMed, Cochrane Library, ISI WOK, SCOPUS, MEDES, IB ECS, Google Scholar]. Additionally, bibliographic references were hand searched. Articles on the economic burden and use of medical resources associated with malnutrition (or malnutrition risk) in institutionalized or community-dwelling older adults, in English or Spanish, were retrieved. All costs were updated to €, 2014.

RESULTS
Of the 1,105 publications identified, a total of 9 accomplished selection criteria.

Figure 1: Identified and selected publications in the literature review

All studies were European estimating direct costs (National Healthcare System perspective). Design varied considerably between studies (Table 1).

Table 1: Methodological characteristics of the selected publications

<table>
<thead>
<tr>
<th>Author, year level of evidence</th>
<th>Country</th>
<th>Design</th>
<th>Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freijer et al, 2013 1B</td>
<td>Holland</td>
<td>Cost of illness</td>
<td>To estimate the annual additional cost of disease-related malnutrition (DRM) in malnourished population in different care settings.</td>
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<tr>
<td>Freijer et al, 2013 1A</td>
<td>Holland</td>
<td>Economic evaluation</td>
<td>To evaluate the budget impact of cost nutritional supplements for DRM in community-dwelling older adults.</td>
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<tr>
<td>Mejiers et al, 2013</td>
<td>Holland</td>
<td>Cost of illness</td>
<td>To determine the economic implications of malnutrition (and risk) in institutionalized patients.</td>
</tr>
<tr>
<td>Rice et al, 2013 2B</td>
<td>Ireland</td>
<td>Cost of illness</td>
<td>To estimate the resources and cost implications for the health service in DRM patients in different care settings.</td>
</tr>
<tr>
<td>Lørenå et al, 2013</td>
<td>Sweden</td>
<td>Observational, prospective cohort study</td>
<td>To study the effect of individualized meals on nutritional status among institutionalized older people and to compare the results with a control group estimating direct healthcare costs for both groups one year after the intervention.</td>
</tr>
<tr>
<td>Guest et al, 2013</td>
<td>United Kingdom</td>
<td>Observational, retrospective cohort study</td>
<td>To examine the effect of malnutrition on clinical outcomes and healthcare resource use from clinical diagnosis.</td>
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<tr>
<td>Kilonzo et al, 2007</td>
<td>Kenya</td>
<td>Observational, prospective cohort study</td>
<td>To assess the relative efficiency of multivitamin and multiminerals supplementation compared with no supplementation in institutionalized and community-dwelling older adults.</td>
</tr>
<tr>
<td>Edington et al, 2005</td>
<td>United Kingdom</td>
<td>Economic evaluation</td>
<td>To assess the impact of nutritional supplementation after discharge from hospital over the nutritional status and healthcare costs in older adults.</td>
</tr>
<tr>
<td>Arnaud-Bettandier et al, 2004</td>
<td>France</td>
<td>Observational, prospective study</td>
<td>To assess the cost of malnutrition and related comorbidities among community-dwelling older adults and to determine the impact of nutritional support practice on these outcomes.</td>
</tr>
</tbody>
</table>

Costs associated with malnutrition
- Freijer et al (2013) estimated an additional total cost of disease related malnutrition (DRM) in institutionalized older adults compared with well-nourished ones of € 438 million (0,5% of the Dutch national health expenditure in 2011), explained by an increase on length of hospital stay in malnourished patients.
- Mejiers et al (2013) calculated an additional cost corresponding to the management of malnourished institutionalized population (and malnutrition risk) of € 255 million (0.7% of the health expenditure in 2009 in the Netherlands) compared with normal nutrition related to extra efforts in nutritional screening, monitoring and treatment.
- Guest et al (2011) estimated the cost per malnourished patient during the 6 months after diagnosis in € 2,119.68 (95% CI€= 1,968.54; P € 2,270.83) compared with € 906.88 (95% CI€= 827.08; P 986.69) in normal nutrition patients, explained by a higher use of healthcare resources in patients with malnutrition (General Practice consultations, hospital admissions and length of hospital stay; p<0.05).

Impact of healthcare interventions on malnutrition costs
- Freijer et al (2012) concluded that the use of oral nutritional supplements (ONS) for the treatment of DRM in community-dwelling older adults reduce the annual total cost of DRM from € 246,644 to € 235,024 million (cost saving: € 11,619.81 million). The additional costs of ONS are balanced due to a re-hospitalization reduction in DRM patients.
- Lørenå et al (2011) estimated the annual direct costs per patient and costs of Primary Care were higher in the intervention group (individualized meals and nutritional education) compared to control group one year after the intervention (€ 830 and € 652 vs € 760 and € 402). Expenditure of hospital care was zero (€ 0) in the intervention group while in the control group was € 81.
- Kilonzo et al (2007) estimated a higher mean cost per patient in a group receiving nutritional supplements [€ 114.88 (SD=€ 197.85)] compared with a placebo group [€ 95.74 (SD=€ 120.25)] with no significant differences between groups (t= 19.14, CI 95%=4.79, 44.71).
- Edington et al (2004) observed a significant difference in cost saving between a group receiving nutritional supplements (€ -451.83) a control group (€ -3,736.77, p=0.034). The number of hospital admissions decreased significantly in both (intervention, p=0.0345; control, p=0.0015).
- Arnaud-Bettandier et al (2004) calculated the annual cost per patient with high prescription of ONS compared with a low prescription rate group (€ 2,795.53 vs. € 2,593.18, CI 90%=929, 478). Although the cost associated with the ONS was € 548 higher in the high prescription rate group (CI 90%=496.01, 599.78), the cost of use resources was lower mainly due to hospital admissions (€ 1,631 vs. € 2,203) and medical visits (€ 299 vs. € 462).

CONCLUSIONS
Malnutrition implies higher medical costs in institutionalized or community-dwelling older adults mainly due to:
- Increased rate of hospitalizations,
- Length of hospital stay and
- Medical visits.

Preventive or therapeutic strategies, including oral nutritional supplements, should be considered if better nutritional status and lower medical costs are sought in this population.