

Compliance to oral nutritional supplementation decreases the risk of hospitalisation in malnourished older patients living in the community without extra cost : Results of the ENNIGME study

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ESPEN
1st -4th September 2018
Madrid (Spain)
N°SUN-P040

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INTRODUCTION AND OBJECTIVES

- Prevalence of malnutrition in older patients is estimated at 5-10% in the community.
- Malnutrition in older patients is associated with higher rates of hospitalisations and morbidity, leading to an economic burden.
- Oral nutritional supplements (ONS) improve energy and protein intake and may reduce costs.
- The study compared the health costs in malnourished older patients living at home, depending on ONS being prescribed or not.**

METHODS

Study design

- Prospective, multicentre, observational medico-economic study in France.
- Inclusion criteria: Patients ≥ 70 years, living at home, malnourished (i.e. at least one following criteria: weight loss $\geq 5\%$ in 1 month, weight loss $\geq 10\%$ in 6 months, body mass index (BMI) < 21 , albuminemia < 35 g/L or mini nutritional assessment short form (MNA) ≤ 7).
- Their general practitioners (GPs) prescribed ONS or not, according to their usual practice.

Data collection

- Collected data included sex, age, comorbidities (CIRS-G), evolutive cancer, disability (ADL), family nucleus in households, self-perception of health status (VAS, 1 to 10), quality of life (QoL) (EQ-5D), weight, BMI, weight loss and appetite (VAS, 1 to 10).
- Daily volume intake of ONS was reported by the patient in a diary in the first month following inclusion.
- Total health costs and hospitalisations were recorded over a 6-month period.

Statistical analyses

- Costs and hospitalisation were compared in ONS and no-ONS groups and as a function of ONS protein and energy intake using propensity score method and a bootstrapping generalised linear regression model with a two-sided 5 % level of significance.

TABLES

Table 1: Characteristics at baseline

	Baseline population (n=441)		p-value
	ONS prescription (N=375)	No-ONS prescription (n=66)	
Females, n (%)	232 (62.2%)	45 (68.2%)	0.353 ^a
Age (years)	82.6 [77.6 ; 87.3]	80.1 [77.5 ; 86.9]	0.543 ^b
CIRS-G score	8.0 [5.0 ; 12.0]	8.0 [5.0 ; 13.0]	0.741 ^b
Evolutive cancer [†]	33 (9.9%)	5 (7.9%)	0.635 ^a
ADL score	5.5 [4.0 ; 6.0]	6.0 [5.5 ; 6.0]	<0.001^b
No family in house	72 (19.3%)	10 (15.2%)	0.425 ^a
Health status (VAS)	3.8 [2.6 ; 5.1]	4.5 [2.8 ; 6.0]	0.053 ^b
EQ5D score (utility)	0.4 [0.1 ; 0.6]	0.5 [0.3 ; 0.8]	0.031^b
Weight (kg)	56.5 [49.0 ; 64.3]	59.0 [49.0 ; 66.5]	0.186 ^b
Body mass index	21.0 [19.4 ; 23.5]	22.8 [18.8 ; 25.1]	0.149 ^b
Usual weight (kg)	64.0 [55.5 ; 72.0]	65.0 [55.0 ; 76.0]	0.582 ^b
Weight loss (% of usual body weight)	-10.3 [-14.6 ; -6.7]	-8.8 [-12.9 ; -4.9]	0.034^b
Appetite (VAS)	3.0 [2.0 ; 4.6]	5.1 [3.5 ; 6.5]	<0.001^b

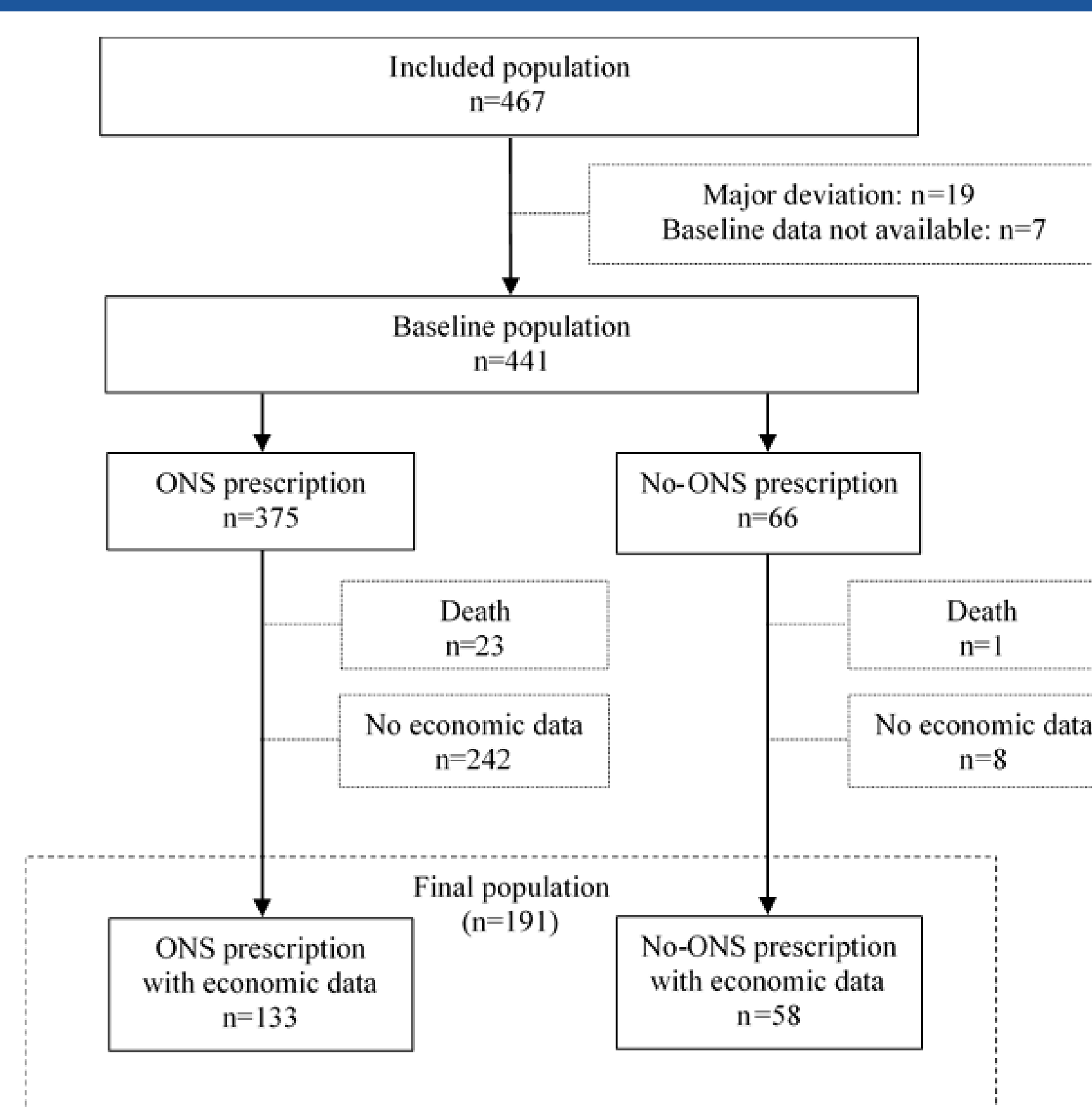
Variables expressed by median [Q1-Q3] or n (%).
ADL: activities of daily living; CIRS-G: Cumulative illness rating scale for geriatrics; EQ-5D: EuroQoL five dimensions questionnaire; ONS: oral nutritional supplements; VAS: visual analogic scale.

[†] Yes: Cancer with ongoing treatment.

^a Chi-Square test; ^b Wilcoxon rank sum test.

FIGURES

Figure 1: Flow chart of the study population



RESULTS (1)

- A total of 467 older malnourished patients were enrolled by 108 GPs. The baseline population included 441 patients. ONS was prescribed to 375 patients. At 6 months, data were complete for 191 patients (Figure 1).
- The baseline population (n = 441) was 82.5 [77.6; 87.1] years old, 63.1% were female. The 375 patients in the ONS group had lower ADL, QoL and appetite and had lost more weight than the patients that were not prescribed ONS (Table 1)
- In the final population (n=191), the 133 patients (70%) that were prescribed ONS were more disabled, had poorer perception of their health, lower QoL and lower appetite than the 58 patients (30%) that were not prescribed ONS. ONS compliance at 1 month was 83.5 %. Duration of ONS supplementation was 130 \pm 59 days (median 178 days).

Table 2: Health care costs (€) at 6 months depending on ONS prescription

	Final population (n=191)		p-value ^a
	ONS prescription (N=133)	No-ONS prescription (n=58)	
Total Costs	2732 \pm 4569 [2 017 ; 3 603]	2345 \pm 5136 [1 281 ; 3 849]	0.707
Hospitalisations	1135 \pm 2946 [686 ; 1 698]	677 \pm 2564 [138 ; 1 420]	0.443
Other costs	1597 \pm 2736 [1 185 ; 2 098]	1669 \pm 4507 [873 ; 3 015]	0.987

Variables expressed by mean \pm standard deviation [95% Confidence interval bootstrap] in Euros.

^a Bootstrap p-value.

Other costs : visits, nurses, physiotherapists, medications, laboratory tests, transport, medical devices, ONS.

Figure 2 : likelihood of being hospitalised

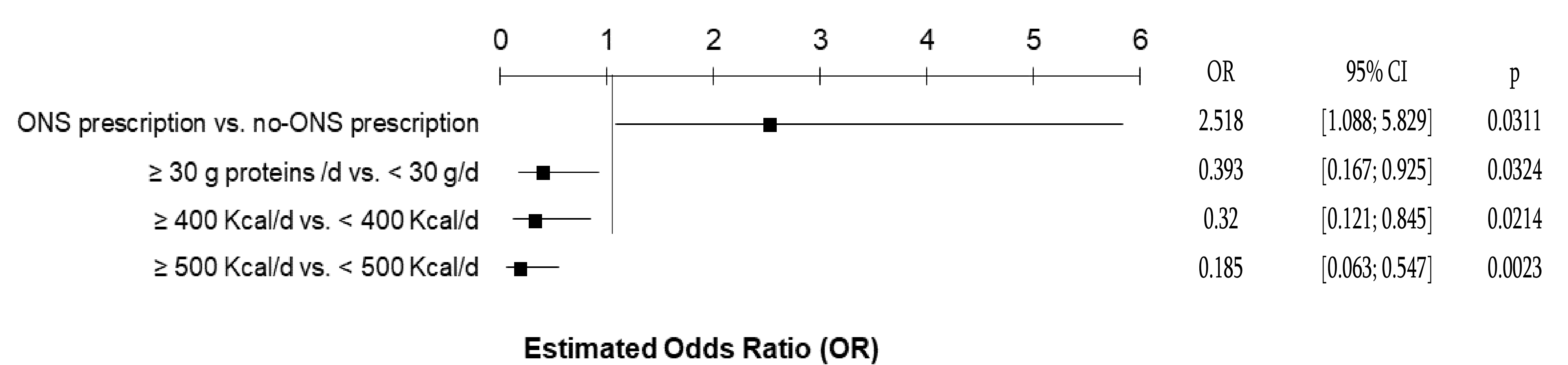


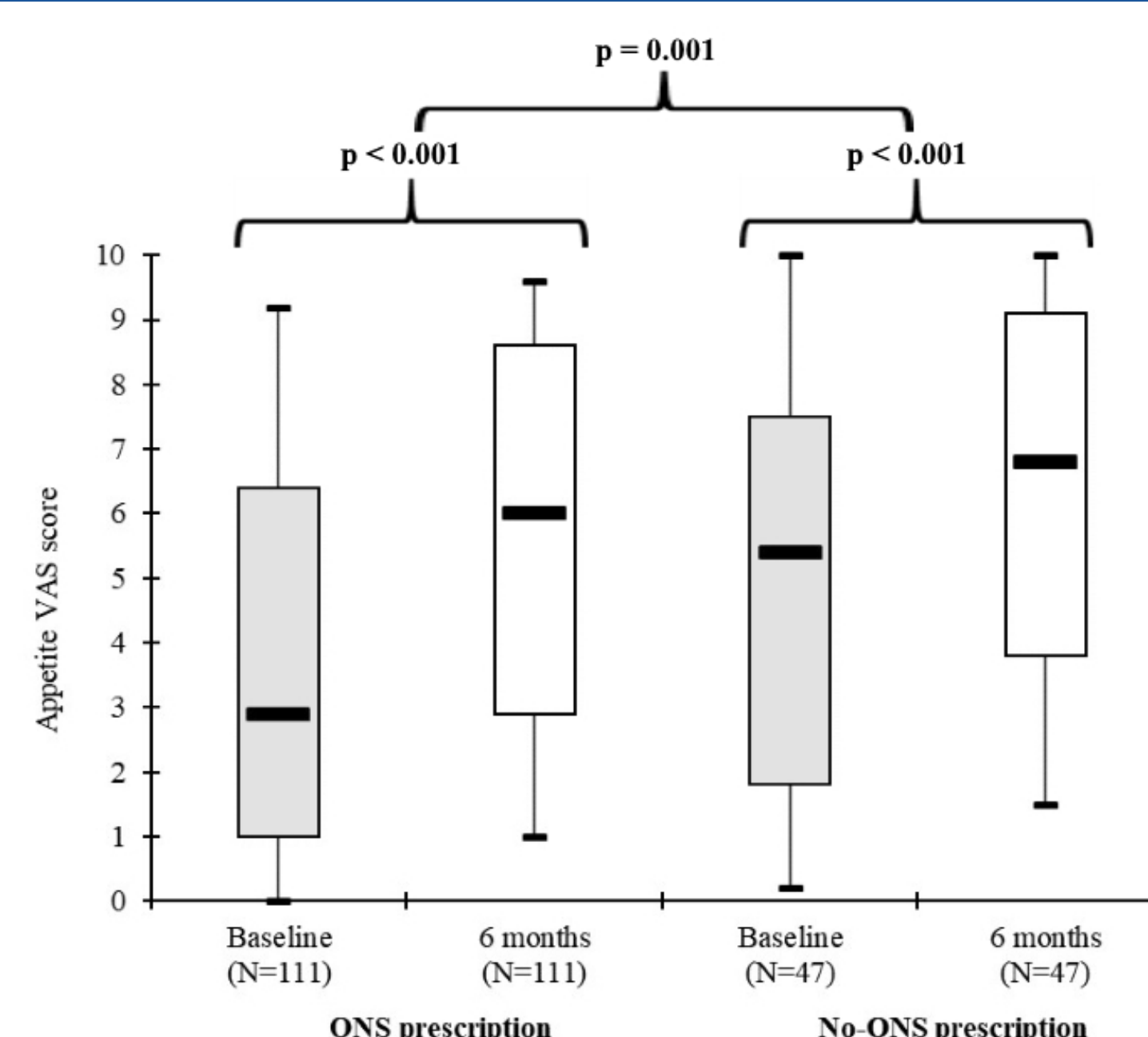
Table 3: Total costs (€) comparison by ONS prescription and level of daily ONS intake (after propensity score adjustment)

n	Final population (n=191)		p-value ^a
	ONS prescription	No-ONS prescription	
128	3 034 \pm 700 [1 812 ; 4 496]	2 131 \pm 609 [1 127 ; 3 548]	0.481
	≥ 30 g of proteins/d	< 30 g of proteins/d	
82	1 505 \pm 315 [955 ; 2 201]	3 255 \pm 752 [1 916 ; 4 916]	0.688
	≥ 400 Kcal/d	< 400 Kcal/d	
82	2 331 \pm 717 [1 236 ; 3 947]	2 883 \pm 797 [1 490 ; 4 620]	0.084
	≥ 500 Kcal/d	< 500 Kcal/d	
82	1389 \pm 264 [922 ; 1951]	3502 \pm 839 [2 018 ; 5 353]	0.042

Variables expressed by mean \pm standard deviation [95% Confidence interval bootstrap] in Euros.

^a Bootstrap p-value.

Figure 3 : Change in appetite from baseline to 6 months in ONS and no - ONS groups



RESULTS (2)

- Patients prescribed ONS were more frequently hospitalised (Figure 2). **However, health care costs did not statistically differ between the two groups** (Table 2).
- In the ONS prescription group, health costs were lower in patients with an energy intake from ONS ≥ 500 kcal/d vs. < 500 kcal/d (1 389 \pm 264 vs 3 502 \pm 839 €; p = 0.042) (Table 3).
- When intake from ONS was ≥ 30 g of protein/day or ≥ 500 kcal/d, the risk of hospitalisation was reduced by 3 and 5 times, respectively (Figure 2).

Clinical data

- At 6 months, **appetite improved significantly** in both groups **but improvement was significantly better in the ONS prescription group** (Figure 3).
- All other clinical parameters were not different between inclusion and 6 months in the two groups.

CONCLUSIONS

- ONS were prescribed in a population with a **poorer health status**.
- Nutrition support with ONS prescription in older malnourished outpatients **did not lead to an increase of total health care costs**.
- Optimal compliance to ONS inducing **high protein and energy intake may reduce the risk of hospitalisation**, and consequently limit the economic burden.