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Faites le point

The evaluation of consumed food portions as a screening test for malnutrition in the older people living in a nursing home: A cross-sectional pilot study



L'évaluation des portions alimentaires consommées comme test de dépistage de la dénutrition chez les personnes âgées vivant en EHPAD : une étude pilote transversale

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ABSTRACT

Introduction. – The Self Evaluation of Food Intake (SEFI[®]) is a simple tool to assess food intake.

Aims. – To evaluate the validity of SEFI[®] to screen malnutrition compared to the Mini Nutritional Assessment (MNA)[®] as the reference method (primary) and other screening tools (secondary); to assess the feasibility of SEFI[®] (secondary) in older people living in a nursing home.

Methods. – Quantitative, non-interventional, cross-sectional, monocentric pilot study. Patients were included in a 143-beds nursing home. The SEFI[®] visual analogue scale (VAS) from 0 to 10, and the evaluation of consumed portions of served food by the general practitioner (SEFI[®] consumed portions) were performed after the MNA[®]. Malnutrition was defined as MNA[®]<17.

Statistics. – Youden method and receiver operating characteristic (ROC) curves.

Results. – Out of 128 patients, 93 were included: 72% women, mean age (\pm SD), 88 ± 7 yr, body mass index, 25.9 ± 6.1 , MNA[®]<17, 26% (24/93), SEFI[®] consumed portions $\leq 50\%$, 29% (27/93) of patients. The feasibility of SEFI[®] VAS and consumed portions were respectively 0 and 100% (93/93). The predictive performance of SEFI[®] consumed portions for the diagnosis of malnutrition was good: area under the curve = 0.81 [95% confidence interval (CI), 0.69–0.93]; sensitivity 75.0% ($n = 18/24$, 95%CI, 57.7–92.3), specificity 87.0% ($n = 60/69$, 77.0–94.9), positive predictive value 66.7% ($n = 18/27$, 48.9–84.4), and negative predictive value 90.9% ($n = 60/66$, 80.0–93.9).

Conclusions. – SEFI[®] is feasible and useful for detecting malnutrition in nursing home residents.

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R É S U M É

Introduction. – Le Score d'Evaluation Facile des Ingesta (SEFI[®]) est un outil simple d'évaluation des apports alimentaires.

Objectifs. – Évaluer la validité du SEFI[®] pour dépister la dénutrition par rapport au Mini Nutritional Assessment (MNA)[®] (principal) et aux autres outils de dépistage (secondaire); évaluer la faisabilité du SEFI[®] chez les personnes âgées vivant dans un Etablissement d'Hébergement pour Personnes Agées Dépendantes (EHPAD) (secondaire).

Méthodes. – Étude pilote quantitative, non interventionnelle, transversale et monocentrique. Les patients ont été inclus dans un EHPAD de 143 lits. L'échelle visuelle analogique (EVA) du SEFI[®] et, l'évaluation des portions consommées (SEFI[®] portions consommées) ont été réalisées par le médecin généraliste après le MNA[®]. La dénutrition a été définie par un MNA[®]<17.

Keywords :
Undernutrition
Nutritional screening
Elderly people
Underfeeding
Energy intake

Mots clés :
Dénutrition
Dépistage

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Personnes âgées
Repas
Prise alimentaire

Statistiques. – Méthode de Youden et courbes ROC.

Résultats. – ont été inclus 93 patients : 72 % femmes, âge moyen (\pm DS), 88 ± 7 ans, indice de masse corporelle, $25,9 \pm 6,1$, $MNA^{\circledast} < 17,26$ % (24/93), $SEFI^{\circledast}$ portions consommées ≤ 50 %, 29 % (27/93). Les faisabilités de l'EVA du $SEFI^{\circledast}$ et du $SEFI^{\circledast}$ portions consommées étaient respectivement de 0 et 100 % (93/93). La performance prédictive pour le diagnostic de dénutrition du $SEFI^{\circledast}$ portions consommées était bonne : aire sous la courbe = 0,81 [intervalle de confiance à 95 % (IC 95 %), 0,69–0,93]; sensibilité 75,0 % ($n = 18/24$, IC 95 %, 57,7–92,3), spécificité 87,0 % ($n = 60/69$, 77,0–94,9), valeurs prédictives positive, 66,7 % ($n = 18/27$, 48,9–84,4) et négative 90,9 % ($n = 60/66$, 80,0–93,9).

Conclusion. – Le $SEFI^{\circledast}$ est faisable et utile pour dépister la dénutrition chez les résidents d'EHPAD.

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1. Introduction

Malnutrition affects 18% of patients in European nursing homes, and 49% are at risk of malnutrition [1,2]. Malnutrition is associated with increased mortality, morbidity, length of stay, and costs [3,4]. Therefore early detection and care for malnutrition are highly warranted to prevent its worsening and its related-complications. If malnutrition was earlier and better diagnosed in nursing home, it would allow triggering earlier dedicated nutritional care. In the older people, the recommended malnutrition screening tool is the Mini Nutritional Assessment[®] (MNA[®]) [5,6], but it is time consuming.

The assessment of food energy intake is a key part of the nutritional assessment [7–9]. This statement was strengthened by the 2018 international consensus for malnutrition diagnosis by The Global Leadership Initiative on Malnutrition (GLIM) [8]: reduced food intake is now one of the top five criteria to diagnose malnutrition [8], together with body mass index (BMI), weight loss, muscle mass, and inflammatory conditions. To assess food intake, the GLIM advocated the use of semi-quantitative methods [8], as done in the NutritionDay[®] survey [9]. We proposed to use a 10-point analogue scale to assess food intake in both in- and out-patients as it is feasible, easy to use, and extremely well correlated with daily energy intake, especially in malnourished patients [10]. Since, these results were confirmed by an independent study conducted in 1762 medical oncology patients [11]. Moreover the 10-point visual analogue scale (VAS) could be useful to detect the risk for malnutrition when the score is below 7 [10,12]. The 'Self Evaluation of Food Intake' (SEFI[®]) (Knoë, Le Kremlin Bicêtre, France) allows the evaluation of food intake by both a 10-point VAS and the evaluation of consumed food portions (as performed in The NutritionDay[®][9]). The validity of SEFI[®] to screen for malnutrition has never been evaluated in the older people living in nursing homes.

Therefore, the aims of this prospective non-interventional pilot study were to:

- evaluate the validity of SEFI[®] (10-point VAS and evaluation of consumed food portions) to screen malnutrition compared to MNA[®] as the reference method in older people living at nursing home (primary);
- evaluate the validity of SEFI[®] to screen malnutrition compared to other malnutrition diagnostic tools (body mass index (BMI), mid-arm circumference, and calf circumference) (secondary).

2. Patients and methods

2.1. Study design and patient selection

This is a quantitative, non-interventional, cross-sectional, monocentric pilot study. The patients were consecutively recruited from January 3 to July 4, 2016, by one investigator general

practitioner (GP) (SM), in a 143-beds nursing home of the Rennes area (EHPAD, Janzé, Ille-et-Vilaine, Brittany, France). The inclusion criteria were all the patients living in the nursing home. The exclusion criteria were: patients being on enteral or parenteral nutrition, and end-of-life. As this study was considered being based on routine practice and non-interventional, ethical committee submission, informed consent and 'Commission Nationale de l'Informatique et des Libertés' agreement were not required by the 2015 French law.

2.2. The assessment of food intake by the Simple Evaluation of Food Intake (SEFI[®])

SEFI[®] (www.sefi-nutrition.com, Knoë, le Kremlin Bicêtre, France) is approved by the French Speaking Society for Clinical Nutrition and Metabolism (SFNCM) to assess food intake [13], and is available in English. SEFI[®] is a short ruler, of simple use, assessing food intake according to two different procedures: a 10-point VAS, and a visual assessment of consumed food portions according to The NutritionDay[®] survey [9]. SEFI[®] was performed by one of the author who is GP (SM). The SEFI[®] 10-point VAS was performed in the morning after the MNA[®] has been performed. The patient had to move a cursor on the SEFI[®] 10-point VAS to answer the inquiry: "how much do you eat at the moment, ranging from "nothing at all" (far left side of the scale) to "as usual" (far right side of the scale)? The result, between 0 and 10, is shown on the reverse side. As shown in previous studies [10,12], the SEFI[®] visual analogue scale was considered as positive, i.e. in favour of malnutrition, if the score was below 7. The evaluation of the consumed food portions by the GP (SEFI[®] consumed portions) was performed at the end of lunch. At the end of lunch, the GP quoted the consumed portion of the main meal, based on the observation of the patient's meal tray.

2.3. Nutritional assessment

The Mini Nutritional Assessment[®] (MNA[®]) [5] was used as the primary criterion for malnutrition screening as recommended by the geriatrics European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines [1]. MNA[®] is composed of 18 items including four different categories: anthropometric data (weight and weight loss, height, mid-arm circumference, calf circumference), a general assessment (lifestyle, medication, acute illness, mobility, cognitive impairment, bedsores), alimentation assessment (number of meals, food and liquid intake, appetite, diet) and finally a subjective assessment (self-assessment of one's nutritional status and comparison to others).

Malnutrition was defined by $MNA^{\circledast} < 17$, the risk of malnutrition by $17 \leq MNA^{\circledast} < 23.5$ and good nutritional status by $MNA^{\circledast} \geq 24$. Current weight and height were collected in the computerized medical record and used to calculate BMI. The mid-arm circumference in centimetres (cm) was measured by the GP, with the elbow bent at

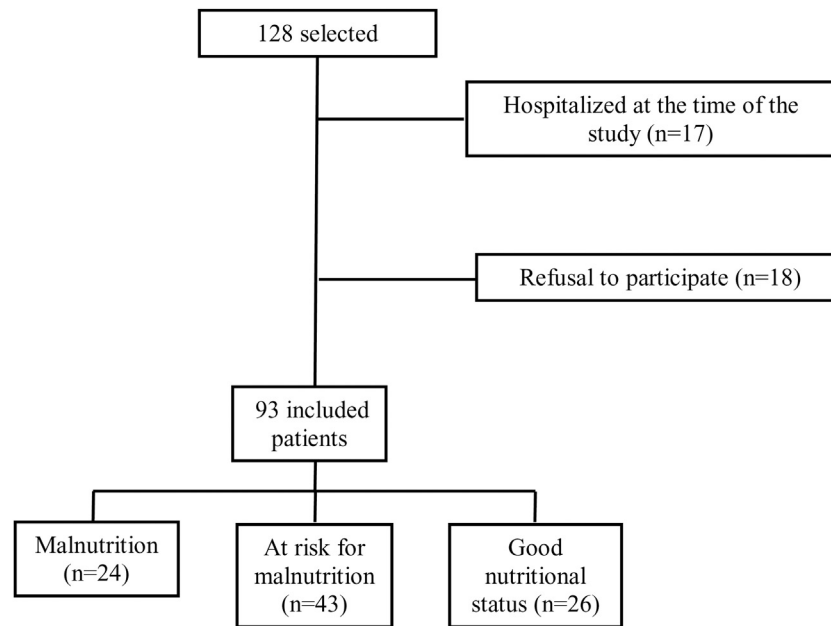


Fig. 1. Study flow chart.

90 degrees, at the middle of the patient's left arm, using a measuring tape. The calf circumference (cm) was measured when the patient is seated or bedridden, with the knee bent at 90 degrees, by rolling up the measuring tape at its widest point. The BMI, mid-arm and calf circumferences were collected during the realization of MNA[®]. All the data needed for MNA[®] items were collected by the GP for the 93 included patients during the clinical examination, the interrogation of the patient and paramedical staff, or by analysing the computerized medical record. In case the patients were unable to answer the questions relating to food intake, eating habits or general assessment, nursing assistants and nurses were interviewed.

2.4. Study endpoints

The primary endpoint was the presence or absence of malnutrition according to MNA[®]<17. The secondary endpoints were: the presence or absence of malnutrition according to BMI<21, mid-arm circumference ≤22 cm, and calf circumference <31 cm, the proportion of patients being collected the SEFI[®] 10-point VAS score and/or the SEFI[®] consumed food portions.

2.5. Statistical analysis

Statistical analysis was performed using SAS / STAT 14.1 software (SAS Institute Inc., Cary, NC, USA). Qualitative variables are reported as number (*n*) and percentage (%) and compared with Chi² or Fisher tests. Quantitative variables are reported as mean ± standard deviation and compared with Student *t* or Mann-Whitney U tests according to the sample size. Statistical correlations between SEFI[®] and malnutrition screening tests were calculated using Spearman's correlation coefficient with *P* values less than 0.05 considered statistically significant. The ROC curve allowed us to assess the predictive performance of the test compared to a reference test, and to determine the optimal threshold value of the test using the Youden index ($Y = \text{Sensitivity} + \text{Specificity} - 1$). This optimal threshold value could be identified as the point of the ROC curve furthest from the diagonal, corresponding to the maximum of the Youden index. The power of discrimination of the area under the ROC curve (AUC), i.e. the performance of

the test, was determined according to the following classification: $0.90 \leq \text{AUC} \leq 1.00$, excellent; $0.80 \leq \text{AUC} < 0.90$, good; $0.70 \leq \text{AUC} < 0.80$, correct; $0.60 \leq \text{AUC} < 0.70$, poor; $0.50 \leq \text{AUC} < 0.60$, none. Sensitivity, specificity, positive and negative predictive values, and their 95% confidence interval (95% CI), were calculated. The feasibility of the SEFI[®] 10-point VAS, and of the evaluation of consumed portions by the GP (SEFI[®] consumed portions) were defined as the proportion of the included patients for whom a score/portion was collected. The significance threshold was 0.05 for all analyses.

3. Results

3.1. Patients' enrolment and characteristics

Study flow chart is reported in Fig. 1. Among 128 eligible patients, a total of 93 patients were included: mean age (\pm SD), 88 ± 7 year, 67 women, mean BMI 25.9 ± 6.1 , consumed food portions, $74 \pm 30\%$ ($n = 93$). Overall 27 patients consumed 50% or less of the served food at lunch (29%) and 24 patients (26%) were malnourished with MNA[®]<17. The patients' characteristics are summarized in Table 1. Patients reporting SEFI[®] consumed portions ≤50% were significantly older and with a higher proportion of cognitive disorders (Table 1). Patients with MNA[®]<17 are more prone to report SEFI[®] consumed portions ≤50% than >50% (18/27 (67%) vs. 6/27 (33%), $P < 0.0001$). Seventeen (18%) patients needing full help for eating, 12 (13%), a partial help, and 64 (69%) were autonomous. Thirty (32%) patients received oral nutritional supplements.

3.2. Feasibility of the SEFI[®] for the screening of malnutrition

The feasibility of the SEFI[®] 10-point VAS and consumed food portions by the GP could be obtained in respectively 0 and 100% (93/93) of the patients.

3.3. Validity of the SEFI[®] for the diagnosis of malnutrition

As SEFI[®] consumed portions was 100% feasible, we only analysed the validity of the SEFI[®] consumed portions for the diagnosis of malnutrition. SEFI[®] consumed portions were correlated with MNA[®] ($\rho = 0.51$, $P < 0.0001$), BMI ($\rho = 0.28$, $P = 0.007$),

Table 1

Clinical and sociodemographic characteristics of all included patients (n=93), according to the consumed food portions ≤ or >50% assessed by the Simple Evaluation of Food Intake (SEFI)[®] by the general practitioner. Qualitative variables are reported as n (%) and compared with Chi² or Fisher tests. Quantitative variables are reported as mean ± standard deviation and compared with Student or Mann-Whitney Wilcoxon tests.

Variables	All (n=93)	SEFI [®] consumed portions ≤50% N=27	SEFI [®] consumed portions >50% N=66	P
Gender ratio (M/F) - n	26/67	5/22	21/45	0.19
Age (year) - mean ± SD	88 ± 7	90.5 ± 5.9	86.8 ± 7.8	0.01
MNA [®] - mean ± SD	20 ± 5	15.4 ± 4.6	21.8 ± 3.8	<0.0001
MNA [®] - n (%)				
≥24	26 (28)	2 (7.4)	24 (36.4)	
17–23.5	43 (46)	7 (25.9)	36 (54.6)	<0.00
<17	24 (26)	18 (6.7)	6 (9.1)	
BMI - mean ± SD	25.9 ± 6.1	23.0 ± 6.1	27.1 ± 5.7	0.005
BMI - n (%)				
≥21	21 (23)	11 (40.7)	10 (15.2)	0.007
<21	72 (77)	16 (59.3)	56 (84.8)	
Weight loss - n (%)				
0 – 1kg	31(33)	13 (48.2)	48 (72.7)	0.05
>1 kg	62 (67)	18 (27.3)	14 (51.9)	
Weight loss ≥3 kg in 3 mo. - n (%)	10 (11)	6 (22.2)	4 (6.1)	0.06
MAC - mean ± SD	26.7 ± 3.8	25.3 ± 4.2	27.3 ± 3.5	0.03
MAC - n (%)				
>22 cm	12 (13)	20 (74.1)	61 (92.4)	0.02
≤22 cm	81 (87)	7 (25.9)	5 (7.6)	
CC - mean ± SD	30.8 ± 5.1	28.1 ± 6.0	31.9 ± 4.2	0.005
CC - n (%)				
≥31 cm	38 (41)	7 (25.9)	48 (72.7)	<0.0001
<31 cm	55 (59)	20 (74.1)	18 (27.3)	
Cognitive disorders - n (%)				
Dementia or severe depression	27 (29)	15 (55.6)	12 (18.2)	0.001
Moderate dementia	27 (29)	5 (18.5)	22 (33.3)	
Absence	39 (42)	7 (25.9)	32 (48.5)	
Pressure sores - n (%)	12 (13)	7 (25.9)	5 (7.6)	0.02
Functional capacity - n (%)				
Bed or chair only	47 (51)	19 (70.4)	28 (42.4)	0.05
Walking inside	30 (32)	6 (22.2)	24 (36.4)	
Walking outside	16 (17)	2 (7.4)	14 (21.2)	
Acute disease < 3 month - n (%)	38 (41)	14 (51.9)	24 (36.4)	0.17

BMI: body mass index; CC: calf circumference; MAC: mid-arm circumference; MNA[®]: Mini Nutritional Assessment.

Table 2

Performance of consumed food portions ≤ 50% evaluated by the general practitioner with the Simple Evaluation of Food Intake (SEFI)[®] for the diagnosis of malnutrition defined by Mini Nutritional Assessment (MNA)[®] < 17 (n=93).

N (%)	Malnutrition (MNA [®] < 17)	Absence of malnutrition (MNA [®] ≥ 17)	Total
SEFI [®] consumed portions ≤50%	18 (19.3)	9 (9.7)	27 (29.0)
SEFI [®] consumed portions >50%	6 (6.5)	60 (64.5)	66 (71.0)
Total	24 (25.8)	69 (74.2)	93 (100)

The sensitivity of SEFI[®] consumed portions ≤50% was 75.0% (n=18/24, 95% confidence interval (CI), 57.7–92.3), specificity 87.0% (n=60/69, 95% CI, 77.0–94.9), positive predictive value 66.7% (n=18/27, 95% CI, 48.9–84.4), and negative predictive value 90.9% (n=60/66, 95% CI, 80.0–93.9).

mid-arm circumference (ρ=0.23, P=0.027), and calf circumference (ρ=0.35, P=0.0006). According to Fig. 2 and Table 2, the predictive performance of SEFI[®] consumed portions ≤50% for the diagnosis of malnutrition defined as MNA[®] < 17 was good: AUC=0.81 [95% confidence interval (CI), 0.69–0.93]. The sensitivity of SEFI[®] consumed portions ≤50% was 75.0% (n=18/24, 95% CI, 57.7–92.3), specificity 87.0% (n=60/69, 95% CI, 77.0–94.9), positive predictive value 66.7% (n=18/27, 95% CI, 48.9–84.4), and negative predictive value 90.9% (n=60/66, 95% CI, 80.0–93.9). Only two patients (7%) with a SEFI[®] consumed portions ≤50% were considered without any nutritional risk (Table 1), meaning that SEFI[®] consumed portions ≤50% is associated with a 93% probability of being malnourished or at risk for malnutrition.

The validities of SEFI[®] consumed portions ≤50% for the diagnosis of malnutrition defined as BMI<21 (AUC=0.63 [95% CI, 0.49–0.77]) or calf circumference < 31 cm (AUC=0.69 [95% CI, 0.58–0.80]) were poor; therefore sensitivity, specificity, positive and negative predictive values are not shown. The validity of SEFI[®] consumed portions ≤75% for the diagnosis of malnutrition defined as mid-arm circumference ≤22 cm (AUC=0.71 [95% CI, 0.56–0.87]) was correct:

sensitivity 91%, specificity 50%, positive predictive value 20%, and negative predictive value 98%. The latter means that patients consuming equal or more than ¾ of their main course have a 98% chance of having a normal mid-arm circumference, so little in favor of reduced muscle mass.

4. Discussion

Our pilot study reports that, in the older people living in a nursing home, the evaluation of the consumed food portions by the GP is a feasible and useful test for screening malnutrition as defined by the reference test, i.e. MNA[®]<17 [8,11]. Based on MNA[®], 26% and 46% of older patients were respectively malnourished or at risk of malnutrition. Given the 87% specificity and the 91% negative predictive value for the diagnosis of malnutrition, the SEFI[®] should be used to identify those patients that are likely not malnourished if the consumed food portions are >50%.

To our knowledge, our pilot study is the first to assess the performance of the consumed food portions for malnutrition screening in nursing homes. The early diagnosis of malnutrition in nursing

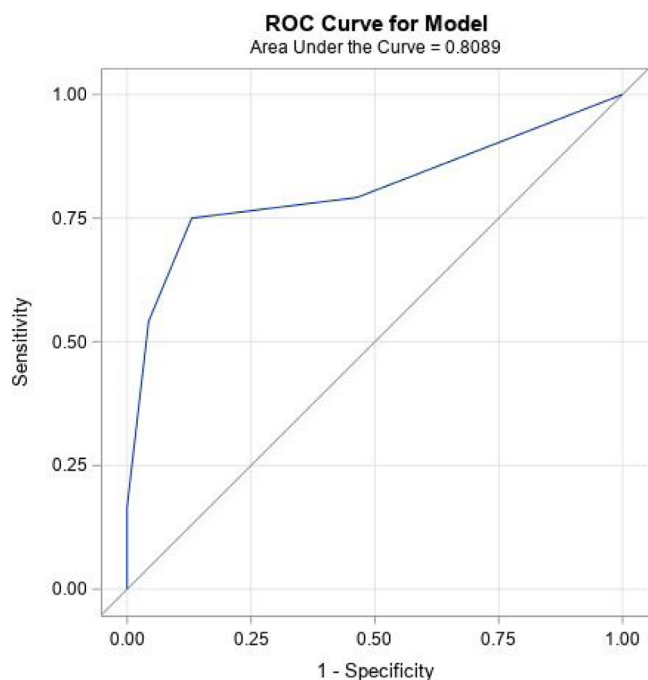


Fig. 2. Area under the receiver operating characteristic curve (AUC) assessing the diagnosis of malnutrition as defined by $MNA^{\circledR} < 17$ by the evaluation of food consumed portions by SEFI[®] performed by the general practitioner ($n = 93$). The predictability of SEFI[®] consumed portions $\leq 50\%$ for the diagnosis of malnutrition defined as $MNA^{\circledR} < 17$ was good: AUC = 0.81 [95% confidence interval, 0.69–0.93].

homes is recommended [1], since malnutrition is associated with increased morbidity, such as infections, pressure sores, delayed healing, or hospital readmissions, as well as increased mortality and costs [2–4]. In the older people, the recommended malnutrition screening tool is the Mini Nutritional Assessment[®] (MNA[®]) [1,5,8], but it could be time consuming, thus potentially delaying malnutrition diagnosis and care. The GLIM consensus has reinforced the room of the food intake assessment in the procedure of malnutrition diagnosis [8]. Knowing that more than two thirds of hospitalized patients reported decreased food intake [14], and that insufficient food intake is the main cause of malnutrition, identifying patients not eating enough could be actually a good way to diagnose the patient malnutrition.

In this study, we used the assessment of the consumed food portions as a semi-quantitative method of assessing food intake, as it is proposed in the NutritionDay[®] survey [9] promoted by the European Society for Clinical Nutrition and Metabolism (ESPEN). Using the SEFI[®], itself designed from the NutritionDay[®] survey, we found that consumed food portions $\leq 50\%$ has a good validity for the diagnosis of malnutrition defined as $MNA^{\circledR} < 17$. In nursing homes, the systematic assessment of consumed food portions may help better selecting the older people who may not need nutritional care, avoiding engaging more health care resources. In our study, the feasibility of the SEFI[®] to evaluate the consumed food portions by the healthcare professional is 100%. As expected, in this population of older people with a high proportion of cognitive disorders (58%), the assessment of food intake by the SEFI[®] 10-point VAS was not feasible, because the patients were not able to answer the VAS inquiry. Nevertheless, the evaluation of the consumed food portions appears as the method the most adaptable to the nursing home setting, when the health care givers, e.g. nurse assistant, could observe directly the portions of consumed food on the meal plate, as did in the NutritionDay[®] [9]. Health policies aiming at improving malnutrition detection and management in our health care system should necessarily start by a higher involvement of the community

practice healthcare professionals (GPs, nurses, dietitians...) in the malnutrition screening process and the nutritional care. Our study suggests that simple and easy-to-use tools, such as the evaluation of consumed food portions by SEFI[®] could be implemented in the daily practice of nursing homes for that purpose.

In our study, the prevalence of malnutrition defined by the $MNA^{\circledR} < 17$, is 26%, and 46% of older patients are at risk of malnutrition in the nursing home. This is consistent with previous studies performed in European nursing homes. In a systematic review and meta-analysis, using MNA^{\circledR} , Cereda et al. indicated that, in nursing homes, 18% of patients were malnourished, and 49% were at risk of malnutrition [15]. NutritionDay[®] in nursing homes indicated that 17.7% of patients had a low BMI < 20 , and 11.3% lost > 5 kg of body weight in the previous year [2]. In our study, we found that 29% of the residents consumed 50% or less of the served food at lunch; in the study by Valentini et al. performed in 2137 Austrian and German residents [16], this proportion was lower (11%), meaning that 89% of patients ate at least half of the lunch meal (vs 71% of the residents included in our study). Independently from malnutrition status, decreased food intake was associated with increased mortality [9,17]. Our cross-sectional study was not designed to assess whether malnutrition or decreased food intake could be associated with worse clinical outcomes. As our study was a pilot one and we chose a study design where the patients were consecutively recruited during a 6-month period, we did not calculate the sample size. Our preliminary results need to be confirmed in a wider population. Our pilot study has other limitations. As the study was designed and performed before the publication of the GLIM criteria [8], the diagnosis of malnutrition was not based on the GLIM criteria: in particular the data regarding other etiologic criteria than food intake, such as reduced assimilation or inflammation due to chronic or acute diseases, were missing.

The lower sensitivity of SEFI[®] for the diagnosis of malnutrition could be explained by two facts:

- some patients could be malnourished without any decrease in food intake, if they had increased resting energy expenditure or malabsorption, due to putative chronic or acute conditions;
- some patients, considered as ‘small eaters’, have received smaller food portions, and may have experienced decreased food intake, i.e. energy intake $<$ nutritional needs, thus being at malnutrition risk, even if they had consumed their meal entirely.

Because of the cross-sectional design of the study, we also cannot rule out that, at the time of the study, some malnourished patients could have been in a phase of improvement of their food intake.

In conclusion, these preliminary results suggest that the evaluation of consumed food portions by SEFI[®] is feasible and useful for detecting malnutrition in nursing home residents. SEFI[®] could help targeting the older people needing dedicated nutritional care. More studies are needed to evaluate whether the integration of SEFI[®] as part of a protocol of nutritional intervention could reduce malnutrition-related complications and healthcare-related costs.

Disclosure of interest

Ronan Thibault designed and received royalties for the Simple Evaluation of Food Intake[®] (SEFI[®]) (Knoë, le Kremlin Bicêtre, France). The other authors declare no conflict of interest related to this article.

Statement of authorship

All authors have made substantial contributions: SM and RT conceived, and designed the study, analysed, interpreted the data, and drafted the article; SM collected the data; HM and LAH analysed the data. All authors approved the final version.

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