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A visual analogue scale for food intake as a screening test for malnutrition in the primary care setting: prospective non-interventional study

Gwenhaël Bouëtté,[1] Maxime Esvan,[2] Katharina Apel,[1] Ronan Thibault[3]

[1]Département de Médecine Générale, Univ Rennes, Rennes, France

[2]Centre d'Investigation clinique, INSERM 1414, CHU Rennes, Univ Rennes, Rennes, France

[3]Unité de Nutrition, CHU Rennes, INRA, INSERM, Univ Rennes, Nutrition Metabolisms and Cancer, NuMeCan, Rennes, France

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Correspondence to:

Prof. Ronan THIBAULT

Unité de Nutrition - Centre labellisé de Nutrition Parentérale à Domicile

CHU Rennes

2, rue Henri Le Guilloux

35000 Rennes

France

Tél. +33 2 99 28 96 46

Fax +33 2 99 28 24 34

E-mail ronan.thibault@chu-rennes.fr

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Highlights

1. The prevalence of malnutrition as assessed by the GLIM criteria is 4.2% in the primary care setting.
2. Screening for malnutrition by assessing food intake is feasible in the primary care setting.
3. A score <7 on the ten-point visual analogue scale for food intake SEFI® has a sensitivity of 76% and a specificity of 87% for the diagnosis of malnutrition on the basis of the GLIM criteria.

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ABSTRACT

Introduction and aims: The Self-Evaluation of Food Intake (SEFI®) is a simple tool to assess food intake that correlates well with the diagnosis of malnutrition in the hospital setting. Aims: to evaluate the validity of SEFI® for the diagnosis of malnutrition among adults in the primary care setting (primary aim); to assess the prevalence of malnutrition, the feasibility of the SEFI® and the variables associated with malnutrition (secondary aims). Methods: A non-interventional prospective study on consecutive patients at three primary care practices. Primary endpoint: confrontation of a SEFI® visual analogue scale score <7/10 with the diagnosis of malnutrition as defined by the Global Leadership Initiative on Malnutrition criteria. Secondary endpoints: the proportion of patients for whom a SEFI® score was collected. Multivariate analysis: threshold α=0.20 in univariate analyses, step-by-step logistic regression. Results: Among 747 eligible patients, 505 were included: mean age (±SD) 56±19 yrs, 61% female, 49% presenting with acute medical problems, 15.8% (n=80) with SEFI® score <7/10, and 4.2% (n=21) with malnutrition. The predictive performance of the SEFI® score <7 for the diagnosis of malnutrition was good (AUC=0.82 [95% confidence interval (CI), 0.72-0.92]): sensitivity 76.2% (n=16/21, [58.0-94.4]), specificity 86.8% (n=420/484, [83.8-89.8], positive predictive value 20.0% (n=16/80, [11.2-28.8]), and negative predictive value 98.8% (n=420/425, [97.8-99.8]). The feasibility of the SEFI® 10-point visual analogue scale was 100% (505/505). The variables independently associated with malnutrition were: female gender (odds ratio 4.9 [95% CI, 1.7-14.2], P=0.003), cancer (4.8 [1.4-15.9], P=0.011) and chronic alcohol consumption (7.4 [1.3-41.4], P=0.023). Conclusions. The prevalence of malnutrition was 4.2% in this primary care setting. The SEFI® visual analogue scale for food intake is feasible and could be helpful for the diagnosis of malnutrition in this setting.

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Keywords: undernutrition; nutritional screening; primary care; general practice; energy intake.

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INTRODUCTION

Malnutrition affects 30–50% of adult patients admitted to hospitals [1,2], and at least 5 % of the French population in the community [3]. An estimated 93% of all those who are malnourished or at risk of malnutrition in the UK live in the community [4]. Malnutrition is associated with increased mortality, morbidity, length of hospital stay, and costs [5]. Malnutrition is underdiagnosed in the community setting [6], although it is associated with increased numbers of consultations with the general physician (GP), and increased costs [7]. Therefore, early detection and treatment of malnutrition are highly warranted to prevent deterioration and malnutrition-related complications. If malnutrition was earlier and better diagnosed by the GP, it would enable the implementation of early nutritional outpatient care and could therefore reduce the prevalence of malnutrition in primary care and, in turn, at hospital admission.

The Malnutrition Universal Screening Tool (MUST) [8], or, for older people >70 years, the Mini Nutritional Assessment-short form (MNA-SF) [9] or DETERMINE [10], can be used to screen for malnutrition in the primary care setting. However, except for the MNA-SF which is designed for older people, these tools have never been deployed in France. Therefore, there is a need to validate tools that could be reliable for malnutrition screening in all categories of patients.

The assessment of dietary energy intake is a key part of nutritional assessment [11-13]. This statement was backed up by the 2018 international consensus for malnutrition diagnosis by The Global Leadership Initiative on Malnutrition (GLIM) [13]: reduced food intake is now one of the top five criteria to diagnose malnutrition [13], together with body mass index (BMI), weight loss, loss of muscle mass, and inflammatory conditions. To assess food intake, the GLIM advocated the use of semi-quantitative methods [13], as in the NutritionDay® survey [14]. In 2009, we showed that a 10-point visual analogue scale of food intake was

feasible, easy to use, and correlated well with daily energy intake, especially among malnourished patients, for both in- and out-patients [15]. Since then, these results have been confirmed by an independent study conducted among 1762 medical oncology patients [16]. Indeed, a 10-point visual analogue scale such as that included in the SEFI® could be useful to detect the risk of malnutrition, defined by the nutritional risk index (NRI) [15] when the score is below 7. The accuracy of a 10-point visual analogue scale in diagnosing malnutrition as defined by the GLIM diagnostic criteria has never been assessed. The prevalence of malnutrition as defined by the GLIM criteria in primary care practice is not known. Little is known regarding the variables associated with malnutrition in primary care.

Therefore, the main aim of this prospective non-interventional study was to evaluate the accuracy of the 10-point visual analogue scale included in the SEFI® for the screening of malnutrition among adults consulting their GP. The secondary aims were to assess: i) the prevalence of malnutrition, ii) the feasibility of the SEFI®10-point visual analogue scale for assessing food intake, and iii) the variables associated with malnutrition in primary care.

PATIENTS AND METHODS

Study design and patient selection

This was a prospective, non-interventional, cross-sectional study. The patients were consecutively recruited from January 22 to April 13, 2018, by one investigator (GB) in three general medicine practices in the regional area of Rennes, Brittany, France. The inclusion criteria were: adult patients presenting for the 1st time, and who agreed to participate in the study. The exclusion criteria were: pregnancy, taking diuretics, having undergone bariatric surgery, cognitive disorders, and inability to be weighed or interviewed. The study protocol #2017-A03172-51 was approved by the Ethics Committee of CPP Ile-de-France VI, Paris, France, on December 13, 2017 (decision #85-17). As this study was considered to be based on

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routine practice and was non-interventional, informed consent and 'Commission Nationale de l'Informatique et des Libertés' agreement was not required by French law. The study protocol was registered under the name of GEN-EPA at ClinicalTrials.gov: #NCT03555461.

The assessment of food intake using the Simple Evaluation of Food Intake (SEFI®)

The SEFI® (www.sefi-nutrition.com, Knoë, le Kremlin Bicêtre, France) is approved by the 'Société Francophone de Nutrition Clinique et Métabolisme (SFNCM)' for assessing food intake [17], and is available in English, Dutch and French (for photographs and details, see https://www.sefi-nutrition.com/?lang=en). The SEFI® is simple to use and assesses food intake using two different procedures: a 10-point visual analogue scale, which was used in this study, and a visual assessment of food portions according to the NutritionDay® survey [14] (not used in this study). Questioning for the administration of the 10-point visual analogue scale was performed in French. The patient was asked to move a cursor on the SEFI® visual scale to answer the question: "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 of the ruler. As shown in a previous study [15], the SEFI® visual analogue scale is considered positive, i.e. indicating malnutrition, if the score is below 7.

Data collected

Data was collected prospectively on all subjects during the medical consultation. Part of this information was used to diagnose malnutrition according to the GLIM criteria [13]. In addition to the SEFI®, weight and height were measured, and body mass index was calculated; patients were interviewed on their previous weight, and weight loss within the past 6 months or beyond 6 months were calculated. Age, gender, marital status (living alone or in a

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couple), dependency, alcohol consumption, tobacco use, socio-professional status (according to the French National Institute for Statistics and Economic Studies (INSEE): https://www.insee.fr/fr/information/2497952), universal health cover status, and reason for consultation were also recorded. To assess the variables associated with malnutrition in general medicine, information regarding other well-known risk factors for malnutrition [18] was collected: previous history of GI surgery, current cancer treatment, chronic organ insufficiency, intestinal malabsorption, chronic infection or inflammation, diabetes, psychiatric disorders, polymedication, and cognitive disorders.

Study endpoints

The primary endpoint was the presence or absence of malnutrition according to a SEFI® visual analogue scale score <7 vs ≥ 7/10 set against the prevalence of malnutrition as defined by the GLIM criteria [13]: the proportion of patients with at least one phenotypic criterion and at least one etiological criterion. Phenotypic criteria: body mass index<20 (or <22 if age ≥70 years), or weight loss >5% within the past 6 months or >10% beyond 6 months; etiological criteria: reduced food intake defined by SEFI® score <7 or reduced food assimilation (malabsorption or previous history of GI surgery), or chronic disease-related inflammation (cancer or chronic organ insufficiency). The "acute disease/injury" criterion was not used, as it is not appropriate for a community-dwelling cohort. The secondary endpoints were: the proportion of patients for whom a SEFI® score was collected, the prevalence of malnutrition, and the factors associated with malnutrition.

Statistical analysis

As the study was designed before the publication of the GLIM criteria in January 2018, the sample size was calculated according to the following diagnostic criteria for malnutrition:

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weight loss >5% within the past 6 months or >10% beyond 6 months, and/or body mass index (BMI) <20 or <22 if age ≥70 yrs, and with the hypothesis of a sensitivity of the SEFI® visual analogue scale for the diagnosis of malnutrition of 90% and a minimum confidence interval of 75%. To reach a minimum power of 80% and a minimum alpha risk of 5%, 45 patients with malnutrition were needed [19,20]. With an expected prevalence of malnutrition of 8% in this population of patients presenting to general medical practice, 563 patients should be included. Since the observed malnutrition prevalence based on the above criteria was 11.9% (n=60/505), we decided to stop patient enrolment before reaching the hypothesized population of 563 patients.

Qualitative variables are reported as n (%) and compared using Chi2 (K) or Fisher (F) tests. Quantitative variables are reported as mean ± standard deviation and compared using Student, Mann-Whitney or Wilcoxon tests. The Receiver Operating Characteristic (ROC) curve was used to assess the predictive performance of the SEFI® compared to the reference test, the GLIM criteria for malnutrition diagnosis, and to determine the optimal threshold value for the test using the Youden index (Y = Sensitivity + Specificity - 1). 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≤AUC≤1.00, excellent; 0.80≤AUC<0.90, good; 0.70≤AUC<0.80, moderate; 0.60≤AUC<0.70, poor; 0.50≤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® visual analogue scale was defined as the proportion of patients included for whom a score was collected. Univariate and multivariate logistic regressions were performed to identify the variables associated with malnutrition. A multivariate logistic regression adjusted on the factors with a P value of <0.2 in the univariate analysis was performed with a backwards stepwise process eliminating all variables that did

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not contribute (P value ≥0.05). Otherwise the significance threshold was 0.05 for all analyses. All the statistical analyses were carried out with SAS software, version 9.4.

RESULTS

Patient enrolment and characteristics

The study flow-chart is provided in **Figure 1**. Among 747 eligible patients, a total of 505 patients were included. Among these 80 patients had a SEFI® score <7/10 (15.8%) and 21 patients (4.2%) were malnourished according to the GLIM criteria. The patient characteristics are summarized in **Table 1**. Patients reaching a SEFI® score <7 were significantly younger, more often female, more frequently living alone and with a previous history of GI surgery or psychiatric disorders.

Accuracy and feasibility of the 10-point visual analogue scale for the screening of malnutrition.

The area under the ROC curve showing the performance of a SEFI® visual analogue scale score <7 (the optimal threshold) for the diagnosis of malnutrition is 0.822 (95% confidence interval (CI), 0.721-0.923), indicating good predictive performance (**Figure 2**). As shown in **Table 2**, the sensitivity of the SEFI® visual analogue scale for the diagnosis of malnutrition is 76.2% (n=16/21, 95% CI, 58.0-94.4), the specificity is 86.8% (n=420/484, 95% CI, 83.8-89.8), the positive predictive value is 20.0% (n=16/80, 95% CI, 11.2-28.8), and the negative predictive value is 98.8% (n=420/425, 95% CI, 97.8-99.8). The feasibility of the SEFI® 10-point visual analogue scale was 100% (505/505).

Variables associated with malnutrition.

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Univariate analysis of the variables associated with malnutrition is shown in **Table 3**. In multivariate analysis, female gender, cancer, and chronic alcohol consumption were independently associated with malnutrition (**Table 4**).

DISCUSSION

In the primary care setting, the SEFI® 10-point visual analogue scale for food intake had 76% sensitivity, 87% specificity and 99% negative predictive value for the diagnosis of malnutrition based on the GLIM criteria [13], and it is feasible for use. Thus, it could be helpful for the diagnosis of malnutrition. The prevalence of malnutrition according to the GLIM criteria in the primary care setting was 4.2%.

To our knowledge, our study is the first to assess the prevalence of malnutrition in the general practice primary care setting. The early diagnosis of malnutrition in this setting is of utmost importance, since malnutrition is associated with increased morbidity, mortality, and costs via more medication and GP consultation requirements [7]. Although the international societies recommend early, systematic identification of malnutrition at admission to hospital [8], in geriatric institutions [21] and by GPs [22-23], malnutrition attracts little attention in the community setting [6]. Yet if malnutrition was better diagnosed in the community, it would enable early implementation of ambulatory nutritional care, and it could thereby reduce the prevalence of malnutrition in the community and at hospital admission. It could thus contribute to reducing malnutrition-related complications, such as infections, pressure sores, delayed healing, or hospital readmissions. Health policies aiming to improve malnutrition management in our health care system should necessarily start by greater involvement of community practice healthcare professionals (GPs, nurses, dieticians etc.) in the malnutrition screening process and the provision of nutritional care [6]. As already reported for the MUST

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[8], our study suggests that the SEFI® 10-point visual analogue scale, a simple and easy-to-use tool, could be used in the general practice setting.

The GLIM consensus has reinforced the value of assessment of food intake in the diagnosis of malnutrition [13]. As more than two thirds of hospitalized patients report decreased food intake [24], and as insufficient food intake is the main cause of malnutrition, identifying patients who are not eating enough is an effective way to diagnose malnourished patients. As the GLIM advises, the use of semi-quantitative methods to assess food intake, and the use of 10-point visual analogue scales, such as the SEFI®, could meet this need. Among 114 adult in- and out- patients either malnourished or at risk of malnutrition, a strong correlation was found between the score on a 10-point visual analogue scale and the daily energy intake assessed using the 3-day dietary record [15]. The use of a 10-point visual analogue scale clearly saves time compared to a 3-day dietary record, potentially diagnosing malnutrition and implementing an earlier and more timely malnutrition management plan. In addition the 10-point visual analogue scale could help identify hospitalized patients at risk for malnutrition, since 81% of patients with scores <7 are at high nutritional risk according to Nutritional Risk Index [15]. Here we show that the SEFI® 10-point visual analogue scale for food intake could also be feasible and helpful for the diagnosis of malnutrition as defined by the GLIM criteria in the primary care setting. As specificity is higher than sensitivity, the SEFI® 10-point visual analogue scale for food intake may have a better predictive performance to identify the patients who are not malnourished.

Another semi-quantitative method for assessing food intake is the assessment of the consumed food portions as proposed in the NutritionDay® survey [14]. Using this method, a correlation between reduced food intake and low BMI has already been reported [25]. Although this could be also done using the SEFI®, consumed food portions were not assessed in this study because the assessment of consumed food portions is more suited to the hospital

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setting, where the health-care staff, e.g. nursing assistants, could directly observe the food consumed when clearing the meal tray, as in the NutritionDay® [14]. In addition, we selected patients expected to have no disability (e.g. without any cognitive disorders) thus able to respond on the visual analogue scale. Therefore, the feasibility of the 10-point visual analogue scale was 100%. We are now undertaking a prospective study to assess the validity of consumed food portions for the diagnosis of malnutrition among older people with cognitive disorders living in a nursing home. Independently from malnutrition status, decreased food intake has been associated with increased mortality [14,26]. Our cross-sectional study was not however designed to assess whether malnutrition could be associated with increased complications in the primary care setting.

There are a few limitations to be noted. First, as the study was designed before the publication of the GLIM criteria [13], body composition assessment was not used to diagnose malnutrition. Second, the low positive predictive value evidenced here could be explained by a recruitment bias related to having performed this study in the general practice setting; indeed, among younger patients with acute GI or ENT infections, the decreased food intake is usually only observed for a few days and neither leads to nor is associated with malnutrition. Third, it can also be noted that although we did not include the number of patients planned from the sample size calculation, it is not likely to have led to substantial bias, as we recruited more malnourished patients than expected. Finally, our study was not designed to compare the validity of the SEFI® compared to other validated malnutrition screening tools, such as MUST [8], or those designed for older people, MNA-SF [9] or DETERMINE [10].

In conclusion, the prevalence of malnutrition according to the GLIM criteria was 4.2% in our study in general primary care practice. The SEFI® visual analogue scale for food intake is feasible and can be helpful for the diagnosis of malnutrition. More studies are needed to evaluate whether dedicated nutritional interventions based on earlier diagnosis and

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management of malnutrition in the primary care setting could have an impact on the prevalence of malnutrition at hospital admission, and therefore could reduce malnutrition-related complications and healthcare costs.

Statement of authorship

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

Conflict of interest statement

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.

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376 **Table 1 – Clinical and sociodemographic characteristics of all patients included (n=505).**

377 Qualitative variables are reported as n (%) and compared using Chi2 or Fisher tests.

378 Quantitative variables are reported as mean ± standard deviation and compared using Student

379 or Mann-Whitney Wilcoxon tests. Dependency is evaluated according to the Katz AVQ scale.

380 Comorbidities were chosen in reference to [10] and [15].

Variables	**Global (n=505)**	**SEFI® ≥ 7 (n=425)**	**SEFI® < 7 (n=80)**	**P value**
Age (year)	55.7 ±18.7	56.7 ±18.4	50.8 ±19.7	0.009
< 45 yrs	139 (27.5)	110 (25.9)	29 (36.3)	0.134
45-70 yrs	251 (49.7)	214 (50.4)	37 (46.3)	
≥ 70 yrs	115 (22.8)	101 (23.8)	14 (17.5)	
Gender (male / female)	196 (38.8) / 309 (61.2)	173 (40.7) / 252 (59.3)	23 (28.8) / 57 (71.3)	0.044
Living alone	154 (30.5)	122 (28.7)	32 (40.0)	0.044
Dependency	18 (3.6)	15 (3.5)	3 (3.8)	1.000
Chronic alcohol consumption	13 (2.6)	9 (2.1)	4 (5.0)	0.135
Tobacco use	65 (12.9)	50 (11.8%)	15 (18.8%)	0.087
Professional status				0.150
farmer	4 (0.8)	4 (0.9)	0	
craftsperson, storekeeper	15 (3.0)	13 (3.1)	2 (2.5)	
student	22 (4.4)	15 (3.5)	7 (8.8)	
executive	39 (7.7)	35 (8.2)	4 (5.0)	
employee	98 (19.4)	80 (18.8)	18 (22.5)	
unemployed person	36 (7.1)	26 (6.1)	10 (12.5)	
worker	31 (6.1)	27 (6.4)	4 (5.0)	
intermediate occupation	36 (7.1)	33 (7.8)	3 (3.8)	
retired	224 (44.4)	192 (45.2)	32 (40.0)	
Universal health cover status	146 (28.9)	122 (28.7)	24 (30.0)	0.815
Reason for consultation				0.535
prevention	19 (3.8)	18 (4.2)	1 (1.3)	
administrative	30 (5.9)	25 (5.9)	5 (6.3)	
systematic follow-up	209 (41.4)	178 (41.9)	31 (38.6)	
acute medical problem	247 (48.9)	204 (48.0)	43 (53.8)	
Nutritional parameters				
Present weight (kg)	70.9 ± 16.2	70.9 ± 15.4	71.1 ± 20.1	0.911
Present body mass index	26.0 ± 5.5	25.9 ± 5.1	26.3 ± 7.0	0.706
Low body mass index	56 (11.1)	40 (9.4)	16 (20.0)	0.006
<20 if <70 yr	42 (75.0)	28 (70.0)	14 (87.5)	
<22 if ≥70 yr	14 (25.0)	12 (30.0)	2 (12.5)	

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Weight loss >5% within the past 6 months	2 (0.7)	2 (0.9)	0	1.000
Weight loss >10% beyond 6 months	2 (0.6)	2 (0.7)	0	1.000
SEFI® visual analogue scale score	8.8 ± 2.1	9.6 ± 0.9	4.4 ± 1.3	< 0.001
Comorbidities				
Previous history of gastrointestinal surgery	13 (2.6)	6 (1.4)	7 (8.8)	0.001
Current cancer treatment	22 (4.4)	16 (3.8)	6 (7.5)	0.138
Chronic organ insufficiency	27 (5.3)	24 (5.6)	3 (3.8)	0.785
Intestinal malabsorption	4 (0.8)	2 (0.5)	2 (2.5)	0.120
Chronic infection or inflammation	29 (5.7)	21 (4.9)	8 (10.0)	0.110
Diabetes	38 (7.5)	30 (7.1)	8 (10.0)	0.360
Psychiatric disorders	73 (14.5)	52 (12.2)	21 (26.3)	0.001
Polymedication	83 (16.4)	68 (16.0)	15 (18.8)	0.543
Cognitive disorders	9 (1.8)	6 (1.4)	3 (3.8)	0.158

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Table 2 – Accuracy of the Simple Evaluation of Food Intake (SEFI)® visual analogue scale score <7 for the diagnosis of malnutrition (n=505). Malnutrition is defined by the Global Leadership Initiative on Malnutrition criteria: proportion of patients with at least one phenotypical criterion and at least one etiological criterion. Phenotypical criteria: body mass index<20 (or <22 if age ≥70 yrs), or weight loss >5% within the past 6 months or >10% beyond 6 months; etiological criteria: reduced food intake defined by SEFI®<7 or reduced food assimilation (malabsorption or previous history of GI surgery), or chronic disease-related inflammation (cancer or chronic organ insufficiency). The 'acute disease/injury' criterion was not suited to this patient cohort from primary care setting.

N (%)	**SEFI® ≥7**	**SEFI® <7**	**Total**
Malnutrition	5 (1.0)	16 (3.2)	21 (4.2)
Absence of malnutrition	420 (83.2)	64 (12.6)	484 (95.8)
Total	425 (84.2)	80 (15.8)	505 (100)

Sensitivity is 76.2% (n=16/21, 95% confidence interval (CI), 58.0-94.4), specificity is 86.8% (n=420/484, 95% CI, 83.8-89.8), positive predictive value is 20.0% (n=16/80, 95% CI, 11.2-28.8), and negative predictive value is 98.8% (n=420/425, 95% CI, 97.8-99.8).

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394 **Table 3 – Univariate analysis of variables associated with malnutrition (n=21) among**

395 **adult patients consulting in general medicine (n=505).** CI, confidence interval.

Variables	**N patients**	**N malnourished patients**	**Odds ratio [CI 95%]**	**P value**
Age (years)				
< 45	139	8	1 [reference value]	
45-70	251	8	0.54 [0.20 ; 1.47]	0.482
≥ 70	115	5	0.74 [0.24 ; 2.34]	
Gender				
Male	196	3	1 [reference value]	
Female	309	18	3.98 [1.16 ; 13.69]	0.028
Living alone				
Yes	154	12	1 [reference value]	
No	351	9	0.31 [0.13 ; 0.76]	0.010
Dependency				
No	487	20	1 [reference value]	
Yes	18	1	1.37 [0.17 ; 10.84]	0.763
Chronic alcohol consumption				
No	492	19	1 [reference value]	
Yes	13	2	4.53 [0.94 ; 21.86]	0.060
Tobacco use				
No	440	16	1 [reference value]	
Yes	65	5	2.21 [0.78 ; 6.25]	0.135
Universal health cover status				
No	359	11	1 [reference value]	
Yes	146	10	2.33 [0.97 ; 5.60]	0.060
Previous history of GI surgery				
No	492	17	1 [reference value]	
Yes	13	4	12.42 [3.48 ; 44.36]	0.0001
Current cancer treatment				
No	483	17	1 [reference value]	
Yes	22	4	6.09 [1.86 ; 19.96]	0.003
Chronic organ insufficiency				

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No	478	18	1 [reference value]	
Yes	27	3	3.19 [0.88 ; 11.60]	0.078
Intestinal malabsorption				
No	501	18	1 [reference value]	
Yes	4	3	80.50 [7.98 ; 812.21]	<0.001
Chronic infection or inflammation				
No	476	17	1 [reference value]	
Yes	29	4	4.32 [1.35 ; 13.80]	0.013
Diabetes				
No	467	21	1 [reference value]	
Yes	38	0	0.00 [0 ; 2.13E271]	0.970
Psychiatric disorders				
No	432	14	1 [reference value]	
Yes	73	7	3.17 [1.23 ; 8.14]	0.017
Polymedication				
No	422	18	1 [reference value]	
Yes	83	3	0.84 [0.24 ; 2.92]	0.786
Cognitive disorders				
No	496	21	1 [reference value]	
Yes	9	0	0.00 [0 ; Infinite]	0.986

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Table 4 – Multivariate analysis of variables associated with malnutrition (n=21) among adult patients consulting in general medicine (n=505). CI, confidence interval.

Variables	**N patients**	**N malnourished patients**	**Odds ratio [CI 95%]**	**P value**
Gender				
Male	196	3	1	
Female	309	18	4.92 [1.71 ; 14.17]	0.003
Cancer				
No	483	17	1	
Yes	22	4	4.78 [1.44 ; 15.94]	0.011
Chronic alcohol consumption				
No	492	19	1	
Yes	13	2	7.36 [1.31 ; 41.41]	0.023

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Figure legends

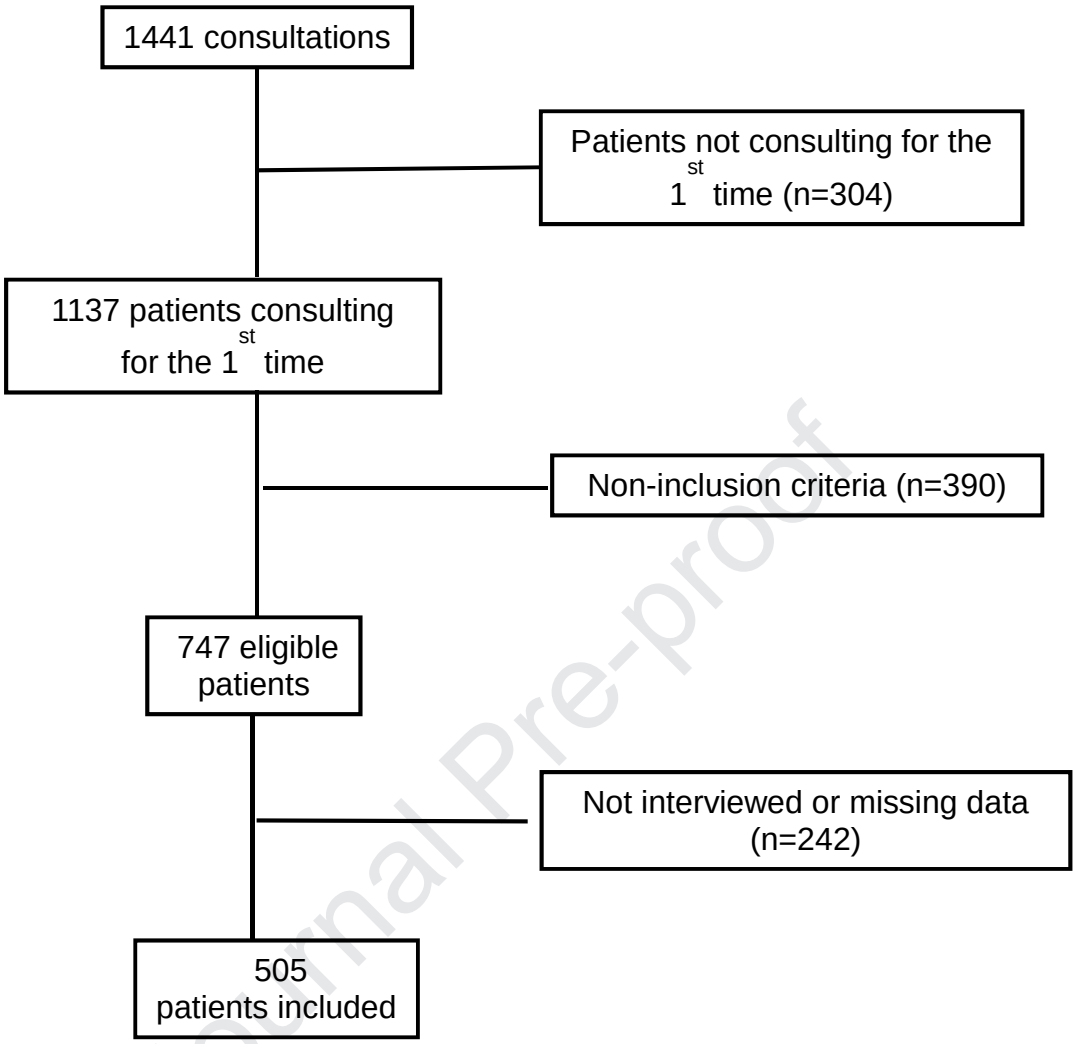
Figure 1 – Study flow chart.

Figure 2 – Area under the ROC curve showing the performance of the SEFI® visual analogue scale for the diagnosis of malnutrition. AUC=0.822 (95% confidence interval, 0.721-0.923), indicating good predictability.

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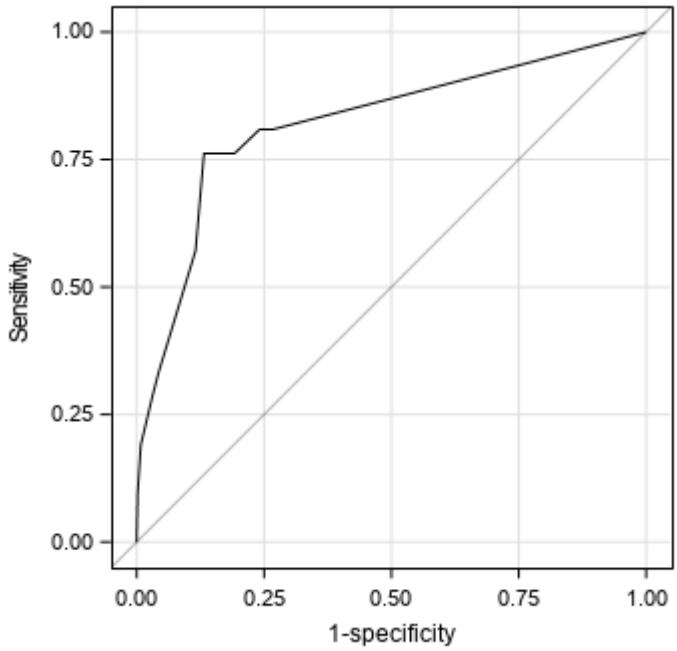
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Figure 1



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Figure 2



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