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► **To cite this version:**

Gwenhaël Bouëtté, Maxime Esvan, Katharina Apel, Ronan Thibault. A visual analogue scale for food intake as a screening test for malnutrition in the primary care setting: Prospective non-interventional study. *Clinical Nutrition*, 2021, 40 (1), pp.174-180. 10.1016/j.clnu.2020.04.042 . hal-02635125

HAL Id: hal-02635125

<https://hal-univ-rennes1.archives-ouvertes.fr/hal-02635125>

Submitted on 28 May 2020

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

3

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10

11 Short title: Malnutrition in the primary care setting

12

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23

24 **Highlights**

25 1. The prevalence of malnutrition as assessed by the GLIM criteria is 4.2% in the primary
26 care setting.

27 2. Screening for malnutrition by assessing food intake is feasible in the primary care setting.

28 3. A score <7 on the ten-point visual analogue scale for food intake SEFI® has a sensitivity of
29 76% and a specificity of 87% for the diagnosis of malnutrition on the basis of the GLIM
30 criteria.

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32 **ABSTRACT**

33 Introduction and aims: The Self-Evaluation of Food Intake (SEFI®) is a simple tool to assess
34 food intake that correlates well with the diagnosis of malnutrition in the hospital setting.

35 Aims: to evaluate the validity of SEFI® for the diagnosis of malnutrition among adults in the
36 primary care setting (primary aim); to assess the prevalence of malnutrition, the feasibility of
37 the SEFI® and the variables associated with malnutrition (secondary aims). Methods: A non-
38 interventional prospective study on consecutive patients at three primary care practices.

39 Primary endpoint: confrontation of a SEFI® visual analogue scale score <7/10 with the
40 diagnosis of malnutrition as defined by the Global Leadership Initiative on Malnutrition
41 criteria. Secondary endpoints: the proportion of patients for whom a SEFI® score was
42 collected. Multivariate analysis: threshold $\alpha=0.20$ in univariate analyses, step-by-step logistic

43 regression. Results: Among 747 eligible patients, 505 were included: mean age (\pm SD) 56 \pm 19
44 yrs, 61% female, 49% presenting with acute medical problems, 15.8% (n=80) with SEFI®
45 score <7/10, and 4.2% (n=21) with malnutrition. The predictive performance of the SEFI®
46 score <7 for the diagnosis of malnutrition was good (AUC=0.82 [95% confidence interval
47 (CI), 0.72-0.92]): sensitivity 76.2% (n=16/21, [58.0-94.4]), specificity 86.8% (n=420/484,
48 [83.8-89.8], positive predictive value 20.0% (n=16/80, [11.2-28.8]), and negative predictive

49 value 98.8% (n=420/425, [97.8-99.8]). The feasibility of the SEFI® 10-point visual analogue
50 scale was 100% (505/505). The variables independently associated with malnutrition were:

51 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)
52 and chronic alcohol consumption (7.4 [1.3-41.4], P=0.023). Conclusions. The prevalence of

53 malnutrition was 4.2% in this primary care setting. The SEFI® visual analogue scale for food
54 intake is feasible and could be helpful for the diagnosis of malnutrition in this setting.

55

56 **Keywords:** undernutrition; nutritional screening; primary care; general practice; energy

57 intake.

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59 INTRODUCTION

60 Malnutrition affects 30–50% of adult patients admitted to hospitals [1,2], and at least 5 % of
61 the French population in the community [3]. An estimated 93% of all those who are
62 malnourished or at risk of malnutrition in the UK live in the community [4]. Malnutrition is
63 associated with increased mortality, morbidity, length of hospital stay, and costs [5].

64 Malnutrition is underdiagnosed in the community setting [6], although it is associated with
65 increased numbers of consultations with the general physician (GP), and increased costs [7].

66 Therefore, early detection and treatment of malnutrition are highly warranted to prevent
67 deterioration and malnutrition-related complications. If malnutrition was earlier and better
68 diagnosed by the GP, it would enable the implementation of early nutritional outpatient care
69 and could therefore reduce the prevalence of malnutrition in primary care and, in turn, at
70 hospital admission.

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

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

84 feasible, easy to use, and correlated well with daily energy intake, especially among
85 malnourished patients, for both in- and out-patients [15]. Since then, these results have been
86 confirmed by an independent study conducted among 1762 medical oncology patients [16].
87 Indeed, a 10-point visual analogue scale such as that included in the SEFI® could be useful to
88 detect the risk of malnutrition, defined by the nutritional risk index (NRI) [15] when the score
89 is below 7. The accuracy of a 10-point visual analogue scale in diagnosing malnutrition as
90 defined by the GLIM diagnostic criteria has never been assessed. The prevalence of
91 malnutrition as defined by the GLIM criteria in primary care practice is not known. Little is
92 known regarding the variables associated with malnutrition in primary care.
93 Therefore, the main aim of this prospective non-interventional study was to evaluate the
94 accuracy of the 10-point visual analogue scale included in the SEFI® for the screening of
95 malnutrition among adults consulting their GP. The secondary aims were to assess: i) the
96 prevalence of malnutrition, ii) the feasibility of the SEFI®10-point visual analogue scale for
97 assessing food intake, and iii) the variables associated with malnutrition in primary care.

98

99 **PATIENTS AND METHODS**

100 **Study design and patient selection**

101 This was a prospective, non-interventional, cross-sectional study. The patients were
102 consecutively recruited from January 22 to April 13, 2018, by one investigator (GB) in three
103 general medicine practices in the regional area of Rennes, Brittany, France. The inclusion
104 criteria were: adult patients presenting for the 1st time, and who agreed to participate in the
105 study. The exclusion criteria were: pregnancy, taking diuretics, having undergone bariatric
106 surgery, cognitive disorders, and inability to be weighed or interviewed. The study protocol
107 #2017-A03172-51 was approved by the Ethics Committee of CPP Ile-de-France VI, Paris,
108 France, on December 13, 2017 (decision #85-17). As this study was considered to be based on

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

112

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

114 The SEFI® (www.sefi-nutrition.com, Knoë, le Kremlin Bicêtre, France) is approved by the
115 ‘Société Francophone de Nutrition Clinique et Métabolisme (SFNCM)’ for assessing food
116 intake [17], and is available in English, Dutch and French (for photographs and details, see
117 <https://www.sefi-nutrition.com/?lang=en>). The SEFI® is simple to use and assesses food
118 intake using two different procedures: a 10-point visual analogue scale, which was used in
119 this study, and a visual assessment of food portions according to the NutritionDay® survey
120 [14] (not used in this study). Questioning for the administration of the 10-point visual
121 analogue scale was performed in French. The patient was asked to move a cursor on the
122 SEFI® visual scale to answer the question: "how much do you eat at the moment?", ranging
123 from "nothing at all" (far left side of the scale) to "as usual" (far right side of the scale). The
124 result, between 0 and 10, is shown on the reverse side of the ruler. As shown in a previous
125 study [15], the SEFI® visual analogue scale is considered positive, i.e. indicating
126 malnutrition, if the score is below 7.

127

128 **Data collected**

129 Data was collected prospectively on all subjects during the medical consultation. Part of this
130 information was used to diagnose malnutrition according to the GLIM criteria [13]. In
131 addition to the SEFI®, weight and height were measured, and body mass index was
132 calculated; patients were interviewed on their previous weight, and weight loss within the past
133 6 months or beyond 6 months were calculated. Age, gender, marital status (living alone or in a

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

142

143 **Study endpoints**

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

155

156 **Statistical analysis**

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

159 weight loss >5% within the past 6 months or >10% beyond 6 months, and/or body mass index
160 (BMI) <20 or <22 if age \geq 70 yrs, and with the hypothesis of a sensitivity of the SEFI® visual
161 analogue scale for the diagnosis of malnutrition of 90% and a minimum confidence interval of
162 75%. To reach a minimum power of 80% and a minimum alpha risk of 5%, 45 patients with
163 malnutrition were needed [19,20]. With an expected prevalence of malnutrition of 8% in this
164 population of patients presenting to general medical practice, 563 patients should be included.
165 Since the observed malnutrition prevalence based on the above criteria was 11.9%
166 (n=60/505), we decided to stop patient enrolment before reaching the hypothesized population
167 of 563 patients.

168 Qualitative variables are reported as n (%) and compared using Chi2 (K) or Fisher (F) tests.
169 Quantitative variables are reported as mean \pm standard deviation and compared using Student,
170 Mann-Whitney or Wilcoxon tests. The Receiver Operating Characteristic (ROC) curve was
171 used to assess the predictive performance of the SEFI® compared to the reference test, the
172 GLIM criteria for malnutrition diagnosis, and to determine the optimal threshold value for the
173 test using the Youden index ($Y = \text{Sensitivity} + \text{Specificity} - 1$). The power of discrimination
174 of the area under the ROC curve (AUC), i.e. the performance of the test, was determined
175 according to the following classification: $0.90 \leq \text{AUC} \leq 1.00$, excellent; $0.80 \leq \text{AUC} < 0.90$, good;
176 $0.70 \leq \text{AUC} < 0.80$, moderate; $0.60 \leq \text{AUC} < 0.70$, poor; $0.50 \leq \text{AUC} < 0.60$, none. Sensitivity,
177 specificity, positive and negative predictive values, and their 95% confidence interval (95%
178 CI), were calculated. The feasibility of the SEFI® visual analogue scale was defined as the
179 proportion of patients included for whom a score was collected. Univariate and multivariate
180 logistic regressions were performed to identify the variables associated with malnutrition. A
181 multivariate logistic regression adjusted on the factors with a P value of <0.2 in the univariate
182 analysis was performed with a backwards stepwise process eliminating all variables that did

183 not contribute (P value ≥ 0.05). Otherwise the significance threshold was 0.05 for all analyses.

184 All the statistical analyses were carried out with SAS software, version 9.4.

185

186 **RESULTS**

187 **Patient enrolment and characteristics**

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

194

195 **Accuracy and feasibility of the 10-point visual analogue scale for the screening of** 196 **malnutrition.**

197 The area under the ROC curve showing the performance of a SEFI® visual analogue scale
198 score < 7 (the optimal threshold) for the diagnosis of malnutrition is 0.822 (95% confidence
199 interval (CI), 0.721-0.923), indicating good predictive performance (**Figure 2**). As shown in
200 **Table 2**, the sensitivity of the SEFI® visual analogue scale for the diagnosis of malnutrition is
201 76.2% ($n=16/21$, 95% CI, 58.0-94.4), the specificity is 86.8% ($n=420/484$, 95% CI, 83.8-
202 89.8), the positive predictive value is 20.0% ($n=16/80$, 95% CI, 11.2-28.8), and the negative
203 predictive value is 98.8% ($n=420/425$, 95% CI, 97.8-99.8). The feasibility of the SEFI® 10-
204 point visual analogue scale was 100% (505/505).

205

206 **Variables associated with malnutrition.**

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

210

211 **DISCUSSION**

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

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

231 [8], our study suggests that the SEFI® 10-point visual analogue scale, a simple and easy-to-
232 use tool, could be used in the general practice setting.

233 The GLIM consensus has reinforced the value of assessment of food intake in the diagnosis of
234 malnutrition [13]. As more than two thirds of hospitalized patients report decreased food
235 intake [24], and as insufficient food intake is the main cause of malnutrition, identifying
236 patients who are not eating enough is an effective way to diagnose malnourished patients. As
237 the GLIM advises, the use of semi-quantitative methods to assess food intake, and the use of
238 10-point visual analogue scales, such as the SEFI®, could meet this need. Among 114 adult
239 in- and out- patients either malnourished or at risk of malnutrition, a strong correlation was
240 found between the score on a 10-point visual analogue scale and the daily energy intake
241 assessed using the 3-day dietary record [15]. The use of a 10-point visual analogue scale
242 clearly saves time compared to a 3-day dietary record, potentially diagnosing malnutrition and
243 implementing an earlier and more timely malnutrition management plan. In addition the 10-
244 point visual analogue scale could help identify hospitalized patients at risk for malnutrition,
245 since 81% of patients with scores <7 are at high nutritional risk according to Nutritional Risk
246 Index [15]. Here we show that the SEFI® 10-point visual analogue scale for food intake could
247 also be feasible and helpful for the diagnosis of malnutrition as defined by the GLIM criteria
248 in the primary care setting. As specificity is higher than sensitivity, the SEFI® 10-point visual
249 analogue scale for food intake may have a better predictive performance to identify the
250 patients who are not malnourished.

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

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

266 There are a few limitations to be noted. First, as the study was designed before the publication
267 of the GLIM criteria [13], body composition assessment was not used to diagnose
268 malnutrition. Second, the low positive predictive value evidenced here could be explained by
269 a recruitment bias related to having performed this study in the general practice setting;
270 indeed, among younger patients with acute GI or ENT infections, the decreased food intake is
271 usually only observed for a few days and neither leads to nor is associated with malnutrition.

272 Third, it can also be noted that although we did not include the number of patients planned
273 from the sample size calculation, it is not likely to have led to substantial bias, as we recruited
274 more malnourished patients than expected. Finally, our study was not designed to compare the
275 validity of the SEFI® compared to other validated malnutrition screening tools, such as
276 MUST [8], or those designed for older people, MNA-SF [9] or DETERMINE [10].

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

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

284

285 **Statement of authorship**

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

289

290 **Conflict of interest statement**

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

294

295 **Acknowledgements**

296 We sincerely thank 'Cabinet médical des Rosiers', Acigné, France, Dr Le Vagueres, Dr
297 Godard, Berné, France, and Dr Berthier, Languidic, France, for their help in the performance
298 of the study.

299

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375

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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 \pm 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® \geq 7 (n=425)	SEFI® < 7 (n=80)	P value
Age (year)	55.7 \pm 18.7	56.7 \pm 18.4	50.8 \pm 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)	
\geq 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
<i>Professional status</i>				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)	
<i>Universal health cover status</i>	146 (28.9)	122 (28.7)	24 (30.0)	0.815
<i>Reason for consultation</i>				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)	
<i>Nutritional parameters</i>				
Present weight (kg)	70.9 \pm 16.2	70.9 \pm 15.4	71.1 \pm 20.1	0.911
Present body mass index	26.0 \pm 5.5	25.9 \pm 5.1	26.3 \pm 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 \geq 70 yr	14 (25.0)	12 (30.0)	2 (12.5)	

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
<i>Comorbidities</i>				
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

381

382 **Table 2 – Accuracy of the Simple Evaluation of Food Intake (SEFI)[®] visual analogue**
 383 **scale score <7 for the diagnosis of malnutrition (n=505).** Malnutrition is defined by the
 384 Global Leadership Initiative on Malnutrition criteria: proportion of patients with at least one
 385 phenotypical criterion and at least one etiological criterion. Phenotypical criteria: body mass
 386 index <20 (or <22 if age ≥70 yrs), or weight loss >5% within the past 6 months or >10%
 387 beyond 6 months; etiological criteria: reduced food intake defined by SEFI[®]<7 or reduced
 388 food assimilation (malabsorption or previous history of GI surgery), or chronic disease-related
 389 inflammation (cancer or chronic organ insufficiency). The ‘acute disease/injury’ criterion was
 390 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)

391 Sensitivity is 76.2% (n=16/21, 95% confidence interval (CI), 58.0-94.4), specificity is 86.8%
 392 (n=420/484, 95% CI, 83.8-89.8), positive predictive value is 20.0% (n=16/80, 95% CI, 11.2-
 393 28.8), and negative predictive value is 98.8% (n=420/425, 95% CI, 97.8-99.8).

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				

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

397 **Table 4 – Multivariate analysis of variables associated with malnutrition (n=21) among**
 398 **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

399

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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Figure 1

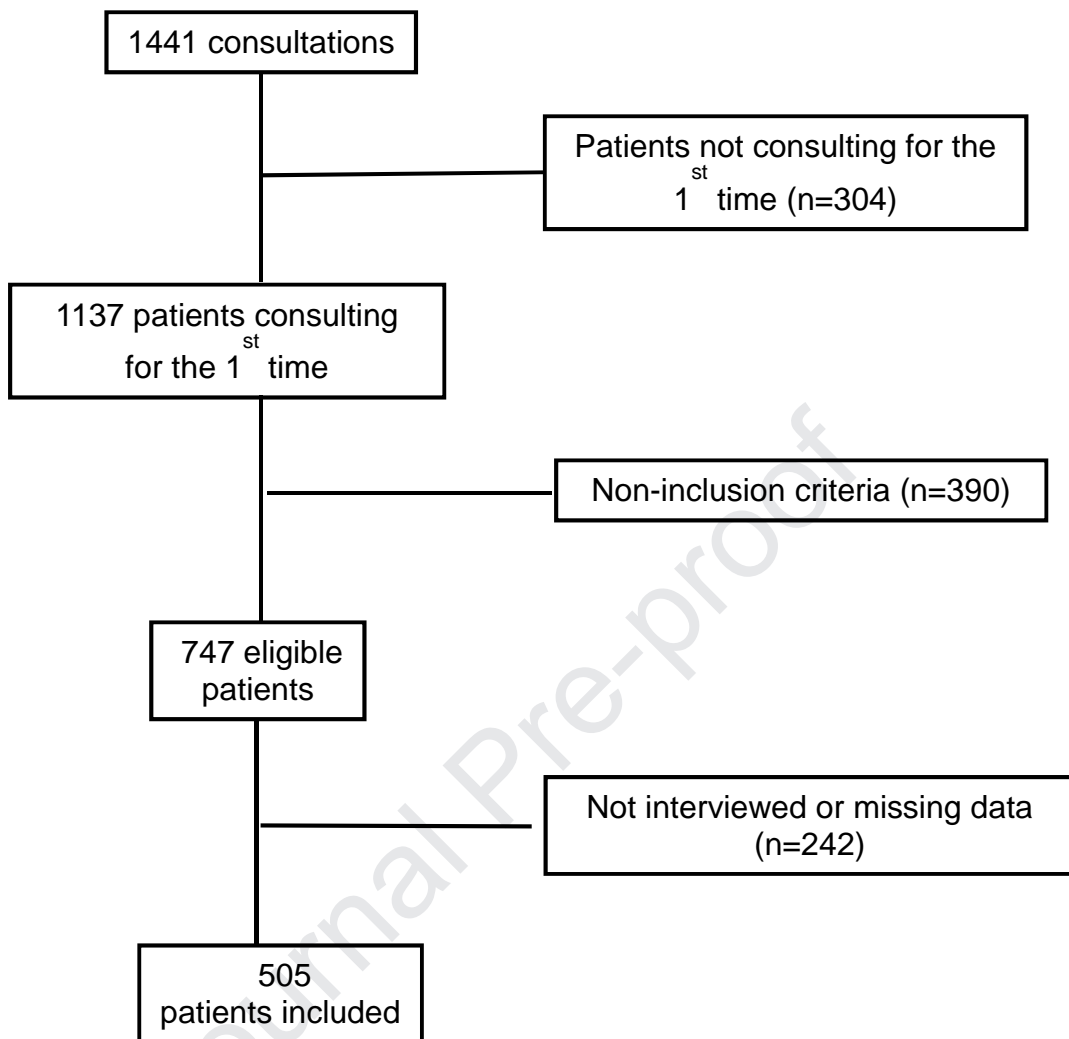
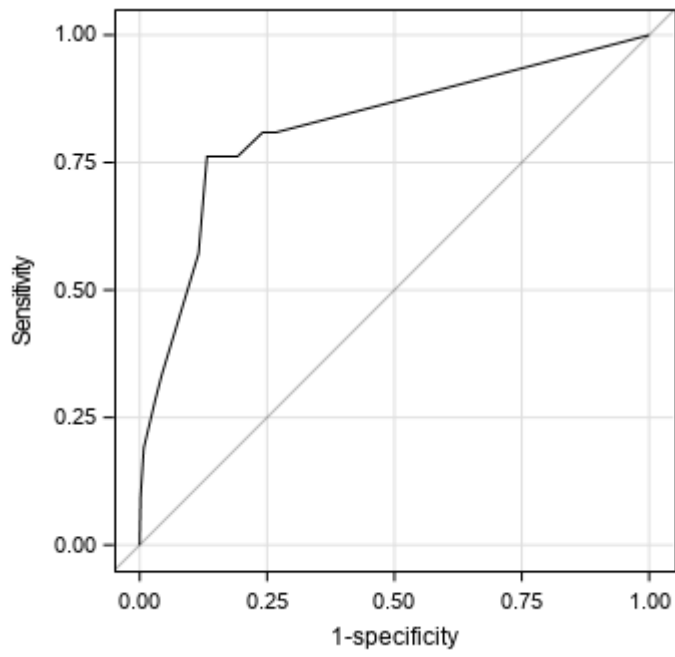


Figure 2



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