Validation Of The Supportive And Palliative Care Indicators Tool (SPICT™) In A Geriatric Population

Background
Timely identification of patients in need of palliative care is especially challenging in a geriatric population because of prognostic uncertainty. The Supportive and Palliative Care Indicators Tool (SPICT™) aims at facilitating this identification, yet hasn't been validated in a geriatric population.

Objective
To validate SPICT in a geriatric patient population admitted to the hospital.

Design
Retrospective cohort study.

Setting/subjects
Patients admitted to the acute geriatric ward of a Belgian university hospital between January 1 and June 30, 2014.

Measurements
Data including demographics, functional status, comorbidities, Do-Not-Resuscitate (DNR) orders and one-year mortality were collected. SPICT was measured retrospectively by an independent assessor.

Results
Out of 435 included patients, 54.7% had a positive SPICT, using a cut-off value of 2 for the general indicators and a cut-off value of 1 for the clinical questions. SPICT-positive patients were older (P=0.003), more frequently male (P=0.028), and had more comorbidities (P=0.015) than SPICT-negative patients. The overall one-year mortality was 32.2%, 48.7% in SPICT-positive patients and 11.5% in SPICT-negative patients (P<0.001). SPICT predicted one-year mortality with a sensitivity of 0.841 and a specificity of 0.579. The Area Under the Curve (AUC) of the general indicators (0.758) and the clinical indicators of SPICT (0.748) did not differ (P=0.638). In 71.4% of SPICT-positive cases, a DNR-code was present versus 26.9% in SPICT-negative cases (P<0.001).

Conclusions
SPICT is a valuable tool for identifying geriatric patients in need of palliative care as it demonstrates significant association with one-year mortality and with clinical survival predictions of experienced geriatricians, as reflected by DNR-codes given.

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Introduction

Offering timely palliative care to patients facing life-threatening illness has proven to be beneficial. It increases satisfaction and quality of life and diminishes depressive feelings, anxiety and stress in both patients and families. (1-3) Unfortunately, this timely identification appears to be a challenge, especially for geriatric patients. (4-10) An important reason is that for the latter patients, the

trajectory of disability in the last year of life is very heterogeneous, resulting in a non-predictable course and prognostic uncertainty. (10)

To identify patients with unmet palliative care needs, several tools were developed over the years. (11-15) The Supportive and Palliative Care Indicators Tool (SPICT) is one of those tools, combining 6 general and 21 clinical questions regarding deteriorating health. (11, 13) Different versions of SPICT have been published and the April 2015 version is used in this study. (16) In contrast to some other tools, such as the Multidimensional Prognostic Index (MPI) or the Study of Osteoporotic Fractures (SOF) (14, 15), the prognostic value of SPICT in a geriatric population has never been validated before.

SPICT was revised in April 2016 with a decrease in cut-off values and thus a changing focus from prognostication to identifying care needs in a broad patient population. (17) Nevertheless the authors believe that prognostication is an indispensable issue when assessing palliative care needs. Offering palliative care to patients who are not yet confronted with impending end of life, may result in deprivation from curative care and healing opportunities, as well as the expression of desires that do not reflect true end-of-life wishes. This latter phenomenon is called pseudo-participation. (9) Only when the patient's prognosis is estimated, can appropriate and timely medical decisions be delivered. (8, 18) Although several studies state that the clinical survival predictions of physicians is superior to prognostic tools in the short-term (19, 20), such prognostic tools may bring an added value for long-term predictions, where physicians often tend to be overoptimistic. (8)

This retrospective cohort study aims at validating SPICT in a geriatric patient population admitted to the acute geriatric ward, by measuring the ability to predict one-year mortality. The association between the retrospectively calculated SPICT and the presence of a Do-Not-Resuscitate (DNR)-code, as a measure for the clinical survival predictions of the geriatrician, is investigated and adds a second validation of SPICT. (21-23)

Methods
All patients admitted to the acute geriatric ward of a Belgian university hospital for more than 1 day, between January 1 and June 30, 2014 were included. On an acute geriatric hospital ward, specialized acute care for geriatric patients is offered within a multidisciplinary approach. (23) Throughout the hospital, a standardized DNR-order is used on which fixed categories of non-treatment decisions can be registered. A DNR-code 0 means full therapy, a DNR-code 1 stands for no cardiopulmonary resuscitation (CPR) only. A DNR-code 2 implies withholding of therapy (e.g. referral to the intensive care unit, upgrading of antibiotics, dialysis), whereas a DNR-code 3 stands for withdrawal of life-sustaining therapy. As for all other medical interventions or decisions, the Belgian Law on Patients' Rights requires informed consent from the patient or his/her surrogate decision-maker in case of incapacity. (22)

Data regarding demographics, functional status, comorbidities, DNR-orders on admission and discharge as well as one-year mortality were collected from the electronic patient record. SPICT was measured retrospectively by an independent assessor. The general and clinical indicators were mainly found in the Comprehensive Geriatric Assessment (CGA), nursing records and reports of multidisciplinary team meetings. Information concerning the one-year mortality wasn't recorded in the patient file for 158 patients. After telephone contact with patients' general practitioners the number of cases with unknown one-year mortality was reduced to 25.

Statistical calculations were carried out using SPSS version 23. For continuous data, median and interquartile range were computed. The relationship between continuous data and the dichotomous outcome of SPICT was assessed using Mann-Whitney-U tests. Categorical data were assessed using Chi-square tests. The exact P values are reported, with statistical significance defined as P≤0.05. To validate the SPICT, a Receiver Operating Characteristic (ROC) curve was built using SPSS, whilst the comparison of the Areas Under the Curve (AUC) was performed using MedCalc.

For this retrospective cohort study, acquisition of informed consent from studied patients was not obliged. The protocol of this study was approved by the ethics committee of the Ghent University Hospital.

Results

1) Prognostic value of SPICT regarding one-year mortality

Out of the 435 included patients, 238 patients (54.7%) obtained a positive result on SPICT. The distribution of the SPICT-positive indicators is displayed in Table 1. SPICT-positive patients were significantly older (P=0.003), were more frequently male (P=0.028) and had more comorbidities (P=0.015) compared to patients who had a negative score on SPICT (Table 1). No significant association between SPICT and the reason for admission could be found (P=0.726). After one year, 48.7% (111/228) of SPICT-positive patients had died, compared to 11.5% (21/182) of SPICT-negative patients (P<0.001). The overall one-year mortality was 32.2% (132/410).

The AUC of the general indicators of SPICT (0.758 with 95% CI: 0.714-0.799) and the clinical indicators of SPICT (0.748 with 95% CI: 0.703-0.789) did not differ significantly (P=0.6379) (Table 2). Using a cut-off value of 2 for the general indicators and a cut-off value of 1 for the clinical questions, as performed in the version of April 2015, SPICT can predict the one-year mortality for geriatric patients with a sensitivity of 0.841 and a specificity of 0.579.

2) DNR-codes and the association with SPICT

At discharge, 225 patients (58.6%) disposed of a DNR-code. Patients with no DNR-code or code 0 had a significantly lower one-year mortality (28/194, 14.4%) than patients with a DNR-code of 1 (11/41, 26.8%) and patients with a DNR-code of 2 (21/36, 58.3%). All patients with a DNR-code of 3 had died within one year (16/16, 100%) (P<0.001). In 71.4% (170/238) of SPICT-positive patients, a DNR-code was present compared to 26.9% (53/197) in SPICT-negative patients (P<0.001). We also noticed a significant association between the type of DNR-code assigned and a SPICT-positive score (P<0.001) (Figure 1).

Discussion

To the best of the authors' knowledge, this study is the first to validate SPICT in predicting the one-year mortality and the association with DNR-codes in a geriatric population. The main finding of this study is that SPICT can predict one-year mortality in a geriatric population with a sensitivity of 0.841 and a specificity of 0.579.

Other prognostic tools, such as the MPI and SOF, show similar sensitivity and specificity when predicting, respectively, the one-year and three-year mortality (sensitivity: ±0.80 and specificity: ±0.40-0.50). (14, 15) However, the use of SPICT is to be preferred because of several advantages. When there are no opportunities to carry out a CGA, the SPICT-tool shows an equal capacity of

prognostication as does the MPI, but using considerably fewer questions. All SPICT-questions can be displayed synoptically on one page. In contrast to MPI and SOF, studies have shown that physicians assess the SPICT as convenient and feasible. (11, 13, 24, 25)

Although both parts of SPICT are equally strong at predicting the one-year mortality, a combination of both parts may bring an added value for physicians who are educated to mainly look for clinical symptoms (second part), rather than functional or general indicators of health (first part). The combination of cut-off value 2 for the first part and 1 for the second part is preferred because of the balance between sensitivity and specificity. A rather low specificity, as in the 2015-version, results in identifying some patients that will not die within one year. Offering these patients Advance Care Planning (ACP) will not cause any harm, therefore a rather low specificity can be tolerated. (1-3) On the other hand, the specificity should not be extremely low. In the SPICT-version of April 2016, where cut-off values 1 and 1 are used, the specificity is reduced to 0.245 in this patient population. Because of the risk of the so-called phenomenon of pseudo-participation, the SPICT-version of April 2015 is preferred by the authors. (9)

Given the fact that SPICT was measured retrospectively, it did not function as a guide to assign DNR-codes, but rather as a measure for the clinical survival predictions of experienced geriatricians. In 71.4% of cases, geriatricians assigned DNR-codes based on their own clinical knowledge and experience. The added value of SPICT in helping experienced physicians on the acute geriatric ward to identify patients in need of palliative care requires further investigation, as well as the possible added value for physicians less experienced in care of the older person.

A limitation of this study is the retrospective collection of data leading to the possibility of missing information. Future research should be multicentric, prospective and should also include hospital wards where geriatric patients are not cared for by geriatric experts.

Conclusion

SPICT can predict the one-year mortality of geriatric patients with a sensitivity of 0.841 and a specificity of 0.579. These values are comparable with prognostic tools commonly used in geriatric medicine, such as MPI and SOF. Because experienced geriatricians were able to identify most patients with limited prognosis based on their clinical survival predictions, the added value of SPICT on an acute geriatric ward can be questioned. The added value of SPICT on other hospital wards and in primary care needs to be further investigated.

Author disclosure statement
No competing financial interests exist.

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Table 1: Baseline characteristics of the study population

	Total group n= 435	SPICT + group n= 238	SPICT - group n= 197	P value
Age (median, IQR[a])	84, 80-88	85, 81-89	84, 80-87	0.033
Gender-female	267 (61.4%)	135 (56.7%)	132 (67.0%)	0.028
Length of stay-days (median, IQR)	10, 6-15	10, 6-16	11, 6-14	0.127
Number of comorbidities (median, IQR)	4, 3-6	5, 3-6	4, 3-6	0.015
One-year mortality	132 (32.2%)	111 (48.7%)	21 (11.5%)	<0.001
General indicators of SPICT (first part)				
Poor performance status (>50% of daytime in bed or chair)	151 (34.7%)	150 (63.0%)	1 (0.5%)	<0.001
Dependent on others for most care needs due to health problems	365 (83.9%)	232 (97.5%)	133 (67.5%)	<0.001
≥2 unplanned hospital admissions in the past 6 months	33 (7.6%)	32 (13.4%)	1 (0.5%)	<0.001
5-10% weight loss over the past 3-6 months and/or low BMI[b]	144 (33.1%)	125 (52.5%)	19 (9.6%)	<0.001
Persistent troublesome symptoms despite optimal treatment of underlying condition	76 (17.5%)	76 (31.9%)	0 (0.0%)	<0.001
Patient asks for supportive and palliative care or treatment withdrawal	26 (6.0%)	22 (9.2%)	4 (2.0%)	0.002
Clinical indicators of SPICT (second part)				
Heart/vascular disease: NYHA[c] III/IV or severe peripheral vascular disease	70 (16.1%)	50 (21.0%)	20 (10.2%)	0.002
Respiratory disease: severe chronic lung disease, long term oxygen therapy or ventilation for respiratory failure	29 (6.7%)	20 (8.4%)	9 (4.6%)	0.110
Kidney disease: eGFR[d] <30ml/min, complications of CKD[e], stopping dialysis	16 (3.7%)	8 (3.4%)	8 (4.1%)	0.700
Liver disease: advanced cirrhosis with complication(s), liver transplant contraindicated	2 (0.5%)	2 (0.8%)	0 (0.0%)	0.197
Neurological disease: speech and/or swallowing problems, recurrent aspiration pneumonia	218 (50.1%)	144 (60.5%)	74 (37.6%)	<0.001
Dementia/frailty: incontinence, little social interaction, multiple falls, recurrent infections, help for walking/eating/ dressing	321 (73.8%)	219 (92.0%)	102 (51.8%)	<0.001
Cancer: progressive metastatic cancer, treatment for symptom control	25 (5.7%)	22 (9.2%)	3 (1.5%)	0.001

SPICT-positive group: ≥2 positive general indicators and ≥1 positive clinical indicator

SPICT-negative group: <2 positive general indicators and/or <1 positive clinical indicator

[a] IQR: interquartile range

[b] BMI: Body Mass Index

[c] NYHA: New York Heart Association

[d] eGFR: Estimated Glomerular Filtration Rate

[e] CKD: Chronic Kidney Disease

Table 2: ROC analysis for the general and clinical indicators of SPICT

| Variables of SPICT	Score	Number of patients with this score	Sensitivity	Specificity	AUC*
General indicators	0	47 (10.8%)	1.000	0.0	Total AUC = 0.758
	1	143 (32.9%)	0.955	0.129	95% CI: 0.714-0.799
	2	135 (31.0%)	0.841	0.554	*P=0.638*
	3	67 (15.4%)	0.508	0.853	
	4	34 (7.8%)	0.258	0.971	
	5	9 (2.1%)	0.061	0.996	
	6	0 (0.0%)	0.000	1.000	
Clinical indicators	0	60 (13.8%)	1.000	0.0	Total AUC = 0.748
	1	91 (20.9%)	0.955	0.187	95% CI: 0.703-0.789
	2	91 (20.9%)	0.856	0.439	*P=0.638*
	3	72 (16.6%)	0.689	0.655	
	4	59 (13.6%)	0.561	0.835	
	5	31 (7.1%)	0.333	0.935	
	6	19 (4.4%)	0.182	0.975	
	7	7 (1.6%)	0.083	0.996	
	8	5 (1.1%)	0.030	0.996	
	9	0 (0.0%)	0.000	1.000	
Combination of 2 general and 1 clinical indicator(s) (version of April 2015)	2+1	238 (54.7%)	0.841	0.579	
Combination of 1 general and 1 clinical indicator(s) (version of April 2016)	1+1	353 (81.1%)	0.932	0.245	

* AUC: Area Under the Curve

n=435, P<0.001
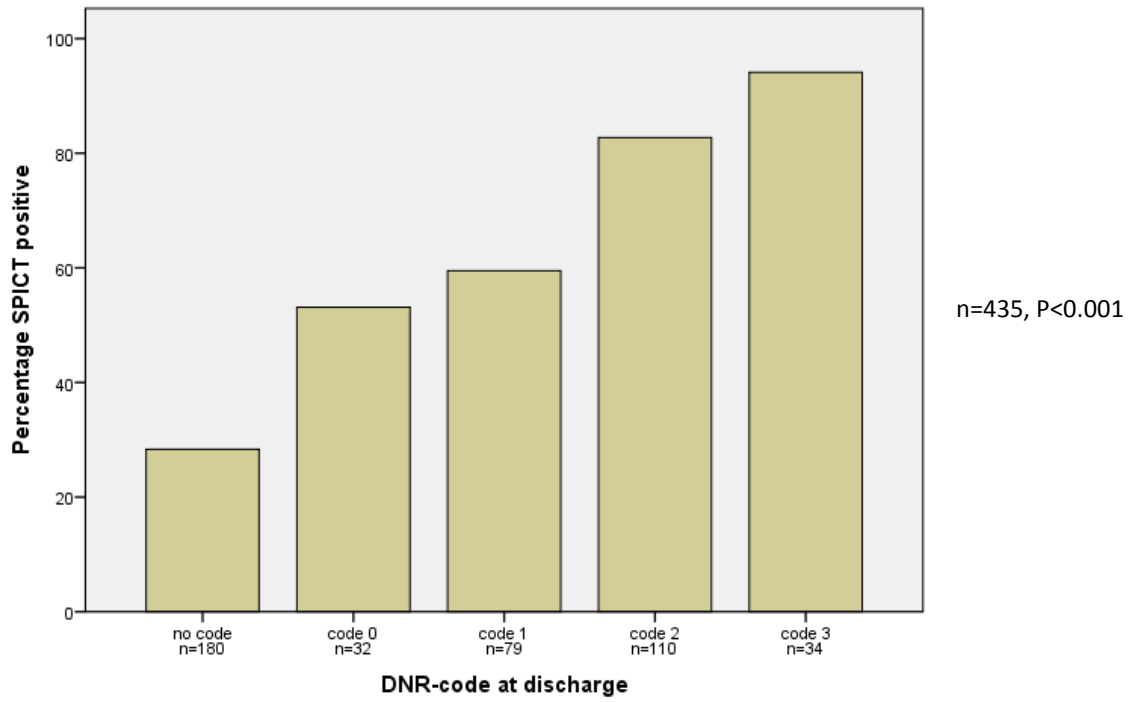
Figure 1: The relationship between the type of DNR-code and percentage of positive SPICT