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Abridged geriatric assessment is a better predictor of overall survival than the Karnofski Performance Scale and Physical Performance Test in elderly cancer patients

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ABSTRACT

Objectives: Comprehensive geriatric assessment (CGA) is a complex and interdisciplinary approach to evaluate the health status of elderly patients. The Karnofsky Performance Scale (KPS) and Physical Performance Test (PPT) are less time-consuming tools that measure functional status. This study was designed to assess and compare abridged geriatric assessment (GA), KPS and PPT as predictive tools of mortality in elderly cancer patients.

Materials and Methods: This prospective interventional study included all individuals aged >70 years who were diagnosed with cancer during the study period. Subjects were interviewed directly using a procedure that included a clinical test and a questionnaire composed of the KPS, PPT and abridged GCA. Overall survival (OS) was the primary endpoint. The log rank test was used to compare survival curves, and Cox's regression model (forward procedure) was used for multivariate survival analysis.

Results: One hundred patients were included in this study. Abridged GA was the only tool found to predict mortality [median OS for unfit patients (at least two impairments) 467 days vs 1030 days for fit patients; $p = 0.04$]. Patients defined as fit by mean PPT score (>20) had worse median OS (560 vs 721 days); however, this difference was not significant ($p = 0.488$ on log rank). Although median OS did not differ significantly between patients with low (≤ 80) and high (>80) KPS scores (467 and 795 days, respectively; $p = 0.09$), survival curves diverged after nearly 120 days of follow-up. Visual and hearing impairments were the only components of abridged GA of prognostic value.

Conclusion: Neither KPS nor PPT were shown to predict mortality in elderly cancer patients, whereas abridged GA was predictive. This study suggests a possible role for visual and hearing assessment as screening for patients requiring CGA.

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1. Introduction

Comprehensive geriatric assessment (CGA) is an interdisciplinary approach that evaluates the medical, psychological and functional capacity of elderly patients. It was developed to predict progression of disabilities and unplanned hospitalizations [1–3]. In the clinical oncology setting, CGA has been suggested to predict chemotherapy-related side effects [4–6] and mortality in patients with haematological [7,8] and solid malignancies [9–11]. As such, some form of abridged geriatric assessment (GA) or minimum database has been discussed [12]. However, due to the limitations of CGA (time-consuming), alternative short screening tools that are less bothersome for patients and physicians have been developed [13,14]. The functional status (FS) of cancer

patients is a parameter that has been shown to predict treatment outcome, overall survival (OS) and quality of life [15,16]. Therefore, several tests have been designed to measure FS, including the Karnofsky Performance Scale (KPS) and the Physical Performance Test (PPT). According to some authors, these can predict treatment outcome, OS and quality of life [17–21]. A previous report showed that both KPS and PPT were negatively correlated with abridged GA, but were not efficient screening tests for unfit patients [22]. The aim of this study was to evaluate and compare the predictive values of KPS, PPT and abridged GA for mortality in elderly cancer patients.

2. Materials and Methods

A prospective cohort study that included cancer patients aged >70 years admitted to the Department of Oncology, Hotel Dieu de France University Hospital between February 2011 and March 2012 was conducted. Inclusion and exclusion criteria have been reported

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Table 1
Abridged geriatric assessment components (total of 83 questions/items) defining 11 impairments.

Geriatric domain of assessment	Tool/scale (number of questions or items)	Vulnerability thresholds (each box equal to one impairment)	Source Ref.
Functional status	Activities of daily living	Katz Index of Independence (6)	Dependence in more than one domain [23]
	Instrumental activities of daily living	Lawton Scale (8)	Complete dependence in more than one domain [24]
Cognitive status	Mini-Mental State Examination (30)	≤24 ^a	[25,26]
Affective status	Geriatric Depression Scale (15)	>5	[27]
Nutritional status	Mini Nutritional Assessment (6)	<12	[28]
Comorbidities	Adult Comorbidity Evaluation score – 27 ^b (11)	>1	[29]
Medical conditions specific to elderly patients	Risk of falls	Timed Up and Go score and history of falls within last 12 months (2)	Score > 14.5 s and/or history of fall ≥1 [30,31]
	Polypharmacy and drug interaction	Two-step question: 'Does the patient have more than three drugs? If yes, does the patient have more than two drugs from the same drug class?' (1)	'Yes' on the two questions [32,33]
	Hearing and vision	Two questions: 'How is your hearing?' 'How is your eyesight?' (2)	'Poor/totally deaf' and/or 'poor/totally blind' [34]
	Urinary incontinence	In case of occasional urinary incontinence on activities of daily living: Two-step question: 'During the last 12 months, have you ever lost urine and got wet? If yes, have you lost urine on at least 6 separate days?' (1)	'Yes' on the two questions [35]
Pain if present	Verbal Numeric Pain Scale (1)	>3	[36]

^a In this study, patients with a Mini-Mental State Examination (MMSE) score <23 were excluded; thus, the vulnerability threshold for MMSE was a score of 23 or 24.

^b The initial test contains 12 domains, but the domain related to malignancy was excluded in the present study.

previously [22]. In brief, included subjects had to be aged >70 years with a KPS score ≥60 and a Mini-Mental State Examination (MMSE) score ≥23. An informed consent form was signed by the participants. The study was approved by the Research Ethics Board of the Faculty of Medicine, Saint Joseph University, Beirut, Lebanon. In summary, a trained medical intern had to assess each patient individually using clinical tests and a pre-established validated questionnaire. This questionnaire included the KPS, PPT and abridged GA, with 83 items defining 11 impairments in several geriatric domains (Table 1). A chronological order was followed by the investigator, who began by assigning the KPS score, followed by the MMSE score, followed by the PPT score, followed by the rest of the abridged GA procedure. Patients were classified according to each score, where unfit subjects scored ≤80 on KPS [37], ≤20 on PPT [21], and had at least two impairments on abridged GA as listed in Table 1 [38,39]. Patients were followed until the study cut-off date in June 2015, at which point OS was assessed using the Kaplan–Meier survival curve. Statistical analysis was performed using Predictive Analytics Software Version 22. The log rank test was used to compare survival curves, and Cox's regression model (forward procedure) was used for multivariate survival analysis. Proportional hazards assumption was checked by plotting the cumulative hazard function for each covariate (Kaplan–Meier survival). Continuous variables were categorized into two groups using the median as the cut-off.

3. Results

Patient characteristics and results for each score have been published previously [22]. This study enrolled 120 patients of whom 14 patients were excluded (six had KPS score <60 and eight had MMSE score <23). Six patients refused to complete the questionnaire (refusal rate 5.6%). The remaining 100 patients had a median age of 76 years (standard deviation 4 years), among whom 53% were males. Lung (18%), colorectal (16%) and breast cancer (15%) were the most common solid malignancies. Out of 14 patients diagnosed with haematological malignancies, seven had multiple myeloma. All participants were receiving cancer-directed treatment, chemotherapy and/or radiation therapy, at the time of the study, mainly as outpatients (85%). Seventy-one percent, 51% and 30% of patients were classified as unfit using abridged GA, KPS and PPT, respectively (Table 2). Median follow-up was 1418 days. At the time of analysis, 55 patients were reported to

be dead, 23 were lost to follow-up (with a median duration of follow-up of 94 days) and 22 patients were still alive. Cause of death was assessed by the medical team together with the family and general practitioner. The majority died from cancer progression (52 patients), whereas three deaths were not related directly to cancer (two myocardial infarction and one traumatic event). Median OS for the total cohort was 560 days (95% confidence interval 310–810 days).

OS was associated with abridged GA, but not with KPS not PPT. Patients with at least two impairments on abridged GA had significantly worse median OS than fit patients (467 vs 1030 days; $p = 0.04$ on log rank test). The predictive value of abridged GA was maintained even after correction for confounding factors such as age, sex, time since diagnosis, disease extension and type of malignancy as demonstrated by Cox regression (Table 3). The same test was used to evaluate each component defining abridged GA, and this showed that visual/hearing loss was the only impairment with significant prognostic value (Table 4). KPS demonstrated a trend to detect better OS in fit patients (KPS score > 80) compared with non-fit patients (KPS score ≤ 80), with a median OS of 795 days vs 467 days ($p = 0.094$ on log rank test), respectively. However, this only had significant prognostic value for patients that survived for >120 days (648 days vs 1121 days for KPS score ≤ 80 or >80, respectively; $p = 0.049$ on log rank test). Interestingly, although not significant, patients defined as fit using the mean PPT score (>20) had worse median OS (560 vs 721 days; $p = 0.488$ on log rank test). Fig. 1 illustrates the Kaplan–Meier survival curves for abridged GA, KPS and PPT.

Table 2

Absolute number of subjects classified according to Karnofsky Performance Scale (KPS), Physical Performance Test (PPT) and abridged geriatric assessment [22].

KPS	KPS score 60–70: unable to carry on normal activity or to do active work, requiring some assistance for personal needs	30
	KPS score 80–90: minor to moderate signs or symptoms of disease	68
	KPS 100: no evidence of disease	2
PPT	PPT score < 11: severe health impairment	4
	PPT score 11–20: moderate health impairment	26
	PPT score > 20: no health impairment	70
Abridged geriatric assessment	Less than two impairments	29
	Two or more impairments	71

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