Geriatric screening in older adults with cancer using electronic patient-reported outcome measures (PROMs) – a feasible approach in a resource-limited setting

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Published in:
Journal of Geriatric Oncology

DOI:
10.1016/j.jgo.2022.03.003

Publication date:
2022

Document version:
Accepted manuscript

Citation for published version (APA):

Go to publication entry in University of Southern Denmark's Research Portal

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Download date: 14. Sep. 2023
Title:
Geriatric screening in older adults with cancer using electronic patient-reported outcome measures (PROMs) – a feasible approach in a resource-limited setting

Type of contribution:
Perspective paper

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Word count: 1830

Tables/Figures: 2

References: 15

Keywords:
Aging, geriatric screening, older patients with cancer, patient-centered care, patient-reported outcome measures, COVID-19, resource-limited setting
Introduction

Cancer is a disease of aging; peak incidence and mortality rates are observed in adults 65 years or older in most cancer types. Due to the aging population worldwide, a sharp increase in the number of older adults is expected during the next decades, e.g., the number of adults aged ≥75 years with cancer is projected being increased with approximately 80% (from 130,000 to 234,000) in the United Kingdom by 2035. Aging is a highly heterogenous process resulting in increased vulnerability due to the decreased functional reserve capacity of multiple organs. Being able to provide appropriate care for older patients with cancer, a holistic, patient-centered approach considering the complex needs of the patient is desired, in addition to the classic tumor-centered care practiced in oncology.

While personalized medicine in oncology means applying advanced molecular biological methods to gain most information about the tumor, in geriatric oncology personalized medicine aims to obtain in-depth knowledge about the patient through a comprehensive approach using geriatric assessment (GA). GA is a concept originating from geriatric medicine applying tools and competences which are not available in most oncology departments. Therefore, simple, brief, easily applicable screening tools feasible for daily oncology use were developed establishing the concept of geriatric screening (GS).

The concept of geriatric screening

Applying GS tools in the daily oncology practice has several benefits: it identifies patients who will benefit from GA and GA-guided interventions and provides information about survival, functional decline, and toxicity related to antineoplastic treatment. GS tools can be completed by the patient or with the assistance of family members or caregivers in 5-10 minutes. Most GS tools are available on-line or even in form of mobile application (OncoAssist®) making the access and use inexpensive and widely available. The use of GS is recommended by the American Society of Clinical Oncology and the International Society of Geriatric Oncology. Detailed guidance on how GS should be applied in daily clinical practice is provided elsewhere.

Patient-reported outcomes (PROs)

Physicians are prone to under-report toxicity and downplay the harms of cancer drugs both in randomized clinical trials as well as in the daily practice leading to worse patient experience and reduced quality of life. Therefore, we need information about toxicity provided by the patients directly without the interpretation of the treating physicians. To meet this need, PROs were developed. Patient-reported outcomes (PRO) are, by the US Food and Drug Administration, defined as: “any report of the status of a patient’s health condition that comes directly from the patient, without interpretation of the patient’s response by a clinician or anyone else.” By this definition, PRO
is an umbrella term covering subjective aspects such as symptoms, physical, social, and mental function, health perceptions, and health-related quality of life\(^\text{10}\). Data about PROs can be collected using PRO measures (PROMs), usually a questionnaire, using pen-and-paper, voice-assisted telephone calls, or other electronic devices. PROs can be measured in absolute terms by severity or in changes over time. In oncology, PROs are used for evaluation of treatment-related toxicity, also known as the PRO version of Common Terminology Criteria of Adverse Events (PRO-CTCA).

In our department, PRO solution was widely adapted in clinical practice to obtain information on various self-reported aspects of the patients’ health status, beyond symptoms and toxicities. Therefore, when potential strategies were discussed regarding the implementation of GS, especially in the context of limited resources, information included in GS was found suitable being collected through PROMs.

**Integrating PROs in daily oncology practice**

Gødstrup Hospital (GH) is a community teaching hospital, located on the Jutland peninsula in Denmark and provides oncology and palliative care services to approximately 700,000 citizens. This high-volume center treats various types of solid tumors. The palliative care unit is integrated into the oncology department. GH has been recognized by the European Society for Medical Oncology (ESMO) and has been an ESMO Designated Center for Integrated Oncology and Palliative Care since 2020. Currently, there is no formal geriatric oncology program or collaboration with the geriatric unit due to limited access to the geriatric service. Though, implementing and applying GS systematically to improve the care of older adults with cancer has been desired for a long time and remained a priority at our department. We aimed to find an innovative solution.

While COVID-19 pandemic has resulted in many negative consequences, it has also led to more creative thinking and development of solutions to accommodate the need for less and shorter outpatient visits in our department\(^\text{11}\). To reduce the risk of our patients being exposed to COVID-19, we implemented systematic GS using an electronic PRO solution (telePRO) provided by AmbuFlex\(^\text{®}\), which has been incorporated into the electronic patient health record and the department routine care since 2015\(^\text{12}\). The telePRO is used for assessment of cancer-specific symptoms and treatment-related toxicity and guides interventions and supportive care in every patient treated at our department. The tumor-site specific questionnaire containing disease-specific symptoms and focusing on prominent treatment-related toxicities. It is completed by the patient at home before a planned treatment which is used to guide the need for dose reductions, treatment delay, or follow-up consultation with the treating physician. The AmbuFlex\(^\text{®}\) system also supports clinicians in deciding
whether patients need further assessment using tele-health solutions (phone call or video consultation) or outpatient visit.

**GS integrated through electronic PROs is a feasible approach in a resource-limited setting**

The GS module integrated in AmbuFlex® is an add-on function containing the validated self-completed versions of Geriatric 8 (G8) and Vulnerable Elderly Survey-13 (VES-13) questionnaires\(^{13,14}\), two single-items from the Geriatric Core Dataset (G-CODE), and a question regarding fall tendency\(^{15}\) (Figure 1a and 1b). When evaluating the results, the validated cut-offs for G8 and VES-13 are applied\(^{13,14}\). The physician receive a color-coded graphical overview of the results; G8 and VES-13: green means normal score and red indicates abnormal score. Regarding single items and fall-tendency, green means no problem at all, yellow indicates few difficulties or needs attention/further explanation, while red means serious issues. By clicking on the summary of the results (Figure 1a), the detailed version appears which includes all items and questions allowing for detailed review (Figure 1b).

Data collection, evaluation, decision-making, and follow-up include the following steps:

1. Patients aged \(\geq 70\) years with cancer referred to the department of oncology receive the electronic screening questionnaire and complete it before the initial visit.
2. Based on the result of the GS, past medical history, medication review, laboratory parameters, together with the disease characteristics (type of primary tumor, stage, prognosis, decision from the multidisciplinary tumor board), the physician creates a preliminary individualized therapeutic plan.
3. Patients not candidate for anti-neoplastic treatment or those, who have asymptomatic disease and do not need urgent treatment, thus “watchful waiting” may be an option, a consultation applying tele-health solutions or in-person meeting (depending on patient preferences) will be arranged. During consultations, gait speed and the Mini-Cog\(^{16}\) are used to evaluate physical and cognitive functions. Patients considered vulnerable or frail, based on the GS, cannot be referred to a geriatrician due to lack of availability. However, GA-guided interventions, such as nutritional counselling, medication review, occupational, and physical therapy, can be performed.
4. A plan will be achieved ideally through shared decision-making considering the GS result, objective data (patient and disease characteristics), recommendation made by the multidisciplinary tumor board, and patient preferences.
5. Vulnerable patients eligible for systemic therapy may receive monotherapy or reduced-dose combination treatment. If patients do not have symptoms or have low tumor burden,
“watchful waiting” may also be considered. Periodic re-evaluation and follow-up of the patients’ general condition, symptoms, interventions, and treatment options occur typically every 2-3 months. Patients who are unsuitable for active antineoplastic treatment and have no or mild symptoms not demanding special competences in palliative medicine are referred to their general practitioners for symptom relief; patients requiring specialized palliative skills or advanced care planning will be referred to the palliative care service.

Case
The utilization of GS tools and a patient-centered approach is demonstrated by a case. Patient and tumor characteristics, results of the geriatric screening, considerations, and treatment options are summarized in Table 1. If focusing exclusively on tumor characteristics, several treatment options were available for our older patient with metastatic colorectal cancer. However, in a patient-centered approach, the challenge was to choose a treatment which balanced efficacy and tolerability with consideration of patient preferences. During treatment discussion with the patient and his daughters, the patient would like to avoid any potential toxicities that may result in hospitalization, thereby making him unable to take care of his wife. Furthermore, regimens with infusional fluoropyrimidines requiring central venous catheter (infusional 5-fluorouracil, FOLFIRI, FOLFOX) and epidermal growth factor receptor inhibitors might cause significant skin toxicity (acneiform rash, skin fissures, paronychia, mucositis), potentially limiting physical function, was declined by the patient.

From the treating physician’s point of view, major concerns included mild cognitive impairment and hearing loss, and the potential for underreporting toxicities by the patient to avoid hospitalization. Following multiple discussions, reduced dose capecitabine (800 mg/m² twice daily in 14 days, administered orally, every third week (qw3)) and bevacizumab (7.5 mg/kg, administered intravenously, q3w) was chosen. Social support was provided by the daughters and a nurse via daily phone calls.

The patient received a total of eight treatment cycles without experiencing any grade ≥3 complications. Time to progression was 8.1 months, and the patient experienced symptoms such as increased fatigue and weight loss (3% in 4 weeks). Re-treatment with capecitabine/bevacizumab or second-line treatment with pembrolizumab were discussed. However, he declined further treatment as he was no longer able to care for his wife and both of them were admitted to the same nursing home.
**Conclusion**

Applying GS tools to routine clinical practice provides a simple, cost-effective, and feasible holistic approach, which can be adapted to the available local resources making patient-centered care available for older patients with cancer in different clinical settings.

**Future perspectives:**

The PRO based GS was approved by the institutional review board and launched in September 2020. To date, over one hundred patients have completed the PRO-based GS.

In addition, we are actively enrolling patients to a prospective observational cohort-study, with a plan enrollment of 500 patients over 5 years to better evaluate the clinical utility of PRO based GS. We will focus on demographic and clinical characteristics of the patients, barriers related to the use and completion of PRO based GS, how the collected data may support prognostic understanding and conversation between patients and physicians, whether the physician considered the result of the GS and patient preferences when treatment decisions were made in terms of both active anti-neoplastic treatment and palliative care. We will also evaluate the effect of interventions initiated due to the GS. Moreover, we will also collect tumor-centered endpoint such as progression-free and overall survival, toxicity, treatment intensity, reason for deterioration, and potential prognostic and predictive factors (e.g.: serum C-reactive protein and neutrophil-to-lymphocyte ratio). This project will serve as an important step in demonstrating the importance of incorporating geriatric expertise in oncology practice, thereby promoting future collaboration.

**Author contribution:**

Concept, manuscript preparation, editing and review: GL, LMVS, HS

**Disclosures:**

The authors have nothing to disclose.

**Funding:**

The authors received no funding for this work.

**References:**


Figure 1a. The output of patient-reported outcome (PRO) based geriatric screening summarizing the result of Geriatric 8, Vulnerable Elderly Survey-13, two single items of the Geriatric Core Dataset (G-CODE), a question about fall-tendency, and body mass index (BMI). The patient can add a commentary as a free text.

Figure 1b. When clicking on the date of completion (12. June 2021) detailed overview of G8, VES 13 are available.
Answers from the 12 June 2021

**PAGE 1**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your height?</td>
<td>157 centimeters</td>
</tr>
<tr>
<td>Your weight?</td>
<td>61.0 kilograms</td>
</tr>
</tbody>
</table>

**PAGE 2**

In general, compared to other people your age, would you say that your health is: Very good

- How much difficulty, on average, do you have with the following physical activities:
  - stooping, crouching, or kneeling? No difficulty
  - lifting, or carrying objects as heavy as 5 kilograms? No difficulty
  - reaching or extending arms above shoulder level? No difficulty
  - writing, or handling and grasping small objects? No difficulty
  - walking 400 meters? No difficulty
  - heavy housework such as scrubbing floors or washing windows? No difficulty

**PAGE 3**

Because of your health or a physical condition, do you have any difficulty with shopping for personal items (like toilet items or medicines)? No

**PAGE 4**

Do you get help with shopping? No
**Table 1.** Clinical case. Patient and tumor characteristics, results of the geriatric screening, considerations, and treatment options are summarized.

(Abbreviations: GFR: glomerular filtration rate; BMI: body mass index; ADL: activities of daily living; IADL: instrumental activities of daily living; TNM: tumor node metastasis; MSI-H: microsatellite instability- high; G8: Geriatric 8; VES-13: Vulnerable Elderly Survey-13; TUG: timed up and go; 5-FU: 5-fluorouracil; FOLFOX: infusional 5FU+oxaliplatin, FOLFIRI: infusional 5-FU+irinotecan; EGFRi: epidermal growth factor-1 inhibitor; S-1: Teysuno (Taiho Pharmaceutical co. and Ltd., Tokyo, Japan)

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>Tumor Characteristics</th>
<th>Geriatric Screening &amp; Considerations</th>
<th>Treatment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics:</td>
<td>Primary tumor:</td>
<td>Geriatric screening:</td>
<td>Regimens Available*:</td>
</tr>
<tr>
<td>• 83-year-old male</td>
<td>• Sigmoid colon</td>
<td>• G8: 14</td>
<td>• 5-FU +/- Bevacizumab</td>
</tr>
<tr>
<td>• Education: University graduate</td>
<td>adenocarcinoma of colorectal type</td>
<td>• VES13: 2</td>
<td>• Capecitabine +/- Bevacizumab</td>
</tr>
<tr>
<td>• Home-dwelling, living with his wife</td>
<td>• Grade 2</td>
<td>• Mini-COG: 4</td>
<td>• Reduced-dose doublet (FOLFOX, FOLFIRI) +/- EGFRi</td>
</tr>
<tr>
<td>Social Support:</td>
<td>• TNM: cT3 cN2b cM1</td>
<td>• TUG: 10 seconds</td>
<td>• Irinotecan +/- EGFRi</td>
</tr>
<tr>
<td>• Sole caregiver for his wife who has severe dementia</td>
<td>• Stage IV</td>
<td>Considerations:</td>
<td>• EGFRi monotherapy</td>
</tr>
<tr>
<td>• Two daughters live 200 kilometers away</td>
<td>• Synchronous</td>
<td>• Patient preferences</td>
<td>• Watchful waiting</td>
</tr>
<tr>
<td>Functional Status:</td>
<td>Metastases:</td>
<td>• Advance care planning</td>
<td>• Best Supportive Care</td>
</tr>
<tr>
<td>• No dependency – ADL, IADL</td>
<td>• Lung</td>
<td>Clinical factors</td>
<td>*First-line treatment options were not available:</td>
</tr>
<tr>
<td>Comorbidities:</td>
<td>• Adrenal gland</td>
<td>o Mild hearing loss</td>
<td>• S-1 +/- Bevacizumab</td>
</tr>
<tr>
<td>• Mild renal impairment: GFR:50 ml/min</td>
<td>• Peritoneum</td>
<td>o Mild cognitive impairment</td>
<td>• Immunotherapy-pembrolizumab</td>
</tr>
<tr>
<td>• Well-regulated hypertension</td>
<td></td>
<td>o Independent in IADLs &amp; ADLs</td>
<td></td>
</tr>
<tr>
<td>• Dyslipidemia</td>
<td>• Mild hearing loss</td>
<td>o Social status issues</td>
<td></td>
</tr>
<tr>
<td>• Mild cognitive loss</td>
<td>• Mild cognitive</td>
<td>o Supportive care issues</td>
<td></td>
</tr>
<tr>
<td>• Mild cognitive impairment</td>
<td></td>
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<tr>
<td>Nutritional Status:</td>
<td>Genetics:</td>
<td></td>
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<tr>
<td>• No weight loss, BMI&gt;25</td>
<td>• RAS and BRAF wild type</td>
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<tr>
<td>Medications:</td>
<td>Symptoms</td>
<td>• MSI-H – sporadic cancer</td>
<td></td>
</tr>
<tr>
<td>• No polypharmacy</td>
<td>• Asymptomatic</td>
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<td></td>
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