



Prevalence of comorbidities in elderly cancer patients

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Summary Comorbidity is common among cancer patients and increases with age. Comorbid conditions potentially affect treatment, therapy outcomes, and survival of people with cancer. This short review aims at presenting the prevalence of comorbidities, to illustrate their impact on elderly persons with cancer and to discuss their assessment.

Keywords Prevalence · Comorbidity · Geriatric assessment · Frailty · Dementia

Introduction

Is cancer a geriatric syndrome? Cancer disproportionately impacts older adults: approximately 70% of patients with cancer are aged 65 and older [1]. Over the next 20 years the number of patients with cancer over the age of 65 is expected to increase even further [1].

As our population ages, more individuals are affected by chronic conditions, and the impact of comorbidity in older adults with cancer is an area of growing importance. Comorbidity and polypharmaco-therapy, which is often necessary as a result, can

complicate cancer treatment and pose competing risks for morbidity and mortality.

Methods

To present the prevalence of comorbidity in elderly patients with cancer, a PubMed search of the published English and German literature was undertaken, using the search terms ‘elderly’, ‘cancer’, ‘clinical trial’, ‘prevalence’, ‘comorbidity’ and ‘assessment’, also including manual searches on references in articles on these topics.

Definitions

The World Health Organization (WHO) describes ageing populations as those over 60 years of age [3]. But older population groups are extremely heterogeneous with respect of physical and mental capacities. The loss of ability associated with ageing is only loosely related to a person’s chronological age [5].

According to the definition of the German Geriatric Society, patients are defined as “geriatric” either:

- on the basis of a geriatric multimorbidity and a higher age (usually 70 years and older) or
- very advanced age (80 years and older) and increased vulnerability due to age-related functional limitations and deterioration of the ability to help oneself.

Age alone is not a criterion for defining a geriatric patient. The performance status varies greatly, depending on age, comorbidities and their therapy: this results in a rough assessment of geriatric patients as “robust”, “vulnerable” and “frail” [4]. More advanced age is also characterized by the manifestation of various complex health states that do not fall into the category of independent diseases. These are commonly

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called *geriatric syndromes* and include, amongst others, frailty [5]. The concept of *frailty* is constantly evolving in the literature. It is characterised by a decline in functioning across multiple physiological systems, accompanied by an increased vulnerability to stressors [6].

Comorbidity is defined as the “coexistence of disorders in addition to a primary disease of interest”. Despite strong associations between them, comorbidity, frailty and functional status are separate constructs, and each has an independent effect on outcomes [7].

Prevalence of comorbidities in elderly patients with cancer

The prevalence of comorbidities increases with age [2]. More than two-thirds of all patients over 65 have at least one, and almost one-fourth suffers from 4 or more comorbidities [8].

Some data on the prevalence of comorbidity in elderly tumour patients are known, but they differ considerably, depending on the comorbidity scale applied e.g. Cumulative Illness Rating Scale-Geriatric (CIRS-G), Older Americans Resources and Services (OARS) questionnaire or Charlson-Score, the study population and the type of tumour studied ([7]; Table 1).

Edward et al. [14] reported data of a large cohort of Medicare beneficiaries (i.e. beneficiaries of the United States health system) aged 66 years or older ($N=1,056,534$) with recently diagnosed cancers of all stages (localised, regional and distant). In this analysis an adapted Charlson Comorbidity Index was used as a comorbidity measure that comprised 16 comorbid conditions. Data indicated that 40.2% of the cancer patients had at least one other chronic condition recorded, and 15% had two or more. The most common chronic conditions among cancer patients were diabetes (16.0%), chronic obstructive pulmonary disease (15.5%), congestive heart failure (9.7%) and cerebrovascular disease (6.0%). In accordance with the findings of other studies, different prevalences of comorbidity were found for the various tumour entities: The highest prevalence of comorbidity was found among lung cancer patients (52.8%), intermediate among colorectal cancer patients (40.7%) and similar prevalences among cancer-free Medicare beneficiaries (control cohort $N=100,000$; 31.8%), breast

cancer patients (32.2%), and prostate cancer patients (30.5%).

In a recent cross-sectional multicentre study conducted in Austria, Balic et al. [15] analysed the prevalence of comorbid conditions, classified according to the Charlson scheme score, in 1136 patients with a median age of 64 years with solid cancer requiring systemic treatment. In the cohort of patients older than 70 years (30%), comorbid conditions were present in 92%. The predominant conditions were cardiovascular diseases (57%), metabolic diseases including diabetes (44%), endocrinological diseases (30%), gastrointestinal diseases (26%), neurological conditions including dementia (23%) and pulmonary diseases (23%).

The prevalence of the comorbidity dementia is 13.9% in people over 70 years of age [16]. This number is expected to triple by 2050 [17]. In addition, about 22.2% of the population suffer from cognitive impairment [18]. Data from cancer patients with cognitive impairment are hardly available since dementia and cognitive impairment is generally an exclusion criterion in clinical trials [19].

Impact of comorbidity

Most observational studies found that cancer patients with comorbidity showed poorer survival than those without comorbidity, with 5-year mortality hazard ratios ranging from 1.1 to 5.8 [20].

In elderly patients with cancer, comorbidity can be seen as disturbing factor in diagnosis and treatment of cancer [2]. Patients with comorbidities such as chronic heart failure or end-stage lung disease receive mammography less frequently than others for instance [2]. In addition, comorbidity increases severe chemotherapy toxicity and hospitalisation [21] and cause early discontinuation of cancer treatment [22].

However, cancer patients seem to have a better outcome or survival advantage when their comorbidities are treated [7].

Particularly challenging in oncological patients is the comorbidity dementia. Increasing data show that cognitive impairment is associated with poorer survival in older patients with cancer and increased chemotherapy toxicity risk [23]. Also, before initiating

Table 1 Prevalence of comorbidities in elderly in literature. Adopted and modified from [13]

Name and year	Tumour entity	Comorbidity Scale	Number of patients examined (N)	Age of the patients (years)	Comorbidity prevalence (%)
Extermann et al. 2004 [9]	Breast cancer	CIRS-G Charlson	15	72–87	100 64
Chaïbi et al. 2011 [10]	Miscellaneous	CIRS-G	161	73–97	97.5
Pottel et al. 2014 [11]	Head and neck tumours	CIRS-G	100	65–86	69.4
Williams et al. 2018 [12]	Miscellaneous	OARS Physical Health subscale	539	65–100	92

CIRS-G Cumulative Illness Rating Scale-Geriatric, *OARS* Older Americans Resources and Services questionnaire.

therapy, the patient's ability to make decisions must first be clarified. Furthermore, the risk of postoperative delirium in patients with dementia is increased.

Little literature is available on the experiences and coping strategies of patients with the comorbid conditions cancer and dementia. In the systematic review of Hopkinson et al. regarding the cancer treatment experience of adults with dementia, the patient's preferences have not been investigated [24]. In their systematic review of comorbid cancer and dementia literature, McWilliams et al. found no papers which explored the treatment-related decision-making experiences of the patient [25]. In the single-site observational study conducted by Courtier et al. in order to explore the cancer treatment experiences of people with dementia, patients were found to underplay the importance of memory problems in cancer consultations [26].

For patients to be able to cope with the complex instructions and treatment regimens concerning their cancer therapy, caregivers are crucial in supporting the process.

Assessment

According to the latest American Society of Clinical Oncology (ASCO) Guideline for Geriatric Oncology, it is recommended that the assessment of comorbidities be performed as part of a geriatric assessment (GA) in patients ≥ 65 years before initiating chemotherapy.

Performing GA has also proven successful in older tumour patients undergoing different cancer treatments (surgical intervention/radiotherapy). However, due to the solidity of the data, the recommendations of the latest ASCO guidelines are limited to patients undergoing chemotherapy [27].

Definition

The geriatric assessment (GA) consists of a selection of validated tools for the systematic recording of functional limitations. According to the latest ASCO guidelines, at least the following domains should be included, in addition to comorbidity: functional status, cognition, depression, nutritional status and a screening for falls [27].

GA—What's its purpose? [28]

- GA can be used to identify *areas of vulnerability* in a patient which are not covered by the usual anamnesis, traditional oncology performance measures such as the Karnofsky performance status or Eastern Cooperative Oncology Group (ECOG) performance status scores, but which are crucial for clinical outcome and prognosis [27, 28].
- GA is used for making the *treatment decisions*—because survival and adverse treatment events can be estimated [28]. In a systemic review conducted by Hamaker et al. the initial cancer treatment plan was modified in 39% of patients based on the GA evaluation [29].
- Once the patients' vulnerabilities have been identified, *GA-guided interventions* can be carried out.

Which measuring tool and GA-guided interventions are recommended?

According to the latest guidelines, the ASCO Expert Panel recommends a GA with the following domains and the resulting GA-guided interventions (Table 2).

Hurria et al. demonstrated that patients completed the GA with a mean completion time of 15 min (range 2–60 min). A total of 78% of patients completed the questionnaire on their own [30].

Table 2 Recommended geriatric assessment (GA) domains, GA tools and GA-guided interventions [27]

GA domain	Instrument/tool	GA-guided intervention
Therapy toxicity	<i>CARG</i> (Cancer and Aging Research Group) <i>CRASH</i> (Chemotherapy Risk Assessment Scale for High-age Patients)	–
Estimated life expectancy (non-cancer)	Prediction tool listed at ePrognosis: <i>Schonberg Index</i> , <i>Lee Index</i>	–
Adverse outcomes	<i>Geriatric-8</i> or <i>VES-13</i> (Vulnerable Elders Survey-13)	–
Functional status	<i>IADL</i> (Instrumental Activities of the Daily Living)	Physio/ergotherapy clarification of assistive devices
Comorbidity	Assessment through <i>history</i> or <i>CCI</i> (Charlson Comorbidity Index), <i>CIRS-G</i> (Cumulative Illness Rating Scale-Geriatric), <i>OARS Physical Health subscale</i> (Older Americans Resources and Services Multidimensional Functional Assessment Questionnaire = OARS MFAQ)	Chronic disease management Minimize medications as much as possible
Falls	<i>1-item fall question</i> : e.g. fall events in the last 6 months or since the last visit	Physio/ergotherapy clarification of assistive devices
Depression	<i>GDS</i> (Geriatric Depression Scale)	Psychotherapy and psychiatric therapy
Cognition	<i>Mini-Cog</i> , <i>BOMC</i> (Blessed Orientation–Memory–Concentration Test)	Cognitive training, Delirium management
Nutrition	Body mass index, weight loss	Dietology

GA-guided interventions including management of comorbidities (Table 2) are recommended for older adults with cancer referred for chemotherapy. But no randomised controlled trial has been completed for this intervention in the oncology setting. There are currently several randomised trials ongoing that are examining the benefits of implementing geriatric management for older adults with cancer [31, 32].

However, since the outcome for non-oncological geriatric patients can be improved by GA-guided interventions, it is assumed that elderly patients with cancer also benefit [27].

Conclusion

More than two-thirds of all patients over 65 have at least one, and almost one-fourth suffer from 4 or more comorbidities [8], whereby comorbidity prevalences in older tumour patients differ considerably, due also to the lack of a uniform geriatric assessment. However, the assessment of comorbid conditions but also of the physiological changes due to ageing allow to better evaluate the risk/benefit ratio and to adjust the treatment accordingly.

Finally, elderly comorbid patients with cancer can be optimally treated within the framework of GA-guided interventions. In Austria, the concept of the Ordensklinikum Linz GmbH Elisabethinen is regarded as a good model for the improvement and optimisation of the treatment strategies of oncogeriatric patients. The treatment concept, a close cooperation between geriatrics and oncology, is aimed at patients over 70 years of age, following the diagnosis of a tumour disease by an oncologist. Initially, these patients are referred to a geriatrician: based on a geriatric assessment, first the vulnerabilities are identified, and then therapeutic resilience, followed by the determination of intervention proposals.

Depending on the outcome of the GA, the decision is made whether a patient can receive outpatient oncological care or whether this is impossible, as in the case of frail patients. In this event, the patient is admitted to a remobilisation ward in order to optimise functionality in cooperation with a multidisciplinary team, with subsequent further care by an oncologist.¹

In our opinion, geriatric assessment in oncology is a worthwhile option for complementing oncological diagnostics by assessing a person's health status in order to create an optimized treatment plan for a patient. It also determines whether a patient should undergo acute geriatric treatment to improve mobility and independence before starting tumour therapy.

Overall, from a geriatric point of view, we would be interested in developing joint treatment concepts; this is not done in our clinical practice, as tumour pa-

tients are remobilized at our acute geriatric ward, but this process is not actively or intentionally included in tumour therapy.

Take-home message

- Comorbid conditions in cancer patients increase their vulnerability and pose an increasing problem due to the demographic development.
- To cope with this challenge and to avoid both overtherapy (excessively dosed tumour therapies lead to side effects or interact with comorbidities) and undertherapy (therapeutic possibilities are underestimated, therapeutic opportunities can be missed and the patient can be deprived of an adequate improvement in their overall condition or quality of life), the current ASCO geriatric oncology guidelines recommend a geriatric assessment (GA) and GA-guided interventions.

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Conflict of interest A. Wenkstetten-Holub, M. Fangmeyer-Binder, and P. Fasching declare that they have no competing interests.

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