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Research Paper

Self-reported electronic symptom monitoring in older patients with multimorbidity treated for cancer: Development of a core dataset based on expert consensus, literature review, and quality of life questionnaires

P.A.L. Nelleke Seghers [a], Marije E. Hamaker [a], Shane O'Hanlon [b,c], Johanneke E.A. Portielje [d], Hans Wildiers [e], Pierre Soubeyran [f], Annemarie Coolbrandt [g,h], Siri Rostoft [i,j,*]

[a] Department of Geriatric Medicine, Diakonessenhuis, 3582, KE, Utrecht, the Netherlands
[b] Department of Geriatric Medicine, St Vincent's University Hospital, D04 T6F4 Dublin, Ireland
[c] Department of Geriatric Medicine, University College Dublin, D04 V1W8 Dublin, Ireland
[d] Department of Medical Oncology, Leiden University Medical Center-LUMC, 2333, ZA, Leiden, the Netherlands
[e] Department of General Medical Oncology, University Hospitals Leuven, Leuven, Belgium
[f] Department of Medical Oncology, Institut Bergonié, Inserm U1312, SIRIC BRIO, Université de Bordeaux, 33076 Bordeaux, France
[g] Department of Oncology Nursing, University Hospitals Leuven, Leuven, Belgium
[h] Department of Public Health and Primary Care, Academic Centre for Nursing and Midwifery, KU Leuven, Leuven, Belgium
[i] Department of Geriatric Medicine, Oslo University Hospital, 0424 Oslo, Norway
[j] Institute of Clinical Medicine, University of Oslo, 0318 Oslo, Norway

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ABSTRACT

Introduction: In cancer care, symptom monitoring during treatment results in improved clinical outcomes such as improved quality of life, longer survival, and fewer hospital admissions. However, as the majority of patients with cancer are older and have multimorbidity, they may benefit from monitoring of additional symptoms. The aim of this study was to identify a core set of symptoms to monitor in older patients with multimorbidity treated for cancer, including symptoms caused by treatment side effects, destabilization of comorbidities, and functional decline.

Materials and Methods: During a scoping literature search, 17 quality of life questionnaires were used to select 53 possible symptoms to monitor. An expert panel of cancer and geriatrics specialists was asked to participate in multiple online surveys to indicate whether these symptoms were not relevant to monitor, only relevant to monitor in a specific patient group, or relevant to monitor in all patients. In a subsequent round the list was reduced and the panel indicated how frequently these symptoms should be monitored during cancer treatment and after cancer treatment completion. Finally, a digital consensus meeting was organised to decide when symptoms had to trigger a recommendation to the patient to get in touch with their medical team.

Results: In total, 30 healthcare professionals participated in the online surveys. After two rounds, a dataset of 19 symptoms related to cancer, cancer treatment, functional decline, and destabilization of comorbidities was agreed upon for monitoring. Five symptoms were selected for daily monitoring during treatment, seven for weekly, and seven for monthly. After treatment completion, the panel agreed upon less frequent reporting. Additionally, nine symptoms to be monitored only in patients with specific cancer types or treatment types were chosen, such as "cough up blood" in lung cancer.

Discussion: This study is the first to identify a core set of symptoms to monitor in older patients with multimorbidity treated for cancer. Future research is needed to investigate whether the monitoring of these symptoms is feasible and improves clinical outcomes in older patients with multimorbidity treated for cancer.

* Corresponding author at: Department of Geriatric Medicine, Oslo University Hospital, 0424 Oslo, Norway.
E-mail addresses: nseghers@diakhuis.nl (P.A.L. Nelleke Seghers), mhamaker@diakhuis.nl (M.E. Hamaker), Shaneohanlon@svhg.ie (S. O'Hanlon), j.e.a.portielje@lumc.nl (J.E.A. Portielje), hans.wildiers@uzleuven.be (H. Wildiers), p.soubeyran@bordeaux.unicancer.fr (P. Soubeyran), annemarie.coolbrandt@uzleuven.be (A. Coolbrandt), siri.rostoft@medisin.uio.no (S. Rostoft).

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1. Introduction

As the population is ageing, the prevalence of older patients with cancer is rising; approximately 50% of patients with cancer are older than 65 years [1]. Cancer and its treatment are likely to come with a significant symptom burden, which may affect the patient's overall quality of life and functioning. Older patients are more prone to these effects as they often have age-related decline in multiple physiological systems, which may contribute to frailty and increase the risk of health decline when confronted with stressors such as cancer and cancer treatment [2–4]. Additionally, older patients often have multimorbidity, and therefore not only cancer and its treatment, but also destabilization of other diseases may cause symptoms and decline [5].

Older patients living with frailty have a higher risk of decline in health status but are also at risk for a steeper decline in the face of a minor stressor [2]. Functional decline in patients with frailty may be deleterious due to challenges with recovery. Cancer and cancer treatment are burdensome and likely to be impactful stressors in older patients [2]. Therefore, frequent monitoring of symptoms and functional decline to allow early detection and treatment is especially important in this population to prevent further health deterioration.

Oncologic treatments are often provided in an ambulatory setting or with short hospitalizations, after which patients are out of sight of the healthcare professionals. Healthcare professionals thus rely on patients to reach out to them with problems, whereas from clinical observation we see that older patients may underreport symptoms. Although the evidence is limited, reasons for underreporting may include cognitive impairment, trouble contacting healthcare personnel, the belief that their symptoms are not caused by cancer or cancer treatment, or out of respect for the hard-working health care professionals that they don't want to bother [6–9]. Furthermore, older patients experience symptoms differently and tend to underestimate symptom severity, as they have low expectations because of their age or think that symptoms are an unavoidable part of the treatment they will have to endure [9,10]. To improve symptom reporting in older adults with cancer, they should therefore be asked to regularly report their symptoms and be clearly instructed in when and how they need to contact their medical team.

Over the past decade, multiple electronic self-reporting symptom monitoring applications have been developed. Promising outcomes from studies of self-reported symptoms are reduction in symptom burden, longer survival, reduced mortality, and a better patient experience including lower distress and anxiety levels [11–15]. These applications were, however, designed for patients with cancer in general and not adapted to the monitoring of older patients with cancer and multimorbidity in whom other symptoms not directly related to the cancer treatment may be equally relevant to monitor. The primary aim of this study was to decide which symptoms are most important to monitor in older patients with cancer and multimorbidity to detect problems at an early stage and prevent decline by using self-reported electronic symptom monitoring.

2. Methods

As this study is part of the GERONTE project, our focus was to decide symptom monitoring for the four most common solid cancers: breast, colorectal, lung, and prostate cancer. GERONTE is a European Union funded project with the aim to develop a new patient-centred holistic care pathway for older patients with multimorbidity treated for cancer (https://geronteproject.eu).

The study protocol for the online expert panel surveys was reviewed by the Medical Research Ethics Committees United on behalf of the Diakonessenhuis, the Netherlands, and received a waiver for full ethics review as was the study protocol for the patient/caregiver interview. All individual participants provided informed consent after receiving the participant information flyer. This study was conducted in accordance with the Declaration of Helsinki and Good Clinical Practice Guidelines.

2.1. Selection of Relevant Symptoms from Literature

Initially we performed a systematic literature search to identify papers on self-management and self-monitoring interventions during cancer treatment for older patients with cancer. As a first step, a literature review was undertaken on MEDLINE and Embase to determine if any previous scientific publications were available that could serve as a library. The following search was performed on January 14, 2021: self [tiab] AND (care[tiab] OR management[tiab] OR monitoring[tiab] OR efficacy[tiab]) AND (older[tiab] OR geriatric[tiab] OR multimorb* [tiab]) AND (cancer[tiab] OR oncology[tiab] OR malign*[tiab]). Searches were limited to the year 2000 onward. This yielded 1058 hits in PubMed and 1766 hits in Embase. The search file was deposited online at https://doi.org/10.5281/zenodo.7540599. While going through the search results, it was clear that this search strategy failed to identify all relevant papers, because self-monitoring has mostly been performed in younger patients with cancer in previous studies and no studies were specifically done in the older population. Studies also differed between self-monitoring and self-management, and most studies on self-monitoring were in relation to cancer screening interventions.

Thus, it was decided to leverage well-known and validated quality of life questionnaires and a previously-used symptom monitoring system in Leuven to compile a list of symptoms related to cancer, cancer treatment, functional decline, and destabilization of comorbidities [16,17]. Quality of life questionnaires often consist of a variety of domains such as symptom burden, physical functioning, and other types of functioning. Quality of life questionnaires for (older) patients with cancer (such as EORTC QLQ ELD-14 and FACT-G [18–20]), for specific cancer types (EORTC QLQ and FACT modules for breast, colorectal, lung and prostate [20,21]), and for specific treatment types (radiotherapy) were included (for the total list see Appendix A) [17,22]. Furthermore, a systematic review on cancer symptom assessment instruments that were developed for disease-related symptoms was consulted to confirm that all pertinent disease-specific symptoms were included [23]. Additionally, due to the lack of literature about symptom reporting in older patients with cancer and geriatric syndromes, geriatricians were asked to provide input about specific symptoms that they would consider relevant to monitor in older patients in general.

The symptoms from the quality of life questionnaires, previously-developed symptom monitoring system, and input from the geriatricians and application used in Leuven yielded a long list of 331 symptoms, which we considered unfeasible to be judged by the expert panel. To organize the symptoms, similar symptoms were grouped together by MH while keeping in mind that symptoms were selected for monitoring of cancer (treatment), functional decline, and destabilisation of comorbidities in a broad range of patients. After review and discussion with SR, symptoms were rephrased and combined, which resulted in a new list. Items that were considered too specific or not important for monitoring were excluded. If no consensus could be reached between MH and SR, symptoms were discussed with NS and SOH.

During in-depth interviews with patients and caregivers that were performed to answer other questions for the GERONTE project, it was verified that all important symptoms were identified. Patients and caregivers were asked what they felt were the most important symptoms that they had experienced and that they had sought recommendations for.

2.2. Fine-Tuning of Symptom List and Frequency of Asking by Expert Panel

An international group of European healthcare professionals gathered as part of the GERONTE project and were asked to participate in multiple rounds of online surveys to fine-tune the list. The panel included medical specialists (medical oncologists, radiation oncologists, surgeons, pulmonary specialists, geriatricians), nurses, and other health care professionals with expertise in geriatric medicine or involvement in

cancer treatment in this population. Purposive sampling was used to ensure a mixture of backgrounds and specialities. Healthcare professionals could participate if they were involved in the care for older patients with cancer, either because they were involved in research in geriatric oncology or because they were seeing older patients with cancer in clinic. Only specialists involved in breast, colorectal, prostate, and lung cancer were invited. For the healthcare professionals, the following background data was collected: age, sex, profession, years in clinical practice, and the treatment types and cancer types they were involved in.

In the first round of the online surveys, experts were asked if the symptoms listed were (1) not relevant to monitor, (2) relevant for all patients during treatment and follow-up, (3) relevant for all patients but only during treatment, or (4) only relevant for patients with specific cancer types or treatment types. Related symptoms were presented together, and all symptoms remained visible while the expert was answering the above-mentioned question. Experts were asked to only consider symptoms that would help them with early detection of problems to enhance feasibility. Participants had the option to suggest missing symptoms. Survey responses were compiled by NS and analysed by MH and SR. After this round, symptoms considered not relevant to monitor by the expert panel or those not relevant to monitor from a medical perspective were excluded and the remaining shortened list of symptoms was taken to the subsequent round. Symptoms were allocated to be relevant for all patients or only relevant for patients with a specific cancer type or treatment type. Answers were analysed anonymously.

In the second round, the experts were asked to identify the ideal frequency/cadence to ask about these symptoms to allow for timely interventions. Symptoms were allocated to daily, weekly, or monthly monitoring depending on the most common response. If percentages were similar, symptoms were evenly distributed between monthly and weekly to not overburden the patients. An iterative process was done for the frequency during follow-up after treatment had been completed.

2.3. Symptom Phrasing for Patients

For the phrasing of the patient questions and symptom grading, we identified previous studies on monitoring of symptoms in the literature and used existing forms (NCI-PRO-CTCAE, Basch et al., Maguire et al. [22,24,25]). After two rounds of surveys, a live online consensus meeting was held with available members of the expert panel to achieve consensus on the phrasing of the questions and gradings of symptoms. The core set of symptoms to monitor and the frequency of monitoring during treatment and during follow-up were presented and agreed upon.

2.4. Data Analysis

Results were reported using descriptive data. For normally distributed data, means with standard deviations were used, for non-normal distributions, medians with range.

3. Results

3.1. Selection of Symptoms and Frequency of Reporting

In total, 17 different quality of life questionnaires and a previously-tested symptom score were used to compile a list of 328 symptoms, and three symptoms were added by the geriatricians [16,17]. Initial categorization of these 331 symptoms by MH resulted in 38 symptoms, which was changed to 53 after review by SR and discussion with NS and SOH (see Appendix B for example).

The 53 symptoms were presented to the expert panel during online surveys (Table 1). While the initial plan was to include symptoms related to cancer, cancer treatment, functional decline, or destabilization of comorbidities, we found that it was not useful and often not possible to allocate symptoms only to a single category. Most symptoms could be

Table 1
List of all 53 symptoms included in the first round of the expert survey.

Symptoms	Number of questionnaires that included this symptom (../17)	Relevant for all patients **	Only relevant for specific cancer or treatment types	Not relevant to monitor
Dyspnoea *	10	97%	3%	0%
Weight loss ±	6	97%	0%	3%
Pain *	17	97%	0%	3%
Confusion ±	Added by geriatricians	93%	3%	3%
Decreased/ change in mobility (walk, rise from chair, stairs) ±	10	93%	0%	7%
Fever/shivering/ feeling ill *	8	90%	7%	3%
Falls ±	Added by geriatricians	90%	7%	3%
Forced to spend time in bed *	12	87%	3%	10%
Need help with self-care (dressing, washing, toileting) *	9	87%	0%	13%
Vomiting *	8	83%	10%	7%
Depressed/ feeling low ±	16	83%	0%	17%
Fatigue *	14	77%	3%	20%
Poor appetite *	11	77%	7%	17%
Stomatitis/sore mouth/dry mouth ¥	3	76%	14%	10%
Anxiety/feeling nervous ±	16	73%	0%	27%
Nausea *	14	73%	17%	10%
Cough up blood ¥	1	73%	23%	3%
Unsteady on your feet/dizziness ±	1	73%	7%	20%
Need help with household chores, groceries, medications ±	8	72%	0%	28%
Wound problems (healing, bleeding) ¥	Added by experts	72%	24%	3%
Rash/skin issues¥	2	71%	11%	18%
Diarrhoea *	9	70%	23%	7%
Oedema/ swelling ±	3	70%	20%	10%
Trouble swallowing	1	70%	17%	13%
Bloody stools or mucus ¥	3	69%	17%	14%
Worrying/upset ±	13	67%	0%	33%
Daily activities limited because of bowel or urinary problems *	5	66%	14%	21%
Trouble sleeping *	12	63%	3%	33%
Trouble remembering ±	7	63%	3%	33%
Trouble thinking/ concentrating ±	1	60%	0%	40%

(continued on next page)

Table 1 (*continued*)

Symptoms	Number of questionnaires that included this symptom (../17)	Relevant for all patients **	Only relevant for specific cancer or treatment types	Not relevant to monitor
Tingling hand/ft ¥	1	59%	14%	28%
Headache ±	1	53%	13%	33%
Uncertainty ±	5	53%	0%	47%
Palpitations	1	52%	10%	38%
Performing strenuous activities	10	52%	0%	48%
Constipation ±	9	50%	27%	23%
Cough ¥	2	50%	13%	37%
Dysuria±	3	46%	25%	29%
Sweats/hot flushes	2	45%	7%	48%
Satisfied with sexual life	8	43%	3%	53%
Weight gain ±	3	41%	21%	38%
Feeling irritable ±	7	41%	3%	55%
Stoma leakage ¥	2	40%	33%	27%
Faecal incontinence ±	3	40%	33%	27%
Frequent bowel movements/ urination ±	4	37%	20%	43%
Sore skin stoma ¥	1	37%	33%	30%
Teary eyes	1	34%	10%	55%
Hair loss	5	33%	13%	53%
Problems with incontinence aid/stoma care ¥	3	33%	40%	27%
Urinary incontinence ±	1	33%	33%	33%
Dissatisfied with body	4	29%	4%	68%
Bloated feeling	2	29%	7%	64%
Release of gas	2	14%	17%	69%

Participants ($N = 30$) could answer that the listed symptom was (1) not relevant to monitor, (2) relevant for all patients during treatment and follow-up, (3) relevant for all patients but only during treatment, or (4) only relevant for specific cancer or treatment types. One answer possible per participant.

* Selected as symptom in the final core set, ± selected as symptom in the final core set, but combined with other symptoms, ¥ selected to be monitored in a specific patient group, sometime multiples symptoms are taken together; Other symptoms were excluded as symptom by either the expert panel or afterwards because they were considered not necessary to monitor from a medical perspective.

** for this table "relevant for all patients to monitoring during treatments" and "relevant for all patients to monitor after treatment" are taken together in one column as "relevant for all patients to monitor".

allocated to multiple categories (Appendix C). For example, dyspnoea could be a symptom of lung cancer, a symptom of side effects of cancer treatment (anaemia caused by chemotherapy), a symptom of destabilized heart failure, or a symptom of functional decline in general. Hence, it was decided to compile one single list of symptoms. During the in-depth patient and caregiver interviews no new symptoms were identified.

Between June 2021 and October 2021, 30 of the 87 invited healthcare professionals responded in the first round of symptom monitoring and 28 in the second round. The expert panel consisted of healthcare professionals with different backgrounds (doctors, nurses), treating various kinds of cancer, and a range of specialities (medical oncology, surgery, radiotherapy, pulmonology, urology, geriatrics, general practitioners). Mean age was 47 years, and respondents had a mean of 17 years in clinical practice. Participants were involved in treatment decisions regarding hormone therapy (43%), chemotherapy (41%), targeted therapy and/or immune therapy (41%), surgery (18%), and radiation therapy (14%). Most participants were involved in a wide range of cancer types (36%). For specific cancer types, the proportions were 32% for colorectal cancer, 23% for prostate cancer, 23% for breast cancer, and 16% for lung cancer.

In the first survey round, the list of 53 symptoms was reviewed by the expert panel; seven items were not considered relevant to monitor by most of the participants and were discarded (Fig. 1, Table 1). As this still left a list of 46 symptoms, the other symptoms were reviewed by three experienced geriatricians in geriatric oncology (MH, SR, and SOH). To reduce the list so as not to overwhelm the patients and healthcare professionals, symptoms without medical consequences were excluded ($n = 11$). Additionally, some symptoms were combined to further reduce the list ($n = 14$), for example, oedema, weight gain, and weight loss were combined into weight change (see symbols in Table 1). The resulting list of 28 symptoms was taken to the next round (Fig. 1, Table 1). Two respondents mentioned missing symptoms, namely "if other people were worried (such as family)" and "motivation of treatment continuation." These were not included in the list as they were each mentioned by only one respondent.

In the second survey round, a set of 19 core symptoms to monitor in all patients was established (Table 2a). Five symptoms were selected for daily monitoring during treatment in all patients, seven for weekly monitoring during treatment, and seven for monthly monitoring during treatment (Appendix D). The nine other symptoms were allocated to be only monitored in a specific tumour type, treatment type, or a combination of these (Table 2b, Appendix E). The frequencies of reporting for the previously mentioned symptoms were adapted for the period after treatment completion (Appendix D, Appendix E).

3.2. *Symptom Phrasing for Patients and Defining Cut-Offs*

An important comment in determining the relevance of symptoms was that the presence of the symptom alone was not sufficient; information on the severity of a symptom as well as the symptom trajectory may affect treatment decisions. Hence, symptom severity was added to the phrasing and details on when the patient should contact the medical team were defined. The phrasing was mainly based on the Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE ®) that were adapted for patient use from the National Cancer Institute's Common Terminology Criteria for Adverse Events [11,16,17,22,24]. This involved a specific time period and allowed respondents to indicate how severe symptoms were in a straightforward way with consistent phrasing and scoring. Questions on how much a symptom interfered with the usual or daily activities were considered unnecessary, as symptoms such as limitations of activities of daily life and mobility were asked separately. Another advantage of this phrasing and grading was that it would improve readability on mobile devices. No separate input from patients was requested in the phrasing. Small-scale pilots will be held to verify that these phrasing and gradings are feasible in older patients.

In Table 3, the exact phrasings for the questions can be found. Some questions asked about the frequency of experiencing the symptoms (never, rarely, occasionally, frequently, almost constantly), but the majority asked only about the severity of the symptoms (none, mild, moderate, severe, very severe). We used the same validated cut-offs as Coolbrandt et al. for when the patient was instructed through the application to contact the medical team (See Appendix D and Appendix E) [26]. In Fig. 2a and Fig. 2b, a schematic of what this would look like in an electronic self-reported monitoring application is presented.

4. Discussion

Based on a literature search and various rounds of expert panel input, a core dataset of 19 symptoms for self-report was chosen to monitor

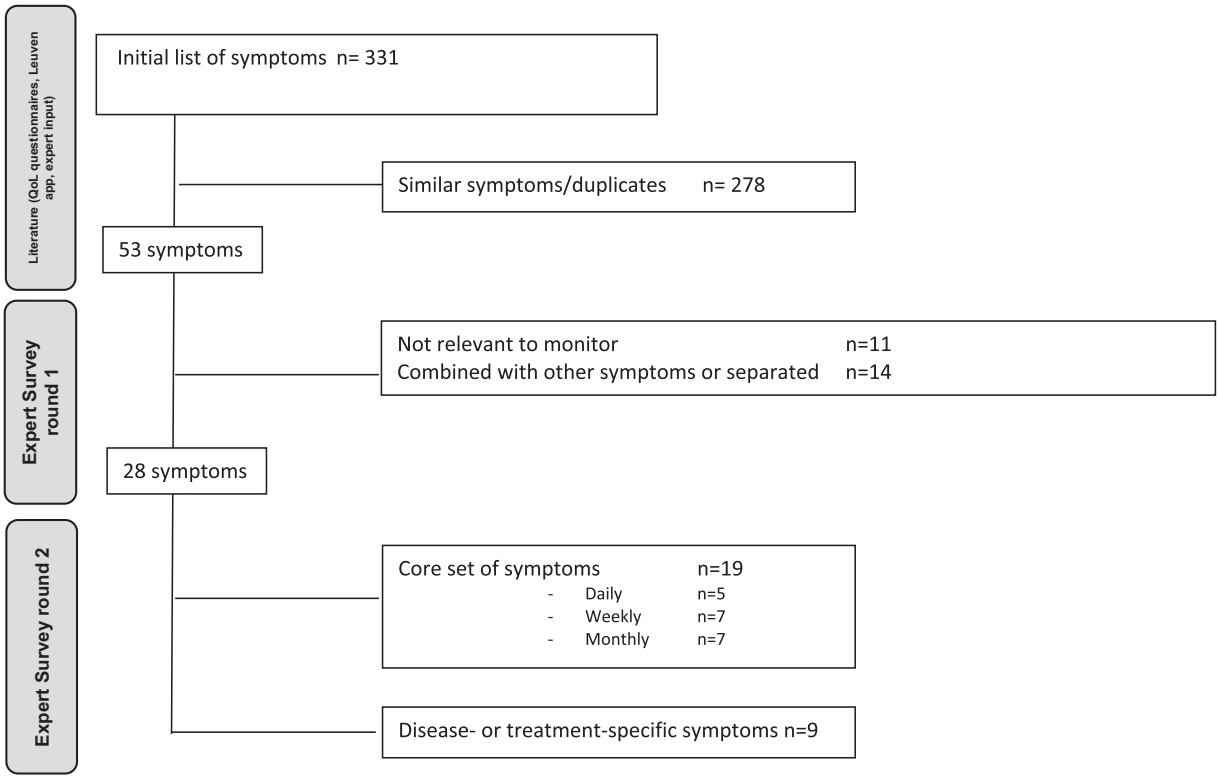

Fig. 1. Selection flow of symptoms for the core dataset.

Table 2a
List of core symptoms relevant to monitor for all patients.

19 Core Symptoms
Dyspnoea
Diarrhoea
Vomiting
Pain
Fever/feeling ill
Nausea
Daily activities limited by bowel/urinary problems
Poor appetite
Weight change
Trouble sleeping
Fatigue
Forced to spend time in bed
Trouble remembering/thinking; confusion
Need help with daily activities
Feeling depressed or irritable
Feeling nervous, worried or uncertain
Change in mobility
Falls
Unsteady on your feet

Table 2b
List of disease- or treatment-specific symptoms relevant to monitor.

9 disease or treatment specific symptoms	Patient characteristics
Sore/dry mouth	Chemotherapy
Tingling hands/feet	Chemotherapy
Bloody stools	Colorectal cancer or prostate cancer treated with radiation therapy
Mucus in stool	Colorectal cancer or prostate cancer treated with radiation therapy
Skin issues/rash	Chemotherapy or radiation therapy
Cough	Lung cancer
Cough up blood	Lung cancer
Wound problems	Surgery or Stoma
Stoma issues	Stoma

Table 3
Grading and phrasing of the symptoms.

Grading	General wording	Wording for specific symptoms**
Phrasing of the question	* What was the severity of your 'symptom' at its worst?	* How often did you have 'symptom'?
0	I did not have 'symptom'	Never
1	Mild	Rarely
2	Moderate	Occasionally
3	Severe	Frequently
4	Very severe	Almost constantly

A few exceptions with a different phrasing, namely fever: 'During the last 24 h, was your temperature ≥38C?' and weight change: 'What was your weight today?'

* During the last 24 h/In the last 7 days/In the last month.

** diarrhoea, forced to spend time in bed, need help with daily activities, bloody stools, mucus in stools.

symptoms related to cancer, cancer treatment, functional decline, and destabilization of comorbidities in older patients with multimorbidity treated for cancer.

To our knowledge, this study is the first to select a core dataset for symptom monitoring of older patients with multimorbidity treated for cancer. Compared to previously developed datasets for oncology research, our expert panel selected similar symptoms, but also added new ones [27]. Our hypothesis is that the monitoring of this core set of symptoms is clinically relevant as it signals new problems that require extra attention, regardless of whether symptoms are caused by cancer, cancer treatment, destabilization of comorbidities, functional decline, or a combination of these. As older patients with multimorbidity are more prone to experience side effects of treatment and functional decline, self-reported monitoring may improve clinical outcomes, because potentially harmful symptoms may be detected early and because symptom burden may lead to treatment adaptation. However, future research is

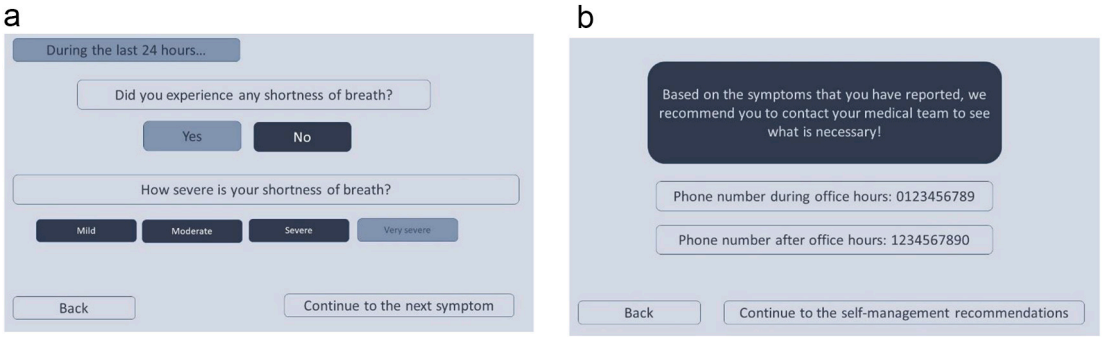

Fig. 2. a Schematic view of symptom reporting in online application.
Example of what a screen in an online patient application could look like.
b Schematic view of notification to contact their medical team in online application.
Example of what a screen in an online patient application could look like.

needed to establish these hypotheses as patients with multimorbidity treated for cancer are a heterogenous population in whom monitoring a single set of symptoms may not be feasible.

Additionally, self-reported symptom monitoring will provide knowledge of the impact of cancer treatments on symptoms. This information is currently lacking and could be helpful during future treatment decision making as older patients consider quality of life and treatment side effects important aspects in decision making [28].

This study has some limitations. Firstly, most health care professionals had a background in cancer care, such as surgeons and medical oncologists, and few were multimorbidity experts. Although many specialised in older patients with cancer who often have multimorbidity, and although geriatricians and internal medicine specialists were involved, their relative underrepresentation may have led to an emphasis on cancer-specific monitoring. A second limitation is the method used to select the symptoms. No strict Delphi procedure was used, because of the lack of evidence and the heterogenous backgrounds of the expert panel. Instead, a more pragmatic way of gathering symptoms and achieving consensus regarding the most relevant symptoms was used. Overall, we think that the most relevant symptoms are included due to our extensive process and because almost no missing symptoms were reported by the expert panel. Moreover, for feasibility reasons we aimed for a somewhat restricted final set of symptoms that will not overwhelm patients and healthcare professionals. This type of patient-centred approach is extremely important when dealing with older people.

To limit the amount of reporting, some symptoms that could be bothersome to patients but were not medically harmful per se were excluded. We also decided to include a list of self-management recommendations for alleviating bothersome symptoms which will be incorporated in the reporting technology that is developed for GERONTE. Previous studies indicate that patients consider symptom monitoring helpful and the time investment worthwhile and have adherence rates for daily monitoring around 60% [8,13,16,17]. Low adherence is seen when patients perceive that healthcare professionals do not consider their symptoms [8]. Therefore, it is also important to engage the healthcare provider to actively look at and discuss reported symptoms with patients.

Healthcare professionals find symptom monitoring to be relevant [16,17], but fear information overload and time-consuming management of the symptoms that patients report. Fortunately, previous studies have shown that severe symptoms occur in a minority and that symptoms often can be managed by a telephone nursing consult [13,17,24]. In our study, symptoms for daily monitoring were carefully selected and it was decided to reduce the frequency of reporting after treatment completion to reduce information overload. Nevertheless, sometimes daily reporting is needed, such as for fever, because weekly or monthly monitoring may not allow for timely management, whereas weekly monitoring may be adequate for poor appetite or trouble sleeping [13].

An advantage of electronic symptom reporting is that severe symptoms may technically directly alert healthcare professionals. This may, however, cause overwhelming demands in clinical practice, because around the clock on-call services need to be organised to receive and act on such alerts. We therefore consider it more feasible that the technology urges the patient to reach out to the medical team. The effectiveness of this approach is less frequently studied than that of actively reaching out to patients, but adding self-management recommendations may improve effectiveness [29].

Previous studies that tested electronic health technologies tailored to older patients have shown feasibility and willingness of patients to use them [30,31]. However, the feasibility of (electronic) self-reported symptom monitoring methods may be lower in older patients as they often have problems such as visual, hearing, or cognitive impairments which may all hamper their health literacy [30]. Furthermore, the use of the electronic monitoring technologies may be difficult due to the lack of necessary skills to use them, missing internet connection, and lack of social support. These barriers need to be tackled if we want to successfully implement electronic self-reported symptom monitoring in the older population. If systems are not adapted, vulnerable individuals with limited resources will be excluded from participation, which will only widen health disparities. If vulnerable patients are identified, alternative solutions should be offered, such as telephone-based reporting or involvement of caregivers or community services [32].

In conclusion, a core set of 19 symptoms for self-report in an electronic application was chosen to monitor cancer, cancer treatment, destabilization of comorbidity, and functional decline in older patients with multimorbidity treated for cancer. Future research is needed to verify if it is feasible to monitor these symptoms, if the monitoring leads to early detection of problems and improved decision-making, and if it will consequently improve clinical outcomes in older patients with multimorbidity treated for cancer.

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Author Contribution

Conception and Design: SR, MH.
Data Collection: NS, AC.
Analysis and Interpretation of Data: SR, NS, MH.
Manuscript Writing: NS, SR, MH.
Approval of Final Article: all authors.

Declaration of Competing Interest

Pierre Soubeyran: Board member with TEVA, Sandoz, BMS and EISAI.

All other authors: No competing interests to declare.

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Appendix A. Supplementary Data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jgo.2023.101643.

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