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Title page

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Benefits, challenges and opportunities of integrating patient-reported outcome measures in geriatric oncology to advance patient screening for functional fitness for treatment

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Abstract

Objectives: To discuss potential benefits, challenges and opportunities of integrating patient-reported outcome measures in geriatric oncology, with the goal being to advance patient screening for 'functional fitness for treatment'.

Data Sources: Narrative review of the relevant literature using PubMed.

Conclusion: Patient screening in geriatric cancer care can be driven by patient self-reports. Most of the research on patient-reported outcome measures in cancer care to date has involved, in different proportions and to different extents, older patients with cancer (≥ 70 years of age). However, reports specifically targeting implementation of patient-reported outcome measures in geriatric cancer care are surprisingly fewer. The International Society of Geriatric Oncology Priorities Initiative calls for more research into the use of patient-reported outcome measures for older adults with cancer. More feasibility studies will be required to evaluate patient-reported outcome measures as fit-for-purpose, reporting frequency, patient burden, integration and display of patient-reported information, and workflow impact. Developing, adapting and validating patient-reported outcome measures for use in geriatric oncology will be key to ensure adequacy of measurement. Groundwork involving consultation of all potential end-users of patient-reported information is paramount as there is no one size fits all. When the ground is ready for implementation adequate preparation, training, resources and ongoing support will be needed.

Implications for Nursing Practice: Among the multidisciplinary team, nurses can promote patient screening that is patient-led. Nursing roles can be developed, supported, expanded or repurposed to involve greater use of patient-reported outcome measures for several key patient outcomes in geriatric cancer care.

Keywords

Patient-reported outcome measures; geriatric oncology; cancer; patient-led care.

Word-count: 2476

References: 59

Tables: 2

1. Introduction

Older age has traditionally been factored in any treatment decision-making in cancer care. In developed countries, over half of all cancers are diagnosed in patients aged 70 years or older¹. With the move towards a broader view of 'functional age' rather than 'biological age', patient characteristics additional to aging (such as comorbidities, social well-being, daily living deficits, or nutrition) have gained greater attention². The key outcome behind determining 'functional age' is to establish the patient's 'functional fitness for treatment'. This requires a holistic evaluation of the patient. Its goal is to identify patients who, irrespective of biologic aging, seem to be more 'treatment resilient' and 'likely to benefit' as opposed to patients who seem more vulnerable and susceptible to adverse outcomes². As such, it is entirely possible that biologically younger patients may be functionally older, and vice versa. This is based on legitimate, evidence-based concerns rather than an alleged vulnerability that 'must' be accompanying older age³.

The evaluation itself aims to maximise patient benefit and safety, while reducing preventable burden and costs. Its holistic nature also means it must do two things: be patient-centred and be patient-led. While the patient-centred component can be obvious given a holistic approach¹, patient-led features may be less visible. Patient-led assessments require collection, evaluation, and action upon patient self-reports. Patient-reported outcomes (such as health-related quality of life) have long been established as crucial treatment end-points, and so called 'patient-reported outcome measures' (in other words, questionnaires that enable patient self-reporting) are key elements of the design of most clinical trials today. Conversely, in clinical practice, initial patient screening and evaluation relies more on clinical assessment and evaluation of hard data (lab values), and less on structured patient-reporting.

This article aims to discuss potential benefits, challenges and opportunities of integrating patient-reported outcome measures in geriatric oncology, with the goal being to advance patient screening for 'functional fitness for treatment'.

2. Geriatric assessment in cancer care

The current gold standard in geriatric oncology is a comprehensive geriatric assessment^{2,4,5}. A comprehensive geriatric assessment is a detailed, multidimensional and interdisciplinary evaluation of older patients with cancer on over ten patient domains⁵. These domains include patient outcomes such as physical function, cognitive function, psychological status, social status, functional status, comorbidity, falls and falls risk, nutrition, medication management, perceived health status, and health-related quality of life³.

In geriatric oncology, a comprehensive geriatric assessment can help to determine the patient's functional age, as well as guide decisions about future interventions with a view to reduce or mitigate potential risks to the patient⁵. The predictive value of specific domains of the comprehensive geriatric assessment has also been examined in relation to post-operative complications (functional status), chemotherapy-related toxicity (functional status, impaired hearing), and mortality (nutritional status, depression, functional status)³.

In line with recent guidelines from the American Society of Clinical Oncology⁶, there is evidence that older adults value formal assessments of geriatric assessment domains⁷. In turn, formally assessed geriatric assessment domains may guide treatment decision-making, and ultimately improve older patient satisfaction with the provided standard of care⁸.

The practicalities of implementing a comprehensive geriatric assessment in cancer settings have been discussed as a stumbling point³. Unavailability of resources in terms of specialised personnel and adequate time to perform a full assessment minimises adoption to practice. A comprehensive geriatric assessment can take up to two hours per patient⁹, not least because most assessments require full clinician involvement and/or lengthy biophysiologic measurements.

Instead, a more practice-friendly option has been proposed with the use of screening tools to identify vulnerable older patients 'in need for' a subsequent comprehensive geriatric assessment² (see Table 1). These screening tools are brief and focus on determining a patient's risk of 'vulnerability' or 'frailty'; thus, they look at selected patient domains only. Importantly, only some can be classified as truly 'patient-reported' outcome measures¹⁰.

3. Patient-reported outcome measures in cancer care

Patient-reported outcome measures are tools (usually in the form of a questionnaire) posing predefined, standardised questions to patients about their condition. To be truly 'patient-reported', patient-reported outcome measures must meet the minimum requirements of content validity, namely relevance, comprehensiveness and comprehensibility¹¹. Not only does content validity ensure that a patient-reported outcome measure is a true reflection of the construct evaluated¹², but also facilitates easier adoption to clinical practice if the measure combines three key features: accuracy, brevity and clarity. Patient-reported outcome measures can be generic, condition-specific or outcome-specific.

Patient-reported outcome measures are used to augment the traditional clinical assessment of patients with cancer by instilling a structured approach to patient involvement in their own health monitoring. In that sense, systematic use of patient-reported outcome measures has been linked to several benefits for the health care system, the health professional, but predominantly the patient^{13,14}. Converging evidence from a good number of systematic reviews conducted in the last decade¹⁴⁻¹⁶ suggest that, irrespective of type or stage of cancer, implementation of patient-reported outcome measures in routine cancer care is linked to better symptom control, reduced treatment-related complications, improved communication with health professionals^{13,14,17,18}, enhanced health-related quality of life, and even prolonged survival¹⁹.

In the United Kingdom, in 2015, Macmillan Cancer Support published a list of six priority actions to help achieve better outcomes in cancer care via use of patient-reported outcome measures²⁰. According to this, patient-reported outcome measures must be used in cancer care to: (1) monitor and evaluate recovery packages, (2) develop risk-stratified care pathways, (3) inform patients about available treatment and support options, (4) perform clinical audits and service improvement projects, (5) test the feasibility of remote monitoring, and (6) inform commissioning strategies as key performance indicators²⁰.

One intriguing concept is this of remote monitoring, harnessing the advantages of information technology²¹. Although the concept of the use of electronic patient-reported outcome measures and systems is not new¹⁷, there is a growing pool of evidence indicating that implementation of such measures and systems in cancer practice can lead to gains in patient safety, support and satisfaction²²⁻²⁶. The facilitators and barriers of realising the implementation of electronic patient-reported outcome measures and systems have been reviewed and debated^{17,18,21,27}, with proactive, information-rich and timely patient monitoring

being counteracted by difficulties in integration into clinical workflows and technology infrastructure barriers.

4. Patient-reported outcome measures in geriatric cancer care

What is the situation in geriatric cancer care though? There is no doubt that most of the research on patient-reported outcome measures in cancer care to date has involved, in different proportions and to different extents, older patients with cancer (≥ 70 years of age). Compared however to the amount of this research, reports specifically targeting implementation of patient-reported outcome measures in geriatric cancer care are surprisingly fewer²⁸⁻³². A systematic review of evidence on the relevance of a geriatric assessment in older patients with a haematologic malignancy found that patient-reported outcomes “were hardly assessed” (p.1491) in 44 studies reviewed³³.

The International Society of Geriatric Oncology Priorities Initiative calls for more research into the use of patient-reported outcome measures for older adults with cancer³⁴. In rectal care, expert recommendations to personalise care for older patients further mandate that patient-reported outcome measures “should no longer be considered secondary measures” (p.1689) if the goal is to provide value-based care³⁰. The use of patient-reported outcome measures in geriatric cancer care is gaining momentum. Let us then explore what benefits, challenges and opportunities such endeavour brings with it.

4.1. Benefits

Olde Rikkert et al. (2018) describe how in clinical practice older patients tend to intuitively prioritise helping the health professional understand the objective cause of their complaints, leaving what globally matters to them as a secondary topic for discussion³⁵ – which might never take place.

Patient-reported outcome measures can be used both as endpoint evaluators and as health status screeners in older adults with cancer. As endpoint evaluators, they have been used to identify gains or deficits in patient-reported outcomes, including health-related quality of life in older and frail patients after cancer surgery^{29,32}, and autonomy and daily living preservation in patients over 70 with metastatic pancreatic cancer³⁶.

As health status screeners, they have been shown to allow the older patient to assess, articulate and record their own interpretation of how cancer or treatment impacts on their lives, which provides a more accurate, first-hand, assessment of risks and abilities¹⁸. For instance, a survey using patient-reported outcome measures revealed that patients with breast cancer over the age of 75 had the most difficulties with mobility, undertaking their usual activities and fulfilling domestic chores, compared to any other age group^{37,38}.

4.2. Challenges

One major sticking point is adaptation and validation of patient-reported outcome measures for use in geriatric oncology. Psychometric performance in older patients with cancer may still be untested or unconfirmed, while direct extrapolation of evidence from younger patient populations may miss key outcome trends and cut-off points that are unique to older patients. A recent linguistic evaluation of 45 patient-reported outcome measures used in

cancer care revealed that most did not meet plain-language best practices³⁹. Health literacy skills may be lacking even among patients in developed countries, and the deficit gap may be wider among older patients³⁹. The consequence may be inaccurate reporting and suboptimal communication of important information on patient well-being⁴⁰.

Challenges regarding comprehensibility are also possible, including difficult words and jargon, or lengthy, convoluted or sensitive questions. This can make the measure hard to complete, lead to patients abandoning it, or worse, collect information that is inaccurate due purely to lack of understanding of the original question⁴¹. Unclear or confusing response format may have the same consequences. Although one might say that patients may be affected equally and irrespective of age, older patients' experience of 'sub-standard measures' may be worse due to mental fatigue or cognitive impairment often associated with older age²⁸. Older patients may find the visual analogue scales comparably 'clearer' to use and understand⁴¹. Recently, it was shown that patients' physical function was not linked to acceptability of routine use of patient-reported outcome measures⁴². This perhaps helps debunk the myth that patients with cancer will almost certainly become burdened by patient-reported outcome measures, although additional data from older patients will be needed.

Older age and technological innovation have long been seen as largely incompatible^{43,44}. This perhaps applies to remote monitoring systems incorporating patient-reported outcome measures. Or does it? A common concern is that older patients will not benefit because they cannot keep up with technology – uptake, usage and adherence are seen as likely being abysmal. Perhaps some level of concern is legitimate when patient burden is taken into account, however new evidence suggests that age is not a barrier here⁴⁵. Instead, the real challenge here is related more to limitations in resources and infrastructure to support innovation in geriatric oncology^{17,45}, perhaps similar to any other area in cancer care.

4.3. Opportunities

Patient-reported outcome measures can help enable a shift towards value-based geriatric cancer care with a special focus on transitional phases in the cancer trajectory of older patients⁴⁶. Montroni et al. (2018) indicate that the starting point should be to reconsider the common definition of 'value' by understanding what outcomes matter the most to patients³⁰. They explain that perhaps older patients more often look for answers to questions like 'Will I tolerate treatment?' than to questions about the local recurrence rate of their cancer³⁰. Additional studies demonstrate that older patients, particularly where frailty and limited life expectancy are present, often prefer functional independence and well-being over survival^{35,47} as measures of treatment success.

Patient-reported outcome measures and systems may enable a thought process to help older patients gain better insight into current issues, risks and abilities. The multidisciplinary team can then encourage and support older patients to become more involved and proactive in the self-management of these issues¹. Scheepers et al. (2020) advocate for greater use of patient-reported outcome measures in the care of older patients with haematologic malignancies to help investigate the link between geriatric impairment and patient-reported outcomes³³ – this is a way to use patient-reported outcome measures as endpoint evaluators. Patient-reported outcome measures can help monitor adherence to medications, polypharmacy and burden⁴⁸ to help optimise medication use in older patients with cancer⁴⁹. In surgical oncology, patient-reported outcome measures can be used as endpoint evaluators of postoperative functional ability and health-related quality of life to help explore the predictive value of preoperative frailty³¹.

Adaptation and validation of existing patient-reported outcome measures for use in geriatric oncology is a must. Ways to increase the 'reliability' of self-reports can be examined. Questions can be both measurable and describable. For instance, when asking about emotional well-being, a measurable question could be 'How long did you feel in good mood yesterday?' (for example, two hours) or 'At what point during the day did you feel in good mood yesterday?' (for example, all morning). Conversely, a describable question could be 'How would you describe your mental health today?' (for example, as bad as it gets or excellent)³⁵. The use of simple numerical or pictorial visual analogue scales can be trialled with older patients with cancer to examine response variability and preferences versus more traditional response formats (such as Likert-type scale questions)⁵⁰, also trying to combat the challenges placed by potential cognitive deficits.

While research is directed to predicting patient-reported outcomes in older patients with cancer⁵¹, it is also intriguing to think of patient-reported outcomes as the means to 'profile' older patients in order to predict future ability, functional fitness for treatment, and post-treatment resilience and adjustment. Our Horizon 2020 consortium (<https://lifechamps.eu/index.php/overview/>) is currently exploring ways to integrate big data from patient-reported outcome measures with sensor data and electronic health record data, also using sophisticated statistical analyses that can supply the multidisciplinary team with predictive models of frailty and health-related quality of life specifically for older patients with cancer.

5. Conclusions

Patient screening in geriatric cancer care can be driven by patient self-reports – it is doable. Among the multidisciplinary team, nurses can promote patient screening that is patient-led. Nurses advocate for older patients' preferences about their cancer treatment, monitor for treatment-related side-effects, provide education throughout the illness trajectory, and empower the patient with self-management and decision-making^{49,52,53}. Systematic use of patient-reported outcome measures can help nurses achieve all these goals. Nursing roles can be developed, supported, expanded or repurposed to involve greater use of patient-reported outcome measures for several key patient outcomes in geriatric cancer care (see Table 2). If information is power, then patient-reported outcome measures can be the power generators.

Before implementation of patient-reported outcome measures in geriatric cancer care, more feasibility studies will be required to evaluate such measures as fit-for-purpose, reporting frequency, patient burden, integration and display of patient-reported information, and workflow impact³⁵. Developing, adapting and validating patient-reported outcome measures for use in this field will be key to ensure adequacy of measurement. Groundwork involving consultation of all potential end-users of patient-reported information is paramount as there is no one size fits all. When the ground is ready for implementation adequate preparation, training, resources and ongoing support will be needed.

References

1. Tremblay D, Charlebois K, Terret C, Joannette S, Latreille J. Integrated oncogeriatric approach: A systematic review of the literature using concept analysis. *BMJ Open*. 2012;2(6):e001483. doi:10.1136/bmjopen-2012-001483
2. Korc-Grodzicki B, Tew WP. *Handbook of Geriatric Oncology: Practical Guide to Caring for the Older Cancer Patient*. 1st ed. (Korc-Grodzicki B, Tew WP, eds.). New York, NY: Demos Medical Publishing; 2017.
3. Ramjaun A, Nassif M, Krotneva S, Huang A, Meguerditchian A. Improved targeting of cancer care for older patients: A systematic review of the utility of comprehensive geriatric assessment. *J Geriatr Oncol*. 2013;4(3):271-281.
4. Parker SG, Mccue P, Phelps K, et al. What is Comprehensive Geriatric Assessment (CGA)? An umbrella review. *Age Ageing*. 2018;47(1):149-155. doi:10.1093/ageing/afx166
5. Wildiers H, Heeren P, Puts M, et al. International society of geriatric oncology consensus on geriatric assessment in older patients with cancer. *J Clin Oncol*. 2014;32(24):2595-2603. doi:10.1200/JCO.2013.54.8347
6. Mohile SG, Dale W, Somerfield MR, et al. Practical assessment and management of vulnerabilities in older patients receiving chemotherapy: Asco guideline for geriatric oncology. *J Clin Oncol*. 2018;36(22):2326-2347. doi:10.1200/JCO.2018.78.8687
7. Wildiers H, Mauer M, Pallis A, et al. End points and trial design in geriatric oncology research: A joint European Organisation for Research and Treatment of Cancer-Alliance for clinical trials in oncology-international society of geriatric oncology position article. *J Clin Oncol*. 2013;31(29):3711-3718. doi:10.1200/JCO.2013.49.6125
8. Mohile SG, Epstein RM, Hurria A, et al. Communication with Older Patients with Cancer Using Geriatric Assessment: A Cluster-Randomized Clinical Trial from the National Cancer Institute Community Oncology Research Program. *JAMA Oncol*. 2020;6(2):196-204. doi:10.1001/jamaoncol.2019.4728
9. Puts MTE, Hardt J, Monette J, Girre V, Springall E, Alibhai SMH. Use of geriatric assessment for older adults in the oncology setting: A systematic review. *J Natl Cancer Inst*. 2012;104(15):1133-1163. doi:10.1093/jnci/djs285
10. Prinsen CAC, Vohra S, Rose MR, et al. How to select outcome measurement instruments for outcomes included in a "Core Outcome Set" - a practical guideline. *Trials*. 2016;17(449). doi:10.1186/s13063-016-1555-2
11. Terwee CB, Prinsen CAC, Chiarotto A, et al. COSMIN methodology for evaluating the content validity of patient-reported outcome measures: a Delphi study. *Qual Life Res*. 2018;27(5):1159-1170. doi:10.1007/s11136-018-1829-0
12. Mokkink LB, Terwee CB, Patrick DL, et al. The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. *J Clin Epidemiol*. 2010;63(7):737-745. doi:10.1016/j.jclinepi.2010.02.006
13. Warsame R, D'Souza A. Patient Reported Outcomes Have Arrived: A Practical Overview for Clinicians in Using Patient Reported Outcomes in Oncology. *Mayo Clin Proc*. 2019;94(11):P2291-2301. doi:10.1016/j.mayocp.2019.04.005
14. Kotronoulas G, Kearney N, Maguire R, et al. What is the value of the routine use of patient-reported outcome measures toward improvement of patient outcomes, processes of care, and health service outcomes in cancer care? A systematic review

- of controlled trials. *J Clin Oncol*. 2014;32(14):1480-1501. doi:10.1200/JCO.2013.53.5948
15. Scheibe M, Herrmann A, Schmitt J, Einhart N, Sedlmayr B, Kowalski C. Implementation of patient-reported outcome assessment in routine cancer care: A systematic review of multicentric programs in Europe. *Z Evid Fortbild Qual Gesundheitswes*. 2020;156-157:11-23. doi:10.1016/j.zefq.2020.08.001
 16. Graupner C, Kimman ML, Mul S, et al. Patient outcomes, patient experiences and process indicators associated with the routine use of patient-reported outcome measures (PROMs) in cancer care: a systematic review. *Support Care Cancer*. 2021;29:573-593. doi:10.1007/s00520-020-05695-4
 17. Kotronoulas G. e-PROactive care for now and for the future. *Evidence-Based Nursing*. <https://blogs.bmj.com/ebn/2020/04/26/e-proactive-care-for-now-and-for-the-future/>. Published 2020. Accessed July 7, 2021.
 18. Howell D, Molloy S, Wilkinson K, et al. Patient-reported outcomes in routine cancer clinical practice: a scoping review of use, impact on health outcomes, and implementation factors. *Ann Oncol*. 2015;26(9):1846-1858. doi:10.1093/annonc/mdv181
 19. Basch E, Deal AM, Dueck AC, et al. Overall survival results of a trial assessing patient-reported outcomes for symptom monitoring during routine cancer treatment. *JAMA*. 2017;318(2):197-198. doi:10.1001/jama.2017.7156
 20. Coulter A, Potter C, Peters M, Fitzpatrick R. Cancer PROMs: A scoping study. *Macmillan Cancer Support*.
 21. Bennett A V., Jensen RE, Basch E. Electronic patient-reported outcome systems in oncology clinical practice. *CA Cancer J Clin*. 2012;62(5):336-347. doi:10.3322/caac.21150
 22. Howell D, Rosberger Z, Mayer C, et al. Personalized symptom management: a quality improvement collaborative for implementation of patient reported outcomes (PROs) in 'real-world' oncology multisite practices. *J Patient-Reported Outcomes*. 2020;4(1):47. doi:10.1186/s41687-020-00212-x
 23. Howell D, Li M, Rosberger Z, et al. Using Electronic Patient-reported Outcome Measures (e-PROMs) and Multifaceted Knowledge Translation Strategies to Improve Distress Management: A Multi-site Study in Ambulatory Cancer Care in Ontario and Quebec, Canada. In: *Psycho-Oncology*. ; 2016:470.
 24. Maguire R, McCann L, Kotronoulas G, et al. Real time remote symptom monitoring during chemotherapy for cancer: European multicentre randomised controlled trial (eSMART). *BMJ*. 2021;374. doi:10.1136/bmj.n1647
 25. Absolom K, Warrington L, Hudson E, et al. Phase III Randomized Controlled Trial of eRAPID: eHealth Intervention During Chemotherapy. *J Clin Oncol*. 2021;39(7):734-747. doi:10.1200/JCO.20.02015
 26. Basch E, Deal AM, Kris MG, et al. Symptom Monitoring With Patient-Reported Outcomes During Routine Cancer Treatment: A Randomized Controlled Trial. *J Clin Oncol*. 2016;34(6):557-565. doi:10.1200/JCO.2015.63.0830
 27. Nguyen H, Butow P, Dhillon H, Sundaresan P. A review of the barriers to using Patient-Reported Outcomes (PROs) and Patient-Reported Outcome Measures (PROMs) in routine cancer care. *J Med Radiat Sci*. 2021;68(2):186-195. doi:10.1002/jmrs.421

28. De Rosa P, Jewell A. The potential use for patient reported outcome measures in people with pancreatic cancer, with a specific focus on older patients. *Eur J Surg Oncol*. 2021;47(3 Pt A):495-502. doi:10.1016/j.ejso.2020.05.010
29. Montroni I, Ugolini G, Spinelli A, et al. Patient-reported outcomes measures (PROMs) in geriatric patients undergoing major surgery for solid cancer: 90-day preliminary report on 643 patients from the geriatric oncology surgical assessment and functional recovery after surgery (GOSAFE) study. *J Geriatr Oncol*. 2019;10(6):S7. doi:10.1016/s1879-4068(19)31132-4
30. Montroni I, Ugolini G, Saur NM, et al. Personalized management of elderly patients with rectal cancer: Expert recommendations of the European Society of Surgical Oncology, European Society of Coloproctology, International Society of Geriatric Oncology, and American College of Surgeons Commissi. *Eur J Surg Oncol*. 2018;44(11):1685-1702. doi:10.1016/j.ejso.2018.08.003
31. Knight J, Ayyash K, Colling K, et al. A cohort study investigating the relationship between patient reported outcome measures and pre-operative frailty in patients with operable, non-palliative colorectal cancer. *BMC Geriatr*. 2020;20:311. doi:10.1186/s12877-020-01715-4
32. Rønning B, Wyller TB, Nesbakken A, et al. Quality of life in older and frail patients after surgery for colorectal cancer-A follow-up study. *J Geriatr Oncol*. 2016;7(3):195-200. doi:10.1016/j.jgo.2016.03.002
33. Scheepers ERM, Vondeling AM, Thielen N, van der Griend R, Stauder R, Hamaker ME. Geriatric assessment in older patients with a hematologic malignancy: A systematic review. *Haematologica*. 2020;105(6):1484–1493. doi:10.3324/haematol.2019.245803
34. Extermann M, Brain E, Canin B, et al. Priorities for the global advancement of care for older adults with cancer: an update of the International Society of Geriatric Oncology Priorities Initiative. *Lancet Oncol*. 2021;22(1):E29-E36. doi:10.1016/S1470-2045(20)30473-3
35. Olde Rikkert MGM, van der Wees PJ, Schoon Y, Westert GP. Using patient reported outcomes measures to promote integrated care. *Int J Integr Care*. 2018;18(2):8. doi:10.5334/ijic.3961
36. Guion-Dusserre J-F, Bertaut A, Ghiringhelli F, et al. Folfirinox in elderly patients with pancreatic or colorectal cancer-tolerance and efficacy. *World J Gastroenterol*. 2016;22(42):9378. doi:10.3748/WJG.V22.I42.9378
37. Quality Health. Quality of life of cancer survivors in England: Report on a pilot survey using Patient Reported Outcome Measures (PROMs). Department of Health. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/267042/9284-TSO-2900701-PROMS-1.pdf. Published 2012. Accessed July 7, 2021.
38. MHP Health Mandate. The outcomes and experiences of older women with breast cancer: driving progress in the new NHS. Breast Cancer Care. <https://breastcancernow.org/sites/default/files/files/outcomes-experience-older-women.pdf>. Published 2013. Accessed July 7, 2021.
39. Papadakos JK, Charow RC, Papadakos CJ, Moody LJ, Giuliani ME. Evaluating cancer patient-reported outcome measures: Readability and implications for clinical use. *Cancer*. 2019;125(8):1350-1356. doi:10.1002/cncr.31928
40. Amalraj S, Starkweather C, Nguyen C, Naeim A. Health literacy, communication, and

- treatment decision-making in older cancer patients. *Oncol (willist Park)*. 2009;23(4):369-375.
41. Pel-Littel RE, Hofman CS, Yu L, et al. Recommendations of older adults on how to use the PROM 'TOPICS-MDS' in healthcare conversations: A Delphi study. *PLoS One*. 2019;14(11):e0225344. doi:10.1371/journal.pone.0225344
 42. Wong L, Brown C, Perez-Cosio A, et al. Does physical function impact the acceptability of routine patient-reported outcome surveys in cancer patients? In: *Journal of Clinical Oncology*. Vol 34. ; 2016:67-67. doi:10.1200/jco.2016.34.7_suppl.67
 43. Fallahzadeh R, Rokni SA, Ghasemzadeh H, Soto-Perez-de-Celis E, Shahrokni A. Digital Health for Geriatric Oncology. <https://doi.org/10.1200/CCI1700133>. June 2018. doi:10.1200/CCI.17.00133
 44. Vaportzis E, Clausen MG, Gow AJ. Older Adults Perceptions of Technology and Barriers to Interacting with Tablet Computers: A Focus Group Study. *Front Psychol*. 2017;8(OCT):1687. doi:10.3389/FPSYG.2017.01687
 45. Coombs LA, Ellington L, Fagerlin A, Mooney K. Age Is Not a Barrier: Older Adults With Cancer Derive Similar Benefit in a Randomized Controlled Trial of a Remote Symptom Monitoring Intervention Compared With Younger Adults. *Cancer Control*. 2020;27(1):1073274820968878. doi:10.1177/1073274820968878
 46. Rogers S, Barber B. Using PROMs to guide patients and practitioners through the head and neck cancer journey. *Patient Relat Outcome Meas*. 2017;8:133-142. doi:10.2147/prom.s129012
 47. Akishita M, Ishii S, Kojima T, et al. Priorities of Health Care Outcomes for the Elderly. *J Am Med Dir Assoc*. 2013;14(7):479-484. doi:10.1016/j.jamda.2013.01.009
 48. Kotronoulas G, Cooper M, Johnston B. Core patient-reported outcomes (PROs) and PRO measures (PROMs) for polypharmacy medicines reviews: A sequential mixed-methods study. *Patient Prefer Adherence*. 2019;13. doi:10.2147/PPA.S236122
 49. Goldberg JI, Burhenn PS, Ginex PK. Nursing Education: Review of Assessment, Clinical Care, and Implications for Practice Regarding Older Adult Patients With Cancer. *Clin J Oncol Nurs*. 2018;22(6):19-25. doi:10.1188/18.CJON.S2.19-25
 50. Castle NG, Engberg J. Response Formats and Satisfaction Surveys for Elders. 2004;44(3):358-367. <https://academic.oup.com/gerontologist/article/48/3/358/553843>. Accessed August 14, 2021.
 51. van der Plas-Krijgsman WG, de Boer AZ, de Jong P, et al. Predicting disease-related and patient-reported outcomes in older patients with breast cancer - a systematic review. *J Geriatr Oncol*. 2021;12(5):P696-704. doi:10.1016/j.jgo.2021.01.008
 52. Puts M, Strohschein F, Oldenmenger W, et al. Position statement on oncology and cancer nursing care for older adults with cancer and their caregivers of the International Society of Geriatric Oncology Nursing and Allied Health Interest Group, the Canadian Association of Nurses in Oncology Oncology &. *J Geriatr Oncol*. 2021;S1879-4068. doi:10.1016/j.jgo.2021.03.010
 53. Presley CJ, Krok-Schoen JL, Wall SA, et al. Implementing a multidisciplinary approach for older adults with Cancer: Geriatric oncology in practice. *BMC Geriatr*. 2020;20(1):231. doi:10.1186/s12877-020-01625-5
 54. Bellera CA, Rainfray M, Mathoulin-Pélissier S, et al. Screening older cancer patients: First evaluation of the G-8 geriatric screening tool. *Ann Oncol*. 2012;23:2166-2172.

doi:10.1093/annonc/mdr587

55. Saliba D, Elliott M, Rubenstein L, et al. The Vulnerable Elders Survey: a tool for identifying vulnerable older people in the community. *J Am Geriatr Soc*. 2001;49(12):1691-1699. doi:10.1046/J.1532-5415.2001.49281.X
56. Bielderma A, Schans CP van der, Lieshout M-RJ van, et al. Multidimensional structure of the Groningen Frailty Indicator in community-dwelling older people. *BMC Geriatr*. 2013;13(1):86. doi:10.1186/1471-2318-13-86
57. Gobbens R, van Assen M, Luijkx K, Wijnen-Sponselee M, Schols J. The Tilburg Frailty Indicator: psychometric properties. *J Am Med Dir Assoc*. 2010;11(5):344-355. doi:10.1016/J.JAMDA.2009.11.003
58. Raiche M, Hebert R, Dubois MF. PRISMA-7: a case-finding tool to identify older adults with moderate to severe disabilities. *Arch Gerontol Geriatr*. 2008;47(1):9-18. doi:10.1016/j.archger.2007.06.004
59. Morley J, Malmstrom T, Miller D. A simple frailty questionnaire (FRAIL) predicts outcomes in middle aged African Americans. *J Nutr Health Aging*. 2012;16(7):601-608. doi:10.1007/S12603-012-0084-2

Tables

Table 1. Example screening tools to identify potentially vulnerable or frail patients in need for a comprehensive geriatric assessment

Measure	Parameter of interest													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Geriatric 8 ⁵⁴	>70	8	Clinician	-	x	-	-	x	x	-	x	-	x	-
Vulnerable Elders Survey-13 ⁵⁵	≥65	13	Patient / clinician	-	-	-	-	x	-	-	-	-	x	-
Groningen Frailty Indicator ⁵⁶	≥65	15	Patient / clinician	x	x	x	x	-	-	-	-	-	-	-
Tilburg Frailty Indicator ⁵⁷	≥65	25	Patient	x	-	x	x	x	x	-	-	-	x	-
Program of Research to Integrate Services for the Maintenance of Autonomy-7 ⁵⁸	≥65	7	Patient / clinician	x	-	-	-	x	-	-	-	-	x	-
Fatigue, resistance, ambulation, illnesses, and loss of weight scale ⁵⁹	≥65	5	Patient / clinician	x	-	-	-	-	x	-	x	-	-	-

Key for parameters:
 1. Target population (age); 2. Number of questions; 3. Who completes; 4. Physical function / symptom burden; 5. Cognitive function / deficits; 6. Psychological status; 7. Social status / isolation; 8. Functional status; 9. Comorbidities; 10. Falls and/or falls risk; 11. Nutrition; 12. Medications / polypharmacy; 13. Perceived health status; 14. Health-related quality of life.

Table 2. Example brief patient-reported outcome measures to support screening of older patients with cancer for functional fitness for treatment

Measure	Number of questions	Target domain	Useful links
Condensed Memorial Symptom Assessment Scale	14	Physical function / symptom burden	https://www.midss.org/content/condensed-memorial-symptom-assessment-scale-cmsas https://pubmed.ncbi.nlm.nih.gov/15565810/ https://www.annalsofoncology.org/article/S0923-7534(19)31583-2/fulltext
Edmonton Symptom Assessment Scale	11	Physical function / symptom burden	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5337174/
Patient-Reported Outcome Measurement Information System Cognitive Function - Short Form 8a	8	Cognitive function / deficits	https://academic.oup.com/jnci/advance-article/doi/10.1093/jnci/djab027/6151729
Patient Health Questionnaire-4	4	Psychological status	https://pubmed.ncbi.nlm.nih.gov/28600855/
Modified Medical Outcomes Scale-Social Support	8	Social status / isolation	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4119888/
Patient-Reported Outcomes Measurement Information System Short Form v1.0 - Self-Efficacy for Managing Daily Activities	8	Functional status / activities of daily living	https://www.healthmeasures.net/explore-measurement-systems/promis/intro-to-promis
Multimorbidity Treatment Burden Questionnaire	10	Comorbidities / multimorbidity burden	https://bmjopen.bmj.com/content/8/4/e019413
Modified Falls Efficacy Scale	14	Falls and/or falls risk	https://pubmed.ncbi.nlm.nih.gov/33591085/
Malnutrition Screening Tool	2	Nutrition / malnutrition	https://static.abbottnutrition.com/cms-prod/abbottnutrition-2016.com/img/Malnutrition%20Screening%20Tool_FINAL_tcm1226-57900.pdf https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8058175/
Medication Adherence Report Scale-5	5	Medication adherence / polypharmacy	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7319010/
European Organisation for Research and	15	Health-related quality of life /	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3749575/

Measure	Number of questions	Target domain	Useful links
Treatment of Cancer Quality of Life Questionnaire – Elderly 15*		Perceived health status	
Patient-Reported Outcomes Measurement Information System - Global health	10	Health-related quality of life / Perceived health status	https://www.healthmeasures.net/expl-ore-measurement-systems/promis/intro-to-promis
*Validated for geriatric oncology.			