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Geriatric assessment tool application in treatment recommendations for older women with breast cancer

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ABSTRACT

Introduction: Treatment of early breast cancer in older women is usually not guideline concordant owing to lack of routine evaluation of their potential frailty. We assessed the feasibility and impact of a self-administered geriatric assessment on the decision-making process in women aged 65 and above treated in a UK District General Hospital.

Methods: One hundred and one patients, aged 65 and above, with early stage, non-metastatic breast cancer were prospectively recruited between Dec-2018 and March-2021. Patients with metastatic breast cancer, a previous history of cancer and dementia were excluded. All patients had a geriatric assessment with a self-administered questionnaire (mycarg.org). All cases were discussed in the multidisciplinary meeting (MDT) and a pre geriatric assessment recommendations was made, based on the tumour grade, size, node status and receptor status. The findings of the assessment were later discussed in a second meeting and a further recommendation was made based on the geriatric assessment. Any change in the proposed treatment was recorded. Potential factors (age, Body Mass Index, co-morbidities, medications, instrumental activities of daily living, and basic activities of daily living, social support and psychological status) associated with a change in the treatment recommendation were compared using Pearson's Chi square tests for categorized data, and Mann Whitney *U* test for continuous data. A multivariate logistic regression was performed to test the association between geriatric assessment domains and change in treatment decision. The multivariate model was built using variables which were associated in the bivariate analysis with a p-value< 0.20.

Results: Patients aged less than 70 years were more likely to be diagnosed through screening programme as compared to older women (64.4% vs. 35.6%, $p = 0.001$).

Self-administered geriatric assessment identified patients who were requiring assistance in their daily routine activities, and hence, were assessed to have higher morbidity status. A third of patients required assistance in their routine activities, with 18/101 patients requiring significant help during self-care. 90% patients were independent for Activity of Daily Living (ADL) at baseline and 34.76% for Instrumental Activity of Daily Living (IADL).

Among the 101 patients evaluated, proposed change in the initial cancer treatment plan was made in 21.8% of patients after the second MDT. Omission of chemotherapy was recommended in 4 patients, omission of radiotherapy in 15 patients and omission of both chemo and radiotherapy in 2 patients. One patient was advised to omit Zolidronic acid, as she was noted to have renal impairment. No patient in this cohort had suggestion for omission of surgery or endocrine therapy. In the bivariate analysis, need for assistance for activities of daily living (ADLs), low physical performance (KPS), polypharmacy (3 or more medications), lack of social support as assessed using the Social Support: Medical Outcomes Study (MOS) Social Support Survey and high BMI (30 or more) all showed significance but on multivariate analysis only polypharmacy was significantly associated with change in the initial cancer treatment plan.

Conclusions: The results of this study of breast cancer patients aged 65 and above suggest that a self-administered geriatric assessment may influence treatment recommendations in a subset of patients. Recommendations that were influenced by the geriatric assessment mainly included those related to the significant morbidity that may have impacted the use of chemotherapy and/or radiotherapy.

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Breast cancer is the most common cancer affecting women world over, with 2.26 million patients diagnosed in 2019 [1]. Its incidence increases with age with 50% of cases diagnosed in women aged 65 and above and almost a third in the over 70s [2,3]. It is the second leading cause of cancer related deaths among females, accounting for 15% of deaths worldwide [1]. Almost half (46%) of these deaths occur in patients aged 70 years or more [4]. Many factors have been postulated as the cause of increased mortality in older women, such as, under-treatment, lack of evidence-based clinical guidelines, and competing causes of death. Oncologists face the challenge of how to determine the best treatment for their older patients. This is compounded by the lack of representation of the older women in clinical trials [5,6]. Most of the treatment recommendations are extrapolated from guidelines which are based on the studies where younger women were predominantly recruited. These guidelines fail to consider the significant variability in older patients, especially with regards to co-morbidities, performance status, frailty, and physiological age [7]. Without the aid of clinical evidence to guide clinicians, it is extremely difficult to define a patient's ability to tolerate or to benefit from oncologic treatment.

In most oncology centres, patient's functional status is assessed by using either the Eastern Cooperative Oncology Group (ECOG/WHO) performance status (PS) or Karnofsky Performance Status (KPS) scales [8]. In the recent years, studies have demonstrated the use of geriatric assessment in objectively appraising the health status of older people [9,10]. These studies suggest that interventions addressing the deficits thus identified could improve the treatment tolerance and quality of life. Geriatric assessment (GA) provides a global assessment of the older patient in an objective manner, by assessing their physical (mobility, comorbidity, and nutrition), physiological (mood and memory) functional and social status [11]. Several frailty assessment tools are available, differing in terms of number of domains included, complexity of administration, need for trained clinician and the time taken to complete individual assessment [12]. For this reason, the frailty screening tools were developed. They are more feasible in the busy clinical practice and could identify patients who could require more comprehensive assessments and associated interventions. Several studies and meta-analyses have found their utility in predicting adverse outcomes, such as, chemotherapy toxicity, functional decline, and 1-yr survival [10,13]. However, most of these studies included patients with many different cancers, both early and metastatic [10]. Only a few studies focused on breast cancer alone [14]. These studies also differed in terms of the individual assessment tool used. This heterogeneity among studies hampers the comparisons of results across studies as well as the ability to extrapolate these results in a different setting [15,16].

The aim of this study was to evaluate whether the use of the self-administered Geriatric Assessment (GA) in older breast cancer patients resulted in a change in their treatment recommendations. A self-administered tool developed by the Cancer and Aging Research Group (CARG) was used in this study because of its suitability with the time constraints and logistics of our busy clinical practice [17].

1. Methodology

1.1. Study design

This was a feasibility study. It was performed in a District General Hospital (Prince Philip Hospital, Llanelli) in UK. The recruitment occurred between Dec 2018 and March 2021. The recruitment was slower than expected mainly because of increased number of patients who had history of previous cancer and because of disruption of the COVID-19 epidemic, hence study was extended from 1 year to 2 years period.

1.2. Selection criteria

1.2.1. Inclusion criteria

Eligible patients were women aged 65 years or older with a newly diagnosed non-metastatic breast cancer, who were willing to provide written informed consent to take part in the study.

1.2.2. Exclusion criteria

Patients were excluded if they had a) prior history of primary breast cancer, b) simultaneously diagnosed or being treated for a second primary tumour at another site, c) metastatic breast cancer on presentation or e) dementia resulting in inability to provide consent for the study.

1.2.3. Sample size

In the literature, the frailty identified by geriatric assessment has been found to result in a change in multi-disciplinary team recommendations in 16–42% of patients [18]. Most of these studies were exploratory and included many different tumours, including early and metastatic breast cancer. They also differed in terms of primary and secondary outcomes. Only a few studies were specifically performed in patients with early breast cancer [19–21]. Hence, as per methodology for a feasibility study, sample size was not formally calculated [22]. A decision was made to collect data on a minimum of 100 patients as an achievable target to reach within the timeframe available for conducting the study.

1.2.4. Data collection procedures

Study patients were identified in the multi-disciplinary meeting (MDT) after completing triple assessment and with a positive core biopsy result. The MDT team included surgeons, radiologist, medical and radiation oncologists, and breast specialist nurses. The patient's histology was discussed in the MDT meeting and an initial recommendation was made based on the tumour biology and stage of the disease as per National Institute of Clinical Excellence (NICE) guidelines. After the results were conveyed to the patients, they were invited to take part in the study. After signing informed consent, each eligible patient was asked to complete a self-administered Geriatric Assessment. The data collected included;

- Functional status, assessed by Instrumental Activities of Daily Living (IADL), Activities of Daily Living (ADL) [18,23], Karnofsky Performance Rating scale (KPS) [8,18], and number of falls in last 6 months [18].
- Physical health assessed by presence of comorbidity, using the Older Americans Resources and Services Physical Health Scale (a self-reporting comorbidity scale containing a list of comorbid conditions and an assessment of their impact on daily activities, rated on a 3-point scale of "not at all" to "a great deal"), number of current medications including over the counter medications (poly pharmacy defined as 3 or more medications, body mass index (BMI) (a BMI of 30 or more was considered abnormal) and percent unintentional weight loss in the last 6 months [18,23,24].
- Cognition assessed by the Blessed Orientation-Memory-Concentration (BOMC) test [25].
- Psychologic status assessed by the Mental Health Inventory (MHI)-17 and a diagnosis of depression [18,26].
- Social functioning assessed by Social Activity Limitations subscale from the Medical Outcomes Study Social Activity Limitations Measure (MOS) and Social Support: Medical Outcomes Study (MOS) Social Support Survey (MOSS-SS) [28] (Appendix 1).

The second component of the assessment was completed by the health care provider (other than the doctor who assessed the patient initially). This included, 1) Blessed Orientation Memory Concentration (BOMC) test, 2) timed up and go (TUG) [29], and 3) Karnofsky performance status (KPS) [8,18]. The data collected from the Geriatric

assessment was entered into www.mycarg.org and scoring and recommendations thus generated were printed. These findings were discussed in the second MDT meeting and a revised recommendation was made. Data regarding the patient's demographics, histology and pre-GA treatment recommendations and post GA treatment recommendations were also collected on a pre-designed proforma. Also data were recorded regarding the actual treatment received by the patient and any deviations from the recommended treatment and its reasons.

The initial MDT decision was accepted as the treatment recommendation for an individual patient. Any change to recommendations and the final treatment received by the patient was also recorded.

1.2.5. Outcome measures

The primary outcome was the change in treatment recommendation after the Geriatric Assessment as compared to the treatment recommendations previously formulated by the MDT. Change in cancer treatment plan was defined as 1) treatment intensification (addition of one or more modalities), 2) treatment omission (removal of at least one modality).

1.2.6. Statistical analysis

For the demographic variables, patient age was classified as 65 to 69, 70 to 74, 75–79, >80 years old. Disease stage was classified as 0, I, II and III using the TNM classification. Surgical procedure was coded as mastectomy, breast-conserving surgery (BCS) followed by radiation therapy, or BCS alone. Receipt of chemotherapy, targeted therapy, Zoledronic acid and adjuvant endocrine therapy was classified as yes or no.

Categorical data were presented using counts and percentages, whilst continuous data were presented using the mean, standard deviation (SD), median, minimum, maximum, and number of patients. Normally distributed data were summarised using means and standard deviations, whereas non-normally distributed data were summarised using medians and ranges. Normality was assessed using the Shapiro-Wilk test.

Data were analysed using IBM SPSS Statistics version 27 (SPSS Inc., Chicago, IL, USA). The proportion of patients with a change to their treatment recommendation was calculated along with the corresponding 95% confidence interval. To compare the patients with modified treatment recommendations after 2nd MDT, versus those without modifications in treatment recommendations, Pearson's Chi square tests were applied for categorized data. As continuous data were not normally distributed, differences between groups were assessed using Mann Whitney *U* test. A binomial logistic regression using modified treatment recommendation by GA as a binary response variable and tumour characteristics and geriatric assessment domains as binary variables was carried out. For continuous variables, goodness of fit was determined by the Hosmer-Lemeshow and Pearson methods, and the odds ratios together with their 95% confidence intervals were calculated. A multivariate logistic regression was performed to test the association between geriatric assessment domains and change in treatment decision. The multivariate model was built using variables which were associated in the bivariate analysis with a p-value< 0.20. In the final model only 3 variables were tested because of the small sample size. Collinear variables were not entered in the final model and interactions were tested according to clinical judgment.

1.2.7. Ethical considerations

The protocol for this study was reviewed and approved by the Wales Research Ethics Committee (Wales REC 7 Ref No. 18/WA/0378). This study was conducted in compliance with all the regulations governing the protection and privacy of human subjects, the Helsinki declaration, after taking informed consent from the participants.

2. Results

2.1. Patient characteristics

Patients and disease characteristics of the baseline study population (N = 101) are listed in Table 1. The majority of patients were ≥70 years old with a median age of 73 years (range 65–89years). Patients aged less than 70 years were more likely to be diagnosed through screening programme as compared to older women (64.4% vs. 35.6%, p = 0.001), and this corresponds to the current age cut-off for screening in UK. Eleven (10.9%) patients had in-situ disease, and 37 (36.7%) patient were diagnosed with stage 1 disease. Most of the patients underwent surgery, either a mastectomy or BCS followed by radiation therapy (n = 97, 96%). Primary endocrine therapy was used in only 4 (4%) patients who were considered unfit for any surgical intervention.

2.2. Geriatric assessment (Table 2)

A third of patients required assistance in their routine activities with 18 patients requiring significant help during self-care. Thirty-four patients (33.7%) were independent for ADLs at baseline and 76 patients (75.2%) for IADLs. The mean TUG score was 15.28 s with 85 patients (84.2%) demonstrating impaired mobility (defined by TUG score of more than 10sec) [23]. Nine patients (8.9%) had experienced one or more falls in the previous six months. The median BOMC score was 2 (range 0–14; normal <11). The mean number of medications taken per patient was 4.71 (0–17), with 54 patients (53.5%) taking 3 or more

Table 1
Patient and tumour characteristics.

	Number (%)
Age (n = 101)	
65–69 years	33 (32.7%)
70–74 years	29 (28.7%)
75–79 years	24 (23.8%)
80+ years	15 (14.8%)
Diagnosis (n = 101)	
Symptomatic	65 (64.4%)
Screening	36 (35.6%)
Histology (n = 101)	
In-situ	11 (18.2%)
Ductal	69 (.7%)
Lobular	10 (3.0%)
Others	11 (9.1%)
Grade (Invasive disease, n = 90)	
Grade 1	19 (21.1%)
Grade 2	47 (52.2%)
Grade 3	23 (25.6%)
Missing	1 (1.1%)
Stage at diagnosis (n = 101)	
Stage 0	11 (10.9%)
Stage 1	38 (37.6%)
Stage 2	44 (43.6%)
Stage 3	8 (7.8%)
Tumour size (Invasive disease, n = 90)	
T1	44 (48.9%)
T2	42 (46.7%)
T3	3 (3.3%)
T4	1 (1.1%)
Nodal status (Invasive disease, n = 90)	
Positive	20 (22.2%)
Negative	70 (77.8%)
Lympho-vascular invasion present (Invasive disease, n = 90)	14 (15.6%)
Tumour biology (Invasive disease, n = 90)	
Oestrogen receptor (ER) positive	71 (78.9%)
Her-2 positive	3 (3.3%)
ER/Her2 positive	5 (5.6%)
Triple negative	11 (12.2%)

medications (polypharmacy). Twelve (11.9%) women had no comorbidities. The most common medical condition was arthritis (n = 52, 51.5%), followed by hypertension (n = 51, 50.5%) and obesity (n = 39, 38.6%). Median performance score was 90 with 80 patients (79.2%) having self-reported good health. There was no difference in the self-reported and physician reported performance status (21/101 (20.8%) patients had impairment identified by each method). Ninety-six patients (95%) exhibited high levels of good general mental health. Depression was reported by twenty-one patients (20.8%).

2.3. Change in MDT recommendation

Among the 101 patients evaluated, a proposed change of the initial cancer treatment plan was made in 21.8% (22/101) after the second MDT. There were no proposals to increase the intensity of the initial cancer treatment plan. A decision to omit chemotherapy was made in 4 patients, and to omit radiotherapy in 15 patients and to omit both chemo and radiotherapy in 2 patients. In one patient a recommendation to omit Zoledronic acid was made as she was noted to have renal impairment. No patients in this cohort were advised to avoid surgery or endocrine therapy following GA assessment.

In the bivariate analysis (Table 3), need for assistance for ADLs, low physical performance (KPS), polypharmacy (3 or more medications), lack of social support (Social Support: Medical Outcomes Study (MOS) Social Support Survey) and high BMI (30 or more) showed significance but, on multivariate analysis only polypharmacy was significantly associated with change in the initial cancer treatment plan.

In the final discussion with the oncologist, the suggested alterations in management were accepted in all 22 patients. Three further patients refused radiotherapy and 8 patients declined chemotherapy (two of these patients were among the 22 patients who had proposed change of treatment based on GA assessment).

Table 2
Geriatric assessment domains.

Measure	Median (Range)	Geriatric impairment identified n (%)	Resulting in MDT Change
Instrumental Activities of Daily Living (IADL)	14 [7–14]	25 (24.8%)	9/25
Medical Outcomes Study (MOS) Activities of Daily Living (ADL)	75 (0–100)	67 (66.3%)	20/67
Karnofsky Performance Status Scale (self-reported)	90 (50–100)	21 (20.8%)	9/21
Karnofsky Performance Status Scale (Physician reported)	90 (50–100)	21 (20.8%)	9/21
Comorbidity: Physical Health Section (Older American Resources & Services Questionnaire (OARS) (>2)	3 (0–8)	53 (52.5%)	15/53
Polypharmacy[a]	4 (0–17)	60 (65.3%)	20/60
Falls in last 6 months[b]		9 (8.9%)	4/9
Unintentional weight loss	0 (0–25 kg)	10 (9.9%)	3/10
BMI (30 or more)	29 (19–53.7)	37 (39.8%)	12/37
Psychological Status: Mental Health Inventory (MHI)-17	79 (38–93)	5 (5%)	1/5
Social Functioning: Medical Outcomes Study (MOS) Social Activity Limitations Measure	58.33 (0–100)	30 (29.7%)	9/30
Social Support: Medical Outcomes Study (MOS) Social Support Survey	100 (0–100)	8 (7.9%)	5/8
Depression[c]		21 (20.8%)	5/21
Timed Up and Go (sec)	12 Sec (6–60)	85 (84.2%)	19/85
Blessed Orientation-Memory-Concentration Test	2 (0–14)	3 (3.0%)	0/3

[a] Polypharmacy (3 or more medications).
[b] Falls in last 6 months: recorded as yes/no.
[c] Depression: recorded as yes/no.

3. Discussion

In this study, nearly half of the patients diagnosed had stage 0 or I, and 77% had node negative disease. These findings are similar to those reported from other breast cancer series suggesting increased prevalence of low-risk disease in older women [30,31]. Only 27% of the patients had high risk disease, defined as node positive ER-positive breast cancer, or Her2-positive or triple negative breast cancer.

There is lack of consensus with regards to the optimal frailty screening tool which is most useful in clinical practice for selecting patients for GA [32–34]. The selection of this tool in our study was based on two considerations; firstly, it was developed and validated in cancer patients. Secondly, it was a self-administered tool, meaning minimal added resources or medical time were required. Our results show the suitability of such a tool in our breast service and that it helps optimize healthcare with minimal additional resources, particularly, as it is not possible to include geriatricians routinely in our MDT. Other studies have also demonstrated the feasibility of self-reported screening tools; a US study showed completion rates of 98% and mean completion time of 15 min [17]. Kalsi et al. also demonstrated feasibility of completing geriatric assessment with a mean completion time of 11.7 min, (86.3% patients did not need any assistance in completing the assessment) [35]. Recruitment for our study was slow as only 37% of patients aged 65 and above treated in the study period were recruited. History of previous cancer, dementia and refusal were the main reasons for patients declining entry into the study, complicated further by the COVID-19 pandemic. Patients were permitted to fill in the forms at home and return them either at their next visit or by post. This allowed remote assessment, especially where transport and social issues might limit the patient's access to clinics.

Analysis of the age-related problems of the 101 patients undergoing assessment, shows that in our cohort, a significant proportion of patients had impaired functional status. Impairment in Activities of Daily Living (ADL) defined by Medical Outcomes Study (MOS) Physical Health Scale was identified in 67 (66.3%) patients. We also found a high rate of psychological distress (low MHI17 scores). The prevailing situation with social isolation imposed by the COVID pandemic was the main reason stated for this.

In this study, the initial treatment plan was changed following the GA in 22 patients (22%). In all cases except one, the amended proposal was to omit chemotherapy and/or radiotherapy. Similar results have been reported by other authors. Okonji et al. observed low chemotherapy (51% vs. 20%, $p < 0.0001$) rates in unfit older patients [20]. Although, the study by Barthelemy et al. failed to show any impact of GA on treatment decisions for chemotherapy in patients with breast cancer, the authors did recognise that only 2/3 of 'fit' patients received systemic adjuvant chemotherapy in their series [14]. In our study, the recommendations for chemotherapy were also low (23/101 patients). However, this was related to the prevalence of low-risk tumours (almost 37% of the cases had in-situ or small, low grade, ER positive, node negative disease). Oncotype Dx Recurrence Scores was done in 31/74 ER-positive, Her-2 negative patients to guide chemotherapy recommendations. Only 7 patients had high Recurrence Scores justifying chemotherapy in ER positive breast cancer.

In our series, the predominant change in MDT recommendations after GA was with regards to radiotherapy after breast conserving surgery (15/22 cases). Most of these patients had surgery performed for low-risk disease. The low absolute risk of ipsilateral breast tumour recurrences without radiotherapy and no impact on regional recurrences, distant metastases, or overall survival, may have influenced the decision of omitting radiotherapy in less fit patients [36].

There was no change in surgical treatment recommendations seen in

Table 3
Bivariate and multivariate association between the change in the initial cancer plan because of GA results.

Variable	Bivariate			Multivariate		
General Characteristics	OR	95% CI	P value	OR	95% CI	P value
Age						
65–69	0.722	0.253–2.058	0.542			
70–74	0.480	0.147–1.566	0.224			
75–79	1.702	0.598–4.841	0.319			
80–84	2.610	0.758–8.987	0.128			
85+	0.000	0.000	0.999			
T1	1.103	0.427–2.852	0.840			
T2-4	0.907	0.351–2.345	0.840			
Node positive	0.576	0.152–2.179	0.416			
LVI	1.166	0.737–1.844	0.512			
Instrumental Activities of Daily Living (IADL)	2.726	0.991–7.497	0.052			
Medical Outcomes Study (MOS) Activities of Daily Living (ADL)	6.809	1.487–31.173	**0.013***			
Karnofsky Performance Status Scale	3.865	1.354–11.032	**0.012***	2.566	0.830–7.930	0.102
Comorbidity: Physical Health Section (Older American Resources & Services Questionnaire	1.888	0.713–5.003	0.201			
Polypharmacy (3 or more medications) n (%)	7.174	1.568–32.826	**0.011***	4.973	1.044–23.692	**0.044***
Number of falls in last 6 months n (%)	3.289	0.801–13.499	0.098			
Unintentional weight loss n (%)	1.624	0.383–6.881	0.510			
BMI (30 or more) n (%)	2.880	1.042–7.962	**0.041***			
Psychological Status: Mental Health Inventory (MHI)-17	0.893	0.095–8.421	0.921			
Social Functioning: Medical Outcomes Study (MOS) Social Activity Limitations Measure	1.912	0.714–5.123	0.197			
Social Support: Medical Outcomes Study (MOS) Social Support Survey	7.451	1.622–34.235	**0.010***	3.995	0.813–19.628	0.088
Depression n (%)	1.158	0.371–3.614	0.800			
Timed Up and Go (sec)	1.247	0.322–4.837	0.749			
Blessed Orientation-Memory-Concentration Test	0.000	0.000	0.999			

our study. This may be a consequence of the small sample size. Moreover, surgery for breast cancer is relatively low risk, and in cases where general anaesthetic is deemed too risky, often it can be carried out successfully under local anaesthesia or regional block. The four patients who received primary endocrine therapy were identified at initial consultation to be too unfit for any surgical intervention and this was confirmed by their poor GA scores. In our cohort, only three patients had no axillary procedure. All these cases were carried out under local anaesthesia and prior clinical and ultrasound assessment of the axilla showed no evidence of nodal metastasis.

Regarding endocrine therapy recommendations, again no effect of GA on recommendation was seen. Aromatase inhibitors are well-tolerated, and they have minimal interaction with other medications. Other reasons for non-significant results with regards to surgery and endocrine therapy may be selection bias or absence of a comparative cohort. This could be minimised by designing a future randomised controlled trial.

In our study, only polypharmacy was associated with a change in the MDT recommendation on multivariate analysis. This may be difficult to compare with previous studies because of the comparative population's heterogeneity (multiple cancers) and the different geriatric evaluation tools used. Chaïbi et al. demonstrated a change of treatment decisions in 82% of older cancer patients (19% had breast cancer) and geriatric treatment intervention based on polypharmacy was proposed in 37% of cases [37]. Sourdet et al. noted the association of low cognition, malnutrition, and low physical performance with change in the initial cancer treatment plan. Our findings maybe different because patients with dementia were excluded [38].

Eleven patients declined recommended chemotherapy and/or radiotherapy, highlights the fact that older patients value their quality of life (QoL) and may opt for lesser treatment to preserve their independence. This is in accordance with other studies which have shown that when compared to younger women, older women value QoL and independence more highly [39]. In the Age Gap Trial also, Wyld et al. demonstrated that use of a decision support tool resulted in older women choosing more primary endocrine therapy vs. surgery [40].

This study has several limitations. It is difficult to assess the generalizability of our results to all older women with breast cancer because of small sample size (n = 101) and the fact that not all the elderly patients treated at our institution during the study period were included, especially patients with metastatic disease and dementia. This subjective selection of patients in this trial may undermine the role of GA because we do not know how many patients who did not undergo geriatric assessment might have obtained an advantage if they had been included. The routine use of a frailty screening tool, validated to determine in which elderly patient geriatric evaluation is useful, would be a major improvement in our practice. Another major limitation of this study is that data was not collected on how many patients completed the assessment without any help. As per the study protocol, the self-reported questionnaire was not followed by a geriatric assessment by a qualified geriatrician. Hence, based on our results, we cannot assess the sensitivity and specificity of the mycarg.org tool in our population. The MDT did not include a geriatrician and hence, their input in the decision making process is not always present. In addition, we did not assess the impact of any subsequent interventions which may have been prompted by the self-reported assessment.

In this study, we have demonstrated the need for further research focusing on incorporating geriatric assessment results to estimate more accurately the benefits of adjuvant chemotherapy in elderly breast cancer patients. This was the focus of the Cancer and Aging Research Group-Breast Cancer (CARG-BC) tool (USA) and the Age Gap tool (UK) [41,42]. The Age Gap Tool is especially useful as it allows active participation of elderly patients in the decision-making process and helps them make an informed decision after considering all the pros and cons of surgery vs. primary endocrine therapy and chemotherapy, including survival estimates. Another important issue to consider in older women is quality of life, especially when it is uncertain what effect treatment has on survival. Fatigue associated with chemotherapy and radiotherapy may diminish a patient's quality of life before any benefits can be seen in terms of disease-free survival and overall survival.

4. Conclusions

In conclusion, our results suggest that in older breast cancer patients, self-administered frailty assessment may influence treatment recommendations in a subset of patients who are candidates for chemotherapy and/or radiotherapy. Taken together, the results of this study emphasise the importance and potential benefit of a complete evaluation of all

older patients and its influence on treatment choices. This study also supports the recommendations of cancer services coming of age report (43). This could be done by increasing geriatric assessment skills within oncology training and encouraging a formal liaison between geriatric and oncology services.

Appendix 1

Description of different domains used to assess frailty	
Functional status	Function status, assessed by patient's ability to complete activities of daily living has been shown to be predictive of treatment related toxicity and survival in cancer patients [18,23,42]. The Instrumental Activities of Daily Living (IADL) is a subscale of the Multidimensional Functional Assessment Questionnaire (MFAQ): Older American Resources and Services (OARS). The OARS MFAQ was developed and then tested in more than 6000 older community residents. It consists of 7 questions rated on a 3-point Likert scale measuring the degree to which an activity can be performed independently [23]. The scores for this domain range from 0 to 14, with a lower score denoting more dependence. In this study, any dependency expressed by the score of less than 13 was considered significant deficit [23,42]. The Activities of Daily Living (ADL) is a subscale of the Medical Outcomes Study (MOS) Physical Health. It measures a broad range of physical functioning ranging from activities for self-care to more vigorous activities, such as running or lifting heavy objects. Items are rated on a 3-point Likert scale measuring independence in performing the activity [23]. Scores for this to mean range from 0 to 100. A lower score reflects more limitation in daily routine activities. In the current study, any dependency expressed by the score of less than 90 was considered significant deficit [42], (43). Karnofsky Performance Rating scale (KPS) The KPS is a measure of patient independence in carrying out routine daily activities and self-care. It was developed in 1948, and since then has been widely used in the oncology practice. It is a global indicator of functional status where patients are given a score on a numerical scale of 0–100 [18]. Both, patient-reported, and physician-reported KPS scale are part of the CARG tool. In the current study, a score of 70 or less was considered significant deficit [18]. Timed Up and Go The Timed Up and Go is a performance test of physical mobility which measures gait speed. It measures time in seconds an individual takes to stand up from a standard armchair, walk a distance of 3 m (10 ft), turn, walk back to the chair, and sit down again. TUG scores have been found to be predictive of functional decline and increasing disability in older cancer patients and increased mortality [24]. For the present study, a score of more than 10 was considered abnormal [18]. Number of falls in last 6 months History of falls not only estimates an older patients' disability, it also increases the risk of treatment associated toxicity. For example, there is an increase in the risk of fracture with fall in the presence of bony metastasis or increased bleeding because of chemotherapy induced haematological disorders [24]. Any history of fall in the last 6 months was considered significant [18].
Physical Health	The OARS (Older Americans Resources and Services) Physical Health Section is a self-reporting comorbidity scale containing a list of comorbid conditions and an assessment of their impact on daily activities, rated on a 3-point scale of "not at all" to "a great deal." The OARS score has been validated in the studies on cancer patients [23]. The OARS assessed 13 common comorbid conditions. Presence of more than 2 comorbidities was considered significant. The number of current medications including over the counter medications was also recorded and poly pharmacy was defined as 3 or more medications [18]. Body mass index In this study a BMI of 30 or more was considered abnormal [18]. Percent unintentional weight loss in the last 6 months Studies on chemotherapy in older patients have shown increased mortality, lower chemotherapy response rates, and decreased performance status in patients with history of weight loss during the 6 months before chemotherapy [28]. Any un-intentional weight loss was considered significant.
Cognition	For assessment of cognition, the Blessed Orientation-Memory-Concentration (BOMC test) is used in the CARG tool. It consists of six questions. The scores were multiplied to yield a weighted score. A higher score more than 11 signifying cognitive impairment [25]
Psychologic	For depression and anxiety assessment, the Mental Health Inventory (MHI)-17 was used. It is a 14-item self-administered questionnaire which provides a score for patient on a scale of 0–100%. A lower score indicates presence of depression and anxiety. For the purpose of this study a score of less than 50 was considered abnormal [26]
Social Functioning	Social Activity Limitations subscale from the Medical Outcomes Study Social Activity Limitations Measure (MOS) was used to assess the impact of physical and emotional status on social functioning. It has four items which are rated on a 5-point Likert scale. The mean of the total score is transformed to a scale of 0–100, with a lower number indicating lack of support available. In this study a score of less than 50 was considered abnormal, [27]. Medical Outcomes Study Social Activity Limitations Measure (MOS) Social Support (MOSS-SS) was used to access to material aid or behavioural assistance and Emotional/Information (the expression of positive affect and empathetic understanding; the offering of advice, information, guidance, or feedback). The scale has two parts with 12 items which were rated on a 5-point Likert scale from "none of the time" to "all of the time" except one item. This domain is also expressed on a scale of zero to 100 with the higher score indicating better social support (Description and Scoring Instructions: MOS Social Support Survey, n.d.). In this study a score of less than 50 was considered abnormal [18].

References

[1] www.who.int. Breast cancer [online] Available at: https://www.who.int/news/fact-sheets/detail/breast-cancer; 2021.

[2] www.uicc.org. Globocan 2020: new global cancer data | UICC (n.d.) [online] Available at: https://www.uicc.org/news/globocan-2020-new-globalcancerdata#:~:text=IARC%20released%20on%2014th%20December%20the%20update d%20Globocan.

[3] Reed M, Audisio AR. Management of breast cancer in older women. Springer International Publishing; 2019.

[4] Our World in Data. University of oxfrod GCDL. https://ourworldindata.org. [Accessed 24 June 2021].

[5] Parks RM, Holmes HM, Cheung KL. Current challenges faced by cancer clinical trials in addressing the problem of under-representation of older adults: a narrative review. Oncol. Therapy 2021;9(1):55–67. https://doi.org/10.1007/s40487-021-00140-w.

[6] Hamaker ME, Stauder R, Munster BC. Exclusion of older patients from ongoing clinical trials for hematological malignancies: an evaluation of the national institutes of health clinical trial registry. Oncol 2014;19(10):1069–75.

[7] Jørgensen TL, Hallas J, Friis S, Herrstedt J. Comorbidity in elderly cancer patients in relation to overall and cancer-specific mortality. Br J Cancer 2012;106(7):1353–60.

[8] Conill C, Verger E, Salamero M. Performance status assessment in cancer patients. Cancer 1990;65:1864–6.

[9] Jauhari Y, Gannon MR, Dodwell D, Horgan K, Tsang C, Clements K, Medina J, Tang S, Pettengell R, Cromwell DA. Addressing frailty in patients with breast cancer: a review of the literature. Eur J Surg Oncol 2019;Jan;46(1):24–32.

[10] Hamaker ME, te Molder M, Thielen N, van Munster BC, Schiphorst AH, van Huis LH. The effect of a geriatric evaluation on treatment decisions and outcome for older cancer patients – a systematic review. J. Geriatric Oncol. 2018;9(5):430–40.

[11] Mohile SG, Dale W, Somerfield MR, Schonberg MA, Boyd CM, Burhenn PS, Canin B, Cohen HJ, Holmes HM, Hopkins JO, Janelsins MC, Khorana AA, Klepin HD, Lichtman SM, Mustian KM, Tew WP, Hurria A. Practical assessment and management of vulnerabilities in older patients receiving chemotherapy: ASCO guideline for geriatric oncology. J Clin Oncol 2018;36(22):2326–47.

[12] Wedding U, Roehrig B, Klippstein A, Steiner P, Schaeffer T, Pientka L, Höffken K. Comorbidity in patients with cancer: prevalence and severity measured by cumulative illness rating scale. Crit Rev Oncol Hematol 2007;61(3):269–76.

[13] Ethun CG, Bilen MA, Jani AB, Maithel SK, Ogan K, Master VA. Frailty and cancer: implications for oncology surgery, medical oncology, and radiation oncology. CA A Cancer J Clin 2017;67(5):362–77.
[14] Barthélémy P, Heitz D, Mathelin C, Polesi H, Asmane I, Litique V, Rob L, Bergerat J-P, Kurtz J-E. Adjuvant chemotherapy in elderly patients with early breast cancer. Impact of age and comprehensive geriatric assessment on tumour board proposals. Crit Rev Oncol Hematol 2011;79(2):196–204.
[15] Ferrat E, Paillaud E, Caillet P, Laurent M, Tournigand C, Lagrange J-L, Droz J-P, Balducci L, Audureau E, Canouï-Poitrine F, Bastuji-Garin S. Performance of four frailty classifications in older patients with cancer: prospective elderly cancer patients cohort study. J Clin Oncol 2017;35(7):766–77.
[16] Aguayo GA, Donneau AF, Vaillant MT, Schritz A, Franco OH, Stranges S, Malisoux L, Guillaume M, Witte DR. Agreement between 35 published frailty scores in the general population. Am J Epidemiol 2017;186(4):420–34.
[17] Hurria A, Lichtman SM, Gardes J, Li D, Limaye S, Patil S, Zuckerman E, Tew W, Hamlin P, Abou-Alfa GK, Lachs M, Kelly E. Identifying vulnerable older adults with cancer: integrating geriatric assessment into oncology practice. J Am Geriatr Soc 2007;55(10):1604–8.
[18] Hurria A, Gupta S, Zauderer M, Zuckerman EL, Cohen HJ, Muss H, Rodin M, Panageas KS, Holland JC, Saltz L, Kris MG, Noy A, Gomez J, Jakubowski A, Hudis C, Kornblith AB. Developing a cancer-specific geriatric assessment. Cancer 2005;104(9):1998–2005.
[19] Parks RM, Hall L, Tang S-W, Howard P, Lakshmanan R, Winterbottom L, Morgan DA, Porock D, Cox K, Cheung K-L. The potential value of comprehensive geriatric assessment in evaluating older women with primary operable breast cancer undergoing surgery or non-operative treatment — a pilot study. J. Geriatric Oncol. 2015;6(1):46–51.
[20] Okonji DO, Sinha R, Phillips I, Fatz D, Ring A. Comprehensive geriatric assessment in 326 older women with early breast cancer. Br J Cancer 2017;117(7):925–31.
[21] Extermann M. A comprehensive geriatric intervention detects multiple problems in older breast cancer patients. Crit Rev Oncol Hematol 2004;49(1):69–75.
[22] Shanyinde M, Pickering RM, Weatherall M. Questions asked and answered in pilot and feasibility randomized controlled trials. BMC Med Res Methodol 2011;11(1).
[23] Fillenbaum GG, Smyer MA. The development, validity, and reliability of the OARS multidimensional functional assessment questionnaire. J Gerontol 1981;36:428–34.
[24] Naeim A, Reuben D. Geriatric syndromes and assessment in older cancer patients. Oncology 2001;15:1567–77.
[25] Kawas C, Karagiozis H, Resau L, Corrada M, Brookmeyer R. Reliability of the blessed telephone information-MemoryConcentration test. J Geriatr Psychiatr Neurol 1995;8:238–42.
[26] Ibbotson T, Maguire P, Selby P, Priestman T, Wallace L. Screening for anxiety and depression in cancer patients: the effects of disease and treatment. Eur J Cancer 1994;30A:37–40.
[27] Stewart AL, Kamberg CJ. Physical functioning measures. In: Stewart AL, Ware JE Jr , editors. Measuring functioning and well-being; the medical outcomes study approach. Durham, NC: Duke University Press; 1992. p. 86–101.
[28] Newman AB, Yanez D, Harris T, et al. Weight change in old age and its association with mortality. J Am Geriatr Soc 2001;49:1309–18.
[29] H. Baartman EA, Geijsen D, van der Leest AH, van den Bongard DJ, van Loon J, Budiharto T, Coebergh JW, Aarts MJ, Struikmans H, LPRO (Dutch National Organization for Radiotherapy in the Elderly). Timed get up and go test and geriatric 8 scores and the association with (ChemoRadiation therapy noncompliance and acute toxicity in elderly cancer patients Int J Radiat Oncol Biol Phys 2017;98(4):843–9 [online]
[30] Morgan JL, Reed MW, Wyld L. Primary endocrine therapy as a treatment for older women with operable breast cancer – a comparison of randomised controlled trial and cohort study findings. Eur J Surg Oncol 2014;40(6):676–84.
[31] Diab SG, Elledge R, Clark G. Tumor characteristics and clinical outcome of elderly women with breast cancer. J Natl Cancer Inst 2000;92(7):550–6.
[32] Hurria A, Dale W, Mooney M, Rowland JH, Ballman KV, Cohen HJ, Muss HB, Schilsky RL, Ferrell B, Extermann M, Schmader KE, Mohile SG. Designing therapeutic clinical trials for older and frail adults with cancer: U13 conference recommendations. J Clin Oncol 2014;32(24):2587–94.
[33] Extermann M, Aapro M, Bernabei R, Cohen HJ, Droz J-P, Lichtman S, Mor V, Monfardini S, Repetto L, Sørbye L, Topinkova E. Use of comprehensive geriatric assessment in older cancer patients. Crit Rev Oncol Hematol 2005;55(3):241–52.
[34] Wildiers H. Siog consensus on geriatric assessment in older cancer patients. J. Geriatric Oncol. 2014;5:S1–2.
[35] Kalsi T, Babic-Illman G, Duraisingham SL, Ross P, Maisey N, Hughes S, Fields P, Brodie H, Wang Y, Harari D. Feasibility, utility of comprehensive geriatric assessment screening via postal questionnaire (CGA-GOLD) in older people with cancer. Eur Geriatric Med 2013;4:S96.
[36] Kunkler IH, Williams LJ, Jack WJL, Cameron DA, Dixon JM. Breast-conserving surgery with or without irradiation in women aged 65 years or older with early breast cancer (PRIME II): a randomised controlled trial. Lancet Oncol 2015;16(3):266–73.
[37] Chaïbi P, Magné N, Breton S, Chebib A, Watson S, Duron J-J, Hannoun L, Lefranc J-P, Piette F, Menegaux F, Spano J-P. Influence of geriatric consultation with comprehensive geriatric assessment on final therapeutic decision in elderly cancer patients. Crit Rev Oncol Hematol 2011;79(3):302–7.
[38] Sourdet S, Brechemier D, Steinmeyer Z, Gerard S, Balardy L. Impact of the comprehensive geriatric assessment on treatment decision in geriatric oncology. BMC Cancer 2020;20(1).
[39] Shrestha A, Martin C, Burton M, Walters S, Collins K, Wyld L. Quality of life versus length of life considerations in cancer patients: a systematic literature review. Psycho Oncol 2019;28(7):1367–80 [online].
[40] Wyld L, Reed MWR, Collins K, Burton M, Lifford K, Edwards A, Ward S, Holmes G, Morgan , Bradburn M, Walters SJ, Ring A, Robinson TG, Martin C, Chater T, Pemberton K, Shrestha A, Nettleship A, Murray C, Brown M. Bridging the age gap in breast cancer: cluster randomized trial of two decision support interventions for older women with operable breast cancer on quality of life, survival, decision quality, and treatment choices. Br J Surg 2021;108(5):499–510.
[41] Magnuson A, Sedrak MS, Gross CP, Tew WP, Klepin HD, Wildes TM, Muss HB, Dotan E, Freedman RA, O'Connor T, Dale W, Cohen HJ, Katheria V, Arsenyan A, Levi A, Kim H, Mohile S, Hurria A, Sun C-L. Development and validation of a risk tool for predicting severe toxicity in older adults receiving chemotherapy for early-stage breast cancer. J Clin Oncol 2021;39(6):608–18.
[42] Department of Health. Cancer services coming of age report published. 2012. webarchive.nationalarchives.gov.uk. [online] Available at: https://webarchive.nationalarchives.gov.uk/20130104170020/. http://www.dh.gov.uk/health/2012/12/cancerservices-report/. [Accessed 5 July 2021].