ORIGINAL ARTICLE

Impact of a Dedicated Geriatric Oncology Service on Rate of Unplanned Hospital Admissions and Length of Stay in Older Cancer Patients: Results of a Pilot Study

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ABSTRACT

Background: Cancer prevalence is greatest in peoples aged >75, a group who have complex care needs requiring longer inpatient admissions compared to their younger counterparts. **Aims:** To evaluate the feasibility of a dedicated geriatric oncology clinic in a tertiary care hospital and its impact on unplanned hospital admission and length of stay in older cancer patients. **Methods:** This is a single centre, prospective pilot study at a Western Australian tertiary hospital comparing patient morbidity, mortality, hospitalisation rates and length of inpatient stay in older cancer patients who attended the geriatric oncology clinic (GO) between Sep 2013- Oct 2014 with those who attended general medical oncology (GMO) clinics. 120 patients aged >75 with newly diagnosed cancer, 60 seen in the GO clinic and 60 seen on the GMO clinic were matched for age and tumour type. **Results:** Patients in the GO group compared to the GMO group showed unplanned readmission rates of 33% and 53% respectively, corresponding with 38% relative risk reduction. Furthermore, the mean length of hospital stay in the GMO group was double that of the GO group (11.05 days and 5.4 days respectively). **Conclusion:** A dedicated geriatric oncology service within a tertiary care hospital is feasible and has the potential to reduce the number of unplanned hospital admissions as well as length of stay in hospital in older cancer patients.

Key words: Geriatric oncology, Comprehensive geriatric assessment

INTRODUCTION

In Western Australia, cancer prevalence is greatest in people aged >75 years, with this age group accounting for the majority of lung, bowel, and prostate cancer diagnoses.[1] With Australia's aging population and the improvements in health care, the number of older cancer patients will increase in coming decades.[2] Traditionally, treatments for older cancer patients do not account for the heterogeneity in the group, potentially resulting in over or under-treatment of some patients. This can have a major impact on patient morbidity, and mortality increasing the strain and costs in the health-care system.[2,3] Older patients have complex care needs, on average they require longer inpatient admissions than their younger counterparts and are affected by factors including comorbidities, their cognitive and functional status, and social situation.[4,5]

Older patients have traditionally been underrepresented in clinical trials. Therefore, extrapolation of results from these trials to older cancer patients should be done with caution as they may not apply to them. Therefore, further research focused on older cancer patients needs to be done to better understand treatment for this patient group.[2]

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Comprehensive geriatric assessment (CGA) is a multidimensional, interdisciplinary diagnostic process that focuses on determining an older person's medical, psychosocial, and functional capabilities.[6] This understanding of the individual allows for an individualized, coordinated, and integrated treatment plan for the patient and may uncover problems that would otherwise go unnoticed.[2,3] A review conducted by Wildiers *et al*. found that compared to the routine performance status assessment in a standard general medical oncology (GMO), CGA was able to identify general health problems that would otherwise be under-recognized and led to a decrease in the aggressiveness of treatments provided for older cancer patients. Previous studies have focused on CGA and id entifying deficiencies in various domains such as activities of daily living, polypharmacy, depression, cognitive status, and comorbidities. However, few of these studies have evaluated the impact of CGA on patient outcomes and health system.[7]

A dedicated GO clinic was established at the Royal Perth Hospital (RPH) to review all patients referred to medical oncology aged ≥75 years. Treatment plans for patients incorporated the expertise of a physiotherapist, pharmacist, dietician, occupational therapist, and social worker along with specialized oncology and geriatric input, aiming to better manage this growing population of patients.

MATERIALS AND METHODS

Prospective data collection was carried out for patients aged ≥75 years seen in the GO Clinic at RPH, which has an established CGA and management program [Figure 1], between September 2013 and October 2014 (n = 60).

Inclusion criteria

The following criteria were included in the study:

a. Age ≥75
b. Diagnosis of localized or advanced cancer and
c. Sound ability to communicate/understand English.

Exclusion Criteria

The following criteria were excluded from the study:

a. Patients from regional Western Australia
b. Hematological malignancy and
c. Patients with behavioral or mental issues that will preclude or compromise their participation in a study.

A comprehensive screening questionnaire (modified Adelaide tool) was posted to participants before their 1st clinic review [Table 1]. Data for the first 60 consecutive patients fulfilling the eligibility criteria listed below were collected. Patients who did not complete the questionnaire before arriving at outpatient's clinic were given the opportunity to complete it in the reception area or in consultation with their oncologist with a geriatric oncology interest.

Table 1: Modified Adelaide tool - comprehensive screening questionnaire

Domains	Assessment
Comorbidities	Total number of comorbidities
Medications	Total number of medications
Physical function	Karnofsky performance scale/ECOG PS
Falls	Number of falls in the past 6 months
Cognition	Are you more forgetful than you used to be?
Nutrition	Unintentional weight loss in the past 6 months
Vision	How is your eyesight? Excellent, good fair, and poor totally blind
Hearing	How is your hearing? Excellent, good fair, good, poor, and totally deaf
Exhaustion	2 questions on exhaustion as used by fried
Pain	11-point numerical rating scale
Distress	11-point numerical rating scale
Social support	Abbreviated medical outcomes scale social support survey (5 questions)
Current support services	List of current support services
Emotional wellbeing	2 questions on mood and interest/ pleasure in doing things

A modified version of Adelaide Tool [Appendix 1], a comprehensive patient completed questionnaire, was used. It assesses functional status (ADLs, physical functioning), physical status using a distress scale, pharmacy, frailty (weight loss, walk time, and exhaustion), comorbidities, and other domains including memory vision and hearing.[8]

A control cohort (n = 60) who was seen through the GMO during that period was identified from the Cancer Registry Data. These patients also fulfilled the criteria for being included in the GO clinic but were seen by oncologists without a geriatric oncology focus but expertise in managing their tumor types as per standard.

In the GO group, specific interventions included medication reconciliation by the departmental pharmacist, physiotherapy and occupational therapy input, social work referral, palliative care/hospice referral, dietician review, geriatrician/ psychologist/memory clinic referral (if indicated), and falls clinic referral. Following patient completion of the screening questionnaire, no cutoffs were used, and referrals were generated if patients were identified to have major deficits in any domain.

The primary objectives of this study were to evaluate: (i) Impact of a geriatric oncology clinic on unplanned hospital admissions and length of stay of older cancer patients and (ii) the feasibility of a dedicated geriatric oncology clinic in a tertiary care hospital defined as the number of patients who completed the screening questionnaire (either themselves or with family member assistance) as a proportion of the total number of questionnaires posted out to them. The secondary objectives of this study were: (i) Incidence of serious treatment-related adverse events and (ii) short-term survival.

Primary endpoints compared the rate of unplanned hospital admission between the GMO and GO groups and mean and cumulative duration of inpatient hospital stay between the two groups. Secondary endpoints compared incidences of Grade 3 or 4 treatment-related adverse events and 6 and 12-month survival rates between the GMO and GO groups. Data for the primary endpoints are presented here.

Statistical analysis

We did a descriptive analysis comparing the two groups in terms of general characteristics, demographics, tumor type, disease stage, and comorbidities. Patient comorbidities were evaluated based on the Charlson *et al*. comorbidity index, which predicts the 1-year mortality for a patient with a range of comorbid conditions. Primary endpoints were analyzed using the intention-to-treat principle. Mean length of stay was compared using an independent *t*-test. All analyses were conducted using STATA 13.0 Ethics. This project was governed by the Research Administration and Governance body of the Ethics Committee at the RPH. All study participants were required to complete a consent form. Eligible patients received information about the purpose, methods and intended possible uses of the study. Those who chose to participate were required to sign a consent form before enrolment. This process was carried out by an independent nurse. Those patients who chose not to participate received standard care. Patients who initially chose to participate were able to withdraw at any point without any detriment to their care. Confidentiality of information and anonymity was ensured by patient de-identification, and data management followed Good Clinical Practice guidelines. Data collection and entry were performed by an independent research nurse and analysis by an independent biostatistician. The investigators have no conflicts of interest to disclose that relate to this study.

RESULTS

A total of 120 patients were included in this study (60 in each group). Baseline demographics of the two groups are summarized in Table 2a and b. The median age of the GO group was 85 years versus 79 years for the GMO group [Figure 1a]. The mean number of medications and comorbidities was higher in the GO group compared to

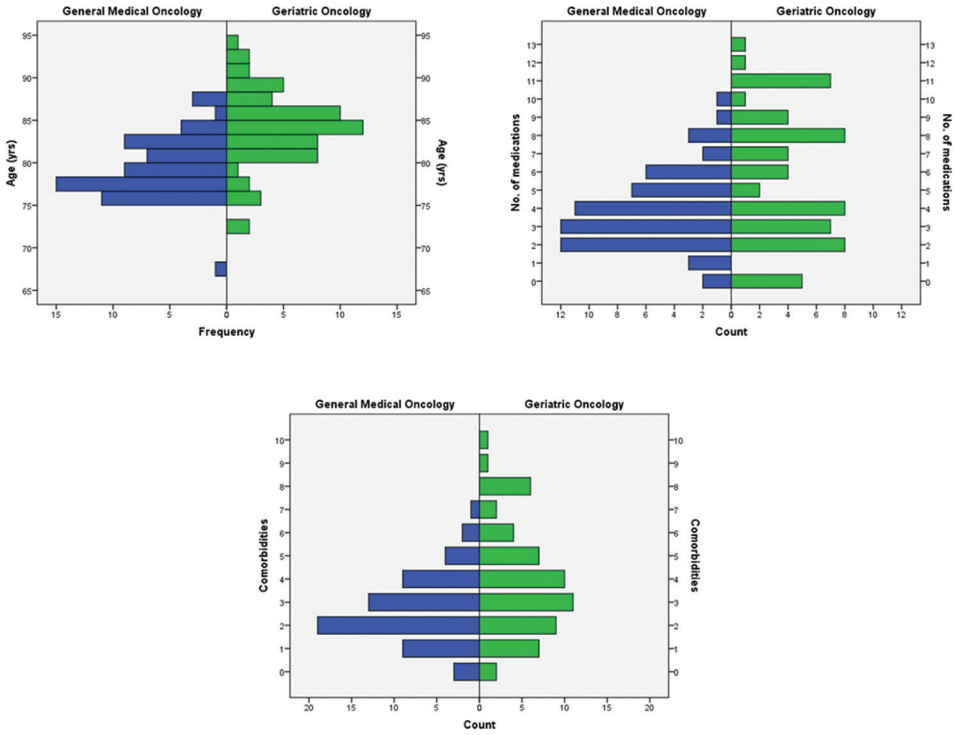

Figure 1: (a)Age distribution in GMO and GO groups (b)Number of medications taken per participant in GMO and GO groups (c)Number of comorbidities in GMO and GO groups

Table 2a: Patient demographics at baseline in GMO and GO groups

Demographics	GMO	Geriatric oncology
	(*n*=60)	(*n*=60)
Median age (years)	79 (68–88)	85 (72–94)
Gender		
Male	40 (67%)	39 (65%)
Female	20 (33%)	21 (35%)
ECOG		
0–1	39 (65%)	45 (75%)
>2	21 (35%)	15 (25%)
Medications (mean)	3.92	5.72
0–5	47 (78%)	30 (50%)
>6	13 (22%)	30 (50%)
Comorbidities (mean)	2.68	3.97
0–4	53 (88%)	39 (65%)
>5	7 (12%)	21 (35%)
Tumor stage		
Loc./locally advanced	24 (40%)	25 (42%)
Metastatic	36 (60%)	35 (58%)

GMO: General medical oncology

Table 2b: Patient demographics at baseline for GO group

Geriatric assessment domain	*n* (%)
Comorbidities	
0–4	39 (65%)
>5	21 (35%)
Medications	
0–5	30 (50%)
>6	30 (50%)
ADLs assistance	
Yes	26 (43%)
No	34 (57%)
IADLs assistance	
Yes	31 (52%)
No	29 (48%)
ECOG PS	
0–1	45 (75%)
>2	15 (25%)
Falls>1 in past 6 months	20 (33.3)
Memory concerns	18 (30%)
Weight loss>5%	25 (42%)
Pain score	
0–5	48 (80%)
>6	12 (20%)
Distress score	
0–5	43 (72%)
>6	17 (28%)

the GMO group (5.7 vs. 3.9 and 3.9 vs. 2.6, respectively) [Figure 1b and c]. There was a relatively higher incidence of melanoma, breast, and upper gastrointestinal cancers in the GMO group in contrast to pancreaticobiliary and carcinoma of unknown primary that was greater in the GO group [Figure 2a]. More patients in the GMO group were treated with curative intent and received chemoradiotherapy and chemotherapy [Figure 2b]. More patients in the GO cohort received best supportive care [Figure 2c].

Geriatric oncology interventions in the GO group are summarized in Table 3. The results from this study indicate that older patients seen in a dedicated GO clinic with CGA had reduced rates of unplanned hospital admissions and the average length of stay in the hospital compared with patients seen through a GMO clinic. The number of admissions to hospital for those seen in the GO clinic was less overall when compared with the GMO clinics. This corresponded to 47% of the GO cohort requiring unplanned hospital admissions over the course of their management compared to 65% of their GMO counterparts (P = 0.052) [Figure 3]. The cumulative length of hospital stay in the GMO group was roughly twice that of the GO group, 663 days versus 324 days, respectively [Figure 4]. There was a difference in the average length of stay of 3.4 days favoring the GO clinic (P = 0.002). The odds of admission in the GO group was a quarter (25%) of the GMO clinic.

Out of the first 60 consecutive patients booked into GO clinic who were posted the screening questionnaire, 51 completed it before arrival at the clinic, and the remaining 9 completed it on arrival at the clinic after a reminder by the reception staff or with the treating clinician.

DISCUSSION

The results from this study indicate that older patients seen in a dedicated GO clinic with CGA had reduced rates of unplanned hospital admissions and the average length of stay in the hospital compared with patients seen through a GMO clinic. This is very encouraging data with potentially huge implications for the global health system where cancer patients are aging and living longer due to the developments in medical and surgical therapies. Timely interventions by addressing the shortcomings in the domains identified through the CGA questionnaire could potentially have helped minimize the unplanned hospital admissions in our study. Besides, the patients and their families could have got the

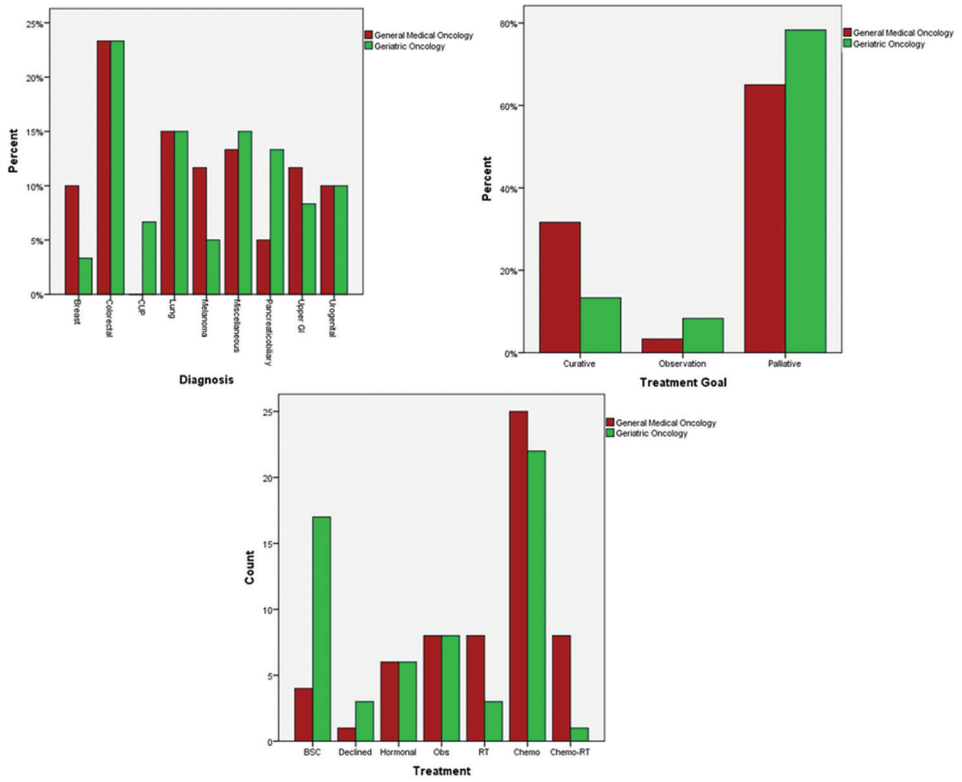

Figure 1: (a)Tumour types in GMO And GO groups (b)Treatment intent in GMO and GO groups (c)Treatment received in GMO and GO groups

Table 3: Geriatric oncology interventions

Geriatric oncology intervention	*n* (%)
Medication reconciliation	34 (57%)
Physiotherapy intervention	39 (65%)
Occupational therapy intervention	30 (50%)
Social worker referral	20 (33%)
Palliative care/hospice referral	20 (33%)
Dietitian review	35 (58%)
Memory clinic referral	18 (30%)
Geriatrician review	2 (3.3%)
Change in treatment decision	5 (8.3%) *7 patients refused treatment voluntarily
Psychologist review	8 (13%)
Falls clinic referral	13 (22%)

help they needed through allied health support in outpatient setting avoiding unplanned admissions, particularly, for social reasons.

The cumulative and mean length of stay was also shorter in the GO group that would help with the patient flow across busy tertiary care public hospitals. Given the allied health, input was initiated earlier in the outpatient clinics in the event of any deficiencies identified in the screening questionnaire; this meant older cancer patients did not have to wait in the inpatient setting awaiting allied health input and to put necessary precautions/equipment in place at their homes. This translated into prompt discharges and reduced the length of hospital stay for this group.

In comparing reasons for hospitalization between treatment groups, 38% and 26% of all hospitalization in the GMO and GO groups, respectively, were treatment-related (i.e. due to febrile neutropenia, febrile illness, GI toxicity, and dehydration). Treatment-related hospital admission rates were lower in the GO reflecting patients were probably better selected and suited for the therapies. This would have avoided over or under treatment of these older cancer patients. Admissions related to symptoms from underlying diseases were similar between the two groups 40% and 39% of all hospitalizations in the GMO and GO groups, respectively, were disease-related (i.e. presenting with dyspnea, nausea, and vomiting, pain, ascites, pleural effusion, thromboembolic events, GI bleed, or GI obstruction). The remaining hospitalizations, 22% and 35% of all hospitalizations in the GMO and GO groups were non-cancer-related (i.e. due to cardiovascular, neurological, or geriatric causes).

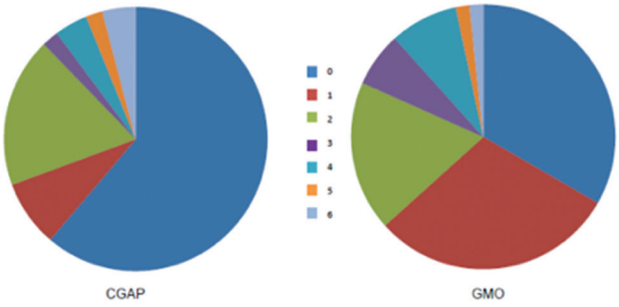

Figure 3: Number of unplanned hospital admission in CGAP and GMO groups

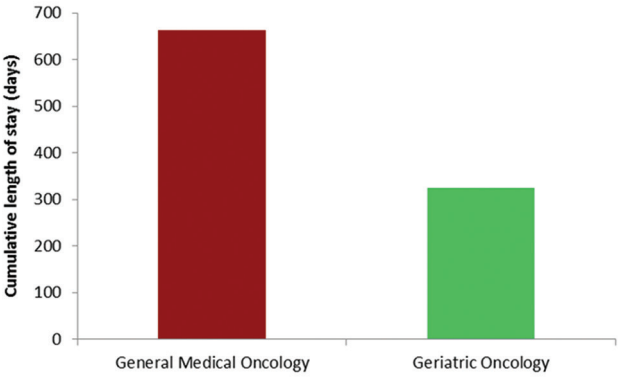

Figure 4: Cumulative length of stay in hospital in GMO and GO groups

A major strength of this study is its prospective nature, where outcome measures can be clearly defined and applied, and multiple outcomes can be studied. Previous studies have looked at identifying various deficits in older cancer patients through CGA, identifying general health problems that would otherwise be under-recognized and led to a decrease in the aggressiveness of treatments provided for older cancer patients. Our study particularly looked at how CGA affects patient outcomes and health-care resource utilization results of this study reflect what is already known and further emphasizes the feasibility of a dedicated GO clinic and its role in reducing the number of unplanned hospital admissions as well as the length of stay in the hospital.

There are many limitations of this study. Patients were not randomized, and the sample size is small from a single cancer center where data were collected retrospectively for the control GMO group. Exclusion criteria such as regional patients and language are some contributing factors to the small sample size. As regional patients received follow-up in regional centers after their care was transferred from tertiary care hospitals, prospective data for them would have been limited. In addition to that, as the screening tool was only available in English, non-English speaking patients had to be excluded from the study for simplicity of the pilot study. Despite balancing for age and stage, there were imbalances in baseline characteristics in the two cohorts. Clinician bias should be factored in this as well as most of the GO cohort patients were reviewed by medical oncologists with interest in CGA. A significant limitation of our analyses is having a population with multiple tumor types and stages, making interpretation of results more difficult as there could have been many tumors related confounding factors.

Although not evaluated in this particular study, there is a plan for a further project to evaluate what interventions were done and their outcomes. In addition to that, a larger randomized controlled trial is needed to more thoroughly assess the impact of CGA on broader aspects of patient care in this particular population.

CONCLUSIONS

A dedicated geriatric oncology service utilizing existing allied health services is feasible in the setting of a tertiary care hospital. CGA can detect problems not appreciated by routine history and physical examination and avoid over or under treatment of older cancer patients. This has the potential to reduce the number of unplanned hospital admission as well as the length of stay in the hospital. Further research is needed to better evaluate this question in a larger randomized study.

REFERENCES

1. Threlfall TJ, Thompson JR. Cancer incidence and mortality in Western Australia, 2012. Department of Health, Western Australia. Perth: Statistical Series Number 99; 2014.
2. Hamaker ME, Buurman BM, van Munster BC, Kuper IM, Smorenburg CH, de Rooij SE. The value of a comprehensive geriatric assessment for patient care in acutely hospitalized older patients with cancer. Oncologist 2011;16:1403-12.
3. Wildiers H, Heeren P, Puts M, Topinkova E, Janssen-Heijnen M, Extermann M, *et al*. International society of geriatric oncology consensus on geriatric assessment in older patients with cancer. J Clin Oncol 2014;32:2595-603.
4. Diwakarla C, Kiberu A, Khattak MA. Implementation of a Comprehensive Geriatric Assessment Program (CGAP) at Royal Perth Hospital (RPH) for Newly Diagnosed Older Cancer Patients. Melbourne: Clinical Oncological Society of Australia (COSA) Annual Scientific Meeting; 2014.
5. McNeil C. Geriatric oncology clinics on the rise. J Natl Cancer Inst 2013;105:585-6.
6. Rubenstein LZ. An overview of comprehensive geriatric assessment: Rationale, history, program models, basic components. In: Rubenstein LZ, Wieland D, Bernabei R, editors. Geriatric Assessment Technology: The State of The Art. New York: Springer; 1995.
7. Schulz KF, Altman DG, Moher D, CONSORT Group. CONSORT 2010 statement: Updated guidelines for reporting

parallel group randomised trials. BMC Med 2010;8:18.
8. Charlson ME, Pompei P, Ales KL, MacKenzie CR, Fields S, Braham RL, *et al.* A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. J Chronic Dis 1987;40:373-83.

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