Published in final edited form as:

J Geriatr Oncol. 2018 September ; 9(5): 534–539. doi:10.1016/j.jgo.2018.02.007.

GERIATRIC ASSESSMENT-DRIVEN POLYPHARMACY DISCUSSIONS BETWEEN ONCOLOGISTS, OLDER PATIENTS, AND THEIR CAREGIVERS

Erika Ramsdale, MD, Tatyana Lemelman, Kah Poh Loh, MD, Marie Flannery, PhD, Lee Kehoe, Teraisa Mullaney, Megan Wells, Nikesha Gilmore, Sandy Plumb, and Supriya Mohile, MD, MS

James Wilmot Cancer Center, University of Rochester, Rochester, NY

Abstract

Objectives—Polypharmacy (PP) and potentially inappropriate medications (PIM) are common in older adults with cancer, increasing the risk of adverse outcomes. Approaches to identifying and addressing PP/PIM are needed.

Materials and Methods—Patients 70 years with advanced cancer were enrolled in this cluster-randomized study. All underwent geriatric assessment (GA), and oncologists randomized to the intervention arm received GA-driven recommendations; no information was provided to oncologists at usual care sites. For patients with PP (5 medications or 1 high-risk medication), clinic visits with treating oncologists were audiorecorded and transcribed, and discussions regarding PP/PIM identified. Quality of provider response was coded as dismissed, mentioned, acknowledged, or addressed.

Results—Forty patient transcripts were analyzed (20 per arm). More discussions occurred in the intervention group (n=81) versus the usual care group (n=51). More concerns per patient were brought up in the intervention group (4.1 vs. 2.6, p=0.07). Physician-initiated discussions were higher in the intervention group (73% vs. 49%, p=0.006). More PP concerns were “addressed” in the intervention group (59% vs. 45%, p=0.1). Oncology supportive care medication concerns were

Address correspondence to: Erika Ramsdale, M.D., James P. Wilmot Cancer Center, 601 Elmwood Avenue, Box 704, Rochester, NY 14642, Phone: 585-275-0394, FAX: 585-273-1051, erika_ramsdale@urmc.rochester.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Disclosures and Conflict of Interest Statements

The authors have declared no conflicts of interest.

Author Contributions

Study concepts: Supriya Mohile, Marie Flannery

Study design: Supriya Mohile, Marie Flannery

Data acquisition: Tatyana Lemelman, Lee Kehoe, Teraisa Mullaney, Megan Wells, Nikesha Gilmore, Sandy Plumb

Quality control of data and algorithms: Supriya Mohile, Marie Flannery, Erika Ramsdale, Kah Poh Loh, Megan Wells, Sandy Plumb

Data analysis and interpretation: Erika Ramsdale, Tatyana Lemelman, Supriya Mohile, Kah Poh Loh, Marie Flannery

Statistical analysis: Erika Ramsdale, Marie Flannery, Lee Kehoe, Teraisa Mullaney, Megan Wells, Nikesha Gilmore, Supriya Mohile

Manuscript preparation: Erika Ramsdale, Tatyana Lemelman

Manuscript editing: Supriya Mohile, Marie Flannery, Kah Poh Loh

Manuscript review: all authors

more often addressed in the usual care group (58% vs 18%, $p=0.008$), but medication management concerns were addressed more commonly in the intervention group (38% vs 79%, $p=0.003$).

Conclusion—In this secondary analysis, a GA-driven intervention increased PP discussions, particularly about total number of medications and medication management. PP/PIM concerns were more commonly addressed in the intervention group, except for the subset of conversations about supportive care medications.

Keywords

Polypharmacy; geriatric assessment

INTRODUCTION

The prevalence of multimorbidity, or multiple chronic health conditions, increases with age.¹ Multimorbidity is associated with polypharmacy (PP), commonly defined as the consumption of 5 or more daily medications.² Older adults are at high risk for PP due to multimorbidity and the involvement of multiple specialists; “prescribing cascades” are also common, whereby new medications are prescribed to treat the adverse effects of other medications.³ PP increases the likelihood of potentially inappropriate medications (PIMs), or medications with risks that may outweigh benefits in older adults. PP and PIMs increase the risk of adverse drug events and interactions, and are associated with additional adverse outcomes including falls, hospitalizations, financial burden to patients and the healthcare system, and mortality.⁴

Cancer prevalence is also associated with aging, and by 2030 it is estimated that 70% of incident cancers will be diagnosed in adults ≥ 65 years.⁵ Antineoplastic treatment regimens, encompassing both antineoplastic agents as well as supportive care medications, can significantly increase the number of prescribed medications: in one study, older patients with cancer were taking an average of 9 medications,⁶ compared to an average of 4 medications for community-dwelling older adults without cancer.⁷ Approaches to identifying and addressing PP in older patients with cancer have not been well-characterized. Several qualitative studies have investigated physician attitudes regarding management of PP in the elderly; however, these studies were not specific to cancer patients, and interventions were not described.^{8, 9} A few studies have investigated “deprescribing” interventions for patients with cancer, but these have largely focused on patients at the end of life.¹⁰

Guidelines recommend the administration of a Geriatric Assessment (GA) to all older patients with cancer.^{11, 12} The GA is a multidisciplinary assessment of a patient’s function across multiple domains, including PP, using sets of validated instruments. It detects deficits not revealed by the standard oncologic evaluation,¹³ and has been shown to predict survival¹⁴ and chemotherapy toxicity^{15, 16} in older adults with cancer. Multiple validated tools exist for the assessment of PP/PIM as part of the GA;¹⁷ the Beers Criteria, last updated in 2015¹⁸ has been the most widely utilized. Studies are underway to investigate how the GA may be used to trigger interventions for older cancer patients at risk for adverse outcomes, including those related to PP/PIM.

Given the risk and prevalence of PP concerns in older adults with cancer, and significant gaps in knowledge regarding how to address these concerns, data collected from an ongoing national clinical trial was used to explore this issue. This secondary analysis investigates and compares the frequency, nature, and efficacy (appropriateness) of conversations about PP between patients, caregivers, and oncologists.

MATERIALS AND METHODS

Patient Selection

A descriptive comparison study was conducted on a subset of patients participating in the multisite cluster randomized national Improving Communication in Older Cancer Patients and Their Caregivers (COACH) study (University of Rochester Cancer Center NCI Community Oncology Research Program [URCC NCORP] Study #1307, [clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT02107443) #NCT02107443). All eligible participants were 70 years of age or older, had a diagnosis of advanced solid tumor malignancy or lymphoma, impairment in at least one of eight geriatric domains other than PP (such as cognition, function, or psychological status) and were receiving antineoplastic therapy including hormonal treatment, chemotherapy, monoclonal antibody therapy, or other targeted therapy. Patients included in this analysis had impairments in PP identified in the GA, as defined by either: 1. taking 5 medications daily; or 2. taking at least 1 high risk medication as defined by the 2015 Beers Criteria.¹⁸

Antineoplastic therapies and topical medications (including prescription eye drops) were excluded from the medication count, but oral/injectable vitamins and supplements were included. Forty patients were selected for inclusion (20 from the intervention group and 20 from the control group). The 40 patients were identified by screening all study participants who had PP impairments in order of consecutive ID numbers. To obtain the required sample size 31 patients were screened for the control group and 27 patients were screened for the intervention group.

Procedures/Intervention

In the multicenter, cluster randomized COACH study, prospectively enrolled older cancer patients received a GA prior to starting antineoplastic therapy. Community oncology practice sites within the URCC NCORP were randomized to either control or intervention. Human subjects approval was obtained for all settings, recruitment occurred at the local practice site, and all patients, caregivers and oncologists signed informed consent. All patients completed a baseline GA using validated tools^{19–28} known to predict morbidity and mortality in older community dwelling older adults.²⁹ For those randomized to the intervention arm, oncologists were provided the GA results, including a summary of impairments and recommendations for management of these impairments (developed by geriatric oncology experts and guidelines³⁰) including PP recommendations. Control group sites received no additional information. Following completion of their GA, patients returned for a clinical encounter with their treatment provider, which was audio-recorded. In this subset, 28 treatment providers were included: 19 providers had 1 patient in the cohort, 6 providers had 2 patients, and 3 providers had 3 patients.

Measures

Demographic data and GA data were collected at baseline for all patients. Measures related to PP conversations at oncology provider follow-up visits were obtained from the audio-transcript of the clinical encounter. The transcript was transcribed verbatim, checked for accuracy and de-identified. Narrative content in the transcripts were extracted based on *a priori* criteria and a coding manual. The coding schema was developed by experts in geriatric oncology and narrative coding, and was designed to capture and evaluate the appropriateness of communication for age-related concerns discussed during the clinical encounter. The coding schema includes definitions of each code and the specific steps the coders executed during the coding process. Coders were blinded to treatment allocation. To ensure reliability of results all transcripts were double coded. In addition, the team of coders received extensive training, and had weekly consensus meetings with PI (SM) involvement to resolve any disputes and to receive ongoing training. Interrater reliability was assessed on an ongoing basis to ensure reproducibility of results.

Transcripts were reviewed and during initial read-through every mention of a medication was identified; multiple PP concerns could be present within any one transcript. Atlas Ti coding software was used to facilitate coding. Next, variables were extracted and recorded specific to every mention of PP concern including: type of PP concern; initiator of the discussion (physician, patient, caregiver, or other healthcare professional); quality of the healthcare team's response to the PP concern, and all recommendations provided to the patient for management of the PP concern (Table 1). After the subset of 40 patients was selected, a further detailed review of transcripts was conducted by an additional independent coder (TL, with review by MF and SM). Using the Atlas Ti data base, every PP concern was reviewed and the transcript re-reviewed for more detailed analysis of PP concerns, and summarized recommendations.

Descriptive statistics were generated for the cohort. Bivariate associations were analyzed with chi-square tests for categorical variables and t-tests for continuous variables.

RESULTS

Description of Sample

The subjects were 45% female, with a mean age 77 years (range 70 – 89). All patients were taking at least 1 high-risk medication per Beers criteria (range: 1–4). Patients were taking an average of 11 medications (range: 2 – 19); 37 patients (93%) were taking 5 daily medications, and 23 (58%) were taking 10 daily medications. There were no significant differences between the control and intervention groups in any demographic or GA variables at baseline (Tables 2 and 3). There was not a one-to-one enrollment of patients to providers, given the structure of the trial; 19 providers were associated with one patient in this analysis, 6 with 2 patients, and 3 with 3 patients. Of the 21 patients who had providers involved with >1 patient, 10 were in the control group, and 11 were in the intervention group.

Polypharmacy Discussions and Response Characteristics

Discussions about PP were identified in 100% of control patients' transcripts and 85% of intervention patients' transcripts. Three transcripts had no evidence of any PP discussion despite the finding of impairments in PP on the baseline GA assessment. A total of 51 discussions took place in the control group compared to 81 discussions in the intervention group. A greater number of PP concerns per patient were brought up in the intervention group compared to the control group (4.1 vs. 2.6, $p = 0.07$). There were significant differences in the types of PP discussions that took place between the two study arms: discussions related to supportive care medications accounted for 51% and 27% in the control and intervention groups, respectively ($p = 0.006$), though the total number of supportive care medication discussions did not differ between groups (26 versus 22, $p = \text{NS}$). Discussions related to total number of medications accounted for 0% and 12% in control and intervention groups, respectively ($p = 0.009$). The percentage of total concerns related to medication management (i.e., management of medications for conditions other than cancer) was also higher in the intervention group compared to the control group (52% vs. 31%, $p=0.02$, Figure 1).

Figure 2 depicts who initiated PP discussions in the control and intervention groups, respectively. Physician-initiated discussions were significantly higher in the intervention group (73% vs. 49%, $p = 0.006$). In reviewing the quality of discussion, no PP concerns were dismissed. More PP concerns were appropriately addressed in the intervention group compared to patients in the control group (59% vs. 45%) although this difference was not found to be significant ($p = 0.1$). Interestingly, supportive care medication concerns were more commonly addressed appropriately in the control group (58% vs 18%, $p = 0.008$), but medication management concerns were addressed appropriately more commonly in the intervention group (38% vs 79%, $p = 0.003$). Figure 3 displays the quality of responses by type of concern.

Implementation of GA Recommendations by Healthcare Providers for Management of Concerns

For all PP concerns coded as "addressed," at least one intervention was identified. Table 4 delineates the interventions performed in each group; starred items denote implementation of individualized recommendations given to the treating providers as part of the GA-driven intervention. Of note, there were a greater number of medications discontinued in the intervention group compared with the control group (4 vs. 1), though this trial was not designed to recommend or capture deprescribing interventions.

DISCUSSION

The U.S. population is aging, and the number of older cancer patients is anticipated to increase dramatically over the next several decades.⁵ Older adults are at higher risk for PP/PIM, ADEs, and drug-drug, drug-chemotherapy, and drug-condition interactions compared to younger patients.^{31–33} These are potentially modifiable risk factors associated with adverse outcomes such as functional decline, morbidity, and mortality. Although several screening tools exist for the identification of PP/PIM in older adults,¹⁷ oncologists may lack

the time, resources, and/or training to assess and intervene on medication issues, particularly those unrelated to the cancer diagnosis. However, during active treatment for cancer, patients often see their oncologists frequently and may sacrifice visits to other providers; the oncologist commonly becomes the de facto primary care provider for these patients. Therefore, interventions targeting PP/PIM may be most effective in the oncology clinic. In this exploratory analysis, we investigate whether GA-driven recommendations can influence discussions about PP in vulnerable older cancer patients.

In this cluster randomized study, significantly more polypharmacy discussions occurred at intervention sites where physicians were provided with their patients' GA results coupled with individualized recommendations, compared to "usual care" sites where providers did not receive GA results and recommendations. Physician discussions within this group of patients placed more emphasis on management of non-cancer medications compared to discussions in the control group. Despite the small sample size, significant between group differences were found for initiation of polypharmacy discussions and type of PP discussions. The increase in total number of PP discussions seen in intervention patients was largely due to a greater number of concerns raised regarding total number of medications and medication management. These types of discussions are an important component of geriatrics-sensitive care. Discussions related to oncology supportive care medications appear to be part of the standard of care within oncology practices and the number of occurrences of these discussions was not significantly different between the groups.

However, despite a similar number of supportive care medication discussions between groups, the quality of response to supportive care medication concerns was higher overall in the control group, with a higher percentage coded as "addressed." Moreover, despite the higher number of discussions overall in the intervention group, 3 transcripts within this group (15%) contained no discussions about PP/PIM, whereas all transcripts in the control group contained at least one such discussion. These findings may indicate a lack of time during the encounter to address all the oncologic and geriatric concerns, and prioritization of other discussions. As shown in Table 3, these patients often have multiple impairments, and for the intervention group these were all reported to the oncology provider coupled with recommendations to implement. Further analysis from this study will seek to elucidate how providers, patients, and caregivers are allocating their time and attention during the clinical encounter; these patients are vulnerable with complex care needs being treated in community oncology practices, where prolonged clinic visits are often not feasible.

Despite potential time and resource barriers, alerting healthcare providers to medication related vulnerabilities identified by the GA linked to recommendations did incite important conversations with patients and their caregivers about their medications, representing a shift in physician behavior. Possible interventions for management of PP concerns, including comprehensive medication reviews, assessing patient adherence, and discussing goals of care, have been suggested in previous studies, though these have largely been limited to the general geriatric population and most did not assess how these interventions impact physician behavior.³⁴ A few studies have investigated pharmacist-driven medication reviews, including in older cancer patients,³⁵ but to date these have not demonstrated improvement in overall patient outcomes.³⁶

A systematic review concluded that physicians were most prone to altering their behavior and implementing new guidelines in response to active forms of continued medical education (CME) or “multifaceted interventions”.³⁷ The GA is a guideline-driven, validated assessment that has been associated with treatment-specific outcomes in older cancer patients.¹⁵ This study shows that GA-driven interventions, such as were used in this study, can shift provider awareness to aging-related issues such as PP/PIM and alters behavior within the clinical encounter. However, within the intervention group, 3 of 20 patient transcripts contained no PP/PIM discussions; clearly, this intervention was not sufficient to change behavior for all providers.

Strengths of this study include the multicenter, randomized design and accrual of patients at community oncology practices, simulating “real-world” conditions and mitigating the risk of patient selection bias. Additionally, it examined the actual communication that occurred during an oncology visit specific to polypharmacy, based on verbatim transcripts. Despite the small sample size, significant differences were found between groups; however, this study was a secondary analysis of existing data, limiting the conclusions that may be drawn from this study. In particular, this subanalysis was not designed to detect differences in patient outcomes. Accrual to the study is ongoing, with planned further analysis of the intervention and outcomes. This analysis should be considered hypothesis-generating, and further work will investigate whether the GA-driven intervention for patients with PP/PIM can improve toxicity or survival outcomes. Future research will also focus on the role of deprescribing in enhancing outcomes in these vulnerable patients undergoing cancer treatment.

The GA has been shown to be a useful tool in assessing vulnerabilities in older patients with cancer. Identification of patients with PP, linked to expert individualized recommendations, increases the number of physician-initiated discussions and may improve their quality and effectiveness. PP and PIMs are significant but modifiable drivers of adverse outcomes, and further studies are urgently needed in the rapidly growing population of vulnerable older adults with cancer.

Acknowledgments

The work was supported by a Patient-Centered Outcomes Research Institute (PCORI) Program contract (4634); UG1 CA189961 from the National Cancer Institute; and R01 CA177592 from the National Cancer Institute. This work was also made possible by the generous donors to the Wilmot Cancer Institute geriatric oncology philanthropy fund. All statements in this report, including its findings and conclusions, are solely those of the authors, do not necessarily represent the official views of the funding agencies, and do not necessarily represent the views of the Patient-Centered Outcomes Research Institute (PCORI), its Board of Governors, or Methodology Committee.

References

1. Salive ME. Multimorbidity in older adults. *Epidemiol Rev.* 2013; 35:75–83. [PubMed: 23372025]
2. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf.* 2014; 13:57–65. [PubMed: 24073682]
3. Rochon PA, Gurwitz JH. Optimising drug treatment for elderly people: the prescribing cascade. *BMJ.* 1997; 315:1096–9. [PubMed: 9366745]

4. Lau DT, Kasper JD, Potter DE, Lyles A, Bennett RG. Hospitalization and death associated with potentially inappropriate medication prescriptions among elderly nursing home residents. *Arch Intern Med.* 2005; 165:68–74. [PubMed: 15642877]
5. Smith BD, Smith GL, Hurria A, Hortobagyi GN, Buchholz TA. Future of cancer incidence in the United States: burdens upon an aging, changing nation. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology.* 2009; 27:2758–65. [PubMed: 19403886]
6. Sokol KC, Knudsen JF, Li MM. Polypharmacy in older oncology patients and the need for an interdisciplinary approach to side-effect management. *J Clin Pharm Ther.* 2007; 32:169–75. [PubMed: 17381667]
7. Charlesworth CJ, Smit E, Lee DS, Alramadhan F, Odden MC. Polypharmacy Among Adults Aged 65 Years and Older in the United States: 1988–2010. *J Gerontol A Biol Sci Med Sci.* 2015; 70:989–95. [PubMed: 25733718]
8. Clyne B, Cooper JA, Hughes CM, Fahey T, Smith SM. team O-Ss. 'Potentially inappropriate or specifically appropriate?' Qualitative evaluation of general practitioners views on prescribing, polypharmacy and potentially inappropriate prescribing in older people. *BMC Fam Pract.* 2016; 17:109. [PubMed: 27515854]
9. Sinnige J, Korevaar JC, van Lieshout J, Westert GP, Schellevis FG, Braspenning JC. Medication management strategy for older people with polypharmacy in general practice: a qualitative study on prescribing behaviour in primary care. *Br J Gen Pract.* 2016; 66:e540–51. [PubMed: 27266862]
10. Lindsay J, Dooley M, Martin J, et al. The development and evaluation of an oncological palliative care deprescribing guideline: the 'OncPal deprescribing guideline'. *Support Care Cancer.* 2015; 23:71–8. [PubMed: 24975044]
11. Hurria A, Browner IS, Cohen HJ, et al. Senior adult oncology. *J Natl Compr Canc Netw.* 2012; 10:162–209. [PubMed: 22308515]
12. Wildiers H, Heeren P, Puts M, et al. International Society of Geriatric Oncology consensus on geriatric assessment in older patients with cancer. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology.* 2014; 32:2595–603. [PubMed: 25071125]
13. Repetto L, Fratino L, Audisio R, et al. Comprehensive geriatric assessment adds information to Eastern Cooperative Oncology Group performance status in elderly cancer patients: an Italian Group for Geriatric Oncology Study. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology.* 2002; 20:494–502. [PubMed: 11786579]
14. Honecker FU, Wedding U, Rettig K, Huschens S, Bokemeyer C. IN-GHO Advisory Board. Use of the Comprehensive Geriatric Assessment (CGA) in elderly patients (pts) with solid tumors to predict mortality. *J Clin Oncol (Meeting Abstracts).* 2009; 27:9549-.
15. Hurria A, Togawa K, Mohile SG, et al. Predicting chemotherapy toxicity in older adults with cancer: a prospective multicenter study. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology.* 2011; 29:3457–65. [PubMed: 21810685]
16. Extermann M, Boler I, Reich RR, et al. Predicting the risk of chemotherapy toxicity in older patients: the Chemotherapy Risk Assessment Scale for High-Age Patients (CRASH) score. *Cancer.* 2012; 118:3377–86. [PubMed: 22072065]
17. Whitman AM, DeGregory KA, Morris AL, Ramsdale EE. A Comprehensive Look at Polypharmacy and Medication Screening Tools for the Older Cancer Patient. *Oncologist.* 2016; 21:723–30. [PubMed: 27151653]
18. By the American Geriatrics Society Beers Criteria Update Expert P. American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. *Journal of the American Geriatrics Society.* 2015; 63:2227–46. [PubMed: 26446832]
19. Davous P, Lamour Y, Debrand E, Rondot P. A comparative evaluation of the short orientation memory concentration test of cognitive impairment. *Journal of neurology, neurosurgery, and psychiatry.* 1987; 50:1312–7.
20. Costa D, Severo M, Fraga S, Barros H. Mini-Cog and Mini-Mental State Examination: agreement in a cross-sectional study with an elderly sample. *Dement Geriatr Cogn Disord.* 2012; 33:118–24. [PubMed: 22508578]
21. Guigoz Y, Vellas B, Garry P. Mini nutritional assessment: a practical assessment tool for grading the nutritional state of elderly patients. *Facts Res Gerontol (second).* 1994:15–59.

22. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. *Journal of the American Geriatrics Society*. 1991; 39:142–8. [PubMed: 1991946]
23. Guralnik JM, Simonsick EM, Ferrucci L, et al. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol*. 1994; 49:M85–94. [PubMed: 8126356]
24. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of Illness in the Aged: The Index of ADL: A Standardized Measure of Biological and Psychosocial Function. *Jama*. 1963; 185:914–9. [PubMed: 14044222]
25. Lawton MP. Scales to measure competence in everyday activities. *Psychopharmacol Bull*. 1988; 24:609–14. [PubMed: 3074322]
26. Hurria A, Gupta S, Zauderer M, et al. Developing a cancer-specific geriatric assessment: a feasibility study. *Cancer*. 2005; 104:1998–2005. [PubMed: 16206252]
27. Wild B, Eckl A, Herzog W, et al. Assessing generalized anxiety disorder in elderly people using the GAD-7 and GAD-2 scales: results of a validation study. *Am J Geriatr Psychiatry*. 2014; 22:1029–38. [PubMed: 23768681]
28. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research*. 1982; 17:37–49. [PubMed: 7183759]
29. Extermann M, Hurria A. Comprehensive geriatric assessment for older patients with cancer. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*. 2007; 25:1824–31. [PubMed: 17488980]
30. Mohile SG, Velarde C, Hurria A, et al. Geriatric Assessment-Guided Care Processes for Older Adults: A Delphi Consensus of Geriatric Oncology Experts. *J Natl Compr Canc Netw*. 2015; 13:1120–30. [PubMed: 26358796]
31. Stepney R, Lichtman SM, Danesi R. Drug-drug interactions in older patients with cancer: a report from the 15th Conference of the International Society of Geriatric Oncology, Prague, Czech Republic, November 2015. *Ecancermedicalscience*. 2016; 10:611. [PubMed: 26823680]
32. Popa MA, Wallace KJ, Brunello A, Extermann M, Balducci L. Potential drug interactions and chemotoxicity in older patients with cancer receiving chemotherapy. *J Geriatr Oncol*. 2014; 5:307–14. [PubMed: 24821377]
33. Maggiore RJ, Gross CP, Hurria A. Polypharmacy in older adults with cancer. *Oncologist*. 2010; 15:507–22. [PubMed: 20418534]
34. Steinman MA, Hanlon JT. Managing medications in clinically complex elders: "There's got to be a happy medium". *Jama*. 2010; 304:1592–601. [PubMed: 20940385]
35. Nightingale G, Hajjar E, Swartz K, Andrei-Sendecki J, Chapman A. Evaluation of a pharmacist-led medication assessment used to identify prevalence of and associations with polypharmacy and potentially inappropriate medication use among ambulatory senior adults with cancer. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*. 2015; 33:1453–9. [PubMed: 25800766]
36. Cooper JA, Cadogan CA, Patterson SM, et al. Interventions to improve the appropriate use of polypharmacy in older people: a Cochrane systematic review. *BMJ Open*. 2015; 5:e009235.
37. Mostofian F, Ruban C, Simunovic N, Bhandari M. Changing physician behavior: what works? *Am J Manag Care*. 2015; 21:75–84. [PubMed: 25880152]

Figure 1.
Polypharmacy Concerns Discussed by Group.

Figure 2.
Initiation of Polypharmacy Concerns.

Figure 3.
Quality of Responses to Polypharmacy Concerns.

Table 1

Subcodes and definitions used in analysis.

Type of Polypharmacy Concern	
Subcode	Definition: any mention of...
Supportive Care Medications	use of med for the adverse effects of treatment
Number of Medications	total number of meds
High Risk Medications	use of high-risk meds as defined by Beers Criteria
Drug/Drug Interactions	potential for adverse interactions between meds
Medication Management	use of medications for comorbid conditions
Age-Related Side Effects	age-related side effects from non-cancer meds
Quality of Response to Polypharmacy Concern	
Subcode	Definition: the healthcare provider...
Dismissed	actively shut down, ignored, moved away from, or minimized the concern expressed
Mentioned	asked/began conversation about non-cancer medications or supplements
Acknowledged	explored the issue but did not implement any care processes
Addressed	implemented appropriate care processes to address the concern

Table 2

Patient demographics at baseline.

	Control	Intervention
Age (mean)	77.5	76.8
Gender		
Male	60%	50%
Female	40%	50%
Race/ethnicity		
White/non-Hispanic	90%	95%
African-American	10%	5%
Education Level		
High school	60%	65%
> High school	40%	35%
Marital Status		
Divorced	10%	25%
Married	70%	60%
Single, never married	0%	5%
Widowed	20%	10%
Income Level		
50k	55%	60%
>50k	20%	20%
Decline/unknown	25%	20%
Patient's Living Situation		
+Child/relative	10%	5%
+Spouse/partner	65%	60%
+Spouse/partner and child	10%	0%
Lives alone	15%	0%
Nursing home	0%	10%
Self-Identified Health Status		
Excellent	10%	5%
Very good	25%	15%
Good	30%	45%
Fair	25%	20%
Poor	5%	15%
Unknown	5%	0%

Baseline GA Results: % impaired

Table 3

Baseline geriatric assessments.

Domain	GA Tool	Control	Intervention
Cognition	BOMC	5%	5%
Cognition	Mini-Cog	50%	40%
Nutrition	Wt loss >10%	25%	15%
Nutrition	BMI < 21	25%	5%
Nutrition	MNA	75%	60%
Functional	TUG	45%	25%
Functional	SPPB	85%	70%
Functional	ADL	25%	20%
Functional	IADL	55%	35%
Functional	OARS	65%	80%
Functional	Falls	25%	25%
Comorbidity	OARS	55%	75%
Affective	GAD	5%	10%
Affective	GDS	25%	30%
Social	OARS	35%	25%

BOMC: Blessed Orientation-Memory-Concentration; BMI: Body Mass Index; MNA: Mini Nutritional Assessment; TUG: Timed Up and Go; SPPB: Short Physical Performance Battery; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; OARS: Older Americans Resources and Services Questionnaire; GAD: Generalized Anxiety Disorder; GDS: Geriatric Depression Scale

Table 4

Interventions in Response to Polypharmacy Concerns

Specific Concern	Interventions in Control Group	Interventions Intervention Group
Supportive Care Medications	<ul style="list-style-type: none"> - Side effect diary recommended - Prescription for medication provided to patient - Over the counter medication recommended - Reviewed appropriate timing for administration of medication - Financial assistance offered to patient and caregiver - Medication reduction recommended - Instructions provided to patient and caregiver to discontinue medication and replace with dietary supplement 	<ul style="list-style-type: none"> - Reviewed justification for use of medication - Reviewed appropriate timing for administration of medication - Reviewed and clarified current supportive care medication prescriptions
Number of Medications	N/A	<ul style="list-style-type: none"> - Handouts from UpToDate® provided to patient and caregiver * - Reviewed and/or consolidated medications * - Pillbox recommended * - Referred patient to primary care provider for medication review - Referred patient to uptodate.com - Inquired into patient's eyesight to ensure that patient is not having trouble seeing medication names and instructions
High Risk Medications	<ul style="list-style-type: none"> - Recommended against medication discontinuation until alternate medication can be provided to patient - Information provided on an appropriate diet while patient is on medication 	N/A
Drug/Drug Interactions	N/A	<ul style="list-style-type: none"> - Reviewed medication * - Evaluated drug/drug interactions *
Medication Management	<ul style="list-style-type: none"> - Prescription provided to patient for new or current medications - Reviewed medications - Instructions provided to patient for alternative regimen 	<ul style="list-style-type: none"> - Reviewed and clarified current prescriptions * - Instructed patient to bring all medications to next appointment * - Medication discontinuation or reduction recommended * - Reviewed * and coordinated medication with outside living facility - Personal telephone number provided to patient - Prescription provided to patient for new or current medications

Specific Concern	Interventions in Control Group	Interventions Intervention Group
		<ul style="list-style-type: none"> - Pillbox recommended * - Review of appropriate timing and usage of medication
Age-Related Side Effects	<ul style="list-style-type: none"> - Agreed with patient choice to discontinue medication 	<ul style="list-style-type: none"> - Personal telephone number provided to patient

* Individualized recommendations given to the treating providers as part of the GA-driven intervention.