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An interprofessionally developed geriatric oncology curriculum for hematology–oncology fellows

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Abstract

Objective—Because the cancer population is aging, interprofessional education incorporating geriatric principles is essential to providing adequate training for oncology fellows. We report the targeted needs assessment, content, and evaluation tools for our geriatric oncology curriculum at MD Anderson Cancer Center.

Methods—A team comprising a geriatrician, a medical oncologist, an oncology PharmD, an oncology advanced nurse practitioner, and two oncology chief fellows developed the geriatric oncology curriculum. First, a general needs assessment was conducted by reviewing the literature and medical societies' publications and by consulting experts. A targeted needs assessment was then conducted by reviewing the fellows' evaluations of the geriatric oncology rotation and by interviewing fellows and recently graduated oncology faculty.

Results—Geriatric assessment, pharmacology, and psychosocial knowledge skills were the three identified areas of educational need. Curriculum objectives and an evaluation checklist were developed to evaluate learners in the three identified areas. The checklist content was validated by

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Author Contributions

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consulting experts in the field. Online materials, including a curriculum, a geriatric pharmacology job aid, and pharmacology cases, were also developed and delivered as part of the curriculum.

Conclusion—An interprofessional team approach was a successful method for identifying areas of learners' educational needs, which in turn helped us develop an integrated geriatric oncology curriculum. The curriculum is currently being piloted and evaluated.

Keywords

Curriculum; Education; Fellowship; Geriatric oncology; Hematology/oncology

1. Introduction

Cancer is more prevalent among older people, with more than 50% of cancer diagnoses and deaths seen in patients older than 65 years; about 20% of patients with cancer are aged 80 years or older.¹ The incidence of cancer in the United States will increase in coming decades, primarily due to the increasing population of older persons; thus, more geriatric oncology training will be needed.²

An Oncology Geriatric Education Retreat, held under the auspices of the John A. Hartford Foundation and the American Geriatrics Society in San Juan, Puerto Rico, in 1997, emphasized this need for developing geriatric oncology curriculum content in various areas including geriatric clinical pharmacology, geriatric assessment, common geriatric syndromes, and symptom management and supportive care.³ Some organizations have responded to this need by emphasizing the importance of geriatric oncology training. The American Society of Clinical Oncology (ASCO) has included geriatric oncology as part of the "core curriculum" proposed for general hematology/oncology fellowship programs.⁴ ASCO has also added online modules on the treatment of elderly patients with cancer to their ASCO University educational website.⁵ The Accreditation Council for Graduate Medical Education (ACGME) guidelines for hematology/oncology fellowship programs, issued in 2007 and updated in 2012, also emphasized the need to include geriatric oncology training in these programs' curricula.⁶

Many needs assessment surveys have been conducted to assess the need for an integrated geriatric oncology curriculum and to determine the areas that need to be covered in such a curriculum. A survey administered to Hematology–Oncology Program directors during the 2008 ASCO annual meeting in Chicago showed that only 32% of training programs had a formal curriculum that covered topics in geriatric oncology; 82% of the respondents, however, indicated that they would be willing to use a geriatric oncology curriculum, if available, as part of their training program curriculum.⁷ Another important study conducted by Moy et al.⁸ addressed this issue in 2013. In that study, the authors asked geriatric oncology experts about the highest priority issues that need to be addressed by ASCO and other societies with respect to the geriatric oncology missions of education, research, and patient care. On the basis of the results from these interviews, the authors developed a new survey that they gave to 117 members of the International Society of Geriatric Oncology. The results showed that in the area of education, the highest priority perceived was the integration of geriatric oncology knowledge into the educational programs of trainees and

clinicians.⁸ More recently, a survey of oncology fellows conducted by Maggiore et al.⁹ in 2014 showed that the fellows perceived a lack of formal geriatric oncology training, variability in confidence in managing older patients with cancer, and a desire to participate in geriatric oncology-based clinics.

We conducted a literature search for integrated geriatric curricula with different specialties and found that although many non-oncology integrated geriatric curricula were published.^{10–15}, very few integrated geriatric oncology fellowship curricula have been published to date.¹⁶

The geriatric oncology rotation at MD Anderson Cancer Center was an ideal rotation in which to develop an integrated geriatric oncology curriculum for fellows as this rotation started in 2010, and was thus very new and not yet formalized. We here report the needs assessment, content, and learners' assessment tools for our new integrated, interprofessionally developed geriatric oncology curriculum at MD Anderson Cancer Center.

2. Methods

An interprofessional team comprising a geriatrician, a medical oncologist, an oncology PharmD, an oncology advanced nurse practitioner, and two oncology chief fellows was formed. A general needs assessment was conducted by reviewing the literature and medical societies' publications. Two expert leaders in the field of geriatric oncology were also consulted. A targeted needs assessment was conducted by reviewing pre-existing geriatric oncology rotation evaluations of MD Anderson trainees and by interviewing trainees and recently graduated oncology faculty.

The team members met monthly or bimonthly starting in January 2013. The curriculum development strategy followed the six-step approach for curriculum development in medical education described by Kern et al.¹⁷: conducting a general needs assessment; conducting a targeted needs assessment; identifying goals and objectives; planning educational strategies; delivering the content; and evaluating the curriculum.

2.1. General Needs Assessment

PubMed was searched for published geriatric oncology curricula. Medical education and geriatric repositories such as MedEdPortal and the Portal of Geriatric Online Education (POGO-e) were also searched. Two expert leaders in the field of geriatric oncology were asked about existing curricula. Finally geriatric and geriatric oncology journals were searched for curricula.

2.2. Targeted Needs Assessment

Fellows who either trained or were in training at MD Anderson Cancer Center as well as MD Anderson Cancer Center faculty were interviewed face to face and by phone. This group comprised four first-year fellows, three second-year fellows, two third-year fellows, and two junior MD Anderson Cancer Center oncology faculty who graduated from fellowships within the past three years. One of the two faculty interviewed had trained at

MD Anderson Cancer Center and the other had trained in a different academic fellowship program. During these interviews, open-ended questions regarding gaps in geriatrics education, educational needs, and clinical practice were asked. A group interview was conducted with two third-year and one second-year hematology–oncology fellows. These fellows interviewed as a group were different from those interviewed individually. The fellows interviewed represented both genders and trained in different internal medicine residency programs. The fellows were asked open-ended questions regarding gaps in geriatrics education and educational needs. The interviews' structure and questions are illustrated in Fig. 1. Finally, the geriatrics rotation evaluations for the 2012–2013 academic year (12 rotations with 1–2 fellows per rotation) were reviewed and analyzed.

The interprofessional team acted as a continuous focus group to guide the curriculum development phases over an 18-month period. The instruction design portion of the curriculum development process similarly adopted an interprofessional longitudinal iterative process, with which we developed materials, pilot-tested them during the rotation, and further adapted them to overcome any unforeseen barriers. We started by defining the goals and objectives, choosing the instruction materials, and designing an evaluation tool to assess mastery of the skills achieved by the learners based on the predefined objectives and guided by the needs assessment and the interprofessional team consensus.

The current manuscript does not involve human subject research; therefore Institutional Review Board approval was not required.

3. Results

Areas of educational needs identified included assessment of which elderly patients would benefit most from chemotherapy versus supportive care alone, risk assessment before initiating treatment in an elderly patient with cancer, polypharmacy, management of adverse effects of chemotherapy in elderly patients with cancer, quick geriatric assessment that could be used during each visit, scoring systems that predict chemotherapy toxicity in elderly patients, tools that estimate life expectancy of elderly patients, and discussion with patients on quality of life and transitioning to palliative care. Consistently expressed needs were comprehensive geriatric assessment and geriatric oncology pharmacology. Psychosocial knowledge and skills were indirectly mentioned as educational needs by some of the learners and faculty who were interviewed but were mostly identified by the interprofessional team. On the basis of these findings, three areas of learners' educational needs were identified: comprehensive geriatric assessment (CGA), geriatric oncology pharmacology, and psychosocial knowledge and skills. The curriculum goals and objectives are shown in Table 1.

A learner's assessment 10-item checklist was designed based on the needs assessment results (Fig. 2). Face and content validity of the checklist were done by seeking feedback from geriatric, oncology, geriatric oncology, pharmacy, and nursing experts in the field. This group of experts consisted of one internal geriatrician, two external leaders in geriatric oncology, one internal oncology PharmD, and two external nursing faculty. Both nursing faculty have completed the University of Texas sponsored Houston Geriatric Education

Center Certificate of Excellence in Geriatrics: Preparing our Future Health Care Workforce for the Aging Boom.¹⁸ The purpose of this checklist was to guide the curriculum and instruction development and to facilitate the tangible items that need to be taught by faculty and demonstrated by fellows during their rotation. Therefore, the checklist was designed as a formative and not a summative evaluation tool. New learning materials including a geriatric pharmacology job aid (Table 2) and pharmacology cases were developed (available upon request from the authors).

The curriculum was delivered by using Sakai, an open source online course management system. We chose an electronic online portal to host the curriculum in order to facilitate the implementation of the curriculum and to allow more flexibility for both instructors and learners. With the help of the academic technology team at MD Anderson Cancer Center, we created a course site on Sakai to host the curriculum materials, learners' assessment tools, and a curriculum evaluation questionnaire.

Major components of the new geriatric rotation are displayed in Table 3, and the rotation syllabus is shown in Fig. 3.

In summary, one or two oncology fellows rotate one-half day per week in the geriatrics clinic at MD Anderson Cancer Center. While providing consultative geriatrics care to older oncology patients, oncology fellows learn how to perform a geriatric assessment and how to use the results to guide treatment decision-making. They also learn principles of appropriate prescribing, with a focus on pharmacokinetic and pharmacodynamic changes with aging that affect chemotherapy dosing. Finally, the fellows learn to provide oncology care with a focus on the significant psychosocial issues that affect the daily life of older patients. While on the rotation, fellows complete readings in the syllabus and apply the knowledge from those readings to the care of consultative patients. They complete ASCO-University modules and have just begun incorporating pharmacology cases into the rotation.

4. Discussion

Given that hematology–oncology fellows may have limited prior training in geriatrics and limited time devoted to geriatric oncology during their fellowship training, a focused, concise curriculum was greatly needed in order to provide structure and to fulfill these overall objectives. This geriatric oncology curriculum was designed to meet the growing need to train fellows to incorporate geriatrics principles into the care of older oncology patients.

The development of our curriculum is timely. The ACGME has recently implemented the New Evaluation System based on educational milestones and Entrustable Professional Activities (EPAs) that track to one or more competencies.¹⁹ The assessment checklist that has been developed as part of this proposed curriculum assesses multiple competencies. In our opinion, if combined with other competencies such as oncology knowledge and communication skills, the checklist constitutes an excellent assessment for geriatric oncology EPAs. An example for a geriatric oncology EPA could be to assess an elderly patient with cancer for appropriateness for chemotherapy. To do this the learner would have to be able to demonstrate his/her knowledge about efficacy and toxicities of chemotherapy;

to communicate with the patient; to do a comprehensive geriatric assessment; to assess for drug interactions with existing medications and chemotherapy; and to assess comorbidities as well as renal and hepatic functions). Integration of our curriculum into the fellowship's established competencies, milestones and EPAs could help ensure buy-in and sustainability at our program and at other sites, if disseminated.

We found CGA to be a key part of a geriatrics curriculum for oncology fellows. CGA is used for multidimensional assessment of older persons and includes validation tools that assess physical function, comorbidity, functional status, cognition, mood, nutrition, social support, and medication use.²⁰ In addition to being comfortable in performing a comprehensive assessment of an older patient with cancer, oncology fellows needed to learn how to apply focused evaluations in their own clinical practice. To that end, the curriculum also included briefer scoring systems based on CGA that could be applied in oncology clinical practice.^{21,22}

Our needs assessment showed the gap in education of fellows in appropriate medication selection and dosing during cancer therapy. Education must be focused on the age-associated effects of pharmacology on comorbidities and on organ function, and such effects must be incorporated into decisions on drug selection and appropriate dosing for geriatric patients being treated for cancer. Finally, the needs assessment also confirmed that psychosocial and cultural factors may influence the geriatric oncology patient's care.^{23–25} Although the psychosocial knowledge and skills necessary to care for elderly patients with cancer were not directly mentioned as educational needs by the learners and faculty who were interviewed, our interprofessional team recognized that this needed to be included in our curriculum. The external experts who reviewed our curriculum's objectives and assessment tools validated this decision.

The curriculum was implemented in October 2013 and has been gradually phased in as individual components were developed and agreed upon by the interprofessional team members. Future plans for curriculum components include incorporation of reflective and interactive learning activities, i.e., videos or role-play that may enhance the fellows' understanding of incorporating the geriatric patient's unique situation and may optimize their delivery of geriatric oncology care. The next steps will be to evaluate the curriculum and the achievement of stated objectives for the curriculum. In the future, we hope to disseminate our findings and the curriculum to other hematology–oncology programs.

Our curriculum has numerous strengths. The major strength, in our opinion, is that it is an interprofessionally developed curriculum built on the expertise of various specialists in different areas of cancer care. This collaborative approach has been proven to be a successful model in academic centers.²⁶ The involvement of two chief fellows in the curriculum developing team has also ensured a learner-centered approach. The systematic curriculum development approach with multiple revisions over an 18-month period used by the interprofessional team allowed continuous evaluation of the curriculum. This continuous evaluation has guided the development, implementation, and evaluation of new educational materials such as the learner's assessment checklist, pharmacology cases, and job aids.

The use of Sakai to host the curriculum materials and assessment tools is an additional strength of our curriculum. Using this online course management system has allowed hosting of self-learning materials and web links that facilitated the implementation of the curriculum and allowed flexibility for both instructors and learners. We anticipate that this system will improve the educational experience for both faculty and learners.

Our study also had some limitations. The general needs assessment was based on published literature reviews on PubMed. A survey of fellowship programs and a search of the unpublished literature were not conducted. This could have enriched the needs assessment, but since our plan was to develop this curriculum based on a targeted needs assessment, a more extensive general needs assessment was not conducted. Another potential limitation is that we did not use a survey for the targeted needs assessment. Instead we used fellow evaluations and interviews; faculty interviews; our team as a focus group; and external experts. The reason we used these other methods instead of a survey is that, based on fellows' interviews, these methods were thought to be better tools to identify the needs for our curriculum. The interviewed fellows' perception was such that they were getting too many surveys that they had to rush through them or not do them at all. These limitations, and the fact that the curriculum was developed based on the experience of one institution, may affect the curriculum's generalizability.

We do not think that this will necessarily be relevant since the three identified areas based on the needs assessment are consistent with previously published materials showing their relevance and validating our work.^{7,8,27} Also, although the targeted needs assessment was primarily based on feedback from fellows who either trained or are currently in training at MD Anderson Cancer Center, some of the faculty interviewed had trained in other fellowship programs. The geriatric oncology and nursing experts who were consulted about the checklist were from outside our institution.

Due to a number of factors, we have not yet begun formal evaluation of the curriculum. Small numbers of faculty and fellows have used the curriculum to date, given that our institution has a limited number of current geriatric faculty available to instruct the curriculum (two geriatricians) and there is a limited number of fellows per rotation (1–2 fellows/ rotation). We thus saw the need to develop a brief assessment survey specific for the curriculum. We are now in the process of evaluating and reviewing the curriculum, which will be the subject of a future publication.

In conclusion, an interprofessional team approach proved to be a successful method of identifying areas of learners' educational needs, which in turn helped in the development of an integrated geriatric oncology curriculum. The curriculum is currently being piloted and evaluated at MD Anderson Cancer Center. Future publications are planned to report the results of the curriculum evaluation and its impact on learners and health care outcomes.

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Faculty interview questions (Phone interviews):

- 1) In your opinion, what topic areas you think need to be covered in fellows' geriatric oncology training that will be useful for them in their future practice?
- 2) In your opinion, in what ways should these topics be taught? (Standardized patients? Real patients? Lectures? Videos? NCCN guidelines?)

Fellows' interview questions (Face to Face interviews):

- 1) Previous training experiences related to geriatric oncology?
- 2) Existing proficiencies related to geriatric oncology?
- 3) Past and current performances in relation to geriatric oncology?
- 4) Attitudes about the geriatric oncology topic and/or curriculum?
- 5) Learning style and needs?
- 6) Familiarity with and preferences for different learning methods?
- 7) Are there other additional areas that need to be learned regarding this topic other than the ASCO curriculum?
- 8) Do you think any of the following could help better identify the need for the curriculum: Fellows surveys, Fellows focus groups, Faculty surveys, Faculty focus groups, Direct observation in clinic, Other (please list)?

Fig. 1.
Interviews' structure and questions.

Geriatric Oncology Assessment Checklist			
Hematology-Oncology Fellowship			
MD Anderson Cancer Center			
Fellow: _____		Date: _____	
0 = Not observed (would have been appropriate) 1 = More emphasis recommended 2 = Accomplished very well			
Comprehensive Geriatric Assessment Skills			
0	1	2	1- Used an existing scoring tool (such as the CARG or CRASH score) to quantify geriatric assessment?
0	1	2	2- Used existing tools (such as SPPB, TGUG or gait speed) to conduct objective physical performance assessment?
0	1	2	3- Determined non-cancer prognosis to guide treatment recommendations?
0	1	2	4- Determined the need for cognitive screening, and used a valid screening tool (such as the mini-COG, MoCA, MMSE) if appropriate?
0	1	2	5- Used a screening tool for depression (such as the GDS or PHQ-9)?
Pharmacology Skills			
0	1	2	6- Reviewed the patient's medication list (therapeutic duplications, no indication, drug/drug interactions)?
0	1	2	7- Considered comorbidities, labs, organ dysfunction (renal/hepatic) and past tolerance when selecting medications and dosages for treatment?
0	1	2	8- Adjusted chemotherapy dosages and provided additional supportive care (hydration, electrolytes, antiemetics, pain meds, etc.) as warranted?
Psychosocial Skills			
0	1	2	9- Inquired about having a designated care giver who can assist him/her with their health care during their oncology treatment?
0	1	2	10- Identified facilitators/barriers to care (age related generational factors, cultural diversity, religion, socioeconomic factors, language) that influence patient care?
Strengths:			
Recommendations:			

Form adapted with permission of Peggy Hsieh, Ph.D. University of Texas Medical School @ Houston. Office of Educational Programs Version 2.0

Fig. 2.
Geriatric oncology assessment checklist.

Curriculum Syllabus:

All readings can be found in "Course Materials". Supplementary reading materials are also in Course Materials in the References folder. All ASCO University modules can be accessed at university.asco.org, with your login credentials.

Week One:

1. Pre-rotation assessment / Geriatric Oncology Checklist
2. Readings: CRASH Score (Extermann, et al, Cancer, 2012), CARG Score (Hurria, et al, JCO, 2011)

Week Two:

1. Readings: Prognostic Indices (Yourman, JAMA, 2012), navigate ePrognosis site (eprognosis.org)
2. ASCO University Assessment of the Older Cancer Patient module: use the ASCO-U Geri-Onc tab in Sakai, or go to <http://university.asco.org/cancer-care-older-patients> >> click "Login" >> click "Access Course" >> click "Assessment of the Older Cancer Patient"

Week Three

1. Readings: Inappropriate Medications in the Elderly (Beers Criteria, JAGS, 2012)
2. ASCO University Pharmacology and Aging module: use the ASCO-U Geri-Onc tab in Sakai, or go to <http://university.asco.org/cancer-care-older-patients> >> click "Login" >> click "Access Course" >> click "Pharmacology and Aging"
3. Pharmacology Cases

Week Four

1. Review of readings and cases
2. Post-rotation evaluation

Fig. 3.
Geriatric oncology curriculum syllabus.

Table 1

Curriculum goals and objectives.

Domain	Goals	Objectives
Learning	The learners will master geriatric oncology skills to provide more appropriate treatment individualized to each elderly patient with cancer.	<p>1 — The learners will demonstrate mastery of the geriatric assessment skills by screening for at least one geriatric syndrome in more than 90% of encounters measured by the evaluation checklist.</p> <p>2 — The learners will demonstrate mastery of geriatric oncology pharmacology measured by making correct choices for drug interactions, chemotherapy drugs, and supportive care medications as well as chemotherapy dose adjustments and elimination of polypharmacy in >90% of cases measured by the evaluation checklist.</p> <p>3 — The learners will obtain designation of patient's caregiver and will identify the facilitators/barriers for patient's care in more than 90% of the encounters measured by the evaluation checklist.</p>
Educational process	The learners will demonstrate satisfaction with the curriculum on a survey questionnaire at the end of the geriatric oncology rotation.	Given a survey questionnaire at the end of the curriculum asking about their perception about the curriculum, the learners and faculty will have a >90% satisfaction score.

Table 2

Geriatric oncology pharmacology job aid.

Medications	Effect	Reference
Allopurinol inhibits oral 6-MP metabolism	Increased exposure to 6-mercaptopurine	Zimms 1983, PMID: 6580097
Anthracyclines	Incidence of CHF after anthracyclines increases progressively after age 70	Balducci 1999, PMID: 10758578 Aapro 2010, PMID: 20956616
Bevacizumab	Significant increase in ATE's in patients > 65 years of age	Cassidy 2010, PMID: 19904559 Ranpura 2010, PMID: 20156114
Carboplatin (flat dose) with aminoglycosides	Hearing loss	Lee 1988, PMID: 3278122
Capecitabine	Adverse effects not greater in elderly patients; remember to adjust for renal function (adjustments begin at CrCl = 50)	
Dexamethasone and aprepitant	Inhibits hepatic metabolism of dexamethasone — reduce dexamethasone dose	
Docetaxel	Patients >65 years of age increased risk for neutropenia (Grade 4) and more febrile neutropenia	Ten Tije 2005, PMID: 15718305
Etoposide	More Grade 4 toxicities in older patients	Miller 1997, PMID: 9815741
Age a significant predictor of toxicity to fluorouracil (PS is not correlated to toxicity)	Monitor patients over 75 years of age receiving fluorouracil closely	Stein 1995, PMID:7804963
Imatinib	Higher rates of myelosuppression and hypothyroidism for patients on levothyroxine	De Groot 2005, PMID: 16198662
Phenytoin increases metabolism of irinotecan	Decreased effect of irinotecan	Prados 2004, PMID: 14769140
Melphalan in the elderly with renal dysfunction	Dose adjust in myeloma patients	Sirohi 2001, PMID: 11487259
NSAIDs reduce methotrexate clearance	Increased methotrexate toxicity	
Omeprazole and benzodiazepines	Inhibition of hepatic metabolism of BZD, enhanced effects	Gerson 2001, PMID: 11396546
Paclitaxel	Reduced tolerance in patients with cancer over 75 years of age	Lichtman 2006, PMID: 16567769
Reglan and SSRI	Risk of serotonin syndrome	Fisher 2002, PMID: 11816261
Avoid verapamil/diltiazem with sunitinib and pazopanib	These nondihydropyridine calcium channel blockers are CYP-3A4 inhibitors	María José Méndez-Vidal 2012, PMID: 22821550
Phenytoin and phenobarbital, inhibit hepatic metabolism of taxol	Increased paclitaxel exposure	Chang 1998, PMID: 9626220
Decrease warfarin metabolism — fluconazole, tramadol, and tylenol	Decrease of warfarin metabolism, increased risk of bleeding	Scher 1997, PMID: 9161668

Run a drug/drug interaction report for any patient on ketoconazole, warfarin or phenytoin.

Table 3

Components of the geriatric oncology curriculum.

Curriculum components	Details
Clinical geriatric experience (4 weeks in duration)	Half day per week in the outpatient geriatric clinic: Geriatric oncology patient care Outpatient geriatric consultation clinic
Self-learning modules	Online curriculum using SAKAI course management system hosting: Two new pharmacology cases Geriatric oncology articles NCCN senior adult oncology link ASCO University geriatric oncology link
Assessment of learners	Knowledge and skills' pretests and posttests using the checklist (faculty observes an encounter conducted between the fellow and a real patient) and pharmacology cases.
Evaluation of the curriculum	Learners' feedback questionnaire evaluating the curriculum