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Development of an Oncology Elective in a Pharmacy School

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Article Info

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Abstract

Purpose: The demand for oncology pharmacists has increased since 2008 and about 1% of the nations licensed pharmacists consider themselves board certified oncology pharmacists despite it being the second largest specialty after pharmacotherapy and one of the firsts to develop in the Board of Pharmacy Specialties. The purpose of this paper is to provide information on how an oncology elective in a pharmacy school was developed, what it consisted of and to provide results of student surveys on it.

Basic Procedures: The oncology elective was offered to third year pharmacy students in their last term of didactic pharmacy courses. Electives are chosen by students; who are required to take two electives each term in their third year. Topics covered in the elective ranged from double checking a chemotherapy order, making chemotherapy with a closed system transfer device, new drugs, first line treatment articles, oral targeted chemotherapy agents, nutrition for oncology patients to a service learning project that was oncology related.

Main Findings and Conclusions: The oncology elective overall received positive feedback. Thirty-two of forty-three students (74.4%) filled out the end of course student evaluation. As rated by the students in the course, overall the mean score of the course was 4.4 out of 5 (88%).

Keywords: Oncology; Elective; Pharmacy school.

Abbreviations: BCOP: Board Certified Oncology Pharmacists; PCOM-SOP-GA: Philadelphia College of Osteopathic Medicine School of Pharmacy Georgia Campus; IRB: Institutional Review Board

Introduction/Background

Cancer has been increasing in the United States for the past decade and impacts nearly every American in the United States. There were over 310,000 cancer related deaths in men and over 275,000 cancer related deaths in women in the United States in 2014. The incidence of cancer is expected to increase over the next few decades [1].

Pharmacists play a significant role in oncology in various practice settings. They counsel patients on oral and intravenous chemotherapy medications, assist with writing chemotherapy orders, round with oncologists, prepare and dispense chemotherapy, assist patients with costs of medications, and play a role in oncology research studies. The demand for oncology pharmacists has increased since 2008 and about 1% of the nations licensed pharmacists are Board Certified Oncology Pharmacists (BCOP) [2].

Due to the increase in cancer diagnoses, there has also been an increase in the amount of cancer drugs that have been utilized. As mentioned earlier, pharmacists play

a major role in counseling patients about adherence, adverse effects and adjusting dosages for drugs in collaboration with the physician. Increased communication with patients and explanation of the cancer itself to patients can lead to greater patient satisfaction [3]. A plethora of these skills are developed in various courses in pharmacy school. At Philadelphia College of Osteopathic Medicine School of Pharmacy Georgia Campus (PCOM-SOP-GA Campus), the biggest exposure the pharmacy students have to oncology is in the integrated therapeutics V module that is offered the winter term of the third professional year for twelve weeks as a four credit hour course (56 lecture hours). An oncology elective was developed to further increase skills, knowledge and interest in pharmacy students. This study went through the Institutional Review Board (IRB) and received an exempt status letter.

Materials/Methods

The oncology elective which was developed was offered to third year pharmacy students in their last term of didactic pharmacy courses. Electives are chosen by students who are required to take two electives each term in their third year. Forty-three students were in the elective in the year 2015. The course was developed by an assistant professor of pharmacy practice who had training in a post-graduate residency for oncology with an oncology-based practice site at a small private hospital. This one credit hour course consisted of twelve lecture hours which met for two hours on Wednesday mornings from the beginning of March 2015 to the beginning of May 2015.

A couple of studies have been done to measure the impact of an oncology elective on career choices for pharmacy students or to see if it helps students achiever higher grades in required therapeutics courses. One study assessed the impact of developing a 1 credit hour oncology elective for third year pharmacy students on examination scores in a required pharmacotherapeutics course. It was hypothesized that students who had taken an oncology elective would receive higher examination scores in the pharmacotherapeutics area. The study found consistently over the years from 2009-2011 that exam scores in the pharmacotherapeutics course were higher for the students who took the elective vs. students who did not take the elective. Unexpectedly, they also found that students who had taken the oncology elective were requesting more oncology rotations [3].

Another study assessed the impact an elective in oncology had on pharmacy students in choosing a career path. This was assessed by administering a survey to students before and after the oncology course was completed. A decrease in interest was seen in students who had taken the elective in becoming an oncology pharmacist, taking part in an oncology specialty residency or becoming board certified as an oncology pharmacist. However, they did conclude that providing elective courses in specialty pharmacy practice areas allows the student to make better informed decisions about their career plans [4].

Topics covered in the oncology elective included an introduction to the course and chemotherapy, supportive care, medication errors, long-term effects of chemotherapy, complementary and alternative medicine, hospice and palliative care, ethical dilemmas, and a service learning reflection activity. The pharmacotherapeutics required course prior to taking the oncology elective covered diagnosis, treatment, signs and symptoms, etiology and pathophysiology of various cancers, supportive care and oncologic emergencies and medicinal chemistry, pharmacology and therapeutics on chemotherapy drugs. Topics covered in the elective are discussed in the following paragraphs.

The first week consisted of an introduction to the course and discussion of long-term effects of chemotherapy on patients. This included a 10% quiz to gauge how much the students have retained in the previous required oncology course. Some students were impressed with the amount of knowledge that they did retain from the prior exposure, while for others realized the need for re-enforcement.

The second week was spent going over chemotherapy orders and the process involved with checking chemotherapy orders as a pharmacist. For many students, this was the first exposure they had to actual chemotherapy orders; it was a good learning opportunity for the students to see the extensive involvement of a pharmacist in the process of checking a chemotherapy order.

The third week, we went over closed system transfer devices. A demonstration was shown to the students using one of the companies' devices, PhaSeal. The students were exposed to standard methods preparation of intravenous medications in their laboratory courses, but it was imperative to explain and demonstrate the differences and the rationale behind closed system transfer devices. Students were given a mock chemotherapy order with mistakes in it and the students were assigned to double check the order to find mistakes. They then made the chemotherapy product in the laboratory using closed system transfer devices provided by PhaSeal. All students were assessed using a rubric for accuracy (Figure 1) of checking the chemotherapy order and sterile products technique.

Competency	Pass*/NP	Comments
1. Student was able to choose correct fulids, pre-medications and post-medications according to the regimen given on the order.		
2. Student was able to double check the chemotherapy order and calculate BSA, CrCl and doses.		
3. Student was able to utilize the closed system transfer device appropriately.		
4. Student performed appropriate gowning procedures before compounding (including washing hands, head cover, shoe cover)		
5. Student performed procedures for initial cleaning of hood with 70% isopropyl alcohol.		
6. Student selected correct products (including syringes, needles, drug vials, IV solution).		
7. Student operated aseptic technique (alcohol wipes on each product to be used)		
8. Student operated at least 6 inches in the hood.		

9. Student attached needle onto correct size syringe.		
10. Student withdrew air using plunger on syringe.		
11. Student applied negative pressure to with draw the appropriate volume of drug from vial (if needed).		
12. Student injected the correct volume of fluid into the bag.		
13. Student correctly labeled all products prepared with expiration dates and signatures.		
14. Student discarded contaminated needles and syringes in appropriate sharp containers.		
15. Student performed the procedures for final cleaning of the hood.		

*For steps 1 and 2, studnets will receive partial credit and must obtain a 70% to pass the activity. For steps 3-15, students must pass 9 of 13 steps (70%) to pass the activity.

Pass/NP: Pass/No Pass; BSA: Body Surface Area; CrCl: Creatinine Clearance; IV: Intravenous.

Figure 1: Sterile Products Activity Rubric.

The fourth week involved a lecture-based approach. The lecture was on Waldenstorm macroglobulinemia as it was one of the many cancers not discussed in the required course previous to the elective. The student's feedback included enthusiasm and curiosity about this rare form of cancer. The students were also taught about oral chemotherapy agents this week as students may encounter it whether they work in hospital or retail. Two fourth year students that were on their oncology rotation at a local hospital were asked to prepare a short lecture that they would present to the class about molecular targeting in oncology. The students in the elective were pleasantly surprised to see their colleagues present on this topic. At the beginning of the course, the students were assigned in pre-selected groups of 4-5 to create a PowerPoint presentation on a journal club article on the gold standard treatment of a particular cancer type. Also on week five, the students were graded via a rubric (Figure 2) and were asked to complete student evaluations (Figure 3) on one another. The power point slides were due a week before the presentation due date. In that time, presentations were verified for validity and accuracy. Upon presentation day, the groups would display their presentations slides or their journal club word document at the head of the class and each member of the group would speak about various parts of the presentation. Each member was required to present; correct pronunciations and presentation skills (i.e., eye contact, not having to look at the slides repeatedly, etc.) were taken into account for grading. If a group were to not meet passing requirements for the assignment, then the group was to submit a paper talking about the epidemiology, etiology, risk factors, signs and symptoms and treatment of the cancer of which they were assigned. The students were expected to be knowledgeable on their presentation topic, for questions from the audience were encouraged. Also, at the beginning of the course, the students were assigned in pre-selected groups of 4-5 students (these were the same groups that the students were in for the gold standard presentation) to complete an "updates" in oncology presentation. The groups were to use the same type of cancer type that they used for the previous presentation. The same as for the gold standard presentation, some trials were available to them, while others required research. They were to include major advances that were discovered in oncology to already established guidelines. The students were to complete PowerPoint presentations including previous trials and where the new update takes place in current therapy.

BACKGROUND AND OVERVIEW -10%	
Article Title/Citation	Z
Study objectives/purpose (and research hypothesis, if applicable)	Z
Brief background (why issue is important, summary of previous literature)	Z
Funding sources	Z
METHODS - 15%	
Study design and methodology (type of trial, randomization, binding, controls, study groups, length of study, ets.)	Z
Patient selection & enrollment (inclusion/exclusion criteria, sample size, etc.)	Z
Interventions (if applicable)	Z
Outcome measures/ endpoints	Z
Statistical analyses	Z
RESULTS - 20%	
Enrollment & baseline characteristics	Z
Summary of primary and secondary outcomes (including subgroup analysis, etc. Be sure to include both efficacy and safery parameters, if appropriate)	Z
AUTHOR'S DISCUSSION & CONCLUSIONS - 20%	
Brief summary of author's main discussion points	Z
Author's conclusions	Z
STUDENT'S DISCUSSION & CONCLUSION - 35%	
Study strengths	Z
Study limitations, weakness, potentials for bias, etc.	Z
Applicability and impacts on pharmacists/healthcare providers	Z
Student conclusions and recommendations	Z

Note: A score of 70% is required to pass the journal club

Figure 2: Rubric and Format for Journal Club Presentation

On week six, similar to the format of the gold standard presentations, the students were graded via a rubric (Figure 2) and complete student evaluations (Figure 3). The class also had an informal discussion about the students' service learning activity experience. At the beginning of the term the students were given the option to choose one topic and answer corresponding questions that were to be presented to the class. This was an individual work assignment, but if students chose to do an activity together, it was allowed but each individual must submit own answered questions. The activities to choose from included Relay for Life of at local universities, American Cancer Society volunteer opportunities participate in any cancer screenings, interview/speak with someone whom has had cancer in the past or undergoing treatment currently, or watch a movie from a list of movies that were cancer-related/ read the corresponding book. After the discussion of the service learning, a brief lecture about the nutrition requirements for oncology patients was given. The students were shown the importance of diet and nutrition to the population at hand. The students were very interested with the impact that certain foods had on the overall patient health.

Peer Group Evaluation Form

Your Name Data

Oncology Elective

Course Name Group Number

Group Members Name	Meets Expectations	Does Not Meet Expectations	Absent
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

Your Signature

Criteria: Comments:

- Z Did fair share of work
- Z Was cooperative and did agreed upon task
- Z Contributed to ideas and planning
- Z Was available for communications
- Z Was positive, helpful

Figure 3. Complete student evaluations.

Results

Overall, the oncology elective course was something students enjoyed based on their comments and involvement throughout the course. The general feedback was that the service learning project was their favorite assignment. The students enjoyed the aspect to look at oncology as practice of medicine rather than just a condition. The oncology elective overall received positive feedback. Thirty-two of forty-three students (74.4%) filled out the end of course student evaluation. As rated by the students in the course, overall the mean score of the course was 4.4 out of 5 (88%). Some student feedback stated that too many presentations were involved and they felt overwhelmed due to other courses they were taking at the same time, which also required presentations. Another student stated he/she had wished to have more practice on writing chemotherapy orders. Positive feedback included students stating they loved the experience of preparing a chemotherapy product and learning how to double-check a chemotherapy order. Based on all of the feedback and the struggles seen in the course, it was concluded that the next time the course is offered that more objective grading assessments will be given (i.e., quizzes, tests) and there will only be one presentation instead of two. Please see Figure 4 for a copy of the survey results. Future considerations will include a survey to see how prepared students feel after this elective for rotations and to follow which students actually take an oncology elective in their fourth professional year for APPE experiences and to see if they felt better prepared as a result of this elective.

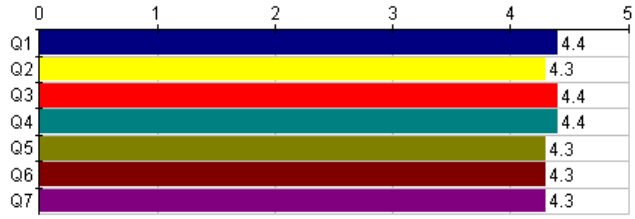
End of Term Survey
Spring 2015

Philadelphia College of Osteopathic Medicine
School of Pharmacy - Georgia Campus

Course: PHAR 376EG P1 - Oncology

Department: PHARMACY

Responses / Expected: 32 / 43 (74.42%)



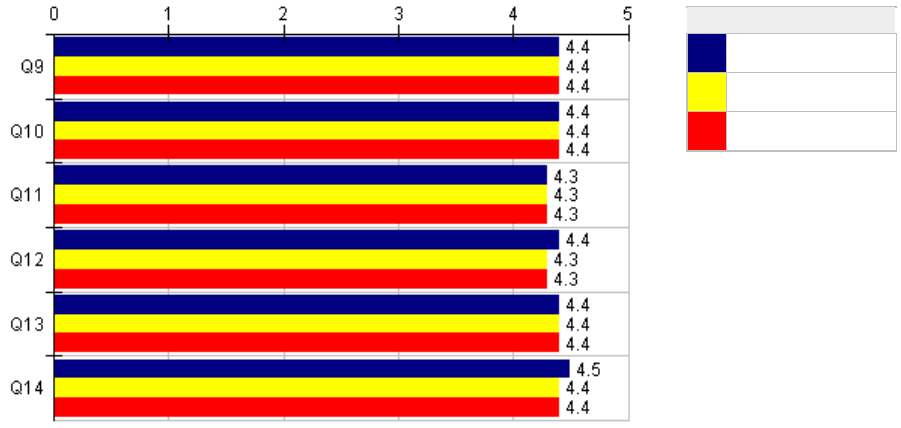
Course Content	PHAR 376EG - P1 Responses 1D	2	3OU	4	5A	N	Course Mean	Med.	Mode	Std
Q1 Course content was appropriate for my level of knowledge	0	0	2	16	14	**32**	**4.4**	4	4	.60
Q2 Course content was presented in a logical progression of difficulty	0	0	4	13	15	**32**	**4.3**	4	5	.69
Q3 Course content was consistent with the course objectives as presented in the syllabus	0	0	4	12	16	**32**	**4.4**	4.5	5	.70
Q4 Course textbooks and other assigned readings appropriately covered the course content	0	0	3	14	15	**32**	**4.4**	4	5	.65
Q5 This course has prepared me to counsel patient regarding medication and also to examine future possible	0	1	5	10	16	**32**	**4.3**	4.5	5	.84
Q6 This course has prepared me to interact with diverse patient population with compassion and empathy.	0	1	4	12	15	**32**	**4.3**	4	5	.80
Q7 This course prepared me to practice in a population with limited access to health care.	0	0	7	10	15	**32**	**4.3**	4	5	.79

Responses: [**1D**] 1=Strongly disagree=1 [**2**] 2=Disagree=2 [**3OU**] 3=Neutral or undecided=3 [**4**] 4=Agree=4 [**5A**] 5=Strongly Agree=5

Q8 - Comments

Response Rate: 3.13% (**1** of **32**)

-	Course was good overall. It would be nice to have practiced writing up a chemo order sheet independently before being tested on it. Though having two presentations on top of everything else going on this term (Spring 2015) seemed to be a bit much, it was nice to get feedback. I'm glad to be create chemo product

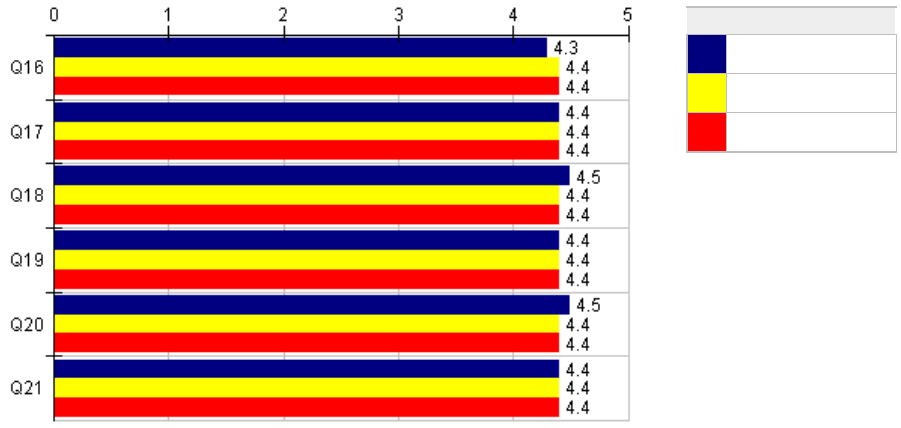


Course Coordinator		Thomas, Sonia										--- Survey Comparisons ---					
		Responses					Individual					PHARMACY			All		
		1D	2	3OU	4	5A	N	Mean	Med.	Mode	Std	N	Mean	Pct Rnk	N	Mean	Pct Rnk
Q9	The material covered was consistent with the course objectives as	0	0	3	12	17	32	4.4	5	5	.66	476	4.4	50	476	4.4	50
Q10	The course objectives and expectations were clearly described.	0	0	2	14	16	32	4.4	4.5	5	.61	476	4.4	50	476	4.4	50
Q11	The grading system was clearly described	0	1	4	10	17	32	4.3	5	5	.81	476	4.3	28	476	4.3	28
Q12	The grading system was applied as described	0	1	2	11	18	32	4.4	5	5	.75	476	4.3	72	476	4.3	72
Q13	Course coordinator was available during office hours or by	0	0	5	10	17	32	4.4	5	5	.74	476	4.4	28	476	4.4	28
Q14	Course coordinator treated students with respect	0	0	2	13	17	32	4.5	5	5	.61	476	4.4	39	476	4.4	39

Responses: [**1D**] 1=Strongly disagree=1 [**2**] 2=Disagree=2 [**3OU**] 3=Neutral or undecided=3 [**4**] 4=Agree=4 [**5A**] 5=Strongly Agree=5
Pct Rnk: Percentile Rank (100 is best, calculated vs. precise Mean)

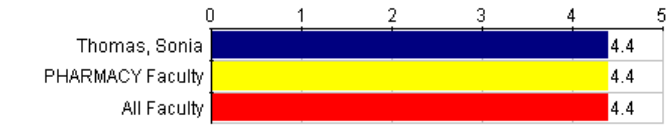
Q15 - Comments

Faculty:	**Thomas, Sonia**
Response Rate:	**No participants responded to this question.** (**0** of **32**)



Instructor		Thomas, Sonia										--- Survey Comparisons ---					
		Responses					Individual					PHARMACY			All		
		1D	2	3OU	4	5A	N	Mean	Med.	Mode	Std	N	Mean	Pct Rnk	N	Mean	Pct Rnk
Q16	Instructor provided clear learning objectives for each topic covered	1	0	2	13	16	32	4.3	4.5	5	.85	1.6K	4.4	35	1.6K	4.4	35
Q17	Instructor was able to answer questions effectively	0	0	2	14	16	32	4.4	4.5	5	.61	1.6K	4.4	48	1.6K	4.4	48
Q18	Instructor presented the material in an organized, clear, and	0	0	2	12	18	32	4.5	5	5	.61	1.6K	4.4	67	1.6K	4.4	67
Q19	Examination questions accurately reflected the learning objectives	0	0	3	12	17	32	4.4	5	5	.66	1.6K	4.4	63	1.6K	4.4	63
Q20	Instructor treated students with respect	0	0	2	13	17	32	4.5	5	5	.61	1.6K	4.4	59	1.6K	4.4	59
Q21	Instructor was available during office hours or by appointment	0	0	3	12	17	32	4.4	5	5	.66	1.6K	4.4	65	1.6K	4.4	65

Responses: [**1D**] 1=Strongly disagree=1 [**2**] 2=Disagree=2 [**3OU**] 3=Neutral or undecided=3 [**4**] 4=Agree=4 [**5A**] 5=Strongly Agree=5
Pct Rnk: Percentile Rank (100 is best, calculated vs. precise Mean)



Instructor	Thomas, Sonia					--- Survey Comparisons ---									
	Responses					Individual					PHARMACY			All		
	1	0	0	0	5=E	N	Mean	Med.	Mode	Std Dev	N	Mean	Pct Rnk	N	Mean	Pct Rnk
Q22 Overall rating for this instructor	0	0	3	14	15	**32**	**4.4**	4	5	.65	**1.6K**	**4.4**	35	**1.6K**	**4.4**	35

Responses: [**1**] 1=poor=1 [**0**] 0=2 [**0**] 0=3 [**0**] 0=4 [**5=E**] 5 = excellent=5
Pct Rnk: Percentile Rank (100 is best, calculated vs. precise Mean)

Q23 - Comments

Faculty:	**Thomas, Sonia**
Response Rate:	**No participants responded to this question.** (**0** of **32**)

Figure 4. Survey Results.

Discussion/Limitations

Overall, the feedback was very positive from students and faculty who taught in the course. Other than the feedback on student evaluations and informal discussions with students, there were no surveys given or objective results to quantify the effect of the elective. We will continue to offer this oncology elective in the spring term of each year.

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