Use of an internet website wiki at oncology Advanced Pharmacy Practice Experiences (APPE) and the effects on student confidence with oncology references

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Abstract

Objective: To describe the impact of utilizing an interactive website (wiki) to direct students to oncology resources during Oncology Advanced Pharmacy Practice Experiences (APPEs) on student ease of use and confidence with utilizing oncology references, and student-preferred initial search strategies.

Methods: We surveyed students who completed an Oncology APPE at University of Colorado Hospital/Cancer Center (UCH/UCCC) before (Control) and after implementation of the wiki (Intervention). The questionnaire included questions regarding student confidence with oncology and general drug-information (DI) resources, ease of finding information, and student-preferred initial search strategies.

Results: Of the 33 students completing an Oncology APPE at UCH/UCCC, 26 responded (response rate 78.8%). Before the APPE, fewer students felt somewhat or very confident researching oncology DI questions compared to general DI questions (Control: 16.7% vs 58.3%; Intervention: 0% vs 71.4%). After the APPE, more students felt somewhat or very confident researching oncology and general DI questions in the Control (75% and 83.3%) and Intervention (85.7% for both) groups ($p < 0.05$ between groups). Student-preferred initial search strategies were similar between groups ($p > 0.05$). Students in the Intervention group reported greater ease using oncology resources than students in the Control group when answering treatment guideline (4.64 vs 3.92) and supportive care questions (4.21 vs 3.92), although this was not statistically significant ($p > 0.05$).

Conclusions: The wiki was received positively by the students and did not adversely impact utilization of oncology resources. These results may provide guidance to oncology and other specialty APPE preceptors regarding use of a wiki to direct students to specialty resources.

Keywords: Advanced Pharmacy Practice Experience; APPE; Wiki; Oncology references; Website

Introduction/background

The Accreditation Council for Pharmacy Education (ACPE) states that the pharmacy practice experiences required for a Doctor of Pharmacy degree (PharmD) should provide opportunities for students to develop the skills and confidence needed to embark on an independent and collaborative practice.\textsuperscript{1} As noted in the Accreditation Council for Pharmacy Education Standards and Guidelines, pharmacy graduates must be able to “retrieve, analyze and interpret the…scientific literature…to provide drug information and counseling to patients, their families or caregivers, and other involved health care providers.”\textsuperscript{1} Although
these skills are addressed through drug-information curricula and as a component of Introductory Pharmacy Practice Experiences (IPPE), students may not feel confident in these activities at the beginning of their Advanced Pharmacy Practice Experiences (APPE) rotations.

This lack of confidence has been reported in a survey of students and preceptors conducted prior to the first APPE. Researchers found that students only felt somewhat prepared to select and utilize clinical and scientific information resources to solve patient problems; this was also expressed by the preceptors surveyed. Students embarking on a drug-information (DI) APPE most frequently cited efficient DI resource use and knowledge of resources as the most important skills they desired to obtain while on rotation. Possible reasons for lack of confidence in DI skills include increasing complexity of questions referred to pharmacists, inexperience utilizing these skills to answer questions when providing patient care, and lack of familiarity with resources.

The potential reasons for lack of student confidence are particularly exacerbated within specialty practice areas such as oncology. As the number of cancer survivors increases to a projected 18 million in the United States (US) by 2022, more pharmacists will participate in the care of these patients at various points within the health care system. Despite the growing number of cancer patients and survivors, and the biologically diverse diseases treated in this setting, schools of pharmacy report an average of 28 contact hours (range: 8–108) for oncology pharmacotherapy. Only one school reported utilizing self-paced learning activities, further limiting student exposure to oncology resources. Although cases are utilized in most curricula, these do not typically require substantial use of oncology resources. Thus, students are not likely to gain significant experience accessing and utilizing oncology resources within the didactic curriculum. Furthermore, the oncology literature is developing rapidly, with over 22 new chemotherapy agents approved by the Food and Drug Administration (FDA) in the last two years. In addition to the issues described above, the accepted resources needed to participate in the care of these patients [e.g., National Comprehensive Cancer Network (NCCN), American Society of Clinical Oncology (ASCO) guidelines, National Cancer Institute website (www.cancer.gov)] differ from general drug-information resources with respect to their location, navigation, and the type of information provided. Thus, students may feel intimidated when trying to locate, interpret, and utilize accepted oncology resources. Oncology patients are medically complex, and evidence supports pharmacists playing a crucial role in providing cost-effective cancer treatment as well as managing adverse effects and other concomitant disease states. A thorough command of oncology resources is critical for students and pharmacists to participate in the optimal care of oncology patients and survivors.

Student manuals, in both electronic and paper formats, have been utilized in a variety of APPE settings to more efficiently prepare students to provide pharmaceutical care. The manuals described in the literature vary—most contain the rotation syllabus and outcomes, assignments and learning modules, evaluation forms, scheduling information, and electronic resources. In our academic medical center, oncology preceptors work closely with students to identify and utilize appropriate oncology and general drug-information resources to answer DI questions pursuant to patient care while on their APPE rotations. In an effort to simplify the process of familiarizing students with oncology-specific resources, the preceptors for oncology rotations at the University of Colorado Hospital/Cancer Center (UCH/UCCC) developed a rotation wiki. The wiki, an internet website that can be edited by its users, was available to preceptors to use when orienting students to commonly utilized oncology references.

Rationale and objectives

We sought to describe the impact of an internet website wiki with information on oncology references for students on Oncology APPE rotations on student ease of use and confidence with utilizing oncology references. Additionally, we aimed to evaluate whether implementation of the wiki affected student use of oncology references.

Materials and methods

Description of the wiki

The wiki was made available to students on Oncology APPEs at the UCH/UCCC, including Inpatient Oncology, Inpatient Hematology/Blood and Marrow Transplant, Outpatient Medical Oncology, and Outpatient Hematology/Blood and Marrow Transplant. The wiki was hosted on a school-specific website, and students were granted access to the wiki at the beginning of their Oncology APPE. The wiki consisted of multiple web pages organized by topic and activity; examples include the following: Hematology/Blood and Marrow Transplant, Supportive Care, and Journal Club Activities. Preceptors posted documents, links to websites, clinical literature, guidelines, FAQs, and other resources they felt were important for students to access during their APPE. Educational materials posted addressed a variety of information useful in the clinical care of a cancer patient, including information on disease epidemiology and pathology, clinical symptoms and their management, and established treatment strategies. There was also a Student Recommendation page to which students were encouraged to post useful documents and websites. The wiki was created and maintained by the principal investigator, with input from other Oncology APPE preceptors.

Survey methodology

The questionnaire was administered electronically via SurveyMonkey. Within one month of the completion of their APPE, students received an e-mailed invitation to
participate, which contained a link to the questionnaire. Student responses were anonymous and not linked to their APPE performance. This questionnaire contained questions regarding ease of finding information, methods of resource communication with the preceptor, student confidence in their abilities to answer general vs oncology-specific drug-information questions, and initial search strategies employed (Appendix 1). Ease of finding information and student confidence in answering drug-information questions were assessed using a 5-point Likert scale. The questionnaire was tested and reviewed by residents and oncology preceptors. After incorporating their feedback to revise the questionnaire, we submitted the questionnaire for IRB approval.

All students who completed one of the Oncology APPEs previously described at UCH/UCCC during the 2010–2011, 2011–2012, and 2012–2013 academic years received the survey invitation. To minimize bias, students received the survey after completion of their APPE and grading of all portfolio materials. Survey distribution methods adhered to the methods established by Dillman et al., with up to two repeat mailings.

Students who completed their APPE prior to implementation of the wiki were assigned to the Control group, and students who had access to the wiki during their APPE were assigned to the Intervention group. Students who did not complete the survey were only included in the demographics portion of the analysis, as it was not possible to exclude these students due to the de-identified nature of the survey. Students who completed multiple Oncology APPEs at UCH/UCCC were only surveyed once at the conclusion of their first Oncology APPE, so there was no crossover between groups.

Data analysis

Statistical analyses were performed using JMP® 10 software (Cary, NC). Descriptive statistics were used when applicable. Ordinal data were analyzed using Wilcoxon rank sum test. Nominal data were analyzed using Fisher’s exact test.

Results

A total of 33 students completed an Oncology APPE during the study period. The mean age of students in the Control group was 30.3 years (range: 24–49), similar to the mean age of 27.2 years (range: 23–37) in the Intervention group. The majority of students in both groups were female, as shown in Table 1. Overall, 12 of the 16 students in the Control group and 14 of the 17 students in the Intervention group completed the survey (response rate 78.8%) and were considered for further analysis. Of the students who completed the survey, ten (83.3%) in the Control group and 11 (78.6%) in the Intervention group reported that they had not previously completed an Oncology rotation at our institution or any others.

Prior to the APPE, student-perceived confidence at answering oncology and general DI questions was similar between groups, as shown in the Figure. When asked about their baseline confidence researching oncology questions, six students (50%) in the Control group felt somewhat or very unconfident and two students (16.7%) felt somewhat confident. In the Intervention group, six students (42.9%) felt somewhat unconfident researching oncology questions; the remaining eight students (57.1%) felt neutral on the matter. When asked about their baseline confidence researching general DI questions, three students (25%) in the Control group felt somewhat or very unconfident at researching general DI questions, and seven students (58.3%) felt somewhat or very confident. In the Intervention group, three students (21.4%) felt somewhat or very unconfident researching general DI questions, and ten students (71.4%) felt somewhat or very confident. This was not statistically different between groups (p > 0.05).

At the conclusion of the APPE, two students (16.7%) in the Control group felt very unconfident researching oncology questions; in the Control group, eight students (66.7%) felt somewhat confident and one student (8.3%) felt very confident about their skills in this area (one student felt neutral about their skills). At the end of the APPE, two students (14.3%) in the Intervention group felt somewhat unconfident researching oncology questions, ten students (71.4%) felt somewhat confident, and two students felt very confident. This was not statistically different between groups (p > 0.05). When asked about confidence researching general DI questions by the end of the APPE, two students (16.7%) in the Control group felt very unconfident and ten students (83.3%) felt somewhat or very confident. In the Intervention group, two students (14.3%) felt somewhat or very unconfident researching general DI questions.
at the end of the APPE; 12 students (85.7%) felt somewhat or very confident. This was not statistically different between groups ($p > 0.05$).

The preferred resource to answer various oncology questions at the end of the APPE was relatively consistent between the groups, as shown in Table 2. Both groups most frequently utilized oncology-specific guidelines when locating information on first-line treatment options (75% in the Control vs 85.7% in the Intervention group) and when finding information on antiemetic prophylaxis (83.3% in the Control vs 85.7% in the Intervention group). When locating information on survival, students in the Control group most frequently utilized peer-reviewed oncology websites (25%) and tertiary databases (25%), compared to the Intervention group, which most frequently utilized tertiary databases (42.9%) followed by primary literature search engines (21.4%) and oncology-specific guidelines (21.4%). Students in the Control and Intervention groups most frequently utilized drug databases when locating information on potential adverse effects (66.7% vs 64.3%, respectively) and drug–drug interactions (100% for both groups). No students reported using general internet search engines (e.g., Google and Bing) as their initial search strategy for any of the scenarios. Patterns in initial reference selection were not statistically different between groups ($p > 0.05$).

Students in the Intervention group reported greater ease at finding information on cancer treatment guidelines (average rating 4.64 on a scale of 1–5) and supportive care (4.21) compared to students in the Control group (3.92 for both), although this was not statistically significant ($p > 0.05$ for both). Overall, students in the two groups did not report significant differences in the ease of finding various types of information during their Oncology APPE.

Students also provided information regarding the way their preceptor most often communicated information about oncology references to them during their APPE. In the Control group, 63.6% of students reported that their preceptor verbally directed them to oncology references, and 36.4% stated their preceptor worked with them to find the appropriate reference. In the Intervention group, 30.8% of students reported that their preceptor verbally directed the student to the desired reference, 23% of students reported that their preceptor directed them to the wiki and 23.1% reported that their preceptor worked directly with them to locate the reference. Approximately 15% stated their preceptor e-mailed oncology references to them, and one preceptor printed the documents for the student.
Students in the Intervention group had positive feedback regarding the wiki, with one student suggesting the addition of relevant clinical trials and another student suggesting the wiki be used to communicate with students regarding ongoing activities. One student uploaded primary literature to the Student Recommendations page of the wiki, and two students suggested that this could be a requirement for future students on Oncology APPE rotations.

**Discussion/conclusions**

This study is the first to evaluate the impact of an APPE wiki on student confidence and ease researching oncology and other DI questions. Oncology pharmacists utilize a variety of references, some of which are specialized and specific to oncology. The interdisciplinary nature of the oncology team, particularly the role of the clinical pharmacist in academic medical centers, makes Oncology APPE rotations an ideal place for PharmD students to practice their DI skills. However, this may be limited by students’ lack of familiarity with and confidence with using oncology references. Prior to their APPE, more of our students felt unconfident researching oncology questions than general DI questions; only 16.7% of students in the Control group, and no students in the Intervention group, felt confident researching oncology questions. This is in stark contrast to the 58.3% of students in the Control group and 71.4% of students in the Intervention group who felt confident researching general DI questions prior to their Oncology APPE. Although these numbers were not statistically significant, it is important to consider these in the light of other studies which found that students-rated preparedness for specific APPE activities is higher than the preceptors’ assessment of student preparedness, suggesting that students’ baseline skills in researching oncology DI questions may be actually lower than reported in our questionnaire.2

Student-perceived confidence at researching oncology and general DI questions was increased at the conclusion of the APPE in both groups, although this change was not statistically significant within either group. This was consistent for both the Intervention and Control groups, indicating growth in these skill sets throughout the rotation. This is consistent with the trend toward improvement observed in students in a Drug-Information APPE,3 and suggests that the benefits of APPEs on these skill sets are not adversely affected by utilizing a wiki to direct students to references. Students were only surveyed at the conclusion of the rotation, thus recall bias may have also blunted the change in confidence observed. A separate Control group was used to minimize the impact of this on our results.

<table>
<thead>
<tr>
<th>Question</th>
<th>Control, n (%)</th>
<th>Intervention, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 5: Estimate a patient’s overall survival</td>
<td>Peer-reviewed oncology websites: 3 (25)</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>Oncology-specific guidelines: 2 (16.7)</td>
<td>3 (21.4)</td>
<td></td>
</tr>
<tr>
<td>General guidelines and reviews: 1 (8.3)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Primary literature search engines: 2 (16.7)</td>
<td>3 (21.4)</td>
<td></td>
</tr>
<tr>
<td>Tertiary databases: 3 (25)</td>
<td>6 (42.9)</td>
<td></td>
</tr>
<tr>
<td>Other: 1 (8.3)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

| Question 6: Identify first-line treatment options | Oncology-specific guidelines: 9 (75) | 12 (85.7) |
| General guidelines and reviews: 2 (16.7) | 0 |
| Tertiary databases: 1 (8.3) | 2 (14.3) |

| Question 7: Identify potential adverse effects of a chemotherapy regimen | Oncology-specific guidelines: 1 (8.3) | 0 |
| General guidelines and reviews: 1 (8.3) | 0 |
| Primary literature search engines: 1 (8.3) | 1 (7) |
| Tertiary databases: 1 (8.3) | 4 (28.6) |
| Drug databases: 8 (66.7) | 9 (64.3) |

| Question 8: Identify appropriate empiric antiemetic prophylaxis for a chemotherapy regimen | Peer-reviewed oncology websites: 0 | 1 (7) |
| Oncology-specific guidelines: 10 (83.3) | 12 (85.7) |
| General guidelines and reviews: 1 (8.3) | 1 (7) |
| Tertiary databases: 1 (8.3) | 0 |

| Question 9: Detect drug–drug interactions with oral chemotherapy | Drug databases: 12 (100) | 14 (100) |

APPE = Advanced Pharmacy Practice Experience.

* Full questions, including brief case scenario, are present in Appendix 1.
Although web-based rotation manuals and interactive wiki sites are being utilized by preceptors at a variety of institutions, there is little information in the literature regarding the practical utility of these technologies and their impact on student confidence and performance. By streamlining the introduction of students to oncology resources and providing consistency between Oncology APPEs at the UCH/UCCC, we aimed to create a practical resource for students and provide additional information regarding use of this technology in a specialty APPE setting. Student ease of use scores tended to be more favorable in the Intervention group than in the Control group, suggesting that students may benefit from a wiki when researching oncology questions. This finding may have been influenced by the method that preceptors most frequently utilized to direct students to oncology resources, as approximately one-fourth of students in the Intervention group reported the wiki was their preceptor’s primary means of directing them to drug-information resources. Although this may appear low, this result may be biased by student recall (e.g., students may be more likely to remember their preceptor working with them in person) and whether students accessed the wiki on their own initiative rather than being instructed to do so each time by their preceptor. As reported by the students, our preceptors employed a variety of strategies when instructing students on oncology resources. The extent to which the wiki was utilized within each APPE was preceptor-dependent and influenced by student needs, preceptor preference, and pharmacy staffing models.

The need to describe student participation in interactive rotation websites such as wikis has been previously documented. Although students could edit the Student Recommendations page of the wiki and were encouraged to do so, only one student elected to do this. This may have been because most of the standard references in each area were already uploaded, or because student names were attached to any documents they posted. We are exploring more effective methods of encouraging student participation on the wiki, such as increasing utilization of the wiki by preceptors, although the optimal strategy remains to be clarified.

Our study population contained students at a variety of ages and is representative of PharmD students in the United States. By including students over three academic years and a variety of Oncology APPEs, we sought to minimize the influence of individual preceptor teaching styles on our results. Despite the broad range of inclusion criteria and the encouraging response rate to our survey, our results were limited by small sample size. As we aimed to assess the impact of the wiki on student-perceived confidence and ease of use, we did not assess students directly on the content but rather what resources students would initially utilize to seek the answer. This was necessary as the “correct” answer may change over time, particularly in a field as rapidly changing as oncology, but the skill sets needed to obtain the correct answer would remain constant. As information needed to answer a DI question may be present in multiple references, we did not deem any responses to be “correct” or “incorrect,” but sought to identify trends in the methods students reported utilizing when answering these questions. To protect student information, responses were not linked to APPE performance or individualized preceptor feedback; these are important considerations for future research with this technology.

Our study showed that use of a wiki on Oncology APPEs may enhance student ease with accessing oncology references and does not adversely impact student confidence at answering oncology questions. These results may also be useful to APPE preceptors in other specialty areas. Specific impacts on student APPE performance, and the optimal manner of engaging students on interactive websites, remain to be clarified in the literature. We will continue to utilize this technology at UCH/UCCC to improve student efficiency and enhance student engagement with members of the oncology team. By enhancing student confidence with oncology resources on their APPEs, we aim to create pharmacists that are confident engaging in the care of cancer patients and survivors regardless of practice setting.

Acknowledgment

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Appendix A. Supplementary Information

Supplementary material cited in this article is available online at doi:10.1016/j.cptl.2014.05.004.

References


