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Research

Integrating Medical Writing into Pharmacy Curricula: Design and Evaluation of an Online Elective Course

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ABSTRACT

Objective: To describe the implementation and effectiveness of an online medical writing elective for third-year student pharmacists.

Methods: A 16-week asynchronous online medical writing elective was developed and evaluated through anonymous precourse and postcourse surveys administered to 5 student cohorts (2019 to 2023). The precourse survey measured baseline confidence in medical writing and peer feedback skills. The postcourse survey assessed changes in confidence after students completed 2 major writing assignments, each with a peer review component.

Results: A total of 188 students (93.1%) completed the precourse survey, and 98 students (48.5%) completed the postcourse survey. Most students had no prior experience in publishing, but did have prior experience providing peer feedback. Postcourse survey results indicated that, compared to baseline, students demonstrated significantly increased confidence in medical writing competencies following course completion. These included writing for a patient audience, applying American Medical Association (AMA) style, and producing content that is clear, scientifically accurate, and free from bias. Students also showed increased confidence in composing original content without templates and in evaluating the work of their peers.

Conclusions: A medical writing elective with opportunities for formative feedback through peer review significantly improved students' confidence in key aspects of medical writing. Our findings underscore the value of a focused curriculum that incrementally builds core writing competencies through assignments and structured feedback.

1. Introduction

Effective communication, both verbal and written, is an essential skill for pharmacists across diverse practice settings.[1,2] Medical writing skills, in particular, are crucial for pharmacists engaged in scholarly activities, such as those in academia and research. Teaching writing to students in public health and medicine has been shown to enhance critical thinking.[2–4] Despite its recognized importance, medical writing and scholarly skills are inconsistently integrated into pharmacy education, hindered by competing curricular priorities, limited formal training standards, and a shortage of accessible, experienced mentors.[2,5]

Although the Accreditation Council for Pharmacy Education (ACPE) Standards underscore the need for verbal, nonverbal, and written communication skills, they provide little direction on how these skills should be cultivated within the PharmD curriculum.[6] Similarly, the American Association of Colleges of Pharmacy (AACP) guidance document on curricular outcomes and entrustable professional activities identifies communication and scholarly activity as essential outcomes but lacks operational guidance on integrating formal medical writing instruction into curricula.[7] A recent systematic review of 166 North American studies focused on drug information and medical literature evaluation instruction in pharmacy education found that only 7 articles (< 5%) addressed the development of written responses, further highlighting the paucity of literature on teaching medical writing within pharmacy education.[8]

Available literature describing student pharmacist perceptions of medical writing training often lacks detail and implementation of applicable coursework and usually describes short-term workshops or single assignments.[9–14] Nevertheless, limited but encouraging evidence

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suggests that structured medical writing instruction can bolster students' confidence and competence in their writing abilities.[9–12,14] Incorporating peer-to-peer feedback may also alleviate faculty workload while empowering students in their learning, a dual benefit especially valuable in large or resource-constrained class settings.[5,12,15]

To address the lack of evidence on the formal integration of medical writing skills into pharmacy curricula, this paper describes the design, implementation, and evaluation of an online medical writing elective for third-year student pharmacists at Retzky College of Pharmacy in Chicago, IL. The course aims to equip students with foundational knowledge and skills in writing, editing, and publishing scientific information. The impact of the course on students' confidence in medical writing and editorial abilities was evaluated through precourse and postcourse surveys conducted over 5 student cohorts between 2019 and 2023.

2. Methods

2.1. Course Design

A 1-credit-hour medical writing elective course is offered each fall semester to third-year PharmD students at the Retzky College of Pharmacy (Chicago, IL). The course is designed for students interested in developing their medical writing and editorial skills and is delivered asynchronously over 16 weeks via Blackboard, the college's online learning management system. Enrollment requires successful completion of 2 prerequisite drug information courses: *Introduction to Drug Information*, a 5-week, 1-credit-hour course offered during the first professional (P1) year that introduces students to primary and tertiary literature sources; and *Evidence-Based Medicine*, a 10-week, 2-credit-hour course offered during the P2 year that covers literature evaluation and core principles of evidence-based practice. Students complete 1 templated writing assignment in the P2 course.

The course aims to build foundational competence in scientific writing, editing, and audience adaptation. Students engage with a series of 14 asynchronous online modules, each approximately 30 min in duration. Weekly instructional content is supplemented with graded activities, including discussion board participation, formal writing assignments, and peer reviews. All discussions are moderated by the course's 2 coordinators and correspond with the week's lecture content or writing task. The online format for the course and asynchronous lecture delivery was intentionally chosen to provide flexibility for both faculty and students. The course objectives are as follows: 1) describe the writing process; 2) compose written biomedical information that is clear, concise, complete, correct, and meets prespecified formatting requirements; 3) apply the American Medical Association (AMA) Manual of Style guidelines when writing and editing; and 4) adapt written biomedical information to a range of target audiences.

Throughout the semester, students complete 2 major writing assignments. Assignment 1 focuses on writing for a patient audience and involves the development of a concise, 2-page medication guide for an assigned drug. Students are provided with the drug's full prescribing information, which has been edited to remove any existing medication guide content. The second assignment targets a health care professional audience and requires students to craft a formal, evidence-based response to the question, "What is the role of [assigned drug] in [assigned disease state]?" Students receive 1 relevant landmark trial as a starting point and must independently identify supporting materials such as clinical guidelines. For both assignments, students are given instructional packets that include detailed directions for the assignment, a summary of AMA style rules, and both faculty and peer grading rubrics.

The course employs a structured peer-to-peer feedback model integrated into both major writing assignments. Using Blackboard's "Self and Peer Assessment" tool, student pairs review one another's draft submissions. Peer assessments are based on a dedicated rubric that is more lenient than the faculty rubric, awarding full credit for good-faith attempts at each required section, regardless of scientific accuracy. For example, a student who attempts to describe a drug's mechanism of action receives credit for that section, even if the description is incorrect. To highlight these types of discrepancies and provide additional feedback, each rubric section also includes a space for optional free-text comments. Additionally, the final section of the peer rubric contains a space for general feedback that uses the "Stop, Start, Continue" model to encourage focused and actionable peer guidance.[16] We adapted this model from its use in curriculum evaluation contexts because its structured prompts can help guide students toward more focused and actionable comments when compared to unstructured free-text alone. Students whose assignments are turned in late for peer review are not eligible to receive points from their peers, but they may still receive credit for completing a peer review themselves. Participation in the peer review process accounts for approximately 18% of the final course grade (approximately 12% from received peer evaluations and 6% for completing peer evaluations).

An overview of the course timeline, weekly topics, and graded assignments is presented in the Appendix Table.

2.2. Data Collection and Analysis

To assess the impact of the elective on students' confidence in medical writing, individuals enrolled in the course from 2019 to 2023 were invited to complete an anonymous, voluntary survey at both the beginning and end of the course. The precourse survey provided baseline measurements of students' confidence in medical writing and their ability to provide peer feedback. Items were aligned with key course objectives, including writing biomedical information that is clear, concise, complete, and correct; applying AMA style guidelines; and adapting content for different audiences. Response options included: *very confident*, *confident*, *somewhat confident*, *only slightly confident*, and *not very confident*. For analysis, the first 3 options were grouped as "confident" and the latter 2 as "not confident." The postcourse survey assessed changes in confidence after completing 2 major medical writing assignments, each of which included a peer review component. Statistical analysis was performed using GraphPad, employing χ^2 and Fisher's exact tests to determine significance; $p < .05$ was considered statistically significant.

3. Results

Survey data were collected from 5 student cohorts (2019 to 2023; $N = 202$). A total of 188 students (93.1%) completed the precourse survey, and 98 students (48.5%) completed the postcourse survey. Data from the precourse survey are summarized in Table 1. The majority of students reported that their most recent writing course was taken during their undergraduate education ($n = 138$), while some had completed writing courses at the graduate level ($n = 34$). Most students had no prior experience publishing full-text articles ($n = 174$) or abstracts ($n = 158$). However, students reported prior experience providing peer feedback across a range of contexts, including workplace settings ($n = 43$), internships ($n = 47$), and course-related activities ($n = 151$).

The results are presented in Table 2. Overall, students demonstrated significantly increased confidence in medical writing competencies following course completion. These included writing for a patient audience, applying AMA style, and producing content that is clear, scientifically accurate, and free from bias. Students also showed increased confidence in composing original content without templates and in evaluating the work of their peers. An overwhelming majority of students (*98%*) indicated they would recommend the course to a peer.

Separate standardized, college-wide student course evaluations further support the findings of our voluntary, course-specific survey. Students consistently praised the flexibility of the asynchronous format and the value of peer review and discussion board participation. One student shared, *"Peer review was helpful and allowed me to apply both my peer reviewing skills to others and get feedback from others on my own work—both very beneficial."* Another student shared, *"I thought that the discussion boards were really helpful for developing our writing assignments, especially for the second assignment, where we essentially laid out the outline*

Table 1
Student-Reported Prior Experience with Writing, Peer Feedback, and Publication Report in the Precourse Survey from 2019 to 2023 (N = 188).

Section	Response option	*N*	%
Level of education during which a writing course was last taken	College–undergraduate	138	73.4
	College–graduate	34	18.1
	High school	14	7.4
	Never	1	0.5
	Other	1	0.5
Medical writing practice opportunities[a]	Course-related activities	151	80.3
	Internship-related	47	25
	Job-related	43	22.9
	Research project (faculty)	45	23.9
Peer feedback practice opportunities[a]	Course-related activities	172	91.5
	Internship-related	36	19.1
	Job-related	35	18.6
	Research project (faculty)	21	11.2
Full-text articles published in research journals	0	174	92.6
	1	9	4.8
	2	1	0.5
	> 3	4	2.1
Abstracts presented or published in peer-reviewed journals	0	158	84
	1	22	11.7
	2	5	2.7
	> 3	3	1.6

[a] Students were permitted to select multiple responses; totals exceed 100%.

of our paper in the discussion board and got ideas from our peers to incorporate into our own papers." Students also appreciated the course's integration with prior PharmD courses. As one wrote, *"I am glad this course was offered to us because it was a great way for us to further practice what we had learned in Drug Information, Evidence-Based Medicine, and our other courses."*

4. Discussion

The medical writing elective course for P3s at the Retzky College of Pharmacy was designed to address the critical need for structured medical writing education within the PharmD curriculum. As highlighted earlier, effective communication skills are essential for pharmacists; however, the development of medical writing proficiency is inconsistently integrated into pharmacy education and scarcely reported in the literature.[2,5,8] Our course serves as an innovative response to these gaps, aiming to cultivate students' competence in medical writing, editing, and peer review through a structured yet asynchronous learning format. Notably, the design of our course aligns with the 2024–2026 AACP Strategic Plan, which calls for greater integration of scholarship into pharmacy education.[17]

At the time of course enrollment, students generally had limited prior experience with formal medical writing. One of their only exposures to a formal medical writing assignment within the PharmD curriculum had occurred the semester prior in a required Evidence-Based Medicine course, which featured a single template-based assignment. Although this did give students an opportunity to build on their writing skills, the structured nature of the assignment did not allow them to make independent decisions about content development and organization. Consequently, this elective represented one of the first opportunities within the PharmD curriculum for many students to build on their prior experiences and engage in original medical writing with structured support and iterative feedback. During the study period (2019 to 2023), the class size ranged from 25 to 52 students, and the grading of the 2 core writing assignments was split among approximately 5 Drug Information faculty members.

Survey data collected from 2019 to 2023 demonstrate that the course significantly improved students' confidence in key aspects of medical writing. Our findings underscore the value of a focused curriculum that incrementally builds core writing competencies through assignments and structured feedback. The observed increase in confidence aligns with prior studies showing that structured writing instruction can positively influence student pharmacist confidence and competence related to medical writing activities.[9,11,14] For example, a pilot medical writing elective reported by Choy[9] found that students not only gained confidence but also expressed intent to seek out additional writing opportunities in the future. Similarly, Slack and colleagues[11] demonstrated that a structured, feedback-oriented series of workshops significantly improved research proposal quality and student-reported knowledge of research proposal writing. Beyond formal coursework, a statewide evaluation of student pharmacist writing clubs by Nagy and colleagues[14] similarly found that mentored, collaborative writing experiences helped students build confidence, develop writing skills, and achieve publication-related goals despite limited prior experience.

The integration of peer-to-peer feedback was a cornerstone of the course. By reviewing their peers' work and receiving constructive comments in return, students gained valuable insights into their own writing and revision strategies. This process emphasized the recursive nature of professional writing, which typically involves multiple rounds of drafting, revising, and editing before a final version is completed. Our results demonstrated a significant increase in students' confidence in providing feedback on a peer's writing. A key contributor to this success was the peer grading rubric, which was intentionally designed to be more lenient than the faculty rubric. By prioritizing effort and completeness over strict accuracy, the rubric encouraged participation and reduced student anxiety, allowing learners to support one another in a collaborative environment. Coupled with qualitative feedback using the "Stop, Start, Continue" model, this structure created a balanced framework for constructive critique and self-directed improvement. Discussion boards further enhanced the learning experience by fostering interaction and collaboration in a virtual setting.

Although the course demonstrated clear benefits, several limitations warrant consideration. First, the voluntary nature of the precourse and postcourse survey participation resulted in incomplete postcourse data, which may limit the generalizability of findings. Next, student grades were not analyzed, so it remains unclear whether the observed increase

Table 2
Pre and Postsemester Student-Reported Confidence in Medical Writing Competencies.[a]

Survey item	Precourse survey (n = 188)		Postcourse survey (n = 98)	
	Not confident, *n* (%)	Confident, *n* (%)	Not confident, *n* (%)	Confident, *n* (%)
Adapting medical information in writing for patients	78 (41)	110 (59)	2 (2)	96 (98)
Applying the AMA Manual of Style guidelines when writing	83 (44)	105 (56)	1 (1)	97 (99)
Composing written medical information that is **clear** to the reader	58 (31)	130 (69)	2 (2)	96 (98)
Composing written medical information that is scientifically **correct**	54 (29)	134 (71)	1 (1)	97 (99)
Composing written medical information that is well-balanced (ie, **free from bias**)	55 (29)	133 (71)	2 (2)	96 (98)
Composing written medical information when a template is provided	19 (10)	169 (90)	1 (1)	97 (99)
Composing written medical information when a template is NOT **provided**	99 (53)	89 (47)	4 (4)	94 (96)
Providing feedback on the overall quality of a peer's writing	33 (18)	155 (82)	3 (3)	95 (97)

Abbreviation: AMA, American Medical Association.
[a] All *p*-values comparing precourse and postcourse survey results were statistically significant.

in confidence in the medical writing objectives translated to improved writing competence or competence in other areas of the PharmD curriculum. Additionally, while peer review reduced faculty burden and promoted collaborative learning, the quality of peer-to-peer feedback was not routinely monitored by faculty unless concerns were raised by students. Furthermore, instructions for completing the peer review were provided solely in written materials for both writing assignments, rather than in a lecture format. No formal instruction was provided on the use of the "Stop, Start, Continue" feedback model, and students were simply instructed to identify 1 element of their peer's writing that should be stopped, one that can be started, and 1 that should be continued. One of the final lectures in the course did, however, review the basic principles of the peer review process in academic publishing.

Another important limitation is that the majority of survey data was collected prior to the widespread availability and use of generative artificial intelligence (AI) tools such as ChatGPT. Although students were introduced to traditional automated writing support tools, such as Microsoft Word's grammar features and platforms like Grammarly, until 2023, the course had not addressed the capabilities, limitations, or responsible use of newer generative AI technologies. In 2023, the course syllabus was updated to state that generative AI tools may be used for writing and other coursework, provided that their use is explicitly disclosed. The policy also emphasizes that students remain fully responsible for verifying the accuracy and appropriateness of any content generated with AI assistance, aligning with guidance on the use of AI-assisted technology from the International Committee of Medical Journal Editors.[18] In 2025, course materials were further updated to include a dedicated lecture on the responsible use of generative AI in medical writing, with particular attention to issues of attribution, transparency, and content integrity. At the time of manuscript completion, the authors were unaware of any student disclosures regarding the use of generative AI for course-related activities, although such use was not systematically collected from all graders of the course's writing assignments.

Given the rapidly evolving use of generative AI in academia and scholarly work, further study is needed to understand how these tools will shape medical writing instruction and pharmacy education in general.[19,20] Faculty members in pharmacy schools are already using AI tools to generate examination questions and personalize student feedback, as well as to gather insights for curriculum improvement.[19] Student pharmacists have reported use of AI tools for personalized learning, particularly for improving communication and problem-solving skills. To better prepare students for real-world practice, future iterations of the medical writing course may consider requiring the structured use of generative AI tools, which has already shown benefit in enhancing student pharmacists' reflective writing skills.[21] Although some experts argue that the use of AI in academic writing may compromise originality and critical thinking, these tools also have tremendous potential to free up time for critical thinking and nuanced analysis by streamlining routine writing tasks.[20] Additional opportunities for students to collaborate on ongoing research and writing projects with college faculty members are also being explored within the medical writing course to further enhance learning outcomes and support career readiness.

5. Conclusion

The medical writing elective course is a meaningful addition to our college's PharmD curriculum, providing students with foundational skills in medical writing, editing, and peer review. By building confidence and competence in these areas, the course addresses longstanding gaps in pharmacy education and better prepares students for both scholarly work and professional communication. Ongoing evaluation and iterative refinement will help maintain the course's relevance and impact, particularly as emerging technologies, such as generative AI, continue to reshape the landscape of medical writing.

Author Contributions

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Declaration of Competing Interest

None declared.

Appendix Table. Medical Writing Elective Course Topics and Assignments

Week	Topic	Assignment
1	Intro to course Intro to assignments Plagiarism	Discussion board posts
2	AMA Manual of Style	Discussion board posts
3	Writing for patients and clinicians	**Submit writing assignment 1 for peer review**
4	Editing	Complete peer review for assignment 1
5	Technology in copyediting	**Submit writing assignment 1 for faculty review**
6	Preparing to write	Discussion board posts
7	The systematic approach to writing- part 1 Using tertiary resources for background information	Discussion board posts
8	The systematic approach to writing- part 2 Summarizing information using tables/figures/graphs	Discussion board posts
9	The systematic approach to writing- part 3 Critique and application to clinical practice	Discussion board posts
10	Referencing	**Submit writing assignment 2 for peer review**
11	Formats used in pharmacy practice	Complete peer review for assignment 2
12	Creating an abstract	Complete peer review for assignment 2
13	Publication requirements Criteria for authorship Additional concepts in writing ethics	**Submit writing assignment 2 for faculty review**
14	Holiday week – no lecture	No assignments
15	Peer review process	Discussion board posts

AMA, American Medical Association.

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