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Research Note

Perception of electronic peer review of SOAP notes among pharmacy students enrolling in their first pharmacotherapeutics course



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ABSTRACT

Introduction: This study aimed to assess the perception of electronic peer review of subjective, objective, assessment, plan (SOAP) notes performed by pharmacy students during their first pharmacotherapeutic course experience.

Methods: In this single-center, cross-sectional study, a questionnaire was administered to students who had undergone an electronic peer review process of a SOAP note. Four areas were assessed: baseline knowledge, development of therapeutic plans, attitudes and perceptions on peer assessment in enhancing SOAP note writing skills, and perceptions of factors that were/would have been helpful toward providing and/or receiving peer assessment.

Results: One hundred students completed and returned the survey (response rate 61.3%). Most students (93%) reported no prior exposure to writing SOAP notes prior to their participation. SOAP note writing was a valuable component of the module, with most students (97%) recognizing that SOAP note writing skills are important for their future practice as pharmacists. Students also acknowledged that activities in the module improved their abilities to develop (93%) and communicate (80%) patient-specific therapeutic plans in the form of SOAP notes.

Conclusions: Students were comfortable receiving an assessment of a SOAP note from a classmate, and most students indicated that their classmates could provide an honest assessment of their SOAP notes. The electronic peer review process allowed students to receive feedback on their work, and this learning strategy could be further extended to the education of other functional skills that are essential in pharmacy practice.

Introduction

Subjective, objective, assessment, plan (SOAP) notes have been utilized widely by clinicians of various healthcare backgrounds to ensure systematic and structural documentation of care. Each term of the SOAP acronym facilitates effective communication among healthcare providers about their patients. Since the introduction of problem oriented medical records and SOAP notes by Dr. Lawrence Weed in the 1970s, SOAP notes have significantly enhanced the practice of medicine and improved the health outcomes of many patients.¹ Their use has also been incorporated pedagogically to guide healthcare students to use their clinical reasoning to assess, diagnose, and treat a patient based on the information provided to them in a controlled environment.

The framework of SOAP notes has become the mainstay of training for many healthcare students to develop their future ready

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capabilities, including self-reflection, peer observance, and lifelong learning. According to Boase-Jelinek et al.,² peer assessment and review is an authentic, real-world approach that fosters students' abilities for critical thinking and self-evaluation. Through the process of reviewing each other's work, the student whose work is being reviewed gains external perspectives, which broadens their views and strengthens their ability to think objectively. For students who perform this review, the exercise allows them to process and analyze other's work critically and gain additional understanding on approaches to solve problems. Ultimately, this process would also enhance the reviewer's skills at writing SOAP notes. Australian and United States studies have reported no significant difference between the SOAP notes scores of students vs. faculty members.^{3,4}

Many academic institutions have incorporated online learning (e-learning) to foster the notion of lifelong learning as well as to provide students with flexibility and convenience to learn when and where they are most comfortable. Technology has also allowed students to look up information independently and instill responsibility for self-directed learning.⁵ The concept of performing peer review of SOAP notes through e-learning is still new in academia due to logistic challenges, but it may be a worthwhile practice to maximize the benefit of SOAP notes and to cultivate students' future readiness. Training healthcare students requires the use of effective tools to facilitate a real-world learning experience. Pedagogical activities such as performing peer-reviews early on will accustom students to the practice of self-reflection and lifelong learning. This study examined the perception of electronic peer review processes of SOAP notes performed by pharmacy students during their first therapeutic coursework.

Methods

The National University of Singapore (NUS) offers a four-year bachelor of science (pharmacy) undergraduate degree that is the only recognized degree in Singapore leading to registration as a pharmacist. The program includes three years of didactic coursework in anatomy, physiology, pharmaceutical sciences, pharmacology, therapeutics, pharmacy professional skills, and law followed by a final-year consisting of research and experiential learning. The pharmacotherapeutics sequence at NUS consists of four required modules per semester in years two and three that allows pharmacy students to learn about the management of various diseases.

Pharmacotherapeutics I is a four-credit core module required of second-year undergraduate students. It is also an integrated module that is co-taught by pharmacology faculty members and clinical pharmacy faculty members. The module is designed to introduce students to common chronic conditions, which include hypertension, dyslipidemia, diabetes, peptic ulcer disease, asthma, and chronic obstructive pulmonary disease. There are three distinct segments in the module. The first segment of the module introduces the pharmacology of various drugs that are used to manage these conditions. The second segment introduces the principles of providing pharmaceutical care, interpretation of common laboratory results, and documentation of pharmacists' care plans in the form of SOAP notes. The third segment of the module introduces therapeutic management of the various diseases and conditions.

Organization of the electronic peer review process

At the end of the pharmacology lectures, students were given reading assignments to introduce them to the management of peptic ulcer disease (PUD), including two journal articles and a chapter from their assigned textbook. PUD was selected as it was the first topic introduced in the module.

Upon completion of self-study of PUD, students then completed the second segment of the module, which includes a didactic lecture on writing SOAP notes. As a take-home assignment, students were given a case study of a patient who was diagnosed with PUD. The students were asked to handwrite a one-page SOAP note on the management of this patient's condition. They then digitalized their notes (by scanning or via a photograph using a mobile phone) and uploaded their notes to the university's learning portal (<https://ivle.nus.edu.sg/>). The portal randomly generated a four-digit code, and each student was asked to name their submission using a four-digit code as the file name. The students were given one week to submit their SOAP note.

Immediately after the note was uploaded, each student was randomly assigned a SOAP note to peer review electronically on the university's learning portal using a standard rubric (Table 1). The review process was double-blinded to both the grader and the student whose SOAP note was being reviewed. The student version of the rubric included an answer key to the SOAP note and detailed evaluation criteria, e.g., a "P" ("partial") was awarded for missing one therapeutic option and "X" was awarded if a student missed two or more therapeutic options. The students were required to provide qualitative comments for all evaluation criteria where "P" or "X" grades were assigned. Each student then received individual feedback including grades and qualitative comments following this anonymous peer assessment process. In this exercise, students did not receive formal grading and feedback of the SOAP note or their peer assessments of their classmates' SOAP notes from the instructors of the module. However, students who had uploaded a written SOAP note as well as submitted their peer assessment would get participation credits for their effort.

Study design and participants

This was a cross-sectional study using an anonymous self-administered survey and a convenience sample of 165 second-year undergraduate pharmacy students enrolled in Pharmacotherapeutics I in the 2018 to 2019 academic year. This study was approved by the university's institutional review board (approval number: S-18-059E).

Data collection and instrument

The survey instrument was adopted from another study that evaluated the benefits of peer review in patient case presentations

Table 1
Generic grading rubric for assessing SOAP notes.

Criterion	Indicate C, P, or X	Comments (Required for “P” and “X”)
<ul style="list-style-type: none"> ● Identify the problem ● State the subjective findings of the patient ● State the objective findings of the patient ● Current medications and allergies—List all relevant information ● Provide relevant pathophysiology ● List all exacerbating/risk factors ● Evaluation for need of therapy ● State all pharmacological options ● State all non-pharmacological options ● Recommend drug therapy ● Provide goals of therapy ● Provide monitoring parameters—efficacy ● Provide monitoring parameters—side effects of medications ● Provide patient education ● Write up is clear and legible ● Care plan was confined to one sheet of SOAP template ● Care plan was written within the borders of the template 		

C = Complete; P = Partial; SOAP = subjective, objective, assessment and plan; X = Incomplete.

among pharmacy students (unpublished). The survey instrument consisted of 20 items divided into four sections¹: baseline knowledge,² development of therapeutic plans,³ attitudes and perceptions on peer review in enhancing SOAP writing skills, and⁴ perceptions of factors that were/would have been helpful toward providing and/or receiving peer review. Responses were measured using five-point Likert statements (ranging from “strongly agree” to “strongly disagree”). There was also one yes/no question and one open-ended question to allow for qualitative comments on peer review.

The survey instrument was administered following the completion of the peer review activity in the module. Printed copies of the survey instrument were distributed in class, and a collection box was placed at the exit for students to return their surveys when they were leaving. The rationale for the study was explained before the survey instruments were distributed. Students were informed that their participation was voluntary and their responses were anonymous; returning the survey served as implicit consent to participate in the study. Permission was sought from the faculty-in-charge prior to conducting the survey.

Data analysis

Responses were transcribed verbatim to Microsoft Excel for further analysis. Qualitative comments were reviewed to identify major themes and representative quotes. Descriptive statistics were used to summarize quantitative survey results. McNemar's test was used to compare differences in students' perceptions of their peers' and their own skills in peer assessment. An a priori alpha level of < 0.05 was used as the criterion for statistical significance. Statistical analysis was performed using STATA.⁶

Results

Among 163 students who completed the SOAP exercise, 100 students completed and returned the survey (response rate 61.3%). Most students (93%) reported no prior exposure to writing SOAP notes prior to their participation. SOAP note writing was a valuable component of the module with most students (97%) recognizing that SOAP note-writing skills are important for their future practice as pharmacists. Students also acknowledged that activities in the module improved their abilities to develop (93%) and communicate (80%) patient-specific therapeutic plans in the form of SOAP notes.

Students' attitudes and perceptions on peer review in enhancing SOAP writing skills

Students' attitudes and perceptions of peer review as a pedagogical strategy to enhance SOAP note writing skills are summarized in Table 2. Students valued peer review as a useful skill in their future careers (91%) and believed that it was a useful way to obtain feedback on their SOAP notes (71%). Their experiences with peer assessment were generally positive; most students received constructive feedback from their peers (64%) that helped them improve their SOAP note writing skills (54%). Students also believed that their peers would provide an honest assessment of their SOAP note and they were equally confident of their peers' skills in doing so in turn (89% vs. 91%, $p = 0.25$). In comparison, students were more confident of their peers' skills than in their own skills in assessing SOAP notes (91% vs. 71%, $p < 0.01$). They were also more comfortable receiving feedback from peers on their own SOAP notes than providing feedback on their peers' SOAP notes (96% vs. 90%, $p = 0.03$).

Qualitative feedback on peer review is summarized in Table 3. Overall, students appreciated the value of the learning activity. Writing their own SOAP notes and assessing peers' SOAP notes was perceived as a good exercise that was helpful in learning SOAP note writing skills. In particular, peer review gave students the exposure to their peers' thought processes of approaching a patient case that might be different from their own, creating additional learning experiences for the students. However, some students

Table 2Students' attitudes and perceptions of peer review in learning SOAP note writing skills ($n = 100$).

Statements	Agreement n (%) ^a	Neutral n (%)	Disagreement n (%) ^b
I believe peer assessment is a useful skill in my career as a pharmacist.	91 (91)	8 (8)	1 (1)
I believe peer assessment is a useful way to obtain feedback on my SOAP note.	71 (71)	21 (21)	8 (8)
I am comfortable providing an honest assessment of my classmate's SOAP note.	90 (90)	9 (9)	1 (1)
I am comfortable receiving an assessment of my SOAP note from a classmate.	96 (96)	2 (2)	2 (2)
I believe I have the necessary skills to assess my classmate's SOAP note.	71 (71)	21 (21)	8 (8)
I believe my classmate has the necessary skills to assess my SOAP note.	91 (91)	8 (8)	1 (1)
I believe a classmate will provide an honest assessment of my SOAP note.	89 (89)	9 (9)	2 (2)
In this module, I received constructive comments from my classmate on my SOAP note. ^c	63 (64)	31 (31)	5 (6)
My classmate's comments helped me improve my SOAP note-writing skills.	54 (54)	40 (40)	6 (6)

SOAP = subjective, objective, assessment and plan.

^a Agreement = strongly agree + agree.^b Disagreement = strongly disagree + disagree.^c One missing response; analyzed $n = 99$.**Table 3**

Summary of themes, subthemes, and representative quotes on students' attitudes and perceptions of peer review.

Theme identified	Representative quotes
Usefulness of peer assessment	"I think it is a good exercise. It allows us to be exposed to different thought processes of our classmates which is a learning experience for ourselves." "It's a good exercise; helps in the learning process."
More practices will be beneficial	"Would be interested to have more cases to practice SOAP on, or just the idea of evaluating a case and planning treatment options." "Can have more of such exercises; I think it is very useful"
Opportunities to clarify	"Did not really know how to handle responses that contained more than what the rubrics stated." "Even though the rubric is provided, some of the answers provided may or may not be correct—perhaps a forum can be set up to clarify some issues."

SOAP = Subjective, objective, assessment and plan.

thought that they could benefit from more practice to further enhance their SOAP note writing skills. Some students were unsure of the appropriate assessment when their peers' SOAP notes deviated from solutions in the grading rubric and would have liked the opportunity to clarify such cases to provide a better assessment of their peers' work.

Helpful factors in providing and/or receiving peer review

Students' perceptions on factors that were or would have been helpful for either receiving or providing quality feedback via peer review are shown in Table 4. Discussing patient cases in class with faculty beforehand and reviewing examples of constructive peer review from similar assignments in the past were perceived as the most useful factors, with 90% of students reporting that these were either very helpful or helpful in conducting peer assessment. In addition, anonymity (87%) and instructions from faculty (86%) were perceived as very helpful or helpful factors in training students to conduct effective peer review; fewer students found passive methods such as readings (50%) and being friends with their peers (49%) to be helpful.

Table 4Students' perceptions on helpfulness for providing or receiving feedback via peer assessment ($n = 100$).

Factors	Very helpful n (%)	Helpful n (%)	Undecided n (%)	Somewhat helpful n (%)	Not helpful n (%)
Reading articles on how to conduct peer assessments.	6 (6)	44 (44)	37 (37)	11 (11)	1 (1)
Receiving instructions from faculty on how to conduct peer assessments.	21 (21)	65 (65)	11 (11)	2 (2)	1 (1)
Reviewing examples of peer assessments from similar assignments.	32 (32)	55 (55)	10 (10)	0 (0)	0 (0)
Discussing patient cases in class beforehand with faculty.	35 (35)	55 (55)	10 (10)	0 (0)	0 (0)
Making the peer assessment anonymous.	47 (47)	40 (40)	9 (9)	3 (3)	1 (1)
Being friends with my classmates. ^a	14 (14)	35 (35)	35 (35)	3 (3)	12 (12)

^a One missing response; analyzed $n = 99$.

Discussion

In this study, we explored the attitudes and perceptions of peer review as a learning strategy on SOAP note writing within a group of undergraduate pharmacy students taking pharmacotherapeutics for the very first time. We are boldly implementing this active learning strategy in a group of learners who may not be very acquainted to peer review each other's work. Overall, the students found the learning activity to be useful, and many stated that they were glad to receive constructive feedback of their SOAP notes from their classmates. Our approach was significantly different from other published studies because unlike other studies focused on the use of peer review as an in-class activity for other pharmacy-practice skills such as literature evaluation, our study used an electronic platform to perform the anonymous peer review in order to reinforce an essential pharmacy-practice skill such as SOAP note writing. Peer review is an extremely essential skill that we would like our students to adopt because it empowers the students to critically review each other's work; this helps them learn from one another.

Over 90% of the class was comfortable receiving an assessment of the SOAP note from a classmate. Most students indicated that their classmates could provide an honest assessment of their SOAP note as their peer reviews were not formally graded. The qualitative comments received were also consistent with findings from our quantitative survey. Students have commented that this activity allowed them to be exposed to different thought processes from their classmates. Interestingly, in another survey that we conducted to understand the perception of SOAP notes among pharmacy students, only 22.7% of the students indicated that they would regularly teach others to write SOAP notes.⁷ This demonstrates that the use of an electronic platform creates additional, valuable opportunities to help our students teach each other, which in turn serves as an active learning opportunity. Prior to this study, there was very little opportunity for students to receive feedback on their SOAP notes. In the past, students enrolling in this course had learned to write SOAP notes, but without opportunities to practice and receive feedback due to limited class time, lack of manpower resources, and large class sizes. Hence, the introduction of peer assessment is beneficial as this allows additional practices among the students, which could further reinforce their learning.

Although we have successfully created a medium for the students to peer review each other's SOAP note, one may question whether this activity was implemented too early within the pharmacotherapy curriculum. The study targeted second year undergraduate students who were learning pharmacotherapy and SOAP note writing. This may explain why only 70% of the classmates believed that they had the necessary skills to assess their classmates' SOAP notes, as they lacked confidence in their own work. Furthermore, approximately half of the students (54%) indicated that their classmates' comments helped them improve their SOAP note-writing skills, and only 64% of the students indicated that they have received constructive comments from their classmates. It is important to emphasize that our study was not designed to investigate what is the most optimal timing to offer peer assessment as a learning pedagogy for learning to write SOAP notes. However, this study adds significant value to the literature because despite the challenges that we identified in conducting peer review for students in their first pharmacotherapeutics course, the process is still valuable in creating opportunities to build the students' confidence in both writing and critiquing SOAP notes. We also believe that early exposure is useful to cultivate the spirit of active learning among pharmacy students. Future studies can focus on longitudinal comparison of students' responses to peer review at different learning levels.

In this study, students provided feedback that they were unsure on how to handle situations when the SOAP notes contained additional information that was beyond the information provided in the grading rubrics. The elements that we required students to peer assess in the rubrics were comprehensive, and they included non-drug therapy options as well as education counseling. These items are acknowledged to be essential elements often left out in SOAP note evaluation rubrics developed by many colleges and schools of pharmacy in the United States.⁸ This reassures us that the grading rubric that we have developed was reasonably comprehensive. However, our students were unsure regarding the accuracy of additional information provided by their classmates, suggesting that our students lack experience to provide constructive feedback to their classmates, which also implies that it could be too early to implement peer review of SOAP notes when they are still learning to write SOAP notes. In addition, although peer review provides an excellent platform for students to provide feedback on their classmates' work, students without adequate knowledge and experience still heavily rely on faculty instructions within the rubric to perform the assessment. Although past studies have shown that the incorporation of rubrics allow consistency grading of electronic SOAP notes as well as transparency in terms of grading,⁹ a rubric designed by the faculty must be sufficiently comprehensive to address all potential responses that the students might face during electronic peer review.

We also assessed whether certain characteristics would make the peer review process useful for our students. Students indicated that having the peer review process be anonymous was helpful; being friends with their classmates did not improve the peer review process. This finding is similar to findings from other studies whereby a pre-existing relationship does not necessarily help or improve the peer review process.¹⁰ Hence, as long as the peer review activity is anonymous, students will be comfortable in providing and receiving feedback.

There were a few limitations in this study. We administered the post-activity survey in class, and the response rate was low (60.6%) vs. other studies that assessed students' perceptions of peer review activities.¹⁰ This is because the lectures are now being webcast, and students may choose not to attend physical lectures. Furthermore, we did not evaluate the accuracy of the students' peer assessment as compared to the rubric. Hence, we do not know definitely whether or not the students provided appropriate assessments to their peers. Furthermore, we did not correlate the students' perceptions against their grades on the assessments. Additionally, our survey instrument did not explicitly ask students to rationalize their responses and therefore, we were unable to thoroughly understand the rationale for their perceptions.

Conclusions

This study successfully evaluated the perception of electronic peer review on SOAP notes as performed by pharmacy students during their first pharmacotherapeutic course. Students were comfortable receiving an assessment of the SOAP note from a classmate, and most students indicated that their classmates could provide an honest assessment of their SOAP notes. Future studies should evaluate whether electronic peer review processes can be further extended to the education of other functional skills that are essential in pharmacy practice.

Disclosure(s)

None.

Declaration of competing interest

None.

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