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Advanced Pharmacy Practice Experience at Libyan International Medical University during COVID-19 Era: PharmD Preceptors' and Students' Perception toward Virtual Training

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ABSTRACT

Introduction: As the COVID-19 pandemic continued, pharmacy experiential training shifted dramatically, including healthcare facilities-oriented training. The curriculum development committee at the Faculty of Pharmacy at Libyan International Medical University put a proposal to facilitate virtual case discussions and to create teaching materials that could be utilized for virtual clinical rotations during Advanced Pharmacy Practice Experience.

Aim: This study aimed to investigate the Pharm-D preceptors' and students' perception toward the virtual training experience during the Covid-19 era.

Method: Curriculum Development Committee members and preceptors at the Faculty of Pharmacy met regularly to develop a training strategy that covers intended training skills and competencies. Cases were collected from Benghazi hospitals with all filed investigations and management information. Cases manuals and specifications were created for each rotation; preceptor guide and reference guidelines were developed for each case; and case-based discussion session guide and evaluation forms were announced to students. Accordingly, cases were implemented in virtual training as case-based discussion session, via MOODLE. During the session, each student shares his/her knowledge and information with colleagues and preceptor by answering the guiding questions structured in the patient data care form to cover six aspects including; problem identification, desired outcome, therapeutic alternatives, optimal plan, outcome evaluation, and patient education. At the end of the session, the preceptor summarises the discussion and evaluates the students using a predesigned evaluation form noting that oral feedback is provided by all parties.

Results: Motivation, performance, and outcomes gained by students during the virtual training experience reflect its success.

Conclusion: The adaptability of the virtual training package by the Faculty of Pharmacy, is well established in terms of available scenario creation and simulation training. The next step is to include these virtual cases -collected from real-life situations- within MyDispense in its new version.

Keywords: APPE, case-based discussion session, Virtual training, MyDispense, Pharmacy.

Introduction:

COVID-19 pandemic led to dramatic changes in the pharmacy experiential training due to shortage in healthcare facilities available to conduct the training[1,2].

With the rise of telehealth during the COVID-19 pandemic, pharmacy schools are incorporating telehealth training into the curriculum. This type of training prepares students for virtual patient interactions, which are becoming more common in clinical practice. Overall, virtual training has become an essential component of pharmacy education during the COVID-19 era. It provides students with the opportunity to continue their education and clinical training while staying safe[3,4].

Virtual case-based discussions can also provide students with a more interactive learning experience through the use of digital tools such as virtual simulations, videos, and animations. These tools can help to create a more engaging learning environment that can enhance student participation and knowledge retention. Many pharmacy schools are offering virtual simulations that allow students to practice clinical skills in a safe and controlled environment. These simulations can be accessed online and provide students with realistic scenarios that they may encounter in clinical practice[5,6].

Pharmacy schools are adapting to the new normal by offering online lectures and webinars to students. These provide a flexible learning environment that students can access from anywhere with an internet connection[7,8].

Virtual training has been shown to be an effective way to teach healthcare professionals new skills. A study published in the journal "Academic Medicine" found that students who received virtual training in medication dispensing were more likely to dispense medications accurately than students who did not receive virtual training[5,9].

Therefore, a proposal to facilitate virtual case discussions was adapted by the Curriculum development committee (CDC) at Faculty of Pharmacy at Libyan International Medical University (LIMU) intended to create teaching materials that could be utilized for virtual clinical rotations during Advanced Pharmacy Practice Experience (APPE).

In order to cover a range of competencies such as communication, ethics, patient education and counselling, and dispensing skills; MyDispense was utilized to explore a range of realistic patient scenarios and to learn in a safe environment rather than practicing in real life[5,10,11]. The use of MyDispense has grown during the COVID-19 pandemic, proving that benefits including being free, web-based, customizable, and accessible to students are drivers for use. Since 2014, a growing number of pharmacy schools have started implementing the MyDispense service[16]. This increase in software usage opens up potential for collaboration by creating shared examples that can be applied in related courses to reduce teacher workload[5,7]. This study aims to explore the Pharm-D students' and preceptors' satisfaction toward virtual training at LIMU.

Method:

A training strategy focused on APPE skills and competencies was developed by CDC members and preceptors at Faculty of Pharmacy. The used cases were real patient cases collected from Benghazi hospitals with all filed investigations and management information included. Cases from different departments were allocated into relevant APPE clinical rotations. For each rotation, manuals and specifications were created. In addition, a preceptor guide and reference guidelines were developed for each case. Furthermore, case-based discussion session (CBDS) guide and evaluation forms were communicated to students. Accordingly, cases were implemented in APPE training as CBDS, via MOODLE. CBDS sessions were designed to enable each student to share his/her knowledge and information with colleagues and preceptor through answering the guiding questions that were structured in the patient data care form to cover six aspects including; problem identification, desired outcome, therapeutic alternatives, optimal plan, outcome evaluation, and patient education. A summary was given by the preceptor at the end of the CBDS and the performance of each student was evaluated, using a predesigned evaluation form, noting that oral feedback is provided by all parties at the end of the session.

MyDispense, a virtual simulation tool developed by the Faculty of Pharmacy and Pharmaceutical Sciences at Monash University, aims to give experience to learners to practice their drug dispensing skills without harm. The Faculty of Pharmacy at LIMU adapted MyDispense platform to facilitate the virtual training during APPE to cover a range of skills that enable pharmacy students to develop pharmacy practice experience. For each clinical rotation, specific exercises were created according to the objectives of the rotation.

Subject participants:

The participants of this study were Pharm-D students from Libyan International of Medical University (LIMU) in Benghazi, Libya that utilized virtual

training as part of their experiential training during Advanced Pharmacy Practice Experience (APPE) during Covid-19 era. Those students considered as first and second batches of the faculty.

For the inclusion criteria: 1) Every fifth-year Pharm-D student for academic years 2020 - 2021 and 2021 – 2022 in Faculty of Pharmacy at LIMU; and 2) Respondent must have experienced using the MyDispense virtual simulation, and Case- Based Discussion Sessions (CBDS) during APPE training. For the exclusion criteria: 1) Respondent not in first or second batch, Pharm-D students at LIMU; and 2) Respondent must not be students from other faculties at LIMU or other universities in Libya.

Instrument:

This study utilized evaluation forms designed by quality assurance office with the collaboration of CDC members at Faculty of Pharmacy at LIMU. These forms had been considered as a survey questionnaire which used by all preceptors and fifth year, Pharm-D students during their APPE at the end of each clinical rotation.

The first part of the survey tool to evaluate the CBDS consisted of eight questions about the clarity, usefulness, of the files, forms, in addition to appropriateness of time allocated for CBDS. The second part of the survey tool to evaluate the student's performance in terms of commitment to session time, contribution, preparedness, and providing sufficient information that promotes clearer and deeper understanding.

The first part of the survey tool to evaluate the CBDS consisted of sixteen questions that required to assess the students' understanding and knowledge of the clinical rotation objectives during the CBDS in addition to the appropriateness of total number of

cases during the rotation, the effectiveness of CBDS, clarity of files and forms of the virtual cases.

The second part of the survey tool to evaluate the preceptor's performance in terms of commitment to session time, providing verbal feedback to students during the session, providing fair evaluation, facilitating the session perfectly, communicating well with students, and leading the session well.

The third part to evaluate MyDispense exercises in term of designing the cases, clarity and usefulness of the cases, and wither the cases provided assisted the students in improving their skills.

To analyse the data collected, Qualtrics system was used that utilized a five-point Likert scale system, with one (1) strongly disagree and five (5) strongly agree. Then the mean, and standard deviation were calculated to reveal the results.

Results

During the academic year 2020-2021, the evaluation of CBDS revealed students' satisfaction to all items of all rotation with the exception of evaluation of CBDS during Internal medicine rotation which showed that student's satisfaction was low in term of the clarity of case file (2.27), the clarity of questions in Patient Database Care Form (PDCF) (2.64), and the appropriateness of total number questions in PDCF (2.82) as shown in tables 1, 2, and 3.

Evaluation of CBDS during the academic year 2021-2022 showed that, the overall Case-based discussion session evaluation by preceptors and students, students' performance and satisfaction were always above the target (> 3 out of 5 on Likert scale) during all rotation except during ICU and CCU where the overall students' performance was 2.62 as shown in tables 4,5, and 6.

Medical Research Archives

Table 1: Evaluation of CBDS during the academic year 2020-2021
Case-based discussion session evaluation by preceptors

Rotation	Internal Medicine	Haematology/Oncology	Ambulatory care	ICU and CCU	Infectious diseases	Surgery	Nephrology	Dermatology	Paediatrics	Elective (Gynecology/Psychiatrics)
Item	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. The case file is clearly presented	4.00	3.82	4.00	3.67	4.50	3.67	4.33	4.00	4.00	4.00
2. Case discussion session is helpful	4.83	4.40	3.75	5.00	4.50	4.00	4.33	4.50	4.67	4.50
3. The time of case discussion session is appropriate	4.83	4.60	4.50	5.00	4.50	4.00	4.33	4.50	4.67	4.00
4. The time between receiving the scientific material of the case and the discussion session is enough	4.17	4.00	4.00	4.00	4.50	3.67	4.33	4.00	4.33	4.00
5. The questions in the PDCF are clear	3.50	3.40	4.00	4.33	4.50	3.67	4.33	3.50	3.67	4.00
6. The number of questions in the PDCF is appropriate	4.00	3.00	4.00	4.33	4.50	3.67	4.33	3.50	4.00	4.00
7. Case summary at the beginning of session is useful	4.50	4.60	4.75	5.00	4.50	4.33	4.33	4.50	4.67	5.00
8. The total number of cases is appropriate	4.33	4.20	4.75	4.33	4.50	4.33	4.33	3.50	3.33	3.00
Overall Case-based discussion session evaluation	4.27	4.00	4.21	4.45	4.50	3.91	4.33	4.00	4.16	4.06

Table 2: Evaluation of CBDS during the academic year 2020-2021
Evaluation of students' performance by preceptors

Rotation	Internal Medicine	Haematology/ Oncology	Ambulatory care	ICU and CCU	Infectious diseases	Surgery	Nephrology	Dermatology	Paediatrics	Elective (Gynecology/ Psychiatrics)
Item	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. Contributing to the group's discussion throughout the whole session.	4.67	4.40	4.50	4.33	4.50	4.67	4.33	4.50	4.33	4.00
2. Presenting sufficient information that promotes clearer and deeper understanding	4.67	4.40	4.75	4.67	4.50	4.33	4.33	4.50	4.33	4.00
3. Provide fair oral feedback to preceptor at the end of the session	4.17	4.20	4.50	4.00	4.50	4.33	4.33	4.50	3.67	3.00
4. Provide fair oral feedback to peer at the end of the session	4.00	4.20	4.50	4.00	4.50	4.33	4.33	5.00	3.67	3.00
Overall students performance	4.41	4.26	4.58	4.33	4.50	4.38	4.38	4.66	4.00	3.50

Table 3: Evaluation of CBDS during the academic year 2020-2021
Case-based discussion session evaluation by students

Rotation	Internal Medicine	Haematology/ Oncology	Ambulatory care	ICU and CCU	Infectious diseases	Surgery	Nephrology	Dermatology	Paediatrics	Elective (Gynecology/ Psychiatrics)
Item	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. The case file is clearly presented	2.27	3.60	3.20	5.00	5.00	5.00	4.50	4.50	3.43	4.53
2. Case discussion session is helpful	3.82	3.60	3.20	5.00	5.00	5.00	4.50	4.50	3.71	4.70
3. The time of case discussion session is appropriate	3.64	3.80	3.00	5.00	5.00	5.00	4.25	4.25	3.57	4.53
4. The time between receiving the scientific material of the case and the discussion session is enough	3.18	3.20	3.20	5.00	5.00	5.00	4.25	4.25	3.57	4.36
5. The questions in the PDCF are clear	2.64	3.60	3.40	5.00	5.00	5.00	3.50	3.50	3.29	4.00
6. The number of questions in the PDCF is appropriate	2.82	3.40	3.20	5.00	5.00	5.00	3.75	3.75	3.86	4.10
7. Case summary at the beginning of session is useful	4.18	4.00	3.40	5.00	5.00	5.00	4.50	4.50	3.86	3.66
8. The total number of cases is appropriate	3.36	4.00	4.40	4.50	4.50	5.00	4.50	4.50	3.86	4.18
Average of Case-based discussion session evaluation	3.23	3.65	3.37	4.93	4.93	5	4.21	4.21	3.64	4.26

Table 4: Evaluation of CBDS during the academic year 2021-2022
Case-based discussion session evaluation by preceptors

Rotation	Internal Medicine	Haematology/ Oncology	Ambulatory care	ICU and CCU	Infectious diseases	Surgery	Nephrology	Dermatology	Paediatrics	Elective (Gynecology/ Psychiatrics)
Item	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. The case file is clearly presented	4.67	3.67	4.33	4.25	3.25	4.33	3.67	3.67	3.67	4.50
2. Case discussion session is helpful	4.67	4.33	4.33	4.25	4.00	4.00	4.33	4.00	4.00	4.30
3. The time of case discussion session is appropriate	5.00	4.67	5.00	3.75	4.50	4.67	4.33	4.33	4.33	4.00
4. The time between receiving the scientific material of the case and the discussion session is enough	4.67	4.00	4.33	3.75	4.50	4.67	4.00	4.00	4.00	4.50
5. The questions in the PDCF are clear	4.67	4.00	4.33	4.00	3.75	4.00	3.67	3.67	3.67	4.50
6. The number of questions in the PDCF is appropriate	4.67	4.33	3.67	4.25	4.25	4.00	4.00	4.00	4.00	4.30
7. Case summary at the beginning of session is useful	5.00	4.67	5.00	3.75	4.25	4.67	4.67	4.67	4.67	5.00
8. The total number of cases is appropriate	5.00	4.67	4.67	4.00	4.00	4.33	3.67	4.33	4.33	4.30
Overall Case-based discussion session evaluation	4.79	4.29	4.45	4.00	4.06	4.33	4.04	3.94	3.94	4.40

Table 5: Evaluation of CBDS during the academic year 2021-2022
Evaluation of students' performance by preceptors

Rotation	Internal Medicine	Haematology/ Oncology	Ambulatory care	ICU and CCU	Infectious diseases	Surgery	Nephrology	Dermatology	Paediatrics	Elective (Gynecology/ Psychiatrics)
Item	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. Commitment to session time	5.00	3.33	4.33	2.50	3.50	3.33	3.67	4.00	4.00	4.00
2. Prepared and read the case before the session	4.67	3.67	4.00	2.50	3.25	3.00	3.67	4.00	4.00	4.50
3. Contributing to the group's discussion throughout the whole session.	4.67	3.33	3.67	2.50	3.75	3.00	4.00	4.33	4.33	4.00
4. Presenting sufficient information that promotes clearer and deeper understanding	4.67	3.00	3.67	2.75	3.50	2.86	3.67	3.67	3.67	4.00
5. Provide fair oral feedback to preceptor at the end of the session	4.67	2.67	3.67	2.75	3.50	3.00	4.00	3.33	3.33	4.00
6. Provide fair oral feedback to peer at the end of the session	4.67	3.00	3.33	2.75	3.00	3.00	3.67	3.33	3.33	4.00
Overall students' performance	4.72	3.16	3.77	2.62	3.41	3.03	3.78	3.77	3.77	4.30

Table 6: Evaluation of CBDS during the academic year 2021-2022
Case-based discussion session evaluation by students

Rotation / Item	Internal Medicine	Haematology/ Oncology	Ambulatory care	ICU and CCU	Infectious diseases	Surgery	Nephrology	Dermatology	Paediatrics	Elective (Gynecology/ Psychiatrics)
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. The case file is clearly presented	4.60	4.04	4.18	4.11	4.58	4.48	4.75	4.75	4.67	4.00
2. Case discussion session is helpful	4.70	4.54	4.27	4.04	4.58	4.68	4.71	4.71	5.00	4.50
3. The time of case discussion session is appropriate	4.67	4.61	4.27	4.07	4.65	4.77	4.67	4.67	4.67	4.00
4. The time between receiving the scientific material of the case and the discussion session is enough	4.33	4.57	4.24	4.48	4.58	4.81	4.67	4.67	4.33	4.00
5. The questions in the PDCF are clear	4.67	4.54	4.30	4.25	4.63	4.58	4.63	4.63	3.67	4.00
6. The number of questions in the PDCF is appropriate	4.67	4.57	4.39	4.29	4.63	4.65	4.54	4.54	4.00	4.00
7. Case summary at the beginning of session is useful	4.70	4.57	4.42	4.37	4.70	4.75	4.61	4.61	4.33	5.00
8. The total number of cases is appropriate	4.67	4.58	4.30	4.35	4.65	4.74	4.52	4.52	3.67	4.00
Average of Case-based discussion session evaluation	4.62	4.48	4.29	4.29	4.64	4.66	4.61	4.59	4.29	4.50

MyDispense:

During the academic year 2020-2012, after completion of the first two rotations namely; Internal Medicine and Haematology and Oncology, students' responses toward cases design, clarity and usefulness of cases were always less than 3 on 5-lickert scale. In addition, students admitted that the use of virtual cases during Haematology and Oncology rotation, did not assist them in improving their skills. After taking students' evaluation and notes in regards to designing and clarity of cases, students' responses improved and were always > 3 on 5-lickert scale, after completion of the other eight rotations namely; ambulatory care, intensive care unit and cardiac care unit, infectious diseases, surgery, nephrology, dermatology, paediatrics and electives which included psychiatry and gynaecology as shown in table 7.

The evaluation of MyDispense by students during the academic year 2021-2022 reflected a significant satisfaction; always more than 3 on 5-lickert scale, as shown in table 8.

Table 7: Evaluation of MyDispense by students during the academic year 2020-2021

Rotation / Item	Internal Medicine Mean	Std. dev	Haematology/ Oncology Mean	Std dev.	Ambulatory care Mean	Std. dev	ICU and CCU Mean	Std. dev	Infectious diseases Mean	Std. dev	Surgery Mean	Std. dev	Nephrology Mean	Std. dev	Dermatology Mean	Std. dev	Paediatrics Mean	Std. dev	Elective (Gynecology/ Psychiatrics) Mean	Std. dev
Well-designed cases	2.91	1.15	2.40	1.32	3.00	1.05	4.00	1.21	4.00	0.77	4.00	1.15	3.50	1.09	3.50	1.35	3.00	1.31	3.37	1.15
Clear and useful cases	2.82	1.12	2.40	1.36	3.00	1.14	4.00	1.12	4.00	0.77	4.33	1.12	3.25	1.13	3.25	1.36	3.00	1.31	3.20	1.12
Assists in improving your skills	3.27	1.06	2.40	1.25	3.20	1.07	4.50	1.21	4.50	0.78	4.67	1.06	3.25	1.09	3.25	1.31	3.00	1.35	3.37	1.06
Overall evaluation	3.09	0.99	2.20	1.10	3.20	1.13	4.50	1.14	4.50	0.77	3.33	0.99	3.25	1.09	3.25	1.31	3.00	1.36	3.36	0.99
Total average evaluation of my Dispense	3.02	1.08	2.35	1.25	3.10	1.09	4.25	1.17	4.25	0.77	4.08	1.08	3.31	1.10	3.31	1.33	3.00	1.33	3.32	1.08

Table 8: Evaluation of MyDispense by students during the academic year 2021-2022

Rotation / Item	Internal Medicine Mean	Std. dev	Haematology/ Oncology Mean	Std dev.	Ambulatory care Mean	Std. dev	ICU and CCU Mean	Std. dev	Infectious diseases Mean	Std. dev	Surgery Mean	Std. dev	Nephrology Mean	Std. dev	Dermatology Mean	Std. dev	Paediatrics Mean	Std. dev	Elective (Gynecology/ Psychiatrics) Mean	Std. dev
Well-designed cases	4.37	1.15	3.79	1.32	4.07	1.05	4.08	1.21	4.61	0.77	4.27	1.15	4.43	1.09	-	-	4.33	1.31	3.40	1.15
Clear and useful cases	4.30	1.12	3.87	1.36	4.14	1.14	4.12	1.12	4.61	0.77	4.27	1.12	4.38	1.13	-	-	4.37	1.31	3.10	1.12
Assists in improving your skills	4.20	1.06	3.91	1.25	4.14	1.07	4.19	1.21	4.59	0.78	4.47	1.06	4.43	1.09	-	-	4.26	1.35	3.36	1.06
Overall evaluation	4.37	0.99	4.00	1.10	4.03	1.13	4.19	1.14	4.61	0.77	4.50	0.99	4.43	1.09	-	-	4.30	1.36	3.36	0.99
Total average evaluation of my Dispense	4.31	1.08	3.89	1.25	4.09	1.09	4.14	1.17	4.60	0.77	4.37	1.08	4.41	1.10	-	-	4.31	1.33	3.30	1.08

Discussion

In the COVID-19 era, LIMU conducted a study to assess the virtual APPE training experience of Pharm-D students. The study aimed to evaluate the students' perception of the training and determine their level of satisfaction with the CBDS application. The results of the study indicated that the students were significantly satisfied with the training experience. The findings of the study were consistent with the results of a previous study conducted by Johnson et al.[11], which compared a paper-based case with a virtual patient case using the ICompared program. The study showed that the satisfaction level of the students increased by 71% for the virtual patient case, while the realism and knowledge acquisition increased by 75% and 60%, respectively. These results suggest that virtual training experiences can be an effective alternative to traditional training methods, especially during the COVID-19 pandemic[2,4].

In other researches endeavour, the viewpoints of students were predominantly favourable, exhibiting noteworthy discrepancies except for the assertion that "I acquire knowledge more effectively through this methodology as opposed to a conventional classroom discourse."[12,17].

The findings of the present investigation demonstrated a noteworthy level of contentment among students who utilized MyDispense. These outcomes were consistent with the conclusions of previous studies, which suggested that MyDispense has the potential to serve as an effective instrument for enhancing the dispensing practice skills of pharmacy students in both community and hospital settings during their academic training[13].

The current study's results indicate that MyDispense is a valuable resource for pharmacy students seeking to improve their dispensing abilities. These findings are in line with previous research that has suggested that MyDispense can be an effective tool for reinforcing the practical skills of pharmacy students in both community and hospital pharmacy settings. Overall, the results of this study suggest that MyDispense has the potential to be a promising addition to pharmacy education programs, providing students with the opportunity to develop and refine their dispensing skills in a simulated environment[18].

A study conducted by McDowell et al.[14] revealed that, the finest features of MyDispense were the students' enhanced comprehension and confidence in dispensing, especially in a safe atmosphere. One of the key findings of the scoping review was that students reported enhanced comprehension and confidence in dispensing after using MyDispense. This was attributed to the fact that MyDispense provides students with a safe and realistic environment to practice their dispensing skills. Students can make mistakes without the risk of harming patients, and they can receive immediate feedback from the simulation[19].

In contrast, the negative remarks were primarily about software faults. In this term, students in the current research revealed that the designing and the clarity of the cases scenario used in MyDispense during the first two rotations did not help them in improving their skills[20]. However, the students' response was high after taking their notes in consideration during the other rotations as shown in Chuang et al[15].study.

Conclusion

The reference provides strong support for the claim that the virtual APPE training experience at LIMU was a success. The reference also suggests that virtual patient cases may be a more effective way to deliver experiential training to pharmacy students than paper-based cases.

Motivation, performance and outcomes gained by students during the APPE virtual training experience reflect its success. Adaptability of APPE virtual training package by LIMU Faculty of Pharmacy, is well established in term of available scenario creation and simulation training. Next step is to include these virtual cases -collected from real-life situation- within MyDispense in its new version.

After receiving more practicing sessions on MyDispense, the students' progression and satisfaction improved throughout the further stages of training. Students were satisfied with their APPE virtual training because of its suitability and flexibility, in addition to the personal preference of convenience and desirability about learning.

Duality of interest: The author declares that there is no competing interests.

Author contributions: RA, HA, MH and SB conceived the idea and designed the study. HA and MH collected the data. MH and HA analyzed, interpreted the data and wrote the first draft of the manuscript. HH reviewed the manuscript draft and read and approved the final manuscript.

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