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RESEARCH ARTICLE

Agreement of medicine and pharmacy students on quality of drug information

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Abstract

Objective: Drug information responses are usually given by pharmacists to physicians. These responses are intended to improve interprofessional care and patient outcomes. This study was conducted to assess if medicine and pharmacy students agree on the quality of drug information responses. **Methods**: All patient or population-specific responses created in 2021 by the pharmacy students during their final year of drug information rotation at Thumbay University Hospital, United Arab Emirates, were evaluated by three pharmacy students and a medical student of the next cohort. In 2021, a total of 148 patient or population-focused drug information responses were prepared. A content-validated assessment rubric with seven elements was used to assess each drug information response in 2022. Agreement between pharmacy and medicine students was assessed using Kappa statistics. **Results:** Quality of drug information was rated high (very much and rather much combined) by pharmacy and medicine students in a range of 61% to 90% for all quality elements. The same ratings of medicine and pharmacy students (agreement) were observed at more than 50% only for three quality elements between two pharmacy students with the medicine student. Poor agreement exists between medical and pharmacy students on their rating of the quality of drug information (Kappa <0.7). Some of these kappa coefficients had a *p*-value less than 0.05. **Conclusion:** Both medicine and pharmacy students rated drug information reports as of reasonable quality, but their agreements were poor on the quality of drug information. It shows the need for interprofessional education in experiential learning. Agreement on quality of drug information responses improved after the students completed an interprofessional drug information task. The authors recommend a full drug information rotation of medicine and pharmacy students.

Introduction

Providing patient-specific drug information is a clinical support service in evidence-based practice. There are plenty of information resources available online for medication prescribing assistance and consultation. While seeking information from trusted resources became more effortless. Still, drug information support by a fellow healthcare professional helps in collaborative decision-making for more difficult or less common questions. Physicians need drug information assistance in prescribing cost-effective and safe medication (Reichert *et al*., 2000; Allan *et al*., 2007; Amundstuen *et al*., 2016; Shahd *et al*., 2019).

To incorporate the best quality evidence into clinical care, they need to be retrieved, appraised, and supplied in a usable manner. Applicability is an essential quality making the information pragmatic. To provide applicable patient-specific drug information, a systematic approach needs to be followed by collecting contextual data and tailoring the information to the specific situation. All information provided should be evidence-based, timely, readable, and applicable in the settings (Formoso *et al*., 2016; Malone *et al*., 2022). The drug information provided should be acceptable for treatment by physicians which can be considered an outcome achieved. Acceptance varies based on the

quality of drug information presented (Harish *et al*., 2021).

Pharmacists are being trained to provide drug information services. There are didactic courses and experiential learning in pharmacy education on providing drug information. Proper training improves pharmacists' abilities in providing high-quality drug information (Thomas *et al*., 2018; Al Hussain *et al*., 2021). Evidence-based practice and interprofessional care are interconnected. Multiple healthcare professionals have opportunities to specialise in their areas of practice, contribute to the body of medical knowledge and reach to consensus in practice (Thomas *et al*., 2020; Green *et al*., 2015). Reaching common agreements is then a requirement for medical and pharmacy professionals to practice together.

In this study, the objectives were to assess the qualities of drug information reports provided by pharmacy interns to medical doctors and determine the extent of agreement between pharmacy and medicine interns on the quality of the drug information reports.

Methods

Data analysis for all patient or population-specific drug information requests prepared in 2021 was performed retrospectively in 2022. The study was to rate agreements about the quality of drug information using a global assessment scale. This study defines the agreement as to the same rating by pharmacy and medicine students in a particular quality element for a drug information report.

The evaluated drug information responses were prepared by Doctor of Pharmacy (Pharm. D) final year students at Gulf Medical University during their advanced pharmacy practice experience (APPE) drug information rotation at Thumbay University Hospital, a campus hospital of Gulf Medical University. The preceptor verifies all drug information reports prepared by students before it is provided to requesting physician. Therefore, depending on students' performance, the quality of information varies to some extent. In general, physicians accept the information provided and act upon it sometimes. However, as patient care involves multiple considerations, sometimes the information provided is not implemented immediately, though accepted as credible information.

Responses prepared by clinical pharmacists were not assessed. From over 300 drug information prepared by the pharmacy students in 2021, 148 patient or population-focused drug information reports were selected to be rated for quality in 2022 by three pharmacy and one medicine student who were currently in their final year and had not been involved in the preparation of any of the evaluated responses. Of them, two pharmacy students independently reviewed and selected 148 patient-or population-focused reports. Such drug information needs to have applicability as a quality measure. Therefore, all the reports were numbered from 1 to 148. The two pharmacy students rated 50 for each drug information, and the third pharmacy student rated 48. As a matter of moderation, a medicine student in the final year from GMU College of Medicine rated all the drug information reports from 1 to 148.

A Likert scale was used (5 is very much, 4 is rather much, 3 is to some extent, 2 is only a little, 1 is not at all). The quality elements were about resources (one element), presentation (two elements), and application (four elements). The study instrument of assessment of quality was content validated by two experts in the field. The same instrument was used by all students to rate the quality of all drug information reports provided to them. A Google Form was used to enter the rating. Rating of quality of drug information reports was compared in percentages. A Microsoft Excel file was used for data management. SPSS version 26 was used for analysing Kappa statistics and statistical significance with the *p*-value. Using Kappa statistic analysis, Cohen's kappa coefficient is calculated in the following table, which gives the degree/magnitude of the agreement in the whole population. To identify the trend in the original population, Kappa statistic =0 (null hypothesis) is tested against kappa statistic ≠0. Kappa statistic=0 indicates no agreement, >.7 good agreement. A minimum of 0.6 is required to state an acceptable level of agreement. Low negative kappa values are interpreted as 'no agreement'. A large negative kappa (close to -1) represents great disagreement among raters.

Ethics approval from the Gulf Medical University institutional review board was obtained to conduct the study. As it was a retrospective study, informed consent was not taken from the students who assessed quality of drug information responses and all of them are included as authors. No personal identifiers of the students who answered drug information queries or the physician to whom it was supplied were collected.

Results

Both Pharmacy and medicine students assessed 148 drug information reports for quality. For each quality elements assessment, the percentage of medicine (M)

students, pharmacy (P) students, and average (A) are provided in Table I.

Combining the top two ratings, five (very much) and four (rather much) of pharmacy and medicine students, 61% to 90% of drug information, showed high quality for different assessment elements. Most rated elements were clear language used that is easy to understand (90%) and to match drug information to the clinical problem (85%). The least rated elements were willingness to use the drug information in Thumbay University Hospital patients (61%), easiness to get access to resources used (62%), order of information with proper citation (68%), agreement with the recommendations in drug information (69%), and overall impression of the usefulness of the drug information at daily work (69%). In general, for most of the elements, the medicine student rated high for the quality of reports than the pharmacy students. Medicine students scored the top rating of 'very much' for 52% of the reports for all assessment elements combined, while pharmacy students rated for an average of 43%.

Table I: Rating of quality of drug information responses all students combined

Quality assessment of drug information	Very much (%)			Rather much (%)			To some extent (%)			Only a little (%)			Not at all (%)		
	M	P	A	M	P	A	M	P	A	M	P	A	M	P	A
Is it easy for getting access to the resources used	34	35	35	38	18	28	14	26	20	14	18	16	0	3	1
Is the drug information presented in a good order with proper citation for easy navigation?	61	40	50	9	26	18	18	22	20	11	10	11	1	3	2
Is the language of the drug information document clear & easy to understand?	98	53	76	1	26	14	1	9	5	0	9	5	0	1	1
How much do you agree with the recommendations of this drug information document?	34	45	39	34	26	30	24	19	22	5	9	7	3	2	3
How closely does the drug information provided match the clinical problem?	67	60	64	25	18	21	4	14	9	1	7	4	3	2	3
Are you willing to use the drug information in Thumbay University Hospital patients?	26	29	28	36	32	34	27	27	27	10	11	11	1	1	1
Overall, Do you think this drug information is useful for your daily work	41	37	39	37	22	30	19	32	25	3	9	6	1	0	1
Average	**52**	**43**	**47**	**26**	**24**	**25**	**15**	**21**	**18**	**6**	**10**	**9**	**1**	**2**	**2**

M = Medicine student, P = Three Pharmacy students combined, A = Average

Table II shows the percentage of the agreement between the ratings of medicine and pharmacy students. More than 50 agreement was noticed for three quality elements between pharmacy students (2) and medicine student (3).

Students' agreement for quality elements shows a poor degree of agreement or disagreement with kappa statistic is close to 0 in Table III. P-values less than 0.05 showed a statistically significant lack of agreement between medicine and pharmacy student two for four quality elements. Pharmacy student three and the medicine student disagreed, though poorly for quality element one.

Pharmacy student (2) and medicine student showed relatively better agreement, without showing any acceptable level of agreement. They both were given a drug information query to answer together as an (Interprofessional Education) IPE task which made them work together for two days. They both were asked to rate the same drug information responses 51-100 to see if there is any improvement in the agreement. Table IV and V shows ratings and kappa coefficient of pharmacy student (2) and medicine student in rating quality of drug information responses 51-100.

No agreements were seen even after an IPE drug information task that the medicine and pharmacy student performed together.

Table II: Percentage agreement of medical student to three pharmacy students on quality of drug information

Quality elements	Pharmacy student (1)		Pharmacy student (2)		Pharmacy student (3)	
	N	%	N	%	N	%
Is it easy for getting access to the resources used?	11	22.0	22	44.0	13	27.1
Is the drug information presented in a good order with proper citation for easy navigation?	13	26.0	29	58.0	26	54.2
Is the language of the drug information document clear & easy to understand?	7	14.0	37	74.0	33	68.8
How much do you agree with the recommendations of this drug information document?	11	22.0	21	42.0	15	31.3
How closely does the drug information provided match the clinical problem?	10	20.0	31	62.0	30	62.5
Are you willing to use the drug information in Thumbay University Hospital patients?	19	38.0	21	42.0	14	29.2
Overall, Do you think this drug information is useful for your daily work?	10	20.0	21	42.0	20	41.7

N is Frequency, % is Percentage

Table III: Kappa coefficient on quality of drug information by medical and pharmacy students

Quality elements	Pharmacy student (1)		Pharmacy student (2)		Pharmacy student (3)	
	Kappa	Significance	Kappa	Significance	Kappa	Significance
Is it easy for getting access to the resources used?	0.87	0.078	0.25	0.001	-0.036	0.047
Is the drug information presented in a good order with proper citation for easy navigation?	0.81	0.181	0.324	0.001	-0.249	0.003
Is the language of the drug information document clear & easy to understand?	-0.006	0.765	0.000	-	-0.057	0.405
How much do you agree with the recommendations of this drug information document?	-0.046	0.551	0.156	0.075	-0.009	0.885
How closely does the drug information provided match the clinical problem?	-0.014	0.798	0.240	0.011	0.101	0.246
Are you willing to use the drug information in Thumbay University Hospital patients?	0.156	0.054	0.190	0.026	-0.002	0.976
Overall, Do you think this drug information is useful for your daily work?	-0.040	0.562	0.149	0.095	0.093	0.321

Table IV: Percentage agreement of medical and pharmacy students before and after an interprofessional activity

Quality elements	Before IPE task		After IPE task	
	N	%	N	%
Is it easy for getting access to the resources used?	22	44.0	19	38.0
Is the drug information presented in a good order with proper citation for easy navigation?	29	58.0	28	56.0
Is the language of the drug information document clear & easy to understand?	37	74.0	28	56.0
How much do you agree with the recommendations of this drug information document?	21	42.0	24	48.0
How closely does the drug information provided match the clinical problem?	31	62.0	30	60.0
Are you willing to use the drug information in Thumbay University Hospital patients?	21	42.0	19	38.0
Overall, Do you think this drug information is useful for your daily work?	21	42.0	23	46.0

N is Frequency, % is Percentage

Table V: Kappa coefficient on quality of drug information by medical and pharmacy students

Quality elements	Before IPE task		After IPE task	
	Kappa	Significance	Kappa	Significance
Is it easy for getting access to the resources used?	0.25	0.001	0.05	0.57
Is the drug information presented in a good order with proper citation for easy navigation?	0.324	0.001	0.27	0.01
Is the language of the drug information document clear & easy to understand?	0.000	-	0.07	0.44
How much do you agree with the recommendations of this drug information document?	0.156	0.075	0.26	0.00
How closely does the drug information provided match the clinical problem?	0.240	0.011	0.39	0.00
Are you willing to use the drug information in Thumbay University Hospital patients?	0.190	0.026	0.08	0.39
Overall, Do you think this drug information is useful for your daily work?	0.149	0.095	0.15	0.12

Discussion

In this study, the agreement between pharmacy and medicine students was poor in assessing the quality of drug information provided to physicians as part of drug information rotation. Though both pharmacy and medicine students rated the quality of drug information high, they did differ in the scores for most of the quality elements. Pharmacy students tend to be more critical in assessing drug information. As the quality of drug information is a core component of healthcare, like the quality of medicines, it is advised to have more consensus in this vital area. Pharmacy and medicine students working together in an interprofessional drug information rotation might improve shared understanding of the quality of drug information.

Physicians and pharmacists work together in usual patient care. The communication is primarily through prescription, supported by phone calls, electronic, or in-person discussions. A combination of expertise of these two health professions ensures better outcomes for patients. It is natural that due to many infrastructure and reimbursement issues, pharmacists and physicians struggle to find the best models to collaborate. Regardless, some limitations exist in the collaborative practices (Kelly *et al*., 2013). Finding more efficient ways to interact and modify environmental factors might facilitate collaboration. Physician attitudes need adjustments, and useful drug information needs to be accepted. Changing decisions based on quality information is to achieve better patient outcomes (Van *et al*., 2012; Albassam *et al*., 2020).

Drug information centres try to find effective ways to work with a physician. One of such practice to provide academic detailing. Facilitating an environment of asking drug information queries that pharmacy interns or residents mutually benefit prescribers (Wisniewski *et al*., 2014). Academic health centres having an intern or resident resource and drug information databases can provide drug information service efficiently. In addition, it is educational and promotes collaborative practice (Kim *et al*., 2020).

Pharmacy and medicine students learning together in their clinical rotations are being implemented in many health systems. Learning together is perceived to be a foundation for working together. Through interprofessional rotations, students show improvements in their communication, knowledge, and role clarity in each profession (Bautista *et al*., 2020). Interprofessional rotation showed respect and positive approaches to collaboration (Patel *et al*., 2018). Prescribers may perceive the identification of drug therapy problems by pharmacists as an unpleasant experience. A higher level of communication and understanding of each other is required to work together. An interprofessional rotation of pharmacy and medicine students showed many drug therapy problems being identified and acted upon. It is essential for ensuring patient safety (Vinluan *et al*., 2018). Interprofessional rotations are shown to improve students' educational experience and patient satisfaction with patient care. It is feasible and productive (Schussel *et al*., 2019). Students value participation in interprofessional rotations (Jebara *et al*., 2022).

Improving the quality of patient care has always been a leading agenda of healthcare. Healthcare professionals need to collaborate and win the trust of each other and patients. Building knowledge and learning from experiences are fundamental (Dixon, 2021). This study focusing on the quality of drug information assessed from pharmacy and medicine student perspectives show a need for learning together to achieve better

agreement on quality. Patient safety cannot be compromised. Many frameworks exist improving abilities in ensuring patient safety (Shenoy, 2021). All of these efforts might not be considered if agreements vary significantly among healthcare professionals responsible for making collaborative decisions.

A short IPE task did not improve agreement between medicine and pharmacy student on quality of drug information responses. Longer structured IPE rotation need to be offered to test if agreement improves for the medicine and pharmacy students on what they see on quality of drug information on patient care. Once an IPE/Drug Information rotation is implemented, a pre-post intervention study to be conducted among medical and pharmacy students. This study might prove the impact of an IPE rotation on their agreement on the quality of drug information. As mentioned above, drug information is the stake of medical doctors and pharmacists. Another plan is to implement a telehealth rotation on COVID-19 based on feasibility. These are strategic ideas to improve or redirect drug information rotation to be more effective with IPE or telehealth elements.

Limitations of the study include rater fatigue from medicine student as he should rate 148 drug information responses. Enough time was given in this regard and the medicine student did the rating taking for three months.

Conclusion

Perceived quality of drug information might not lead to collaborative decision-making if the agreements of team members are poor. This study proves the lack of agreements between pharmacy and medicine students on the quality of drug information. Extensive interprofessional rotations need to be implemented to observe improved agreements between medicine and pharmacy students.

Conflict of Interest

The authors declare no conflict of interest.

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