

## The Pharmacists' Responses and the Collaboration Between Pharmacists and Prescribers Towards Hospital Medication Errors, Saudi Study

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### ABSTRACT

Background: medication errors result with many morbidities and mortalities that cost the country billions of dollars. Aim: this study aims to assess hospital pharmacists' responses towards medication errors and to determine the collaboration between healthcare providers in solving problems related to medication errors in major hospitals of the Western Region, Saudi Arabia. Methods: a cross sections study was adopted in this research. A total of 270 questionnaires were randomly distributed to hospital pharmacists through face to face interviews in 8 major hospitals in the Western Region in Saudi Arabia. Data was analyzed using IBM SPSS, version 22, Armonk, NY: IBM Corp. Associations between variables were tested by Chi-square and Fisher's exact tests. The level  $P \leq 0.05$  was considered as a cut-off point for significance. Results: A total of 190 pharmacists successfully completed the questionnaire from targeted hospitals. Only less than 40% of respondents check patients' medications history and any potential allergy and drug-drug interactions. About 50% of pharmacists correct medication errors without referring to physician. Whereas, about one-quarter of physicians always accept pharmacists' suggestions and write new prescriptions based on pharmacist recommendations. Forty nine percent of pharmacists perceived physicians inaccessible persons and about 70% of them feel frustrating when they call physicians without getting any response from them. Conclusion: pharmacists and physicians roles should be perceived as complementary role rather than competitive role. More collaboration need to be enforced the two professions through shared activities, events and workshops to reduce the gap of misunderstanding of their complementary role.

**Keywords:** Medication errors, pharmacists, responses, Saudi Arabia.

### INTRODUCTION

Medication errors is a worldwide problem that results with many morbidities and mortalities globally<sup>1</sup>. In the US alone, more than USD 30.1 billion are spent annually on the management of adverse drug reactions<sup>1</sup>. This huge financial and human impact of adverse drug reactions related to medication errors make it a major area of research.

Medication errors might arise during any stage of prescription processing which include prescription ordering, transcribing, dispensing and finally administration. Pharmacists are experts in medicines and are able to detect any errors or problems related to prescriptions<sup>2,3</sup>. Pharmacists are the last interceptors and detectors of errors before reaching patients<sup>4</sup>. They have to carefully check the prescription regimen, check for drug-drug interactions, prescription dose, and frequency.

A cross sectional study was conducted among 5 private and 5 public primary healthcare clinics in Riyadh, Saudi Arabia, to evaluate medication errors during a one day study. A total of 5299 drugs were obtained from the studied clinics on that day. Of them, 990 errors (18.7%) were obtained<sup>5</sup>. Another study was conducted in a teaching hospital in KSA to evaluate prescribing errors for a period

of one month. Out of 1580 medication orders noticed during the study period, a total of 113 (7.1%) prescribing errors were found. Main errors were medication strength and frequency of administration which represented 35% and 23%, respectively of the total prescribing errors<sup>6</sup>. Medication safety is of concern among healthcare professionals in Saudi Arabia. Contributing factors to medication safety problems including pharmacists overload, underreporting of medication errors and adverse drug reactions, and low level of communication between healthcare professionals and patients<sup>7</sup>. Pharmacist-physician-nurse collaboration and team work would result in improving the drug therapy decision making and improving patients' healthcare<sup>8</sup>. On the other hand, communication failure is very serious and would significantly affect on patients safety<sup>9</sup>. Trustworthiness and role specifications are key factors for physician-pharmacist collaboration<sup>10</sup>. Physicians lack the knowledge about the capacity and training of pharmacists. This could be bridged through shared education between medical and pharmacy students during their university education<sup>11</sup>. On the other hand, pharmacy students are lacking the sufficient training and knowledge during their study on communication for issues related to medication errors<sup>12</sup>.

Table 1: Demographic characters of participants. (N=190)

Characters		Frequency	Percentage (%)
Gender	Male	104	54.7
	Female	86	45.3
Nationality	Saudi	156	82.1
	Non-Saudi	34	17.9
Education level	B. Pharm	123	64.7
	Pharm D	58	30.5
	Master	8	4.2
	PhD	1	0.5
Residence	Inside the hospital campus	51	26.8
	Outside the hospital campus	139	73.2
Graduation university	Local university	148	77.9
	Arabic university	31	16.3
	Non Arabic university	11	5.8
Type of work	Tertiary governmental hospital	86	35.8
	General governmental hospital	66	34.7
	Private hospital	14	7.4
	Military hospital	42	22.1
	Type of pharmacy	Inpatient pharmacy	95
	Outpatient pharmacy	95	50

Therefore, this study aims to assess hospital pharmacists' responses towards medication errors and to determine the collaboration between healthcare providers in solving problems related to medication errors in major hospitals of the Western Region, Saudi Arabia.

## MATERIALS AND METHODS

### *Design, setting and target population*

A Cross-sectional study design was adopted. The study was conducted during the period from September 2016 to February 2017. The study was carried out amongst pharmacists who worked in different hospitals in Western Region, Saudi Arabia. The target hospitals included three tertiary hospitals in Taif city, three tertiary hospitals in Mecca city and two tertiary hospitals in Jeddah city. A total of 270 Questionnaires were distributed randomly to the pharmacists who work at these hospitals.

### *Study procedure and instrument*

A structured self-administered questionnaire was adopted to assess the collaboration and barriers towards medication errors between the pharmacists and doctors in the

hospitals. Every pharmacist in the mentioned hospitals was received questionnaire accompanied with full instructions. The questionnaire consisted of 3 sections. The first section include; the demographic characteristics such as gender, educational level, graduation year ...etc.. The second section dealt with pharmacists' responses towards medication errors, and explore pharmacists' perceptions about the medications before, during and after dispensing in order to detect any medication errors such as drug-drug interactions, drug food interactions, monitoring patients' sensitivity to drugs and dosage corrections. At the end of this section; 5 questions about the medication errors documentation were mentioned. The last section consisted of a 5- point Liker scale (from strongly agree to strongly disagree) to explore the relations, cooperation and barriers between physicians and pharmacists.

The questionnaire was pretested for internal consistency and validity on 20 pharmacists from relevant settings. The piloted data was not included in the study results.

### *Data analysis*

The collected data were computed and analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 22, Armonk, NY: IBM Corp.). Means, frequencies and percentage were determined. Associations between variables were tested by Chi-square and Fisher's exact tests. The level  $P \leq 0.05$  was considered as a cut-off point for significance.

### *Ethical consideration*

This study obtained approval and funded by the Secretariat of Postgraduates and Scientific Research, Taif University, KSA. Personal verbal consent was obtained from each participant prior to his/her enrollment in this study.

## RESULTS

A total of 270 questionnaires were distributed to the pharmacists at the hospitals in different areas, 190 pharmacists completed the questionnaire with response rate (70.4%). Mean age  $\pm$  SD of participants was (29.1  $\pm$  6.4). Table 1 shows that, male respondents were dominant (54.30%), and 151 (79.9%) of them were Saudi. The majority of the respondents 109 (57.7%) were B. Pharm holder, while Pharm D holders constituted 58 (30.7%). The predominant interviewed pharmacists 62 (32.8%) worked at tertiary governmental hospitals, while 59 (31.2%) of them worked at general governmental hospitals. Table 2 illustrates the pharmacists' verifications towards prescriptions' elements. The majority of respondents 160 (84.2%) always used to verify the completion of prescriptions elements before dispensing. Almost 175 (92.1%) of participants always check route and time of administration. Hypersensitivity of drugs may lead to serious reactions for allergic patients. Unfortunately, only 74 (38.9%) out of participants always ask patients about medications' allergies. Regarding the concomitant use of other medications which help pharmacists to detect drug-drug interactions; 76 (40%) of the investigated pharmacists always ask patients whether they used other medications, and only 103 (54.2%) of them always verify drug-drug interactions throughout the prescriptions. Pharmacists' demographic characters have not significant effects on

Table 2: Pharmacists' verification of prescriptions' elements before dispensing.

Responses		Completion of prescription	Route and time of administration	Patient age	Drug allergy	The use of other medications	Drug-drug interactions
Responses	Always	160(84.2%)	175(92.1%)	115(60.5%)	74(38.9%)	76(40%)	103(54.2%)
	Sometimes	29(15.3%)	13(6.8%)	61(32.1%)	86(45.3%)	83(43.7%)	67(35.3%)
	Seldom	1(0.5%)	2(1.1%)	11(5.8%)	22(11.6%)	27(14.2%)	15(7.9%)
	Never	0(0%)	0(0%)	3(1.6%)	8(4.2%)	4(2.1%)	5(2.6%)
P-value	Gender type of hospital	0.912*	0.556*	0.652*	0.798*	0.950*	0.287*
	Type of pharmacy	0.937*	0.182*	0.922*	0.879*	0.042*	0.056*
	Pharmacists' education level	0.078*	0.904*	0.919*	0.325*	0.934*	0.455*
		0.213*	0.189*	0.131*	0.142*	0.710*	0.852*

\* Fisher test

Table 3: Pharmacists and physicians' responses towards medication errors.

Responses		Correct ME without referring to prescriber	Correct ME by contacting the prescriber	Correct ME by sending the patients to prescriber with my opinion	Dispense the prescription without correction	Physicians accept the pharmacists' opinion without comment and correct ME	Physicians accept the pharmacists' opinion after professional discussion	Physicians ignore pharmacists' opinion and refuse correction of ME	Physicians accept the pharmacists' opinion and rewrite a new prescription
Responses	Always	23 (12.1%)	119 (62.6%)	63 (33.2%)	13 (6.8%)	46 (24.2%)	51 (26.8%)	13 (6.8%)	46 (24.2%)
	Sometimes	58 (30.5%)	61 (32.1%)	71 (37.4%)	19 (10%)	103 (54.2%)	100 (52.6%)	62 (32.6%)	96 (50.5%)
	Seldom	47 (24.7%)	7 (3.7%)	26 (13.7%)	18 (9.5%)	28 (14.7%)	29 (15.3%)	80 (42.1%)	25 (13.2%)
	Never	62 (32.6%)	3 (1.6%)	30 (15.8%)	140 (73.7%)	13 (6.8%)	10 (5.3%)	35 (18.4%)	23 (12.1%)
P-value	Gender type of hospital	0.779	0.756*	0.581	0.820	0.283	0.614*	0.708	0.337
	Type of pharmacy	0.074*	0.036*	0.096	0.072*	0.305*	0.324*	0.212*	0.087*
	Pharmacists' education level	0.489*	0.357*	0.699*	0.035*	0.543*	0.290*	0.955*	0.416*
		0.681*	0.326*	0.001*	0.076*	0.468*	0.003*	0.112*	0.196*

\* Fisher test

ME= medication errors

their verification of prescriptions' elements as shown in Table 2. Regarding the responses of pharmacists towards medication errors; the results revealed that 119 (62.6%) of interviewed pharmacists admitted that, they always correct medication errors by contacting the prescriber, while only 3 (1.6%) of them never do this. There was a significant association between this response and different hospital types, ( $P = 0.036$ ). Furthermore; above one-third 68 (36.6%) of respondents sometimes correct medication errors by transmit his/her opinion with patients to the prescriber, while 26 (13.7%) of the respondents seldom do

the same. The majority of the respondents 140 (73.7%) never used to dispense prescriptions without correction. Type of pharmacy; whether inpatient or outpatient pharmacy significantly affected on the dispensing prescription without correction by the pharmacists, ( $P = 0.035$ ). On the other hand the participants' opinion about how prescribers deal with pharmacists' comments on medication errors, the results showed that, more than one fourth 46 (26.8%) of prescribers always rewrite the prescription according to the pharmacists' comments, while only 13 (6.8%) of prescribers always refuse

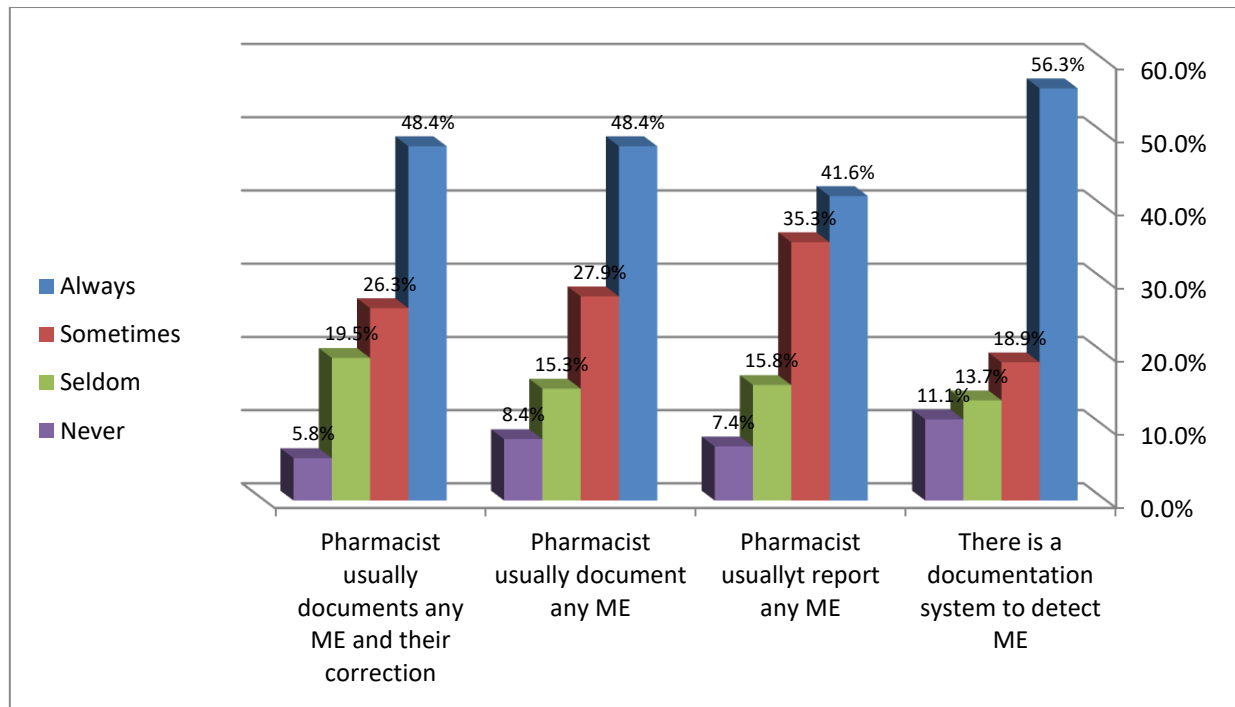


Figure 1: Pharmacists' responses toward documentation of medication errors  
ME= Medication errors.

correction and ignore the pharmacists' opinions. There was no statistically significant association between demographics and opinion of pharmacists toward prescribers' responses ( $P > 0.05$ ). Table 3.

Medication errors documentation is a crucial part in this problem solving. Majority of the respondents 107 (56.3%) stated that; there was a documentation system to detect ME. A total 79 (41.6%) of the participated pharmacists always report medication errors, while only 14 (7.4%) of them never reported any medication errors. There were 92 (48.4%) of the respondents admitted that, they always document medication errors, and they always documented its correction, Figure 1.

Table 4 illustrated the participants' perceptions towards barriers between pharmacists and prescribers. Most of the respondents 123 (64.7%) strongly agreed that, the pharmacist is the final interceptor in detecting medication errors before reaching the patients, while only 7 (3.7%) of them strongly disagreed on this perception. There were 109 (57.4%) of the respondents strongly agreed that the contact between pharmacists and physicians will develop a trustworthy relationship. Both respondents' gender and the type of hospital which they work in had a statistically significant effects on the past two perceptions ( $P < 0.05$ ). Overall 86 (45.3%) of the pharmacists whom disagreed or strongly disagreed the belief that, pharmacists hesitate to contact doctors concerning medication errors. Regarding to barriers that preventing inter-professional relationships; 56 (29.5%) of the respondents strongly agreed that, one pharmacist dispenses prescriptions from many doctors which hinder the contact between them. On the other hand; 60 (31.6%) of the respondents disagreed the opinion that, correction of medication errors may create a bad relationship with prescribers. There were 62 (32.6%) of the

respondents that agreed that prescribers are inaccessible, and 56 (29.5%) of them agreed or strongly agreed that they rarely talk to doctors. Types of hospitals has a significant effect on accessibility to prescribers ( $P = 0.003$ ). Table 4. shows that majority of pharmacists 143 (75.3%) used to feel trust when they call doctors, while 136 (71.6%) of them strongly agreed or agreed that it is really frustrating when pharmacist call a doctor's office and don't find help from him. Most of respondents 137 (72.1%) admitted that, they enjoy building relationship with doctors. About two-third 125 (65.8%) of investigated pharmacists refused the idea that patients' management is sole responsibility of the doctors, and 167 (87.9%) of them though pharmacists share with doctors in patients' management responsibility. Overall 171 (90%) of the respondents thought that the roles of both pharmacists and doctors are complementary, so 192 (91.5%) of them accepted the collaboration with doctors in patients' managements. Fortunately almost 185 (97.4%) of participants admitted that collaboration between pharmacists and doctors is necessary and should be encouraged, and 183 (96.8%) of them agreed or strongly agreed that this collaboration will improve treatment outcome. Also 180 (94.7%) of respondents thought that this collaboration will improve service quality.

## DISCUSSION

Patient safety is the responsibility of all healthcare professionals. They have to work together to maximize patients' quality of life and minimize any potential harmful side effect. Pharmacists play a major role in improving patients' healthcare and reducing the risk of medication errors<sup>3</sup>. Pharmacists proved to be effective and beneficial role in many different medical fields. They played a major

Table 4: Pharmacists perceptions towards inter-professional relations and collaborations between them and prescribers.

Relations and barriers	Responses					P-value	Gender	type of hospital	Type of pharmacy	Pharmacists' education level
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree					
Pharmacist is the final interceptor in detecting ME before they reach the patient	123 (64.7%)	41 (21.6%)	8 (4.2%)	11 (5.8%)	7 (3.7%)	0.037*	0.031*	0.881*	0.931*	
Pharmacist develops trust relationship with doctors through contacting with them	109 (57.4%)	65 (34.2%)	10 (5.3%)	6 (3.2%)	0 (0%)	0.007*	0.008*	0.0624*	0.175*	
I have trust and confidence in doctors concerning to medication	28 (14.7%)	64 (33.7%)	55 (28.9%)	32 (16.8%)	11 (5.8%)	0.401	0.028*	0.646*	0.264*	
I enjoy working relationship with doctors	61 (32.1%)	76 (40%)	29 (15.3%)	16 (8.4%)	8 (4.2%)	0.124	0.004*	0.193*	0.063*	
I feel convenient when call doctors	65 (34.2%)	78 (41.1%)	32 (16.8%)	11 (5.8%)	4 (2.1%)	0.075	0.161*	0.827*	0.523*	
Pharmacist share with doctor in responsibility of patient management	116 (61.1%)	51 (26.8%)	7 (3.7%)	10 (5.3%)	6 (3.2%)	0.117*	0.125*	0.539*	0.186*	
Doctors and pharmacists' role are complementary	136 (71.6%)	35 (18.4%)	14 (7.4%)	2 (1.1%)	3 (1.6%)	0.018*	0.919*	0.850*	0.262*	
I collaborate with doctors in patient management	125 (65.8%)	47 (24.7%)	13 (6.8%)	3 (1.6%)	2 (1.1%)	0.757	0.132*	0.571*	0.025*	
Collaboration is necessary and should be encouraged	147 (77.4%)	38 (20%)	4 (2.1%)	0 (0%)	1 (0.5%)	0.002*	0.037*	0.731*	0.074*	
Collaboration will improve treatment outcome	149 (78.4%)	34 (17.9%)	5 (2.6%)	0 (0%)	2 (1.1%)	0.058*	0.474*	0.224*	0.670*	
Collaboration will improve interdisciplinary relationship	146 (76.8%)	33 (17.4%)	8 (4.2%)	1 (0.5%)	2 (1.1%)	0.045*	0.252*	0.470	0.826*	

\* Fisher test

ME= medication errors

role in improving patients outcomes in HIV clinics<sup>13</sup>, cardiology clinics<sup>14</sup>, pediatric clinics<sup>15-17</sup>, primary care clinics<sup>18</sup>, and emergency departments<sup>19</sup>.

In this study, pharmacists showed that they always play a major role in prescription verification before dispensing. Where majority of them >80% always check for prescription completion and route of administration. Unfortunately, only 40% of respondents check if patients uses other medications and only 54% of them always check drug-drug interactions.

A study was conducted in a teaching hospital in Tehran to evaluate clinical pharmacists' role in detecting medication errors. A total of 132 patient records were evaluated during a period of two months. A total of 262 errors were identified by pharmacists. Most errors were wrong frequency of medication administration 27%, wrong medication selection 12.5%, and drug interactions 9.9%<sup>20</sup>. Medication errors underreporting is a worldwide problem<sup>21-25</sup>. In our study, only 41% of respondents always report medication errors. There should be more efforts to encourage and teach all pharmacists on the importance of medications reporting as well as on the reporting systems available in the country.

Communication failure between healthcare professionals is very serious and would significantly affect on patient safety<sup>9</sup>. Lack of communication might resulted from the lack of knowledge and trust among healthcare professionals on others role, experience and education. Pharmacists-physicians collaboration would result in improving the drug therapy decision making and patient healthcare<sup>8</sup>. A literature survey was carried out to find the influence of pharmacist on physicians prescribing decisions. A total of 12 articles were found. A debatable influence was found among the reviewed articles. Major factors that were found to influence on physicians prescribing behavior were pharmacists' expertise, pharmacist-physician collaboration, and trust between physicians and pharmacist<sup>26</sup>. Physicians lack the knowledge about the capacity and training of pharmacists. This could be bridged through shared education and collaboration between medical and pharmacy students during their university education<sup>11,27,28</sup>. A study in Poland found that medical students would like to collaborate with pharmacy students in their future career as well as they would like to join pharmacy students in relevant workshops during their study<sup>29</sup>. Physician-pharmacist collaboration was explored in Australia through interviewing 22 community pharmacists and 22 GPs. It was found that trustworthiness was considered a key factor for this collaboration. Main barrier for collaboration was that GPs perceived pharmacists lacking of knowledge and experience in chronic disease management and pharmacists can't add more than what GPs do<sup>30</sup>.

In this study, only 32% of respondents said that physicians refused their opinion and refused to rewrite a new prescription based on pharmacist's recommendations. Therefore, it was found that about 81% of our respondents sometimes and always correct medication errors without referring to prescribers. In a study in the UK found that

physicians' responses to pharmacists' interventions were lower than the expected level<sup>31</sup>.

Lack of trust between physicians and pharmacists, as well as the low level of physicians' responses to pharmacists' recommendations, make pharmacists to hesitate to contact doctors regarding medications errors which was represented by 39% of our respondents. In addition, about 32% of our respondents believed that correcting medication errors would create a bad relationship with doctors. Furthermore, dealing with many prescribers was considered as a hinder to contact them regarding medication errors which was believed by 57% of respondents. Many other studies found that work overload, documentation, long working hours and managerial activities as the main barriers to collaborate and communicate with prescribers<sup>8,32</sup>.

On the other hand, due to physicians' attitude and busy schedule, about 49% of respondents believed that physicians are inaccessible. In addition, about 71% of respondents fell frustrating when they call physicians' office without responding to their calls. On the other hand, 89% of respondents believed that pharmacists share with doctors the responsibility of patients' management. Positive attitudes were found in a study that evaluated pharmacists and physicians perceptions towards collaboration in Nigeria. Where about 99% of their pharmacists believed that roles of physicians and pharmacists are complementary. 100% of pharmacists believed that collaboration will improve patients' outcomes and 100% of pharmacists believed that doctors and pharmacists roles are equally important in patient management. Physicians shared pharmacists in their believes where about 93% of physicians enjoy working with pharmacists, 84% of physicians believed that their role and pharmacists role are complementary, and 95% of them believed that their collaboration with pharmacists will improve patients outcomes<sup>33</sup>. Therefore, it is believed that shared activities between pharmacists and physicians especially during their university education would reduce this misunderstanding between the two professions. It is important to understand that physicians and pharmacists are complementary to each other rather than competitive to each other.

## CONCLUSION

Pharmacists play a major role in providing quality services to patients through making sure that they receive the right drug with the right quantity at the right time on the right frequency. Pharmacists need to concern more on the patients' medications history and verifying the presence of drug-drug interactions which was found inappropriate in our study. In general, pharmacists perceived physicians as colleagues and experts but they hesitate to contact them due to physicians' response. There is an immense need to improve the trustworthiness between physicians and pharmacists through shared activities, workshops and events during their study period and after their graduation. Improving the collaboration between the two professions would definitely result with improving patients care.

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