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WHEN HEALTH POLICIES AND PROFESSIONALS' NEEDS COLLIDE: A QUESTIONNAIRE-BASED STUDY ON PHARMACY TECHNICIANS IN EGYPT

E. A. Bassiouny *, M. M. Abbassi and S. F. Farid

Clinical Pharmacy Department, Faculty of Pharmacy, Cairo University, Kasr El-Ainy street, Cairo 11562, Egypt.

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Correspondence to Author:
E. A. Bassiouny
RPh

Faculty of Pharmacy,
Cairo University, Kasr El-Aini street,
Cairo 11562, Egypt.

E-mail: Eglal.mostafa@pharma.cu.edu.eg

ABSTRACT: Introduction: Expanding technicians' role allows pharmacists to focus on patient care. In Egypt, the health authorities refuse to admit technicians' role. In the draft amendments to the law, the "technician" was removed from the pharmacy workforce. Despite the high pharmacist density; technicians manage shifts alone. Technicians' role is unclear and they have no educational programs resulting in drug-related errors. This study assessed pharmacists' and technicians' attitudes towards technicians' current role and certification concept. **Methods:** Two validated specially designed questionnaires were distributed to pharmacists and technicians in Cairo, Giza and Qalyobia and filled at once by a direct interview. The questionnaires discussed: demographics, technician job satisfaction, task distribution and the concept of technician certification. Chi-square and Fisher's Exact tests were conducted (P<0.05). **Results:** Questionnaires were filled by 502 pharmacists and 500 technicians. Technicians were standing alone in 247 pharmacies (26.8%). Technicians made drug-related errors as reported by 267 pharmacists (53.2%). Four hundred and thirty seven pharmacists (87.1%) and 470 technicians (94%) agreed on application of technician certification and 381 pharmacists (75.9%) agreed to train technicians as a part of this certification program. There was a significant association between the participants' jobs and their responses to technician's involvement level in daily tasks (Chi-square and Fisher's Exact tests, P<0.05). **Conclusions:** Pharmacists and technicians agreed that applying national standards for technicians' education and role in Egypt will enhance patient care and reduce errors. The health authorities should consider certifying technicians, increasing the pharmacies' profit margin and decreasing the number of faculties admissions.

INTRODUCTION: The Pharmacy Technician Certification Board (PTCB) defines pharmacy technician as "an individual working in a pharmacy who, under the supervision of a licensed pharmacist, assists in pharmacy activities that do not require the professional judgment of a pharmacist". [1] The technicians help relieve the manpower shortage and allow pharmacists to focus on direct patient care.[2]

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Community pharmacies provide clinical, diagnostic and public health services besides dispensing medications. [3]

In the United States of America (USA), the technician education programs are conducted by accredited health care organizations as the American Society of Health-System Pharmacists (ASHP). [4] Technicians then take the Pharmacy Technician Certification Exam (PTCE) or the Exam for the Certification of Pharmacy Technicians (ExCPT). [5, 6] Many pharmacies consider the on-the-job training for technicians enough. [7] The only national credential provided to pharmacy technicians is "Certified Pharmacy Technician" (CPhT). [1]

A 2009 survey by the National Association of Boards of Pharmacy (NABP) showed that the term "pharmacy technician" is found in the regulations of 47 states. [6] The ASHP anticipates that by 2020, certification will be required to become licensed. [8] Licensure requirements vary widely by state where some states require training from board-approved schools, PTCB certification, on-the-job training or no requirements at all. [9] After all, the states still require achieving consistency in training and examination standards. [6] Pharmacy technicians do the following tasks: package and label prescriptions, organize inventory, monitor drug shortages, cashier, answer phone calls, enter patient information into computer and dispense prescriptions under pharmacist's supervision.[10]

On the other hand, technician's registration in the United Kingdom (UK) is mandatory since 2011. Registration requirements include one of the competency based qualifications, one of the knowledge based qualifications and work experience in a pharmacy for 2 years. [11, 12] After registration, technicians are required to earn additional qualifications including an accredited checking certificate (A1), National Vocational Qualifications (NVQ) assessment and verification certification (V1). [13] Pharmacy technician duties include: assembling, dispensing and labeling prescribed medicines, selling over-the-counter medicines (OTC) and checking the stock levels under pharmacist's supervision. [14]

In New Zealand (NZ), pharmacy technician is a recognized qualification and he holds a NZ Certification in Pharmacy Level 4 or 5. [15] Technician's role includes assembling medications, managing stock and other administrative duties under pharmacist's supervision. [15]

The literature is supporting Expanding the technicians' role. There are many studies in USA, NZ and UK that support such roles as tech-check-tech, medication reconciliation, clinical pharmacy technician, community health worker and accuracy checking technician(ACT). [6, 15-26].

Egypt is the 15th most populous country. [27] There were around 24 pharmacy schools in 2008 and the first pharmacy program was in Cairo University in 1824. [28] According to the World Bank Classification (WBC), it's considered a lower middle income country with pharmacist density (number of pharmacists per 10,000 population) 18.15 in 2012. [29] The number of graduate pharmacists is more than that required by the market, which makes a lot of them immigrate to other countries.[30] Due to that and the pharmacies' low profit margin, pharmacies tend to hire technicians. [31, 32]

There was an institute for educating pharmacy technicians but it was closed more than 50 years ago.[33] Four years ago, a number of technicians constituted the Egyptian Trade Union of Workers in Pharmacies which was approved only by the Ministry of Manpower. The Union provides humble courses for subscribed technicians. [33]

The Egyptian Pharmacy Practice Law admits the technician's role and allows him to substitute for the pharmacist only during the official holidays. [34] However, these acts are not applied nowadays due to the lack of technician's job description and educational programs.

Although the Egyptian Pharmacy Practice Law states that only pharmacists deal with medications, [34] some pharmacies allow technicians to manage a shift alone. The Pharmacists' Syndicate made draft amendments to the Pharmacy Practice Law-to be submitted to the Parliament-that included removing the technician from the pharmacy workforce planning. [35] Former officials of the Pharmacists' Syndicate considered technicians as intruders on the pharmacy profession and competitors for employment. [33]

Pharmacies nowadays offer an increasing number of services besides drug dispensing. This increases pharmacists' work load and may affect patient safety. Therefore, pharmacists need to delegate to pharmacy technicians. The current lack of clear responsibilities and standard education of technicians inhibits the extent to which pharmacists can delegate tasks to them. It was shown that some technicians made serious errors.[31, 32, 36]

This study aimed to figure out pharmacists' and technicians' attitudes towards the concept of technician certification and the actual tasks performed by technicians.

MATERIALS AND METHODS:

Study design: This was a cross-sectional, prospective, questionnaire-based study. Structured interviews were conducted based on two different validated specially designed questionnaires. The two questionnaires were directed to community pharmacists and technicians in Greater Cairo region (it includes parts of 3 governorates: Cairo, Giza and Qalyobia). The study protocol was approved on February 23, 2015 by the Research Ethics Committee for Experimental and Clinical Studies at Faculty of Pharmacy, Cairo University.

The website of Yellow Pages was used to give an approximate total number of pharmacies in Greater Cairo region.[37] The sample size was calculated by using Raosoft sample size calculation software in which the population size (the number of pharmacies in Greater Cairo) was 6795, response distribution as 50%, margin of error and confidence interval were set at 5% and 95% respectively.[38] A minimum sample size of 364 was calculated. Therefore, we decided to take a sample of 500 pharmacists and 500 technicians assuming a 1:1 ratio in community pharmacies. Stratified sampling technique based on geographical distribution was used in selecting participants.

Questionnaires development and validation: The questionnaires were developed to evaluate the community pharmacists' and technicians' attitudes towards the current role of technicians and the concept of implementing national standards for technicians' education. The pharmacists' questionnaire was in English while the technicians' was in Arabic. That is because pharmacists' education is in English while most technicians are not fluent English speakers. The term "technician" in this study referred to non-pharmacist personnel who dealt with medications and not the house-keeping workers.

Face validity was conducted by asking colleagues in Clinical Pharmacy Department to comment on the questionnaires' clarity and relevance. Few modifications were made accordingly. Content validity was assured by carrying a pilot study on 28 pharmacists and 26 technicians. Each participant was asked to mark each question as essential, useful but not essential or not necessary. Content Validity Ratio (CVR) was calculated for each question in both questionnaires and it was greater than zero for all of them. [39, 40]

Content validity index (CVI) for pharmacists' and technicians' questionnaires was 0.799 and 0.785, respectively. Reliability of the task distribution table, as a measure of the level of technician's involvement in daily tasks, was measured in both pharmacists' and technicians' questionnaires using Cronbach's alpha, yielding a value of 0.762 and 0.902, respectively.

The questionnaires consisted of yes and no questions, multiple response questions and open ended questions. A number of questions required respondents to make free text comments. There were 18 questions in the technicians' questionnaire that covered the following: (1) Demographics and setting characteristics. (2) The technician's experience years and educational level. (3) Current job details and job satisfaction. (4) The technician's attitude towards enhancing his knowledge and getting certified. (5) The technician's attitude towards the pharmacist's role. (6) The level of technician's involvement in daily tasks.

There were 15 questions in the pharmacists' questionnaire that covered the following: (1) Demographics and setting characteristics. (2) The pharmacist's experience years and educational level. (3) The pharmacist's attitude towards technicians. (4) The pharmacist's attitude towards implementing national standards for technicians' education, his expectations of the consequences and his readiness to participate in their training. (5) The level of technician's involvement in daily tasks.

Questionnaires distribution: Community pharmacists and technicians in Greater Cairo were approached. The investigator introduced herself and explained the purpose of the study. The targeted subjects were free to refuse participation. Participants were assured that their responses are confidential and will only be used for research purposes. The participant's approval to fill in the questionnaire was considered as consent to participate in the study. The questionnaires were introduced to the target participants by a direct interview and filled at once. The duration of the interview varied according to the presence or absence of interruptions by customers.

Statistical analysis: Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) software package version 20 (SPSS, Inc., Chicago, IL, USA). The data underwent frequency analysis. Comparison of the Pharmacists' and technicians' responses to the technician's involvement level in daily tasks was conducted using Chi-square and Fisher's Exact tests, $P<0.05$.[41]

RESULTS:

Demographics of participants and settings: Number of pharmacies entered was 920 pharmacies but 233 pharmacies refused to participate. The pharmacies were distributed over 119 districts in Greater Cairo region (**Table 1**).

TABLE 1: GEOGRAPHICAL DISTRIBUTION OF PHARMACIES

Governorate	Cairo	Giza	Qalyobia	Total
Number of districts	87	28	4	119
Number of pharmacies entered	536	344	40	920
Number of pharmacies refused to participate	141	83	9	233
Number of participating pharmacies	395	261	31	687
Number of pharmacists' questionnaires	306	175	21	502
Number of technicians' questionnaires	304	175	21	500

Questionnaires were filled by 502 pharmacists and 500 technicians working in 687 pharmacies (10.1% of the registered pharmacies in Greater Cairo according to Yellow Pages). Only 72 pharmacies (7.8%) did not hire technicians while 247 pharmacies (26.8%) had only the technician present. Only 58% of the filled questionnaires (290 pharmacists' questionnaires and 291 technicians' questionnaires) were paired from the same settings. That is because many pharmacies had either the pharmacist or the technician present during filling the questionnaires. On the other hand, some pharmacies had more than one pharmacist or technician present. The demographic data of pharmacists and technicians is shown in **Table 2**.

TABLE 2: DEMOGRAPHICS OF PARTICIPANTS

Demographics		Pharmacists' Frequency (%) N=502	Technicians' Frequency (%) N=500
Age range	<21	0 (0%)	56 (11.2%)
	21-30	281 (56%)	272 (54.4%)
	31-40	121 (24.1%)	126 (25.2%)
	41-50	47 (9.4%)	36 (7.2%)
	51-60	37 (7.4%)	7 (1.4%)
	>60	16 (3.2%)	3 (0.6%)
Gender	Male	354 (70.5%)	430 (86%)
Experience years range	<1 year	41 (8.2%)	35 (7%)
	1-5 years	190 (37.8%)	180 (36%)
	6-10 years	111 (22.1%)	156 (31.2%)
	11-15 years	63 (12.5%)	73 (14.6%)
	16-20 years	39 (7.8%)	36 (7.2%)
	>20 years	58 (11.6%)	20 (4%)
Number of pharmacy branches	Independent community pharmacy	273 (54.4%)	261 (52.2%)
	2-5 branches	130 (25.9%)	149 (29.8%)
	More than 5 branches	99 (19.7%)	90 (18%)

The common pharmacist to technician ratios, as stated by pharmacists; were 1:1 (280, 55.8%), 1:2 (92, 18.3%), 2:1 (56, 11.2%), 1:3 (17, 3.4%) and 2:3 (17, 3.4%). When pharmacists were asked if they had any postgraduate degrees, 26 (5.2%) stated that they had Master of Science degree (MSc.), 4 (0.8%) had Doctor of Philosophy degree (Ph.D.), 1 (0.2%) had Doctor of Pharmacy degree (Pharm. D.), 30 (6%) had postgraduate diploma, 30 (6%) had US Board of Pharmacy Specialties (BPS) certification and 419 (83.5%) did not have any postgraduate degrees. On the other hand, 3 technicians (0.6%) were illiterate, 6 (1.2%) finished primary school, 17 (3.4%) finished preparatory school, 134 (26.8%) finished secondary school or its equivalent, 86 (17.2%) were university students and 254 (50.8%) were university graduates.

Technicians' work conditions and job satisfaction: When asked about their daily working hours, one (0.2%) technician said he worked for less than 4 hours, 227 (45.4%) worked for 4-8 hours, 238 (47.6%) worked for 9-12 hours and 34 (6.8%) worked for more than 12 hours daily.

Three hundred and nineteen technicians (63.8%) stated that they planned to continue working as technicians, 129 (25.8%) said they would not and 52 (10.4%) said they did not know. The main reasons for wanting to continue in this job were their love for the job (207 technicians, 64.9%) and having a huge experience in it (73 technicians, 22.9%). The main reasons for wanting to quit the job were: wanting a job with a better salary (117 technicians, 64.6%) and wanting a job in their education field (49 technicians, 27%) This was an open ended question.

The majority of technicians (233 technicians, 46.6%) had no source of pension or insurance, 105 (21%) worked in pharmacies that provided health insurance, 148 (29.6%) worked in pharmacies that provided pension, 35 (7%) worked in pharmacies that provided pension and/or insurance but they had another source for them and 51 (10.2%) worked in pharmacies that did not provide insurance or pension but they had another source for them. Technicians could choose both pension and health insurance.

When technicians were asked if they were satisfied with their salaries, 310(62%) said yes, 187 (37.4%) said they deserved higher salary and 3 (0.6%) said the salary was high compared to their efforts. Only 76 technicians (15.2%) heard about the Egyptian Trade Union of Workers in Pharmacies.

Pharmacists' attitude towards technicians' role and education: When pharmacists were asked about the criteria for hiring pharmacy technicians- they could choose more than one answer for this question- the main criteria were experience (404, 80.5%), honesty (239, 47.6%), living near the pharmacy (162, 32.3%), qualifications (155, 30.9%), young age (98, 19.5%), low wages (73, 14.5%), learning capabilities (17, 3.4%) and being a representative figure (2, 0.4%). The challenges that pharmacists faced with technicians are illustrated in **Fig. 1**.

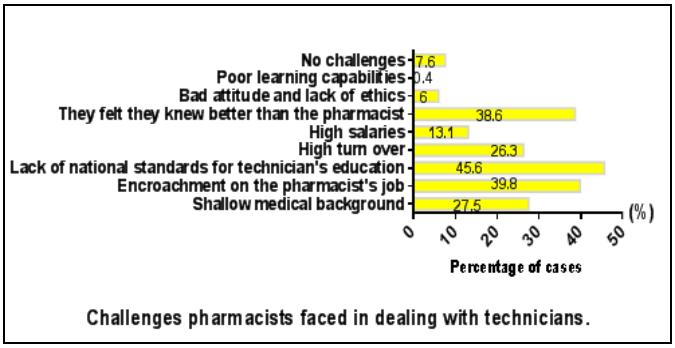

FIG. 1: CHALLENGES FACED BY PHARMACISTS IN DEALING WITH TECHNICIANS EXPRESSED AS PERCENTAGE OF CASES. PARTICIPANTS COULD CHOOSE MORE THAN ONE ANSWER AND ONE OF THE ANSWERS WAS "OTHERS. PLEASE SPECIFY". OTHERS INCLUDED: BAD ATTITUDE AND LACK OF ETHICS, POOR LEARNING CAPABILITIES AND NO CHALLENGES

The most common challenges were the lack of national standards for technician's education (229 pharmacists, 45.6%), technicians' encroachment on the pharmacist's job (200, 39.8%) and that technicians felt they knew better than the pharmacists (194, 38.6%). Pharmacists could choose more than one answer for this question. Two hundred and sixty seven pharmacists (53.2%) mentioned that technicians made drug-related errors. The most common type of error was dispensing the wrong drug (198 pharmacists, 39.4%). **Fig. 2** shows different types of errors reported. Pharmacists could choose more than one answer for this question. Among the errors reported by the pharmacists were: giving tetanus vaccine without performing a sensitivity test, dispensing Primoteston (androgenic steroid) instead of Primosiston (oral contraceptive), dispensing Dolphin 500 instead of Dolphin 250, dispensing Cyteal (antiseptic) instead of Cetal (analgesic), dispensing Lactocal (multivitamins) instead of Lactodel (anti-hyperprolactinemia) and dispensing Clozapex (anti-psychotic) instead of Clopex (antiplatelet).

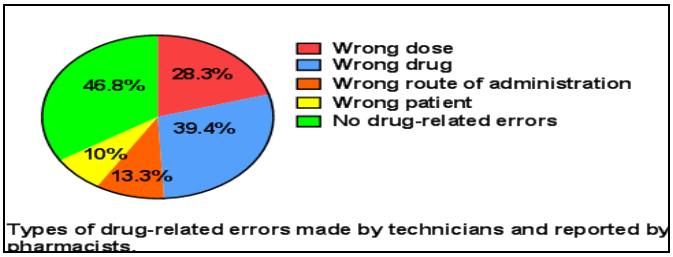

FIG. 2: TYPES OF DRUG-RELATED ERRORS MADE BY TECHNICIANS, AS REPORTED BY PHARMACISTS; EXPRESSED AS PERCENTAGE OF CASES. PARTICIPANTS COULD CHOOSE MORE THAN ONE TYPE OF ERROR

Most pharmacists (373, 74.3%) stated that they provided in-pharmacy training for technicians. Thirty two pharmacists (6.4%) said they provided training courses, while 129 (25.7%) said they did not provide any training. Pharmacists could choose either or both types of training.

The majority of pharmacists (437, 87.1%) supported implementing national standards for technician certification and training. **Fig. 3** illustrates the expected consequences of technician certification from pharmacists' point of view. The main expected consequence was that tasks would be delegated to technicians, saving time for pharmacists to provide direct patient care (386 pharmacists, 76.9%). Pharmacists could choose more than one answer for that question.

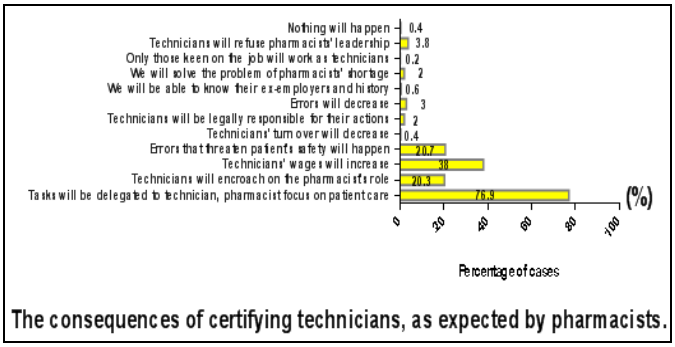

FIG. 3: THE CONSEQUENCES OF CERTIFYING TECHNICIANS, AS EXPECTED BY PHARMACISTS; EXPRESSED AS PERCENTAGE OF CASES. PARTICIPANTS COULD CHOOSE MORE THAN ONE ANSWER AND ONE OF THE ANSWERS WAS "OTHERS. PLEASE SPECIFY". OTHERS INCLUDED: TECHNICIANS' TURNOVER WILL DECREASE, TECHNICIANS WILL BE LEGALLY RESPONSIBLE FOR THEIR ACTIONS, ERRORS WILL DECREASE, WE WILL BE ABLE TO KNOW THEIR HISTORY AND EX-EMPLOYERS, WE WILL SOLVE THE PROBLEM OF PHARMACISTS' SHORTAGE, ONLY THOSE KEEN ON THE JOB WILL WORK AS TECHNICIANS, TECHNICIANS WILL REFUSE PHARMACISTS' LEADERSHIP AND NOTHING WILL HAPPEN.

Three hundred and eighty one pharmacists (75.9%) were ready to train technicians as a part of the certification program. The main reason for wanting to train them was that they would eventually be beneficial for the pharmacist and he would be able to depend on them (292, 76.6%). Other reasons included decreasing errors (32, 8.4%), transferring the pharmacist's experience (59, 15.5%), teaching them their job description (27, 7.1%), loving to teach (22, 5.8%), teaching them job ethics (5, 1.3%) and to ease communication (4, 1%). The main reasons for refusing to participate in their training were lack of time (55, 45.5%), refusing the concept of certification (25, 20.7%), being not good at teaching (19, 15.7%), the fear that they might be dishonest (11, 9.1%), the lack of experience (8, 6.6%) and believing that only pharmacists should deal with medications (8, 6.6%). This was an open ended question.

Technicians' attitude towards their role and education: When technicians were asked if they had received any training, 315 (63%) said that they were trained in the pharmacy they currently work for and 185 (37%) said that they were only trained in the pharmacy they worked for previously.

More than half of the technicians (307, 61.4%) were interested in taking courses to enhance their knowledge. The courses they were interested in included pharmacology (173, 56.4%), English language (106, 34.5%), computer (29, 9.4%), first aid (27, 8.8%), IV cannulation and injections (18, 5.9%), communication skills (10, 3.3%), cosmetics (8, 2.6%), reading prescriptions (8, 2.6%), sales (5, 1.6%), reading laboratory reports (4, 1.3%) and terminology (2, 0.7%). This was an open ended question. Four hundred and seventy technicians (94%) wanted technicians to be certified and registered based on national standards. **Table 3** illustrates the reasons for supporting and rejecting the concept of implementing national standards for technician certification. Technicians could choose more than one answer. One of the answers was "Others. Please specify".

Three hundred and seventy seven technicians (75.4%) said that the technician's presence cannot substitute for the pharmacist's presence in the pharmacy. Their reasons for this response were that pharmacists are more specialized in this field (325, 86.2%), that there should always be a pharmacist by law (58, 15.4%), some customers ask for the pharmacist (16, 14.2%) and they did not want to be legally responsible for their actions in the pharmacy (7, 1.9%). For those technicians who stated that the technician's presence is enough, their reasons were that most technicians are more experienced than the pharmacists (107, 87%), pharmacists do not have time for the pharmacy (13, 10.6%) and the pharmacist's job has become a trade (15,12.2%). This was an open ended question.

The pharmacists' and technicians' attitude towards the daily task distribution: Both pharmacists and technicians were asked to state the level of involvement of technicians in daily tasks. Chi-square and Fisher's Exact tests were conducted to compare the responses from the pharmacists' and technicians' questionnaires. There was a statistically significant association between the participants' jobs and their responses (P<0.05). **Table 4** illustrates the level of the technician's involvement in daily tasks.

TABLE 3: THE TECHNICIANS' REASONS FOR SUPPORTING OR REJECTING THE CONCEPT OF THEIR CERTIFICATION

Reasons for Supporting the concept of certification	Frequency (%) N=470
To get a better salary	101(21.5%)
To have a valued occupation	334(71.1%)
To enhance my knowledge	328(69.8%)
To decrease errors[a]	3(0.6%)
To be able to work in other countries[b]	1(0.2%)
To have a source of social insurance[c]	6(1.3%)
To gain customers' trust[d]	2(0.4%)
Reasons for rejecting the concept of certification	**Frequency (%) N=30**
I have no time to study	7(23.3%)
It will cost money	4(13.3%)
I already have the required knowledge	11(36.7%)
I do not want to be legally responsible for my actions in the pharmacy	3(10%)
It is a temporary job for me	13(43.3%)
I am a member of another syndicate[e]	2(6.7%)
Practical experience is more important than theoretical information[f]	3(10%)

*Technicians could choose more than one answer. One of the answers was "Others. Please specify". Others included a, b, c, d, e and f.

TABLE 4: THE PHARMACISTS' AND TECHNICIANS' RESPONSES TO THE LEVEL OF THE TECHNICIAN'S INVOLVEMENT IN DAILY TASKS

Task	Pharmacists' responses Frequency (%) N=502				Technicians' responses Frequency (%) N=500				P-value (P<0.05)
	N/A[a]	Technician alone	Technician under pharmacist's supervision	Pharmacist only	N/A	Technician alone	Technician under pharmacist's supervision	Pharmacist only	
Dispensing OTC medications	0(0%)	170(33.9%)	148(29.5%)	184(36.6%)	0(0%)	351(70.2%)	86(17.2%)	63(12.6%)	0.000
Dispensing Prescriptions	0(0%)	127(25.3%)	255(50.8%)	120(23.9%)	0(0%)	310(62%)	139(27.8%)	51(10.2%)	0.000
Dispensing narcotics	153(30.4%)	15(3%)	23(4.6%)	311(62%)	189(37.8%)	49(9.8%)	35(7%)	227(45.4%)	0.000
Retrieving medications	0(0%)	445(88.6%)	48(9.6%)	9(1.8%)	0(0%)	476(95.2%)	18(3.6%)	6(1.2%)	0.000
Fixing prescribing errors	2(0.4%)	20(4%)	54(10.8%)	426(84.8%)	0(0%)	155(31%)	90(18%)	255(51%)	0.000[b]
Patient counseling	0(0%)	130(25.9%)	75(14.9%)	297(59.2%)	0(0%)	334(66.8%)	46(9.2%)	120(24%)	0.000
Recommending alternatives	9(1.8%)	106(21.1%)	75(14.9%)	312(62.2%)	8(1.6%)	270(54%)	52(10.4%)	170(34%)	0.000
Cashier	105(20.9%)	236(47%)	29(5.8%)	132(26.3%)	99(19.8%)	323(64.6%)	9(1.8%)	69(13.8%)	0.000
Managing bills	83(16.5%)	118(23.5%)	35(7%)	266(53%)	87(17.4%)	157(31.4%)	25(5%)	231(46.2%)	0.020
Sticking barcodes	137(27.3%)	331(65.9%)	18(3.6%)	16(3.2%)	167(33.4%)	319(66.8%)	4(0.8%)	10(2%)	0.003
Entering medications into computer	83(16.5%)	262(52.2%)	30(6%)	127(25.3%)	110(22%)	315(63%)	6(1.2%)	69(13.8%)	0.000
Purchasing medications	57(11.4%)	99(19.7%)	28(5.6%)	318(63.3%)	52(10.4%)	223(44.6%)	14(2.8%)	211(42.2%)	0.000
Receiving ordered medications	0(0%)	369(73.5%)	52(10.4%)	81(16.1%)	0(0%)	444(88.8%)	15(3%)	41(8.2%)	0.000
Arranging medications on shelves	0(0%)	469(93.4%)	23(4.6%)	10(2%)	0(0%)	486(97.2%)	9(1.8%)	5(1%)	0.018
Monitoring drug shortages	11(2.2%)	230(45.8%)	107(21.3%)	154(30.7%)	2(0.4%)	388(77.6%)	48(9.6%)	62(12.4%)	0.000
Monitoring expired medications	7(1.4%)	323(64.3%)	94(18.7%)	78(15.6%)	1(0.2%)	423(84.6%)	31(6.2%)	45(9%)	0.000[b]
Disposal of expired medications	47(9.4%)	115(22.9%)	46(9.1%)	294(58.6%)	52(10.4%)	198(39.6%)	23(4.6%)	227(45.4%)	0.000
Managing drug recalls	44(8.8%)	110(21.9%)	52(10.3%)	296(59%)	57(11.4%)	184(36.8%)	26(5.2%)	233(46.6%)	0.000
Managing narcotics inventory	166(33%)	24(4.8%)	21(4.2%)	291(58%)	206(41.2%)	73(14.6%)	30(6%)	191(38.2%)	0.000
Managing drug inventory	34(6.8%)	66(13.2%)	316(62.9%)	86(17.1%)	49(9.8%)	129(25.8%)	270(54%)	52(10.4%)	0.000
Managing refrigerated medications	0(0%)	180(35.8%)	138(27.5%)	184(36.7%)	0(0%)	313(62.6%)	76(15.2%)	111(22.2%)	0.000
Receiving phone calls	12(2.4%)	125(24.9%)	68(13.5%)	297(59.2%)	18(3.6%)	287(57.4%)	35(7%)	160(32%)	0.000
Monitoring storage conditions	6(1.2%)	158(31.4%)	56(11.2%)	282(56.2%)	5(1%)	267(53.4%)	29(5.8%)	199(39.8%)	0.000
Tech-check-tech[c]	6(1.1%)	248(49.4%)	60(12%)	188(37.5%)	6(1.2%)	324(64.8%)	37(7.4%)	133(26.6%)	0.000
Training pharmacy students	76(15.1%)	20(4%)	26(5.2%)	380(75.7%)	68(13.6%)	140(28%)	34(6.8%)	258(51.6%)	0.000

[a]N/A: Either this task was performed by someone else other than the pharmacist and the technician or this task was not available in the pharmacy.
[b] Fisher's Exact was used instead of Chi-square because one or more cells had expected count less than 5.
[c]The checking of a technician's order-filling accuracy by another technician rather than a pharmacist.

On comparing questionnaires paired from the same settings, there was still a statistically significant association between the participants' jobs and their responses (n=290 pharmacists and 291 technicians) except for the following tasks: retrieving medications, cashier, managing bills, arranging medications on shelves and tech-check-tech. (Chi-square and Fisher's Exact tests, P<0.05).

DISCUSSION: In Egypt, the term "technician" does not exist in the draft amendments of the Pharmacy Practice Law that will be soon submitted to the Parliament. [35] The health authorities refuse to admit technicians' role. Although pharmacies hire technicians and let them deal with medications, their role is not clear and they do not have specialized educational programs. This affects patient safety negatively and the legal responsibility falls on the pharmacist. We conducted this study to assess the pharmacists' and technicians' perceptions about the technicians' current role and the concept of having certified registered technicians. To the best of our knowledge, this is the first study to assess the role and education of community pharmacy technicians in Egypt.

In Egypt, the Pharmacy Practice Law states that only pharmacists are allowed to dispense medications.[34] However, as was shown in this study, about 9 out of 10 community pharmacies hire technicians; which is similar to USA according to Schering Report XXIII. [1] The pharmacy managers said that they tend to hire technicians due to several reasons. First, the low profit margin prevents them from paying high salaries to pharmacists. Second, as this study showed, more than half of the technicians work for nine hours or more per day and take lower salaries. Finally, despite the large number of registered pharmacists, most of them prefer working in pharmaceutical companies to working in community pharmacies. This was also stated by pharmacy students and a former member of the Board of the Pharmacists' Syndicate. [31, 32]

On the other hand, the pharmacists' shortages increase the need for technicians in USA. [7] Although USA is more populous than Egypt, in 2012 the number of pharmacists per 10,000 population in Egypt was 18.15 while that of USA was 8.82. [29] This number is more than that needed by the market and is due to the high number of annual admissions to the Faculties of Pharmacy in Egypt despite the objection of the Pharmacists' Syndicate. [42, 43] The number of pharmacy schools' graduates in the past 5 years equals to half the total number of graduates since the construction of pharmacy schools in Egypt. [43] This problem is also currently in UK, NZ and USA.[44] The Center for Workforce Intelligence (CfWI) suggested capping the number of students to avoid future unemployment of pharmacists. [44]

According to the Egyptian Pharmacy Practice Law, the pharmacist should always be present in the pharmacy. Pharmaceutical institutions are subjected to periodical inspections carried out by the competent health authority. [34] It also states that anyone who practices pharmacy profession without a license will be imprisoned for a maximum of 2 years and/or pays a fine of maximum two hundred pounds and the setting will be closed. [34] However, more than quarter of the pharmacies had only the technician present during filling the questionnaires. Other studies in India and the Kingdom of Saudi Arabia (KSA) showed similar results. [45-47] This proves that the role of the pharmacy technicians in Egypt is undeniable.

In this study the pharmacist to technician ratio in the majority of pharmacies was 1:1. In USA the ratio depends on the number of technicians that the pharmacist can supervise effectively. In some states it varies depending on the practice setting and on the presence of certified technicians. The prevailing ratio is 1:2 or 1:3. [7]

In this study, the major challenges that pharmacists faced in dealing with technicians were the lack of national standards for the technicians' education and technicians' encroaching on the pharmacist's job. Participating technicians had different educational levels and they only gained the required pharmaceutical knowledge by experience. Experience was the main hiring criterion. According to pharmacists, more than half of the technicians made drug-related errors. Several past incidents showed up in the Egyptian media.[31, 32, 36] This shows that in-pharmacy training and courses given by chain pharmacies are not enough to produce a qualified technician.

Several previous studies in USA showed that both technicians and pharmacists made drug-related errors.[1] Several serious events that involved non-certified pharmacy technicians occurred in USA and most of them led to patients' deaths.[6] Other studies showed that well trained technicians could detect dispensing errors effectively. [48-50]

This shows that specialized standard courses and training are required in Egypt. The pharmacists may also need courses on how to work effectively with technicians.

In this study, the majority of the participating technicians (68%) were either university students or university graduates. On the other hand, since 2004 the highest level of education among PTCB certification's candidates was high school (52.1%), an associate degree (12.9%), a bachelor's degree (15.9%), a master's degree (1.8%), a certification from a pharmacy technician program (12.3%) and other (5%). [6] This shows that the majority of technicians seek higher education despite it not being related to work.

This study findings showed that the majority of pharmacists and technicians wanted technicians to be certified based on national standards. Pharmacists expected expanding technicians' role to help them delegate tasks to technicians and save more time for patient care. Technicians wanted to be certified to enhance their pharmaceutical knowledge and to have a valued occupation. Most of the pharmacists were ready to participate in training technicians as a part of the certification program because it would help them depend more on technicians and reduce drug-related errors. The majority of technicians said that the presence of the technician alone is not enough since pharmacists are the ones specialized in pharmaceuticals. This proves that both pharmacists and technicians welcome certifying technicians and expanding their role. These results were similar to those of a study performed in NZ in which most pharmacists said that separating the clinical assessment of prescriptions from the mechanical dispensing would have a positive impact on public safety. However, there should be first a job description for the technician's role and technicians should be trained. [15] In 2009, a study was conducted in USA and showed similar positive pharmacists' attitude towards technician certification. [51]

There was a statistically significant difference between the pharmacists' and the technicians' answers to the technician's involvement level in daily tasks even in questionnaires paired from the same pharmacy (Chi-square and Fisher's Exact tests, $P<0.05$). The majority of each party said that they did most of the tasks alone. A possible explanation is that either the pharmacists did not supervise technicians effectively or that one of the two parties was exaggerating in describing his role. Most pharmacists said that the technician was mainly involved in non-dispensing tasks like cashier, retrieving medications, arranging medications, monitoring expired medications, monitoring drug shortages, entering medications into the computer, receiving ordered medications and sticking barcodes while the majority of technicians said that they can provide patient counseling, recommend alternative medications, receive phone calls and dispense OTC and prescription medications alone as well. This shows that the technician's job description differs depending on the pharmacy setting and that he encroaches on the pharmacist's tasks. This will definitely affect patient safety.

A study conducted in NZ showed similar discrepancy due to lack of a clear job description for technicians. [52] In USA, chain pharmacies depend on technicians in medications filling and counting, prescription input, tech-check-tech and as cashiers. [7] In UK, they have ACT, this role allows technicians to check the accuracy of a dispensing clinically approved by the pharmacist, this position is invalid in USA. [53] In community pharmacies, technicians assemble and dispense prescription medications, sell OTC medications and counsel patients. [14] In NZ, the dispensary staff consists of pharmacists and pharmacy technicians who work under the direct supervision of the pharmacist. [54]

In Egypt; there is not a definite job description for the technician. As our study showed, the tasks performed by the technician differed from one setting to another. There was even a discrepancy between the pharmacists' and the technicians' responses to the technician's role in the same setting. This further emphasizes the need for proper education and clear definitions in the regulations governing pharmacy technicians.

Study Limitations: One of our study limitations is that it was conducted on community pharmacists and technicians working in the Greater Cairo region, therefore extrapolation of the results to hospital pharmacists and technicians or rural areas of Egypt maybe invalid.

However, pharmacists and technicians who work in hospitals may also work part-time in community pharmacies. The small area of pharmacies may have affected the data collected due to limited privacy and frequent interruptions. Meanwhile, each participant was interviewed separately.

About 42% of the pharmacists' and technicians' questionnaires were not paired from the same setting, because many pharmacies had either the technician or the pharmacist present during filling the questionnaires. Whether this has increased the discrepancy between the pharmacists' and technicians' responses to technician's involvement level in daily tasks needs to be discovered in further studies. However, the results still prove that the job description of the pharmacy technician differs from one pharmacy to another.

CONCLUSION: There is now a trend for technician certification and expanding technicians' role worldwide. In Egypt, we need to implement our own national standards for technicians' education and training. We also need to work on a job description for pharmacy technicians as a part of the pharmacy profession. Both pharmacists and technicians should start working as partners. Certification will allow pharmacists to delegate tasks to technicians and save more time for providing patient care and reducing the drug-related errors thus improving the health care services provided to patients. Also, technicians will have a valued occupation. The scope of community pharmacy practice in Egypt should change from product-based services to patient-centered care. We present this paper as a stimulus for an urgent action. The health authorities should reconsider their attitude towards technicians' role and increase pharmacies' profit margin and the higher education authorities should cap the number of admissions to Faculties of Pharmacy in Egypt.

CONFLICT OF INTEREST: Authors of this study declare no conflict of interest.

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