

Factors of the development of pharmaceutical care in community pharmacies in Buenos Aires, Argentina, through the model of partial least squares structural equation modeling (PLS-SEM)

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SUMMARY

Aim: To describe the factors for the development of pharmaceutical care (PCare) in community pharmacies in Buenos Aires, Argentina, through the model of structural equations through partial least squares, using information from community pharmacists.

Methods: Data was collected from pharmacists of Buenos Aires city between March and April 2018 using an anonymous questionnaire. It was surveyed 350 pharmacists. Data was analyzed through structural equation modeling using the partial least squares method (PLS-SEM) with SmartPLS v3.2 software. Three dimensions included in the questionnaire were evaluated by exploratory factor analysis.

Results: Pharmacists expressed in questionnaires that the

money (payment for the service), space in the community pharmacy, PCare training and communication training were the main factors reported. According to structural model, the training in PCare have a positive influence of 0.329 to the skills of pharmacists. The training in PCare have a positive influence of 0.333 to the sources of the community pharmacies. The skills in PCare have a positive influence of 0.229 to PCare practice in the community pharmacies. The sources of the community pharmacies have a positive influence of 0.117 to PCare practice in the community pharmacies.

Conclusion: In the community pharmacies Buenos Aires, Argentina exists different factors of the development of PCare that need different efforts and strategies to be overcome.

Key Words: Pharmaceutical care, community pharmacy, Argentina, structural equation modeling, PLS-SEM.

Factores para el desarrollo de la atención farmacéutica en farmacias comunitarias en Buenos Aires, Argentina, a través del modelo de ecuaciones estructurales mediante mínimos cuadrados parciales (PLS-SEM)

RESUMEN

Objetivo: Describir los factores para el desarrollo de la atención farmacéutica (AF) en farmacias comunitarias en Buenos Aires, Argentina, a través del modelo de ecuaciones estructurales mediante mínimos cuadrados parciales, utilizando información de farmacéuticos comunitarios.

Métodos: Los datos se obtuvieron de los farmacéuticos de la ciudad de Buenos Aires entre marzo y abril de 2018 mediante un cuestionario anónimo centrado en las barreras percibidas para la implementación de AF. Se encuestó a 350 far-

macéuticos. Los datos se analizaron mediante modelos de ecuaciones estructurales utilizando el método de mínimos cuadrados parciales (PLS-SEM, por sus siglas en inglés *partial least squares structural equation modeling*) con el software SmartPLS v3.2. Se evaluaron tres dimensiones incluidas en el cuestionario mediante análisis factorial exploratorio.

Resultados: Las principales barreras reportadas fueron la falta de dinero (pago por el servicio), la falta de espacio suficiente en la farmacia de la comunidad, la falta de capacitación en AF y la falta de

capacitación para comunicarse con los pacientes. Según el modelo estructural, la falta de capacitación en AF tiene una influencia positiva de 0.329 en la falta de habilidades de los farmacéuticos. La falta de capacitación en AF tiene una influencia positiva de 0.333 en la falta de fuentes de las farmacias comunitarias. La falta de habilidades en AF tiene una influencia positiva de 0.229 a la práctica de AF en las farmacias comunitarias. La falta de fuentes de las farmacias comunitarias tiene una influencia positiva de 0.117 para la práctica de AF en las farmacias comunitarias.

Conclusión: En las farmacias comunitarias de Buenos Aires, Argentina, existen diferentes barreras para la implementación de la AF que necesitan diferentes esfuerzos y estrategias para superar.

Palabras clave: Atención farmacéutica, farmacia comunitaria, Argentina, ecuaciones estructurales, PLS-SEM.

INTRODUCTION

Community pharmacists have the main role in the health system to provide care to different kind of patients. Academic literature confirms the benefits of pharmaceutical care to the patients¹⁻⁵. However, in spite of the evidence of positive outcomes, the implementation of PCare is still a hard task, specifically when all aspects related to the health system, patients, other health professionals and, the performance of pharmacists are not reviewed. Factors of development in few countries also have been described in the literature, and it can be recognized that the factors are not the same between different countries. Studies developed previously found some factors to the provision of PCare such as poor prescription⁶, the need for pharmaceutical care teaching⁷, discrepant attitudes of physician/ nurses⁸ between others. It is important to analyze what is the real situation of a healthcare system to create innovative strategies for PCare implementation⁹. The present work used a modeling to establish what is the effect size of each factor (instead of just describing what they are) because in this way those factors that have a greater influence can be prioritized in the implementation strategies that are formulated in the future.

It was used PLS due to some specific reasons¹⁰:

a. PLS is particularly suitable for data analysis during the early stage of theory development where the theoretical model and its measures are not well-formed.

b. The objective of PLS is an explanation of the relationships and prediction of the criterion variables of the model.

c. PLS is a more rigorous approach compared to correlation and regression analyses.

d. PLS is more appropriate for the exploratory nature of a study.

e. The PLS method is more robust since its does not require either a large sample or normally distributed data.

In Argentina, there is the Law of Pharmacies¹¹, which is the normative document ruling to pharmaceutical activity and that was approved on 1987. More currently was released the Good Practice in Community Pharmacies¹², developed for Argentinian regulatory agency (Administración Nacional de Medicamentos, Alimentos y Tecnología Médica - ANMAT). The most important issues that influence the community pharmacy practice in Argentina is the Integral Program of Medical Assistance (Programa de Asistencia Médica Integral - PAMI in Spanish), created in 1971 and focused to provide medicines to veterans population.

Aim of the study

To describe the factors for the development of pharmaceutical care (PCare) in community pharmacies in Buenos Aires, Argentina, through the model of structural equations through partial least squares, using information from community pharmacists.

Current study question established was: which are the factors of development of PCare in community pharmacist in Buenos Aires, Argentina are? Also, it is proposed the following set of hypotheses:

Main hypothesis

The training of pharmacists in PCare, mediated by the skills of pharmacists in PCare for PCare practice, has a positive correlation on PCare practice.

Specific hypothesis

H1. The training of pharmacists in PCare has a positive correlation to the skills of pharmacists in PCare.

H2. The skills in PCare of pharmacists has a positive correlation to PCare practice.

H3. The sources in community pharmacies for PCare has a positive correlation to PCare practice.

The term "positive correlation" is used in statistic measurement to describe the direct relation between two variables (it means when the first variable increase, the second variable increase too and vice versa. It must not be confused with good impact in the clinical outcomes of the patients).

METHOD

Setting

Data in this cross-sectional study were derived from a pharmacist survey conducted in community pharmacies in Buenos Aires. It was a descriptive study because the study explains the characteristics of the sample; the study is correlational because it is established the relations between factors. The study was prospective because the information was not available in any database or report so current study obtained new information.

Sample selection

It was planned to collect the data of 300 pharmacists who work in community pharmacies to conduct face-to-face surveys with a questionnaire elaborated by the authors. The selection criteria were to evaluate the community pharmacies which the pharmacist was working during the visit to collect information. At the time of the study, the population of Buenos Aires was 2.89 million, and there were 1897 community pharmacies. Approximately 55% of pharmacists work in community pharmacies. The sample size was estimated for 95% of confident and 5% of error. Formula calculation mentioned 320 pharmacists but we obtained data from 350 community pharmacies for a 4.8% of error. The pharmacists surveyed self-completed the questionnaires in the presence of the interviewer.

Questionnaire development

For the current study, it was used adaptation of the questionnaire developed by Megralian *et al.*¹³. The instrument comprised two sections. The first section captured demographic information as sex, age, education level, year of experience and their position in the pharmacy. The second part included a 5-point Likert scale, where 1=strongly agree and 5=strongly disagree. It was tested 10 items, distributed in their independent variables: Training, skills and sources and one dependent variable: PCare practice.

Training

The clinical training towards pharmacotherapy follow-up.

The training towards communication.

The training towards social pharmacy.

Skills

The skills for the evaluation of pharmacotherapy.

The pharmacists' documentation skills.

The of management skills.

Sources

Money to pay for the service.

The space in the community pharmacies.

PCare practice

I usually give information about the use of medications.

I usually report the adverse reactions found.

For the scale validation, internal consistency was measured using Cronbach's alpha which values are considered adequate when a dimension has a factor loading greater than 0.707 as expressed by Carmines & Zeller¹⁰. At this stage, during the development of the questionnaire, the Cronbach's alpha values of each dimension were 0.781, 0.883, 0.774 and 0.865, so it did not need changes in items of questionnaire.

Research model

For the current study, it was designed a research model to be evaluated. Figure 1 shows the research model. The present model was used to analyze a multivariate relationship of factors because of this mod we can know the influence that the independent variable has, through the mediating variables, on the dependent variable.

Validation with PLS-SEM¹⁰

Using partial least squares structural equation modeling (PLS-SEM) was evaluated the validity of construct and discriminant and, internal consistency by the composite reliability. SmartPLS statistical package is used to calculate the factorial structure of the indicators, using partial least squares. PLS-SEM aims to predict the latent variables by estimating partial least squares (PLS) and principal component analysis (PCA). In a PLS model, the individual reliability of the indicators is assessed by examining the load between each indicator and dimension, accepting as reliable those above 0.40 loads for exploratory studies. For internal consistency reliability composite reliability should be 0.7 or higher. If it is an exploratory research, 0.6 or higher is acceptable.

Data collection

Between March and April 2018, 350 self-administered questionnaires were delivered to community pharmacists in Buenos Aires city. Questionnaires anonymous were delivered which included an informed consent for each participant. The pharmacists surveyed self-completed the questionnaires in the presence of the interviewer.

Ethical considerations

Protocol of study was approval by the Universidad Internacional Iberoamericana. Informed consent was obtained from each participant of current study, following in accordance with The Code of Ethics of the World Medical Association.

Statistical analysis

A descriptive analysis and reliability were conducted using SPSS 24. Also, data was analyzed through structural equation modeling using the partial least squares method with SmartPLS 3.2

RESULTS

350 questionnaires were fulfilled. Regarding the pharmacists who answered the survey, 71.72% were women. The average age of the pharmacists was 42.77 years (SD: 11.95). Most of the participating pharmacists had on average more than 12.1 years (SD: 8.46) of experience as community pharmacists.

More than 50% of the participants chose the "strongly agree" and "agree" alternative for items that included:

- Money to pay for the service.
- The space in the community pharmacy.
- The training in PCare.
- The training towards communication.

Figure 1. Research model designed by authors

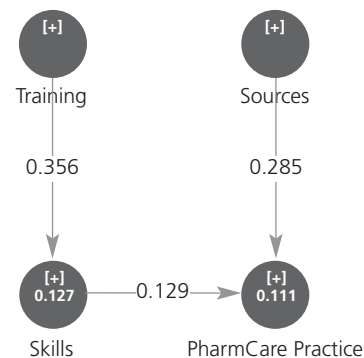
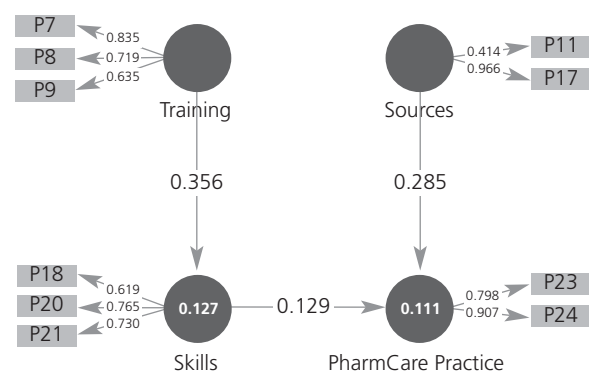


Figure 2. Research model tested



Evaluation of hypotheses

Considering the relation showed in Figure 2, we evaluated the hypotheses proposed.

H1: The training of pharmacists in PCare has a positive correlation to the skills in PCare of pharmacists

The training in PCare have a positive correlation of 0.356 to the skills of pharmacists. The training in PCare explains 12.7% de the skills in PCare of pharmacists ($p < 0.01$).

H2: The skills in PCare of pharmacists has a positive correlation to PCare practice

The skills in PCare have a positive correlation of 0.129 to PCare practice in the community pharmacies ($p < 0.01$). The skills in PCare explains 11.1% de the skills in PCare of pharmacists ($p < 0.01$).

H3: The sources in community pharmacies for PCare has a positive correlation to PCare practice

The sources of the community pharmacies have a positive correlation of 0.285 to PCare practice in the community pharmacies. The skills together with sources explains 11.1% of the PCare Practice ($p < 0.01$).

Main hypothesis

The training of pharmacists in PCare, mediated by the skills of pharmacists in PCare for PCare practice, has a positive correlation on PCare practice.

The training of pharmacists in PCare, mediated by the skills in PCare of pharmacists has a positive correlation on PCare practice. The skills together with the sources explain 11.1% of the PCare practice ($p < 0.01$).

DISCUSSION

Previous outcomes found different factors to the provision of PCare, as in the case of the study developed in Belgium by Binakaj y Stojkov¹⁴ who found the need of mental health training to provide pharmaceutical care in patients with depression. El Hajj *et al.*¹⁵ in Qatar show that the main factors are the difficulty in accessing the patient's medical information, as well as the lack of staff and time. The research of Ibrahim & Scott¹⁶ in community pharmacies in Sudan shows among the main factors to performance of PCare the lack of support of physicians, lack of qualified personnel, lack of professional standards, lack of specific training and lack of remuneration. In the case of the current research, reviewing each dimension in detail, it can be evidenced that in the resource domain, both the payment for the service and the space are the main factors. The training of the public towards pharmaceutical services is the biggest factor that has been reported, not surprising because the activities of pharmacists are usually not promoted compared to other professionals, for which the population is fully aware of their functions. Communication limitations were also reported, but with less importance, from a professional orientation towards patients and clinical training. The communication experience for the implementation of PCare has been reviewed as well as the improvement strategies¹⁷. The service inspiration of pharmacists is an issue to be evaluated since it is possible that, despite working in a community pharmacy, pharmacists may be only focused on the products they sell and not to the patients they serve. Educational gaps are a constant in several countries since undergraduate training often lacks hours of practical training to solve patients' clinical problems. Although pharmacists are in charge of pharmacy management, the incorporation of a specialized service such as PCare implies a greater responsibility and a more detailed control of the management of the patients that we are quoting and who are following up. One aspect that is striking is that the communicational skills of pharmacists are not considered important, implying that there is good communication with the patients. The communication skills of the pharmacists can be used to communicate to patients about personalized services to optimize the use of medications. Inappropriate evaluation and promotion to develop pharmaceutical care, national health structure and legal limitations were identified as important limitations to the provision of PCare.

The use of the technique of structural equation analysis allows us to establish an effect size that makes it possible to show which variables are more important to explain the dependent variable. As shown in the results, the training of pharmacists has an important influence on skills (0.356) and these skills have an influence (0.129) on the practice of pharmaceutical care. This leads to raise the urgent need to increase and improve the training of pharmacy students (future pharmacists) and pharmacists who are already working, in order to optimize the clinical services that are required to provide patients. It is also important to mention that resources have an influence (0.285) on the practice of pharmaceutical care, since physical spaces and access to data sources are fundamental for the service to patients.

This result explains that it is perceived among the pharmacists surveyed that although it is an individual issue for the development of services towards patients, aspects at the level of the health structure, as well as the absence of

specific norms that support clinical services, are crucial to improve clinical outcomes in patients.

All the information that has been evaluated in the research serves to know what are the reasons why pharmacists do not provide pharmaceutical care services. Policymakers need to know the barriers and at the same time they need to know the advantages offered by pharmaceutical care, which is widely described in the literature on different diseases such as diabetes¹⁸, COPD¹⁹, dermatitis²⁰, HIV/AIDS²¹, hepatitis C²² and others. Also, there are evidences for type of patients in relation to age as neonatal²³ and older people²⁴.

CONCLUSION

Pharmacists in community pharmacies in Buenos Aires, Argentina, estimated that lack of money (payment for the service), lack of enough space in the community pharmacy, lack of PCare training and lack of training to communicate to patients were the main barriers reported. These aspects should be addressed by both health system regulators and pharmacy faculties to generate changes that, although they will take years to be perceived in the system, need to be initiated in the short term to optimize clinical outcomes in the patients using medication.

Conflicts of interest: The authors declare that they have no conflict of interest.

BIBLIOGRAPHY

1. Cazarim MS, Freitas O, Penaforte TR, Achcar A, Pereira LRL. Impact assessment of pharmaceutical care in the management of hypertension and coronary risk factors after discharge. *PLoS One*. 2016;11(6):e0155204. doi: 10.1371/journal.pone.0155204.
2. Alvarez-Risco A, Quiroz-Delgado D, Del-Aguila-Arcenales S. Pharmaceutical care in hypertension patients in a peruvian hospital. *Indian J Public Health*. 2016;7(3):183-188.
3. Xin C, Ge X, Zheng L, Huang P. Evaluation of pharmaceutical care in a diabetes ward from China: a pre-and post-intervention study. *Int J Clin Pharm*. 2014;36:963-8.
4. Domingues EA, Ferrit-Martín M, Calleja-Hernández MÁ. Impact of pharmaceutical care on cardiovascular risk among older HIV patients on antiretroviral therapy. *Int J Clin Pharm*. 2017;39(1):52-60. DOI: 10.1007/s11096-016-0387-1.
5. Silveira MPT, Guttier MC, Page K, Moreira LB. Randomized controlled trial to evaluate the impact of pharmaceutical care on therapeutic success in HIV-infected patients in Southern Brazil. *AIDS Behav*. 2014;18(Suppl 1):S75-84.
6. Alvarez-Risco A, Del-Aguila-Arcenales S. Errores de prescripción como barrera para la Atención Farmacéutica en establecimientos de salud públicos: Experiencia Perú. *Pharm Care Esp*. 2015;17(6):725-731
7. Aburuz S, et al. Pharmaceutical care in a community-based practice setting in Jordan: where are we now with our attitudes and perceived barriers? *Int J Pharm Pract*. 2012;20:71-79.
8. Acheampong F, Anto BP. Perceived barriers to pharmacist engagement in adverse drug event prevention activities in Ghana using semi-structured interview. *BMC Health Serv Res*. 2015;15(1):361.
9. Alvarez-Risco A, Del-Aguila-Arcenales. Pharmaceutical care in Latin America. *The Pharmacist Guide to Implementing Pharmaceutical Care*, 183-190.
10. Rojas-Osorio M. y Alvarez-Risco A. Intention to Use Smartphones among Peruvian University Students. *International Journal of Interactive Mobile Technologies (IJIM)* 2019;13(3):40-52. <https://doi.org/10.3991/ijim.v13i03.9356>.
11. Ministry of Health of Argentina. (1987). Law of Pharmacies. Available from: <http://www.gob.gba.gov.ar/legislacion/legislacion/l-10606.html> [Last retrieved on 2019 Jul 16].
12. ANMAT (2003). Good Practice in Community Pharmacies. Available from: http://www.anmat.gov.ar/fna/buenas_practicas_farmac_farmacia_oficial.pdf [Last retrieved on 2019 Jul 16].
13. Mehralian G, Rangchian M, Javadi A, Peiravian F. Investigation on barriers to Pharmaceutical care in Community pharmacies: a structural equation model. *Int J Clin Pharm*. 2014;36(5):1087-94. doi:10.1007/s11096-014-9998-6.
14. Binakaj Z, Stojkov S. Pharmaceutical Care of the Patients Suffering from Depression. *Journal of Pharmacy and Pharmacology*. 2016;6(2):253-260

15. El Hajj MS, Al-Saeed HS, Khaja M. Qatar pharmacists' understanding, attitudes, practice and perceived limitations related to providing pharmaceutical care. *Int J Clin Pharm.* 2016;38(2):330-43. doi: 10.1007/s11096-016-0246-0.
16. Ibrahim A, Scott J. Community pharmacists in Khartoum State, Sudan: their current roles and perspectives on pharmaceutical care implementation. *Int J Clin Pharm.* 2013;35(2):236-43. doi: 10.1007/s11096-012-9736-x.
17. Alvarez-Risco A, Del-Aguila-Arcenales S, Stevenson JG. Pharmacists and mass communication for implementing pharmaceutical care. *Am J Pharm Benefits.* 2015;7(3):e125-e126.
18. Abdulrhim SH, Saleh RA, Hussain MAM, Al Raey H, Babiker AH, Kheir N, & Awaisu A. (2019). Impact of a collaborative pharmaceutical care service among patients with diabetes in an ambulatory care setting in Qatar: A multiple time series study. *Value in health regional issues.* 19, 45-50.
19. Nguyen TS, Nguyen TLH, Van Pham TT, Hua S, Ngo QC, & Li SC. (2019). Impact of pharmaceutical care in the improvement of medication adherence and quality of life for COPD patients in Vietnam. *Respiratory Medicine.* 153,31-37.
20. Koster ES, Philbert D, Wagelaar KR, Galle S, & Bouvy ML. (2019). Optimizing pharmaceutical care for pediatric patients with dermatitis: perspectives of parents and pharmacy staff. *International journal of clinical pharmacy.* 1-8.
21. Margusino-Framiñán L, Cid-Silva P, Castro-Iglesias Á, Mena-de-Cea Á, Rodríguez-Osorio I, Pernas-Souto B, & Martín- Herranz I. (2019). Teleconsultation for the pharmaceutical care of hiv outpatients in receipt of home antiretrovirals delivery: clinical, economic, and patient-perceived quality analysis. *Telemedicine and e-Health.* 25(5),399-406.
22. de Sevilla MÁCF, Úbeda MG, Benito MH, García-Cabrera E, García BM, Pozo MT, & Iglesias-Peinado I. (2019). Implementation of a pharmaceutical care program for patients with hepatitis C treated with new direct-action antivirals. *International Journal of Clinical Pharmacy.* 41(2),488-495.
23. Krzyżaniak N, Pawłowska I, Pawłowski L, Koci I, & Bajorek B. (2019). Pharmaceutical care in the neonatal intensive care unit: Perspectives of Polish medical and pharmacy students. *Currents in Pharmacy Teaching and Learning.* 11(4),361-372.
24. Alhusein N, Killick K, Macaden L, Smith A, Stoddart K, Taylor A, & Watson MC. (2019). "We're really not ready for this": A qualitative exploration of community pharmacy personnel's perspectives on the pharmaceutical care of older people with sensory impairment. *Disability and Health Journal.* 12(2),242-248.