UNIVERSIDADE FEDERAL DE SERGIPE

CENTRO DE CIÊNCIAS BIOLÓGICAS E DA SAÚDE

DEPARTAMENTO DE FARMÁCIA

RAFAELLA DE OLIVEIRA SANTOS SILVA

AVALIAÇÃO DE INDICADORES DE ESTRUTURA EM UM SERVIÇO DE REVISÃO DA FARMACOTERAPIA

São Cristóvão, SE

Dezembro de 2014

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Monografia apresentada como exigência para obtenção do título de **Bacharel em Farmácia.**

Orientador: Prof. Dr. Divaldo Pereira de Lyra Jr.

São Cristóvão, SE

Dezembro de 2014

RESUMO

SILVA, R.O.S. **AVALIAÇÃO DE INDICADORES DE ESTRUTURA EM UM SERVIÇO DE REVISÃO DA FARMACOTERAPIA.** Trabalho de Monografia do curso de Farmácia da Universidade Federal de Sergipe, 2014.

Este estudo avalia indicadores de estrutura empregados na implantação do Serviço de Revisão da Farmacoterapia. Foi realizada uma pesquisa de desenvolvimento metodológico de março de 2012 a março de 2013, no Serviço de Revisão da Farmacoterapia do ambulatório-escola, de um Hospital Universitário no Nordeste do Brasil, em duas etapas consecutivas. A primeira etapa consistiu de uma busca na literatura sobre indicadores de estrutura para Serviços de Revisão da Farmacoterapia. Na segunda etapa foi feita a avaliação por meio dos indicadores reunidos na etapa anterior. Reunimos 28 indicadores de estrutura necessários para avaliar outros Serviços de Revisão da Farmacoterapia que foram divididos em cinco categorias: instalações físicas, recursos humanos, recursos materiais, documentação e financiamento. O Serviço de Revisão da Farmacoterapia analisado atendeu a maioria dos indicadores sugeridos pela literatura.

Palavras-chave: revisão da farmacoterapia; avaliação de qualidade de serviços; indicadores de estrutura

ABSTRACT

SILVA, R.O.S. **EVALUATION OF A STRUCTURAL INDICATORS IN A MEDICATION REVIEW SERVICE.** Monograph Pharmacy Course at the Federal University of Sergipe, 2014.

This study evaluates structure indicators used in the implantation of the Medication Review Service. Developmental research methodological was carried out from March 2012 to March 2013, at the Medication Review Service of the school-based outpatient clinic of the University Hospital in Northeastern Brazil, in two consecutive steps. The first step consisted on a searching in the literature about structure indicators for Medication Review Service. On the second step was done the evaluation through the indicators gathered in the previous step. We gathered 28 structure indicators needed to assess other Medication Review Services that were divided into five categories: physical areas, human resources, material resources, documentation and funding. The Medication Review Service analyzed attended most indicators suggested by the literature.

Keywords: medication review; quality assurance (health care); structure indicators

SUMÁRIO

INTRODUÇÃO

INTRODUÇÃO

A crescente morbimortalidade relacionada aos medicamentos é considerada um problema de saúde pública relevante em vários países do mundo, visto que o uso simultâneo de vários medicamentos tem se tornado uma ferramenta comum na prática clínica (Galato et al., 2010; Manasse Jr. e Thompson, 2005). Em consequência, os custos com a morbimortalidade relacionada à farmacoterapia nos Estados Unidos foram estimados em US$ 300 bilhões de dólares (Center for Disease Control and Prevention, 2014; Rottenkolberet al., 2011). No mesmo país, os gastos provocados por problemas relacionados aos medicamentos (PRMs) foram duas vezes maiores que os gastos com os próprios medicamentos (Baker, 2004; Ernst e Grizzle, 2001).

Diante do exposto, a Organização Mundial de Saúde (OMS) (2002) estabeleceu como seu grande desafio para a década de 2010 a promoção e melhora na racionalidade do uso de medicamentos. Assim, OMS tem destacado que o papel do farmacêutico pode ser determinante para a prevenção de erros de medicação e promoção do uso racional de medicamentos, no que concerne às orientações dos pacientes nos diversos cenários de prática como hospitais, farmácias comunitárias e ambulatórios (World Health Organization, 1994; World Health Organization, 1998).

Nessa perspectiva, estudos demonstram que o aumento das consultas e outros serviços farmacêuticos em ambientes ambulatoriais proporcionam a oportunidade para otimizar o estado de saúde dos pacientes, como o seguimento farmacoterapêutico (Hirsch et al., 2014; Molino et al., 2014; Wei et al., 2014) e a Revisão da Farmacoterapia (Goh et al., 2014; Lenander et al., 2014). Este último serviço, foi definido inicialmente como a avaliação crítica e estruturada dos medicamentos do paciente com o objetivo de alcançar um comum acordo sobre sua farmacoterapia, otimizando o tratamento, diminuindo os problemas relacionados a medicamentos (PRMs) e os gastos dos sistemas de saúde (Shaw et al., 2002).

Na prática Clínica, a Revisão da Farmacoterapia vem trazendo diversos resultados clínicos, econômicos e humanísticos (López et al., 2012; Patterson et al., 2011; Riley, 2013). Em uma revisão sistemática com 54 estudos, Hatah et al. (2014) concluíram que a Revisão da Farmacoterapia teve impacto significamente positivo sobre os resultados dos pacientes, como redução dos níveis pressóricos, níveis de

LDL (lipoproteína de baixa densidade), taxas de hospitalizações e PRMs, além de aumentar a adesão a farmacoterapia. Embora este serviço seja desenvolvido em vários países (Patterson et al., 2011; Leikola, 2012; Salgado et al., 2012) e, em alguns destes, com respaldo dos sistemas de saúde (Pharmaceutical Services Negotiating Committee, 2013; Pharmaceutical Society of Australia, 2011), as publicações sobre serviços farmacêuticos que se autodenominem como um serviço de Revisão da Farmacoterapia na América Latina são incipientes.

Neste cenário faz mais de uma década que a avaliação da qualidade dos serviços de cuidados vem ganhando força na maioria dos sistemas de saúde (Morris et al., 2002). Isso é explicado principalmente pelos prejuízos gerados pela morbimortalidade relacionada a medicamentos e a nova conjuntura dos sistemas de saúde em fornecer incentivos financeiros aos prestadores de cuidados (McBane et al., 2011). Assim, a nova tendência das agências de saúde é exigir dos prestadores de cuidados o mais alto grau de qualidade dos serviços de saúde ao menor custo possível (Mainz, 2003).

Um dos primeiros autores a estudar a avaliação da qualidade dos serviços de saúde foi Avedis Donabedian (1966). Segundo o mesmo para a qualidade em saúde, pode ser avaliada sob tríade estrutura, processo e resultado (Modelo SPO). A estrutura corresponde aos recursos físicos, humanos, materiais, instrumentos normativos e administrativos utilizados, assim como as fontes de financiamento. O processo, por sua vez, diz respeito às interações e procedimentos envolvendo profissionais de saúde e pacientes, enquanto que os resultados (*outcomes*) se referem à alteração no estado de saúde atribuível à intervenção em saúde (Donabedian, 1966, 1978).

Embora desde a década de 1970 sejam utilizados modelos para a avaliação da qualidade de serviços farmacêuticos (Mikael et al., 1975). No Brasil, estudos com foco no planejamento, monitorização e avaliação de serviços clínicos farmacêuticos, como a revisão da farmacoterapia são escassos. Portanto, é necessário que mais investigações sejam realizadas a fim de implantar, avaliar e difundir serviços clínicos que garantam a qualidade do cuidado e a segurança do paciente.

Diante do exposto, este estudo fez parte da Dissertação de Mestrado em Ciências Farmacêuticas da Universidade Federal de Sergipe de Genival Araújo dos Santos Júnior, intitulado: “Indicadores de estrutura e de processo em Serviços de

Revisão da Farmacoterapia". O estudo será apresentado em forma de artigo com o título de: "**Evaluation of a structural indicators in a Medication Review Service**". Este estudo será submetido à *Health & Place – an International Journal*, que possui qualis A2 e fator de impacto 2,435.

REFERÊNCIAS BIBLIOGRÁFICAS

Baker, G.R., Norton, P.G., Flintoft, V., Blais, R., Brown, A., Cox, J., Etchells, E., Ghali, W.A., Hébert, P., Majumdar, S.R., O'Beirne, M., Palacios-Derflingher, L., Reid, R.J., Sheps, S., Tamblyn, R., 2004. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. Canadian Medical Association Journal 170(11), 1678–1686.

Donabedian, A., 1966. Evaluating the quality of medical care. Milbank Memorial Fund Quarterly 44, 166-206.

Donabendian, A., 1978. The quality of medical care. Science 200(4344), 856-864.

Ernst, F.R., Grizzle, A.J., 2001. Drug-related morbidity and mortality: Updating the cost of illness model. Journal of American Pharmacists Association 41(2),192-199.

Galato D., Silva E.S., Tiburcio, L.S., 2010. Estudo de utilização de medicamentos em idosos residentes em uma cidade do sul de Santa Catarina (Brasil): um olhar sobre a polimedicação. Revista Ciência & Saúde Coletiva 15(6), 2899-2905.

Hatah, E., Braund, R., Tordoff, J., Duffull, S.B., 2014. A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. British Journal of Clinical Pharmacology 77(1), 102–115.

Hirsch, J.D, Steers, N., Adler, D.S., Kuo, G.M., Morello, C.M., Lang, M., Singh, R.F., Wood, Y., Kaplan, R.M., Mangione, C.M., 2014. Primary Care–based, Pharmacist–physician Collaborative Medication-therapy Management of Hypertension: A Randomized, Pragmatic Trial. Clinical Therapeutics 36(9), 1244–1254.

Goh, B.Q., Tay, A.H.P., Khoo, R.S.Y., Goh, B.K., Lo, P.F.L., Lim, C.J.F., 2014. Effectiveness of Medication Review in Improving Medication Knowledge and Adherence in Primary Care Patients (Online).Proceedings of Singapore Healthcare 23(2) (acessado).

Leikola, S., 2012. Development and application of comprehensive medication review procedure to community-dwelling elderly. Tese de Doutorado, Universidadede Helsink, Helsink.

Lenander, C., Elfsson, B., Danielsson, B., Midlöv, P., Hasselström, J., 2014. Effects of a pharmacist-led structured medication review in primary care on drug-related problems and hospital admission rates: a randomized controlled trial. Scandinavian Journal of Primary Health Care (2014) <http://dx.doi.org/<10.3109/02813432.2014.972062> (Online First).

López T.M., Camacho, J.C.D., Morgado, D.P., Camacho, M.O.C., Serna, J.C.M., Rubio, S.L., 2012. Revisión de la medicación en ancianos polimedicados en riesgo vascular: ensayo aleatorizado y controlado. Atención Primaria 44(8), 453-462.

Manasse Jr, H.R., Thompson K.K, 2005.Medication safety as problem in public policy. In: Conner, C.M., Floge, B. (Eds), Medication safety: a guide for health care facilities. ASHP, Bethesda, pp.1-15.

McBane, S., Trewet, C.B., Havican, S.M., Kiser, K., Klingel, C., Riche, D.M., Sease, J.M., Nau, D.P., Zillich A.J., 2011. Tenets for developing quality measures for ambulatory clinical pharmacy services. Pharmacotherapy 31(7), 115-134.

Mikeal, R.L., Brown, T.R., Lazarus, H.L., Vinson, M.C., 1975.Quality of pharmaceutical care in hospitals. American Journal of Health-System Pharmacy 32(6), 567-574.

Molino, C.G.R.C., Carnevale, R.C., Rodrigues A.T., Visacri, M.B., Moriel, P., Mazzola, P.G., 2014. Impact of pharmacist interventions on drug-related problems and laboratory markers in outpatients with human immunodeficiency virus infection. Therapeutics and Clinical Risk Management 10, 631–639.

Morris, C.J., Cantrill, J.A., Hepler, C.D., Noyce, P.R., 2002. Preventing drug-related morbity-determining valid indicators. International Journal for Quality in Health Care 14(3), 183-98.

Organización Mundial de La Salud, 2002.Perspectivas políticas de la OMS sobre medicamentos [Online]. Promoción del uso racional de medicamentos: componentes centrales. Organización Mundial de La Salud, Geneva, September 05, 2002. URL: <http://www.who.int/medicinedocs/collect/medicinedocs/pdf/s4874s/s4874s.pdf> (acessado 08.04.13).

Patterson, S.M., Hughes, C.M., Cardwell, C., Lapane, K.L., Murray, A.M., Crealey, G.E., 2011. A cluster randomized controlled trial of an adapted U.S. model of pharmaceutical care for nursing home residents in Northern Ireland (Fleetwood Northern Ireland study): a cost-effectiveness analysis. Journal of the American Geriatrics Society 59(4), 586-593.

Pharmaceutical Services Negotiating Committee, 2013. Guidance on the medicines use review service [Online]. NHS Employers, London, October, 2013. URL: <http://www.nhsemployers.org/~/media/Employers/Documents/Primary%20care%20contracts/Pharmacy/MUR%20Guidance.pdf> (acessado 29.11.14).

Pharmaceutical Society of Australia, 2011. Guidelines for pharmacists providing Home Medicines Review (HMR) services. PSA, Canberra.

Riley, K., 2013. Enhanced medication management services in the community: A win-win proposal from an economic, clinical and humanistic perspective. Canadian Pharmacists Association 146(3), 162-168.

Rottenkolber, D., Schmiedl, S., Rottenkolber, M., Farker, K., Saljé, K., Mueller, S., Hippius, M., Thuermann, P.A., Hasford, J., 2011. Adverse drug reactions in Germany: direct costs of internal medicine hospitalizations. Pharmacoepidemiology and Drug Safety 20(6), 626-634.

Salgado, T.M., Moles, R., Benrimoj, S.I., Fernandez-Llimos, F., 2012.Exploring the role of renal pharmacists in outpatient dialysis centres: a qualitative study. International Journal of Clinical Pharmacy 34(4), 569-578.

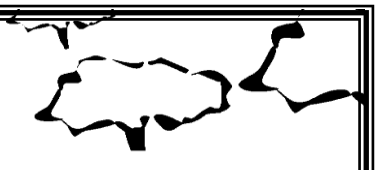
Shaw, J., Seal, R., Pilling, M., 2002. Task force on medicines partnership and the national collaborative medicines management services programme. Room for review - a guide to medication review: the agenda for patients, practitioners and managers. Pharmaceutical Press, Wallingford.

Wei,L., Yang, X., Li, J., Liu, L., Luo, H., Zheng, Z., Wei, Y., 2014. Effect of pharmaceutical care on medication adherence and hospital admission in patients with chronic obstructive pulmonary disease (COPD): a randomized controlled study. Journal of Thoracic Disease 6(6), 656–662.

World Health Organization, 1994.The Role of the Pharmacist in the Health Care System [Online]. WHO, New Delhi, Dezember 16, 1988 and Tokyo, September 3, 1993. URL: <http://apps.who.int/medicinedocs/en/d/Jh2995e/> (acessado 14.04.13).

World Health Organization, 1998.The role of the pharmacist in self-care and self-medication. Report of the 4th Consultive Group on the Role of the Pharmacist. WHO, Hague.

ARTIGO



Evaluation of a structural indicators in a Medication Review Service

Rafaella de Oliveira Santos Silva
Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil.
E-mail: rafaellaa_oliveira@hotmail.com/ lepfs.ufs@gmail.com
Phone: +557996077258

Genival Araújo dos Santos Júnior
Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Laboratory Pharmaceutical Testing and Toxicity (LEFT), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil.
E-mail: farm.genival@gmail.com/ lepfs.ufs@gmail.com
Phone: +557999482287

Carina Carvalho Silvestre
Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil.
E-mail: caryna_@hotmail.com/ lepfs.ufs@gmail.com
Phone: +557988369005

Tatiane Cristina Marques
Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil.

E-mail: tatianecm@hotmail.com/ lepfs.ufs@gmail.com
Phone: +557991655141

Francilene Amaral da Silva
Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Laboratory Pharmaceutical Testing and Toxicity (LEFT), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil.
E-mail: farmsilva@hotmail.com/ lepfs.ufs@gmail.com
Phone: +557988523213

Divaldo Pereira de Lyra Júnior
Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Department of Pharmacy, Federal University of Sergipe, São Cristóvão, SE, Brazil
Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil.
E-mail: lyra_jr@hotmail.com/ lepfs.ufs@gmail.com
Phone: +557991925577

Corresponding author: DP Lyra Jr. Laboratory of Teaching and Research in Social Pharmacy (LEPFS), Address: Cidade Universitária "Prof. José Aloísio Campos", Jardim Rosa Elze, São Cristóvão, CEP: 49100-000, Brazil. Phone/Fax: +557921056319. E-mail: lepfs.ufs@gmail.com.

INTRODUCTION

In last three decades, clinical services established with pharmacists' knowledge and skills have encouraged the training of health care professionals in the selection and monitoring of pharmacotherapy in practice scenarios, such as hospitals, community pharmacies, and ambulatory care clinics (Roberts et al., 2008; World Health Organization, 1994; World Health Organization, 1998). Among clinical pharmaceutical practices that focus on patients and help improve clinical, humanistic, and economic outcomes, Medication Review stands out (Doucette et al., 2009; El-Ibiary et al., 2008; Hatah et al., 2014; Murray et al., 2007; Planas et al., 2009).

Initially, Medication Review was defined as the careful analysis of medications used by patients to optimize their treatment, decrease drug related problems (DRPs),and decrease health system costs (Hatah et al., 2014; Shaw et al., 2002).Recently, Leikola (2012) confirmed that the main benefit of Medication Review is the improvement of outpatient therapeutic regimens.

In the United States, the expansion of these services started ten years ago and led patients and health plans to require the assessment of outpatient pharmaceutical care, such as Medication Review, focusing on cost-benefit ratio (Mainz, 2003). It is important to emphasize that quality assessment guarantees health care and health services management. Therefore, it is necessary to measure the efforts of institutions, the quality of health services provided, and their utility and social relevance (Adami, Maranhão, 1995; Carayon et al., 2014).

In this scenario, the model "structure-process-outcome" has been used to identify and associate processes developed by pharmacists and patient outcomes (Farris, Kirking, 1993; Nau, 2009). According to Donabedian (1966, 1978), structural indicators correspond to physical, human, and material resources regulatory and administrative instruments used, as well as funding sources. Process indicators, in turn, refer to interactions and procedures that involve health care professionals and patients, while the outcomes are measured by changes in health status that occur as a result of health care intervention.

Although these concepts are widely used, healthcare professionals, including pharmacists, have not assimilated the integrated concept of quality improvement in the clinical context (Bruchet, Loewen, 2011; Carayon et al., 2014). Consequently,

McBane et al. (2011) report the existence of few measures to assess the quality of different care services provided by pharmacists, including Medication Review.

In Brazil, for instance, there is no framework of standardized procedures, processes, or workflows to assess the quality of these services. Moreover, in this country, studies to address the quality of pharmaceutical services, such as Medication Review, still need to be performed. Therefore, further investigations would be required to optimize the quality of review services and health outcomes.

Considering this, the aim of this study was to assess structural indicators for the implementation of the Medication Review service in a school-based ambulatory care clinic of the University Hospital in Northeastern Brazil.

METHODS

Developmental research methodological was carried out from March 2012 to March 2013, at the Medication Review Service of the school-based outpatient clinic of the University Hospital in Northeastern Brazil. The evaluation of pharmaceutical services was based on the model proposed by Donabedian (1988), focused on structure. Due to the lack of instruments to assess structural indicators for Medication Review, this study was divided into two consecutive phases.

The first phase consisted in finding and defining structural indicators of pharmaceutical services that could be properly adapted to Medication Review in outpatient clinics. Therefore, two international guidelines were selected:1) "*Guidelines for pharmacists providing Home Medicines Review (HMR) services*" developed by the Pharmaceutical Society of Australia (2011); and 2) "*Minimum Standard for Pharmaceutical Services in Ambulatory Care*" proposed by the American Society of Health-System Pharmacists (ASHP) (1999). Moreover, six national research studies (Aguiar et al., 2013; Correr et al., 2004; França-Filho et al.,2008; Lyra Jr., 2005; Rios et al., 2013; Silva, 2003) served as theoretical references to define the indicators that would then be analyzed.

The two international guidelines aimed to assess pharmaceutical services. On the other hand, the selected Brazilian studies addressed structural indicators for community or outpatient pharmacies with or without clinical pharmacy services. Hence, two pharmacists-investigators (G.A.S.J. and C.C.S.) selected, compiled, and

adapted structural indicators for this study, according to the theoretical framework proposed by Donabedian (1980). The degree of agreement between the two pharmacists was calculated using the *Kappa* index*,* which may vary from 0 to 1. The closer to 1 the index is, the higher is the agreement between the evaluators. For different responses, a third pharmacist (T.C.M.) was consulted to break the tie.

In the second phase of the study, Medication Review Service structural indicators were evaluated based on the structural indicators previously identified. It is important to emphasize that evaluations of the studies analyzed are self-evaluations. Therefore, to reduce possible biases and to provide an external validation of the results, each criterion was assessed by a pharmacist-investigator (G.A.S.J.) and a pharmacist-auditor (D.T.S.) external to the Medication Review service of the outpatient clinic analyzed. For each item, the responses of pharmacists-evaluators were grouped into three possible categories: yes (for items included in the service), no (for items not included) and not applicable (when the criterion did not suit local realities). The degree of agreement of these responses was also calculated by the *Kappa* index. All data collected were entered twice into an Excel spreadsheet and a descriptive statistical analysis was carried out.

This study was approved by the Research Ethics Committee of the University Hospital, Federal University of Sergipe (Brazil), under registration CAAE number 11735412.5.0000.5546. The pharmacists, physicians, Medical and Pharmacy students signed The Informed Consent (TCLE).

RESULTS

Structural indicators for the Medication Review service

In this study, only structural indicators to assess the Medication Review service were considered, although both guidelines also contained items for processes, which still need to be analyzed. Therefore, among the 77 items recommended by the ASHP (1999), only 14 refer to structural indicators. A clinical pharmacy service must satisfy the criteria highlighted in the guideline to reach the minimum standard. These are divided into four main categories: (I) leadership and management practice; (II)

pharmacotherapy and pharmaceutical care; (III) control and distribution of medicines; (IV) installations, equipment, and other resources. The guideline also points out that although these requirements may vary from place to place depending on the patients' needs, the criteria are strongly associated with the outcomes of the services provided to the patients and neglecting them may compromise service quality.

Similarly, in *"Guidelines for pharmacists providing Home Medicines Review (HMR) services"* (Pharmaceutical Society of Australia, 2011), only two items assess the structure of the service and were applied in this study. This guideline also covers the fundamental rules governing most types of Medication Review services existing in that country. Moreover, it also recommends that pharmacists familiarize themselves with other professional guidelines. Therefore, Medication Review practice must satisfy the 30 criteria recommended by the Pharmaceutical Society of Australia (2011), which are described in the guideline.

The degree of agreement between the two evaluators referring to all structural indicators was moderate (k=0.522). However, after consensus on divergent items was reached, the index was excellent (k=0.894). The structural indicators that were defined are described in Table 1.

Table 1. Structural indicators for clinical pharmacy services

Structural indicators	Reference
PHYSICAL AREAS	
Private area: private area to evaluate and guide the patient, to enable the assessment of his/her knowledge, understanding, and adherence to the prescribed pharmacotherapy and follow-up care plans. The space should accommodate the pharmacist, the patient, and when appropriate, family members or caregivers	(Aguiar et al., 2013; American Society of Health-System Pharmacists, 1999; Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005)
Administrative area: area for administrative activities, meetings, and training	(American Society of Health-System Pharmacists, 1999)
Furniture (wardrobe, desk, and chair): furniture	Aguiar et al., 2013; Lyra Jr.,

suitable for providing care with patient seating and cabinets to store materials and documentation.	2005; Rios et al., 2013)
Internet: internet access available to the pharmacist.	(Aguiar et al., 2013; Correr et al., 2004; Lyra Jr., 2005)
HUMAN RESOURCES	
Trained pharmacists: pharmacists with the necessary knowledge and skills to conduct Medication Review	(Aguiar et al., 2013; American Society of Health-System Pharmacists, 1999; Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005)
Trained staff: auxiliary staff trained to fulfill their responsibilities and work with pharmacists in Medication Review services	(Aguiar et al., 2013; American Society of Health-System Pharmacists, 1999;Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005)
Years to graduate in Pharmacy: time (in years) for the pharmacist to graduate.	(Aguiar et al., 2013; Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005)
Years of experience in clinical pharmaceutical services: time (in years) the pharmacist has worked in services such as clinical pharmacy, pharmaceutical care, Medication Review, or follow-up.	(Aguiar et al., 2013; Correr et al., 2004; Lyra Jr., 2005)
Highest degree of the pharmacist (PharmD, MSc, PhD, or post-doctorate): previous participation of the pharmacist in graduate courses.	(Aguiar et al., 2013; Correr et al., 2004; Lyra Jr., 2005)
Level of knowledge of foreign languages: the pharmacist should have at least basic knowledge of other foreign languages.	(Aguiar et al., 2013; Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005)

Pharmacist coordinator/Technical manager: the service should have a legally qualified and professionally competent pharmacist coordinator. The pharmacist technician in charge should know or have management experience or ambulatory care practice.	(American Society of Health-System Pharmacists, 1999; Silva, 2003)
Computer knowledge: experience in computer tools and internet resources used in the Medication Review service.	(França-Filho et al., 2008; Lyra Jr., 2005)
Pharmacist license: all pharmacists must have a license provided by their professional association to practice their occupation.	(American Society of Health-System Pharmacists, 1999; Pharmaceutical Society of Australia, 2011; Silva, 2003)
Working conditions of the staff: working conditions and remuneration in accordance with labor laws.	(Silva, 2003)
Certified technicians: all technicians must have the certification to practice their occupation in pharmaceutical services.	(American Society of Health-System Pharmacists, 1999)
MATERIAL RESOURCES	
Computer equipment (hardware): equipment, such as computers and printers, should be available to be used whenever necessary in the Medication Review service.	(Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005; Rios et al., 2013)
Information system: computerized system to archive the patients' information, drug therapy profile, and care plans.	(American Society of Health-System Pharmacists, 1999)
Medical devices: availability of medical devices that can be used in Medication Review, such as sphygmomanometer, stethoscope, thermometer, glucometer, and others.	(Aguiar et al., 2013; Rios et al., 2013; Silva, 2003)
Consumable materials: the office supplies used, such as paper, pen, among others, should be	(Lyra Jr., 2005; Rios et al., 2013; Silva, 2003)

available in a sufficient amount to meet the requirement of the service.	
Available sources of information (primary, secondary, and tertiary): should include scientific and professional journals and latest editions of textbooks.	(Aguiar et al., 2013;American Society of Health-System Pharmacists, 1999; Correr et al., 2004; França-Filho et al., 2008; Lyra Jr., 2005; Rios et al., 2013;Silva, 2003)
Drug therapy form: the service should keep an updated form with the medicines approved by the medical staff.	(American Society of Health-System Pharmacists, 1999)
DOCUMENTATION	
Mission: the service should have a written mission that reflects patient care and the responsibilities of the service.	(American Society of Health-System Pharmacists, 1999)
Standards and technical procedures: a manual with all rules and procedures that govern outpatient pharmacy care (administrative, operational, and clinical) should be available and regularly updated.	(American Society of Health-System Pharmacists, 1999; Silva, 2003)
Laws and regulations: the pharmacist should maintain written or computerized documentation regarding law and recommendations compliance (local, state, and federal) applied to pharmaceutical services in outpatient clinics.	(American Society of Health-System Pharmacists, 1999; Silva, 2003)
Record of patients' clinical information: patients' clinical information should be recorded and stored in a secure location with restricted access.	(Silva, 2003)
Work schedules: work schedules, procedures, and staff assignments should exist to ensure safety, pharmaceutical, and patient care.	(American Society of Health-System Pharmacists, 1999)
Description of roles and functions:	(American Society of Health-

responsibilities and competencies of pharmacists and staff should be clearly defined and written.	System Pharmacists, 1999)
FUNDING	
Funding for the service	(Aguiar et al., 2013)

Evaluation of the Medication Review service of a school-based outpatient clinic

The evaluation of structural indicators of the Medication Review service was carried out in the second phase of the study, for which the degree of agreement between pharmacist-investigator and pharmacist-auditor, who was external to the service, was excellent *(k*=0.889).

Regarding the evaluation of physical facilities, the outpatient clinic had an air-conditioned private room of approximately 12m^2 for pharmacy care that was not exclusive to the Medication Review service. The furniture of the room was similar to other outpatient clinics and included a table, chairs, a stretcher, and a cabinet. The material resources used were purchased with the pharmacist's own funds and funds from other research projects. Therefore, sources of primary, secondary, and tertiary information were rendered available to pharmacists, physicians, patients, Medical students, and Pharmacy students. Importantly, despite the lack of computers with internet access, the service had a tablet with internet access that allowed quick searches of evidence-based medicine content. Consumables were acquired over the period of care provision and it was not necessary to purchase medical devices (sphygmomanometer, stethoscope, glucometer, thermometer, etc.).

With regard to human resources, although not from the University Hospital under study, four pharmacists (one coordinator and three caregivers) and eight Pharmacy students (four trainees, two undergraduate students, and two volunteer students) formed the Medication Review service. All twelve had a workload of 20 hours per week and most of them were women (58.33%; n=7).

The average age of the pharmacists was 30.75 ± 8.73 years and 50% were men (n=2). With regard to training, two pharmacists were MSc students, one was a PhD student, and one was a post-doc; the average time for graduation was 8 ± 8.04

years and the average time of direct patient care experience was 5.5 ± 4.36 years. All pharmacists had advanced knowledge of English.

The average age of the Pharmacy students was 22.25 ± 1.28 years and the majority were women (62.5%; n=5) and attended the eighth semester of the Pharmacy course. Half of these students had intermediate English levels, three spoke basic English, and only one was fluent. Most students (75%; n=6) had never cared for patients in clinical care-focused services. Therefore, before starting service attendance, all students participated in a training course organized and promoted by pharmacists, which consisted of 20 hours of theoretical training (four hours of service simulation, four hours of searching sources of information, four hours of legal aspects on medical prescription, four hours of documentation, and four hours of pharmaceutical diagnosis) and 32 hours of practical training (direct practice observation and supervised service, which were monitored by the pharmacists in charge).The entire staff (pharmacists and Pharmacy students) had advanced computer knowledge.

As computers were not available, the documents were manually prepared, using forms adapted by the authors of the study (Cipolle et al., 2012). Regarding service documentation, care flowcharts (standards and technical procedures) were printed out and rendered available to all the staff members.

As for financial resources and since three pharmacists and two undergraduate students were participating in research projects, they were funded by local and national agencies. Moreover, it is important to notice that Medication Review was paid according to procedures listed in the table of the Brazilian Unified Health System (SUS) and according to the consultation category of senior level professionals for specialized care. However, the resources obtained were curiously not used to directly support the service.

DISCUSSION

Implantation of quality clinical pharmacy services, initially, requires the development of research on structures to delineate the profile of existing conditions that translate into changes necessary for their viability (Correr et al., 2004; França-

Filho et al., 2008 ; Lyra Jr., 2005; Silva, 2003). As proposed by Donabedian (1980), structural indicators should be initially used to evaluate and implement health services as these are essential for subsequent phases, including processes and outcomes.

In this study, we observed that several international indicators found were similar to national indicators. Therefore, the international guidelines selected to evaluate structural indicators of Medication Review service complemented indicators of selected national studies. This similarity can be explained by a new global tendency in pharmacy wherein the pharmacists' activities are not only focused on medicines but also on providing care (Nkansah et al., 2010). Therefore, indicators could be used to evaluate these services.

The adaptation of several indicators assessed in this study to meet the local reality is recommended in the literature (American Society of Health-System Pharmacists, 1999). For instance, the U.S. guideline "*Minimum Standard for Pharmaceutical Services in Ambulatory Care"* recommends that pharmacists evaluate and adapt these rules to meet the requirements of each practice that is being carried out (American Society of Health-System Pharmacists, 1999). Moreover, the literature shows that protocols and guidelines developed by professional societies should be used as parameters for quality improvement (Woolf et al., 1999). Therefore, the adoption of international standards and national indicators may have been crucial for structuring the service. According to Donabedian (1980), it is important to assess structural measures, because they influence processes and results.

As for human resources, the qualification of the pharmacists and their prior experience in patient care were important for the implementation of this service. In countries such as Australia and Finland, in addition to experience, pharmacists undergo accreditation processes and participate in periodic updates while conducting Medication Review services (American Society of Health-System Pharmacists, 1999; Leikola, 2012). Although no accreditation processes have been established so far in Brazil, Smith (2009) emphasizes that the clinical experience of pharmacists may positively influence patients' health outcomes. This allows patients to take care of themselves and contributes, together with other health professionals, to ensure the appropriate, cost-effective, safe, and convenient use of medication. Moreover, the

implementation of indicators in Brazil may contribute to the development of future accreditation processes in these clinical pharmacy services.

With regard to human resources, the literature emphasizes the importance of training programs and effective supervision, which aims to increase the knowledge and practice of pharmacists and students, thus improving the care provided to the community (Minh et al., 2013). In this study, the fact that all pharmacists were involved in teaching and research may have facilitated the training process of Pharmacy students who were interested in developing clinical services, which favored the implementation of the service and the formation of a practice environment.

As recommended by the ASHP, in Medication Review services pharmacists and Pharmacy students must go through a selection process, and theoretical and practical training to improve the knowledge and skills required developing patient care activities (American Society of Health-System Pharmacists, 1999). In this study, the selected students were trained by pharmacists of the service and invited according to relevant topics for the Medication Review. It is important to emphasize that due to insufficient knowledge and skills offered by the curricula of Pharmacy students, as established by Resolution number 02 (2002), of National Education Council/Higher Education Council (CNE/CES), of 2002,complementary training on ambulatory care services is required.

In addition to human resources, infrastructure is an important component to confer quality to healthcare services. In this study, the infrastructure that was used was in agreement with the national and international literature, which recommends the existence of a private or semiprivate space with appropriate furniture, able to promote the safe and efficient workflow of pharmacists, academics, patients, and/or caregivers while attended at the Medication Review service (Aguiar et al., 2013; França-Filho et al., 2008; Lyra Jr., 2005; Pharmaceutical Society of Australia, 2011).In the practice of the Medication Review service, the existence of a private area for pharmaceutical care contributed to the creation of therapeutic relationships between pharmacists, Pharmacy students, and patients. To support this notion, the study of Pringle et al. (2011) demonstrated that the patient achieves good health outcomes when a therapeutic bond is formed with the pharmacist. However, França-

Filho et al. (2008) found that only 11.4% of pharmacies providing pharmaceutical services in the State of Santa Catarina (Brazil) had a private or semiprivate area.

In the Medication Review service that was studied, clinical pharmacy services was given in the same area where medical examinations were performed and immediately after they occurred to avoid further displacement to the hospital, especially for patients coming from other cities or states. Moreover, when problems are detected when reviewing a patient's medication, pharmacists and Pharmacy students may intervene immediately with doctors to optimize the pharmacotherapy prescribed. However, in this service the therapeutic relationship was compromised as the consultations were short and did not allow detailed interviewing of patients.

In Australia and Finland, Medication Review that starts in the community pharmacy or in the doctor's office may be complemented at home, thus facilitating the therapeutic pharmacist-patient relationship (Leikola, 2012; Pharmaceutical Society of Australia, 2011). It is important to emphasize some benefits of homecare, such as identification of discrepancies with medicines dispensed in community pharmacies, storage and administration of pharmacotherapy, and lifestyles that influence the use of medications (Hsia et al., 1997; Leikola, 2012; Yang et al., 2001). According to these authors, the patients' home environment is more comfortable and suitable for the creation of a therapeutic relationship with the patient. In the future, the extension of Medication Review services to domiciliary care, integrated with other hospital clinical services such as Pharmacy residency, may represent an effective strategy to improve patient care.

As for material resources, consultation of information sources about medications was not compromised in this study by the absence of computers connected to internet. In this study, updated textbooks, scientific papers, standards, and relevant legislation(laws, resolutions, ordinances, etc.), booklets, and materials developed by the authors were rendered available, in addition to mobile internet resources that were available by tablet, which enabled efficient database consultations as recommended by the literature (França-Filho et al., 2008; Wazaify et al., 2004; Zehnder et al., 2004).

To provide this, pharmacists and Pharmacy students working in the service had unlimited access to medical sources of information, which required specific training and knowledge of other languages. Therefore, the results obtained were better than

those found in other national and international studies (Correr et al., 2004; Rodríguez et al., 2000). Although the literature suggests that clinical pharmacy services should have clinical devices (sphygmomanometer, glucometer, thermometer, etc.), they were not necessary in this study, since clinical and laboratory examinations were performed by physicians or clinical laboratories, and the results were rendered available to the entire staff in the records (Rios et al., 2013; Silva, 2003).Furthermore, documentation is a structural indicator for services.

Zierler-Brown et al. (2007) state that documentation should be clear, concise, readable, free of judgments, systematized, centered on the patient, and ensure confidentiality. Therefore, the preparation of structured forms to document the care provided in this study, the training of the team in documentation and service simulation, combined with patients' availability and their clinical information (medical records, clinical and laboratory examinations, and medical reports),led to pharmacists' records meeting the literature recommendations. Moreover, Mackinnon and Mackinnon (2008) argue that documentation is necessary for the communication between pharmacists and other health care professionals, which stresses their importance in decision-making and patients' clinical outcomes. Besides, the documentation used by the service should undergo continuous updates to satisfy new requirements presented by each patient.

Regarding funding indicators, studies suggest that in other countries, health providers pay for patient care services and support clinical pharmacy services (Consejería de Sanidad y Consumo, 2006; Kuo et al., 2004; Leikola, 2012). Although the Medication Review service charges the consultation according to the Brazilian Unified Health System (SUS) Table in an innovative way, the resources obtained are not directly reverted to support the service. Moreover, service functioning depends on the fellowships of undergraduate and graduate students. Then, it is necessary to implement measures that aim to support the service, through the recruitment of pharmacists, investment in specific structures, and integration with other services, such as the residency.

CONCLUSION

This study emphasized structural indicators required to evaluate the Medication Review service. Additionally, the developed structure satisfied the majority of the indicators proposed and may contribute to the establishment of structural standards for similar services. In a complementary form, it is expected that further studies should focus on work processes of Medication Review at ambulatory levels. It will thus be possible to implement structured Medication Review services with well-defined workflows and positive results for patients and health professional teams.

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REFERENCES

Adami, N.P., Maranhão, A.M.S.A.,1995. Qualidade dos serviços de saúde: conceitos e métodos avaliativos. Acta Paulista de Enfermagem 8(4), 47-55.

Aguiar, P.M., Balisa-Rocha, B.J., Lyra Jr, D.P., 2013. Implantação do serviço de Atenção Farmacêutica na Farmácia Popular do Brasil: um estudo piloto. Revista de Ciências Farmacêuticas Básica e Aplicada 34(3), 401-410.

American Society of Health-System Pharmacists, 1999. ASHP guidelines: minimum standard for pharmaceutical services in ambulatory care. American Journal of Health-System Pharmacy 56, 1744-1753.

Bruchet, N., Loewen, P., 2011. Improving the quality of clinical pharmacy services: a process to identify and capture high-value “Quality Actions”. Canadian Journal of Hospital Pharmacy 64(1), 42-47.

Carayon, P., Wetterneck, T.B., Rivera-Rodriguez, A.J., Hundt, A.S., Hoonakker, P., Holden, R., Gurses, A.P., 2014. Human factors systems approach to healthcare quality and patient safety. Applied Ergonomics 45(1), 14-25, http://dx.doi.org/<10.1016/j.apergo.2013.04.023>.

Cipolle, R.J., Strand L.M., Morley, P.C., 2012. Pharmaceutical Care Practice: The Patient-Centered Approach to Medication Management. McGraw-Hill Medical, Minneapolis.

Correr, C.J., Rossignoli, P., Souza, R.A.P., Pontarolo, R.,2004. Perfil de los farmacéuticos e indicadores de estructura y processo en farmacias de Curitiba – Brasil. Seguimiento Farmacoterapéutico 2(1), 37-45.

Dirección General de Farmacia y Productos Sanitarios, 2006. Programa de Atenciónal Mayor polimedicado para la mejora en la utilización de los medicamentos. Consejería de Sanidad y Consumo, Madrid.

Donabedian, A., 1966. Evaluating the quality of medical care. Milbank Memorial Fund Quarterly44, 166-206, http://dx.doi.org/<10.1111/j.1468-0009.2005.00397.x>.

Donabendian, A., 1978. The quality of medical care. Science 200(4344), 856-864.

Donabedian, A., 1980. The definition of quality and approaches to its assessment. Health Administration Press, Ann Arbo.

Donabendian, A., 1988. The quality of care. How can it be assessed? Journal of the American Medical Association 260(12), 1743-1748.

Doucette, W.R., Witry, M.J., Farris, K.B., McDonough, R.P., 2009. Community pharmacist-provided extended diabetes care. Annals of Pharmacotherapy 43(5), 882-889, http://dx.doi.org/<10.1345/aph.1L605>.

El-Ibiar, S.Y., Cheng, C., Alldredge, B., 2008. Potential roles for pharmacists in pharmacogenetics. Journal of American Pharmacists Association 48(2), e21-29, http://dx.doi.org/<10.1331/JAPhA.2008.07050>.

Farris, K.B, Kirking, D.M., 1993. Assessing the quality of pharmaceutical care. II. Application of concepts of quality assessment from medical care. Annals of Pharmacotherapy 27(2), 215-223.

França-Filho, J.B., Correr, C.J., Rossignoli, P., Melchiors, A.C., Fernández-Llimós, F., Pontarolo, R., 2008. Perfil dos farmacêuticos e farmácias em Santa Catarina: indicadores de estrutura e processo. Brazilian Journal of Pharmaceutical Sciences 44(1), 105-113.

Hatah, E., Braund, R., Tordoff, J., Duffull, S.B., 2014. A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. British Journal of Clinical Pharmacology 77(1), 102–115.

Hsia, D.E., Rubenstein, L.Z., Choy, G.S., 1997. The benefits of in-home pharmacy evaluation for older persons. Journal of the American Geriatrics Society 45, 211-214.

Kuo, G.M, Buckley, T.E, Fitzsimmons, D.S., Steinbauer, J.R., 2004. Collaborative drug therapy management services and reimbursement in a family medicine clinic. American Journal of Health-System Pharmacy 61(4), 343-354.

Leikola, S., 2012. Development and application of comprehensive medication review procedure to community-dwelling elderly. Doctoral Dissertation, University of Helsink,Helsink.

Lyra Jr, D.P., 2005 Impacto de um programa de Atenção Farmacêutica nos resultados clínicos e humanísticos de um grupo de idosos, assistidos na unidade Básica de Saúde Dr. Ítalo Baruffi, Ribeirão Preto (SP). Doctoral Dissertation, University of São Paulo, Ribeirão Preto.

Mackinnon, G.E., Mackinnon, N., 2008. Documentation of pharmacy service. In: DiPiro, J.T., Talbert, R.L., Yee, G.C., Matzke, G.R., Wells, B.G., Posey, L.M. (Eds), Pharmacotherapy: A Pathophysiologic Approach. McGraw-Hill, New York, pp. 34-45.

Mainz, J., 2003. Defining and classifying clinical indicators for quality improvement. International Journal for Quality in Health Care 15(6), 523-530, http://dx.doi.org/<10.1093/intqhc/mzg081>.

McBane, S., Trewet, C.B., Havican, S.M., Kiser, K., Klingel, C., Riche, D.M., Sease, J.M., Nau, D.P., Zillich A.J., 2011. Tenets for developing quality measures for ambulatory clinical pharmacy services. Pharmacotherapy 31(7), 115-134, http://dx.doi.org/<10.1592/phco.31.7.723>.

Minh, P.D., Huong, D.T., Byrkit, R., Murray M., 2013. Strengthening pharmacy practice in Vietnam: findings of a training intervention study. Tropical Medicine and International Health 18(4), 426-434, http://dx.doi.org/<10.1111/tmi.12062>.

Murray, M.D., Young, J., Hoke, S., Tu, W., Weiner, M., Morrow D., 2007. Pharmacist intervention to improve medication adherence in heart failure: a randomized trial. Annals of Internal Medicine 146(10), 714-725.

Nau, D.P., 2009. Measuring pharmacy quality.Journal of American Pharmacists Association 49, 212-229, http://dx.doi.org/<10.1331/JAPhA.2009.09019>.

Nkansah, N., Mostovetsky, O., Yu, C., Chheng, T., Beney, J., Bond, C.M., Lisa, B., 2010. Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. Cochrane Database of Systematic Reviews, 7, http://dx.doi.org/<10.1002/14651858.CD000336.pub2>.

Pharmaceutical Society of Australia, 2011. Guidelines for pharmacists providing Home Medicines Review (HMR) services. PSA, Canberra.

Planas, L.G., Crosby, K.M., Mitchell, K.D., Farmer, K.C., 2009. Evaluation of a hypertension medication therapy management program in patients with diabetes. Journal of American Pharmacists Association 49(2), 164-170, http://dx.doi.org/<10.1331/JAPhA.2009.08164>

Pringle, J., Melczak, M., Aldridge, A., Snyder, M., Smith, R., 2011. Medication adherence and its relationship to the therapeutic alliance: results from an innovative pilot study within a community pharmacy MTM practice. Innovations in pharmacy 2(1), 1-16.

Resolution number 02 of CNE/CES of February 19, 2002. Institui Diretrizes Curriculares Nacionais do Curso de Graduação em Farmácia. Conselho Nacional de Educação, Câmara de Educação Superior. Diário Oficial da União, Ministério da Educação, Brasília.

Rios, M.C., Cruz, A.D., Balisa-Rocha, B.J., Brito G.C., Rios, S.S., Lyra Jr.,2013. Estruturação de farmácias comunitárias para implementação dos serviços farmacêuticos. Revista Brasileira de Farmácia 94(1), 66-71.

Roberts, A.S., Benrimoj, S.I., Chen, T.F., Williams, K.A., Aslani P., 2008. Practice change in community pharmacy: quantification of facilitators. Annals of Pharmacotherapy 42(6), 861-868, http://dx.doi.org/<10.1345/aph.1K617>.

Rodríguez, N.F.A., Riestra R.G., Hermida, M.T.O., Somoza F.F.I., 2000. Perfil de los integrantes de los grupos de trabajo Del Colegio de Farmacéuticos de Pontevedra. Pharmaceutical Care España 2, 20-27.

Shaw, J., Seal, R., Pilling, M., 2003. Task force on medicines partnership and the national collaborative medicines management services programme. Room for review - a guide to medication review: the agenda for patients, practitioners and managers. Pharmaceutical Press, Wallingford.

Silva, R. R., 2003. Acreditação de farmácias: a construção de um modelo. Doctoral Dissertation, University of São Paulo, São Paulo.

Smith, M., 2009. Pharmacists' role in improving diabetes medication management. Journal of Diabetes Science and Technology 3(1), 175-179.

Wazaify, M., Maani, M., Ball, D., 2009. Drug information resources at community pharmacies in Amman, Jordan. International Journal of Pharmacy Practice 17(3), 151-155.

Woolf, S.H., Grol, R., Hutchinson A., Eccles, M., Grimshaw, J., 1999. Clinical guidelines: potential benefits, limitations, and harms of clinical guidelines. British Medical Journal 318(7182), 527-530, http://dx.doi.org/<10.1136/bmj.318.7182.527>.

World Health Organization, 1994.The Role of the Pharmacist in the Health Care System[Online].WHO, New Delhi, Dezember 16, 1988 and Tokyo, September 3, 1993. URL: ⟨http://apps.who.int/medicinedocs/en/d/Jh2995e/⟩ (accessed 14.04.13).

World Health Organization, 1998. The role of the pharmacist in self-care and self-medication. Report of the 4th ConsultiveGroup on the Role of the Pharmacist. WHO, Hague.

Yang, Z., Peterson, R.T., Huang, L., 2011. Taking the pulse of Internet pharmacies. Marketing Health Services 21(2), 4-10.

Zehnder, S., Beutler, M., Bruppacher, R., Ehrenhöfer, T., Hersberger K., 2004. Needs and use of drug information sources in community pharmacies: a questionnaire based survey in German-speaking Switzerland. Pharmacy World and Science 26(4), 197-202.

Zierler-Brown, S., Brown, T.R., Chen,D., Blackburn, R.W., 2007. Clinical documentation for patient care: models, concepts, and liability considerations for pharmacists. American Journal of Health-System Pharmacy 64(17), 1851-1858.

RESEARCH HIGHLIGHTS

- We gathered 28 structure indicators that were divided into five categories.
- Categories: physical areas, documentation, funding, human resources and material.
- Several international indicators found were similar to national indicators.
- The Medication Review Service analyzed attended most indicators gathered.
- This study may contribute to the establishment of structural standards.

AUTHOR DECLARATION

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

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