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Original Research

Medication review practices in European countries

A. Bulajeva, M.Sc.(Pharm.), Ph.D.(c.)[a,*], L. Labberton, M.Sc.(Pharm.), Ph.D.(c.)[b], S. Leikola, Ph.D.[c], M. Pohjanoksa-Mäntylä, Ph.D.[a], M.M.E. Geurts, M.Sc.(Pharm.)[d], J.J. de Gier, Ph.D.[d], M. Airaksinen, Ph.D.[a]

[a]*Division of Social Pharmacy, University of Helsinki, P.O. Box 56, 00014 Finland*
[b]*Department of Molecular Medicine and Surgery, Karolinska Institute and University Hospital, 171 76 Stockholm, Sweden*
[c]*The Association of Finnish Pharmacies, Pieni Roobertinkatu 14 C, 00120 Helsinki, Finland*
[d]*Department of Pharmacotherapy and Pharmaceutical Care, University of Groningen, Antonius Deusinglaan 1, 9713 Av Groningen, The Netherlands*

Abstract

Background: Medication review procedures have been developed in many countries to improve rational and safe medication use. The similarities, comprehensiveness, and effectiveness of these procedures has not been assessed, or compared.
Objective: The aim of this study was to explore medication review practices in European countries.
Methods: An online survey was sent to 32 European countries (all 28 European Union countries and 4 other European countries) by email to one person in each country known to be aware of medication review practices in their country in May 2011. The informants were identified through Pharmaceutical Group of European Union. To complement and validate the information received through Pharmaceutical Group of European Union, medication review experts involved in Pharmaceutical Care Network Europe were contacted. The survey assessed comprehensiveness of the medication review procedures classified according to 3 types in terms of settings; access to patient clinical information; patient involvement; availability of documentation and information; collaboration with the physician; quality control, and training required.
Results: Almost two thirds (64%) of the 25 European countries which responded (response rate 78%) indicated having at least one type of medication review procedure in their country. In the community setting prescription (type I) and adherence (type II) medication reviews were the most common (established in 9 and 11 countries, respectively). More comprehensive type III clinical medication reviews requiring access to clinical patient information were still rare, and just being established in 6 countries.
Conclusions: Medication review procedures are becoming common in health care throughout Europe, however improving their comprehensiveness would require better access to patient information for those professionals conducting clinical medication reviews. In addition to benchmarking, the inventory can enhance cooperation between countries and stakeholders involved in medication review practice development nationally and internationally.

* Corresponding author.
E-mail address: anna.bulajeva@gmail.com (A. Bulajeva).

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Introduction

The hazard of prescribing and taking inappropriate medications leading to adverse drug events, extra hospitalizations and costs have been long recognized.[1–3] Medication review procedures involving pharmacists have been suggested as a way to identify, solve and prevent drug-related problems and improve patients' drug therapy outcomes.[4–8] The importance of regular medication reviews increases due to aging populations, leading to increasing drug use and polypharmacy.

Medication review procedures vary in terms of access to clinical data, patient involvement and the purpose of the medication review.[5,9–13] Australia, United States of America and the United Kingdom were the first countries to incorporate medication review services into primary outpatient care.[8,14,15] The medication review procedures in these countries are well-described in published literature.[5,16–18] In Europe, several countries are either developing or have recently implemented medication review procedures, but little is known of these procedures. The aim of this study was to explore availability and comprehensiveness of medication review practices in primary care in European countries.

Methods

Study design and population

The study design was a cross-sectional European wide online survey, which was coordinated by the University of Helsinki, Finland. The study population consisted of all European Union countries ($n = 28$) and four other European countries (total $n = 32$). In order to reach the national key informants knowledgeable of the medication review practices in their country the questionnaire was sent to the national community pharmacy associations via the mailing list of the Pharmaceutical Group of the European Union (PGEU), an advocacy organization of community pharmacies toward EU (www.pgeu.eu). As Latvia, Macedonia, Slovenia, Switzerland, Turkey and Iceland are not members of PGEU their contact information was separately searched from the Pharmaceutical Care Network Europe (PCNE) for mailing the questionnaire. In Belgium, national organizations representing Walloon and Flemish part of the country were both approached separately with the questionnaire.

Survey instrument

Previous literature was used to develop the survey instrument.[5,12,19–23] Clyne's typology of medication reviews was applied to assess comprehensiveness of the procedures[12] (Table 1). The questionnaire was divided into three sections according to this typology. Each of the three sections had the following questions related to the medication review procedures and their implementation: setting (hospital vs. primary care); the medication review type according to the classification by Clyne et al (2008)[12] (Table 1); type

Table 1
Types and characteristics of medication review procedures according to their clinical comprehensiveness

	Type I prescription review	Type II adherence and compliance review	Type III clinical medication review
Purpose	Address technical issues relating to the prescription	Address issues relating to the patient's medicine taking behaviors	Address issues relating to the patient's use of medicines in the context of their clinical conditions
Review's focus	Medicines	Medicine use	Medicines and conditions
Patient involvement	No	Yes	Yes
Access to patient information (e.g., clinical conditions and laboratory test results)	Sometimes	Sometimes	Always

Modified from Clyne et al (2008).

Table 2
General information about medication review procedures specified by country

Country	Community setting			Hospital setting	Nursing home setting
	Type I	Type II	Type III		
Bulgaria	x	x		x	
Croatia	x	x	x		
Czech Republic	x	x		x	
Denmark	x	x	x	x	x
Finland	x	x	x	x	x
France				x	
Hungary	x			x	
Iceland				x	
Latvia				x	
The Netherlands	x	x	x	x	x
Norway		x			
Portugal		x		x	
Spain			x	x	x
Sweden	x	x	x	x	x
Switzerland	x	x		x	
United Kingdom		x		x	x

of procedure (national or local); patient involvement; place where medication review is conducted; issues addressed during each type of review; pharmacists' collaboration with other health care professionals; access to patient information on prescription and non-prescription medicines, clinical conditions and test results; drug-related issues covered (Tables 4 and 5); documentation; competence requirements for pharmacists conducting medication reviews; guidelines related to each type of medication review; requirement of training; charges and reimbursement. The questionnaire consisted of structured questions followed by open fields for comments after almost every question.

The coverage of drug-related problems in the medication review procedures was assessed by applying the Pharmaceutical Care Network Europe classification for drug-related problems. A combination of versions 5.01 and 6.2 was used,[23,24] because our previous experience showed that both versions had some positive and negative characteristics important for medication reviews.[13]

The survey was mailed to 32 European countries in May 2011 (all 28 European Union and 4 other European countries, namely: Macedonia, Iceland, Turkey and Switzerland). It was followed by two e-mailed reminders to non-respondents during a six weeks period. To complement and validate the information received through PGEU, medication review experts involved in Pharmaceutical Care Network Europe were contacted. An email with attached first round response from that particular country were sent to those 12 PGEU contact persons who indicated having medication review procedures in their country during the 1st round. They were asked to complement the data from the first round, if needed. In addition, Spain was included in the second round survey on the basis of information obtained from the Spanish representative in the PCNE Symposium in October 2011.

Statistical analysis

The data were transferred from the online survey statistics system into Microsoft Excel, which was used to calculate descriptive statistics. The reported charges for medication reviews are presented in euros. The conversion was made using exchange courses of March 2011. Open fields for comment in the questionnaire were analyzed separately using the qualitative content analysis.

Results

Responses were received from 25 countries (response rate 78%). Sixteen countries (64%) reported having established medication review procedures (Table 2). Fourteen countries (56%) reported having a procedure for hospital setting, thirteen countries (52%) for community setting, and six (24%) for nursing homes.

The countries, which reported medication review procedures in community setting ($n = 13$) most commonly indicated having a type II procedure (11/13 countries, 85%, Table 2). Five of these countries (45%) had national type II procedures, four countries (36%) local procedures, and two countries (18%) had both. More than two-thirds (69%) of the countries with medication review procedures in community setting, reported having type I procedures (9/13). Of the countries, 4 (44%) had national procedures, 3 countries (33%) local and 2 countries (22%) both local and national procedures.

Six countries out of 13 (46%) with MR procedures reported having type III medication review procedures (Table 2). Two out of six countries had local type III medication review procedures, two countries had national; and two countries out of six reported having both national and local medication review procedures.

Table 3
Medication review procedures by scope (national vs. local) and by different types

Country	National/local procedure	Patient interview	Access to information on: prescription medicines	Non-prescription medicines	Clinical conditions and laboratory test results	Case report/written follow up plan	Case conference with the physician	Guidelines	Postgraduate training	Payment
Type I										
Bulgaria	National		x	x				x		
Croatia	Local	x	x	x						
Czech Republic	Local	x	x	x	x			x		
Denmark	National		x	x						
Finland	Local		x							
Hungary	National	x	x							
The Netherlands	Both		x	x	x	x	x	x	x	
Sweden	Both	x	x	x		x		x		
Switzerland	National	x	x	x		x	x	x		x
Type II										
Bulgaria	National	x	x	x						
Croatia	Local	x	x	x	x	x	x			
Czech Republic	Local	x	x	x	x			x		
Denmark	National	x	x	x	x	x		x	x	x
Finland	Local	x	x	x						x
The Netherlands	Both		x	x	x	x	x	x	x	x
Norway	Local	x	x	x				x	x	x
Portugal	National	x	x	x	x	x		x	x	x
Sweden	Both	x	x	x						
Switzerland	National	x	x	x		x	x	x		x
United Kingdom	National	x	x	x		x		x		x
Type III										
Croatia	Local	x	x	x	x	x	x			
Denmark	National		x	x	x[a]	x		x	x	x
Finland	Both	x	x	x	x	x	x	x	x	x
The Netherlands	Both	x	x	x	x	x	x	x	x	x
Spain	National	x	x	x	x	x		x	x	
Sweden	Local	x	x		x	x	x	x		

[a] Clinical information only if the patient is known by staff or the information is documented in the nursing home record.

Table 4
Drug-related issues in type I medication reviews by country ($n = 9$)

Drug-related issue	Bulgaria	Croatia	Czech Republic	Denmark	Finland	Hungary	The Netherlands	Sweden	Switzerland
Effectiveness of treatment	x	x	x				x	x	
Untreated conditions		x	x						
Unnecessary drug treatment			x			x			
Adverse drug reactions	x	x	x			x	x	x	
Contraindications	x	x	x				x	x	x
Appropriateness of drug choice		x	x	x					x
Appropriateness of drug dose	x		x	x	x		x	x	x
Appropriateness of drug form	x		x	x		x	x	x	x
Appropriateness of treatment duration	x	x	x	x			x		x
Appropriateness of dosing time	x	x	x	x	x		x		x
Drug–drug interactions	x	x	x	x	x	x	x	x	x
Duplication	x	x	x	x	x		x	x	x
Drug/treatment costs	x		x	x	x	x	x	x	x
Poor adherence			x				x	x	
Patient dissatisfaction with the therapy	x	x	x				x	x	x

Characteristics of existing medication review procedures by type

Type I medication review (prescription review)

Of the type I medication review procedures 2/9 (22%) included access to patient information on clinical conditions and laboratory test results (Table 3). Patient interview was included in 5/9 (56%) of the procedures. The drug-related issues that were most typically reviewed in a type I medication review procedure were drug–drug interactions (100%), duplication of therapeutic group or active ingredient (89%) and drug and treatment costs (89%) (Table 4). The responsibility for making clinical decisions and/or making the follow-up plan based on the type I medication review belonged to the general practitioner in 5/9 (56%) of the procedures (Table 3). The documentation of a type I medication review was part of the procedure in 3/9 (33%) of the countries (e.g., a case report on findings to the physician and a written follow up plan or medication action plan). Written instructions or guidelines for conducting type I medication reviews were available in 5/9 (56%) of the countries.

Type II medication review (adherence and compliance review)

Specific patient inclusion criteria were mentioned in 8/11 (73%) of the type II medication review procedures. These criteria differed according to a specific disease, such as hypertension, asthma/COPD and diabetes to an age of 65 or older, or polypharmacy. In 6/11 of the countries (55%) the patient or the relatives were able to decide whether they wanted to have a type II medication review. Of the procedures, 10/11 (91%) included patient interview (Table 3). In 6/11 of the countries (55%) a written patient consent and interview form was used for the patient interview, and patient's medication record was reconciled during the review. In 5/11 of the countries (45%) clinical conditions, laboratory test results and diagnosis were available for the pharmacist conducting a type II medication review. According to our informants, in some countries the patient, not the general practitioner, submitted the

Table 5
Drug related issues in type II medication reviews by country ($n = 11$)

Drug-related issue	Bulgaria	Croatia	Czech Republic	Denmark	Finland	The Netherlands	Norway	Sweden	Portugal	Switzerland	UK
Effectiveness of treatment		x	x	x		x	x	x	x	x	x
Untreated conditions		x	x	x	x	x	x		x		
Unnecessary drug treatment		x	x	x	x	x	x		x		
Adverse drug reactions	x	x	x	x	x	x	x	x	x	x	x
Contraindications	x	x	x	x		x	x	x	x	x	
Appropriateness of drug choice		x	x	x		x	x		x		x
Appropriateness of drug dose	x	x	x	x	x	x	x	x	x	x	x
Appropriateness of drug form	x	x	x	x	x	x	x	x	x	x	x
Appropriateness of treatment duration	x	x	x	x	x	x	x		x		x
Appropriateness of dosing time	x	x	x	x	x	x	x		x	x	x
Drug–drug interactions	x	x	x	x	x	x	x	x	x	x	x
Duplication		x	x	x	x	x	x	x	x	x	x
Drug/treatment costs	x		x	x	x	x	x	x	x	x	
Poor adherence		x	x	x	x	x	x	x	x	x	x
Patient dissatisfaction with the therapy	x	x	x	x	x	x	x	x	x	x	x

diagnoses and laboratory test results. Almost all of the drug-related issues listed in the PCNE classification were addressed in a type II medication review (Table 5). Unnecessary drug treatment (treatments with no indication) and untreated conditions (indications with no treatment) were the most seldom addressed drug-related problems in type II reviews. A case report to the physician and a written follow up plan or medication action plan was made in 6/11 (55%) of the procedures. Of the procedures 3/11 (27%) included a case conference with the physician to decide on actions.

Written instructions or guidelines related to type II medication review services were available in 7/11 countries (64%). These guidelines were in most of the countries established by the association of pharmacists or pharmacy owners. In 4/11 countries (36%) there was a postgraduate training on medication review type II for pharmacists. The extent of training varied from 1, 7 to 3 ECTS credits (1 credit equals to 27 h of student work). A payment was set for the type II medication review procedures in 7/11 countries (64%) (Table 3). The payment varied between 20 and 80 euros.

Type III medication review (clinical medication review)

For all countries with a type III medication review ($n = 6$) there were specific patient inclusion criteria. In 4/6 of the procedures (67%) it was the general practitioner who decided whether the patient needed a type III medication review. There was access to documentation related to patient's use of non-prescription medicines and other dietary supplements in 5/6 (83%) of the countries. Patient interview was included in the type III medication review in 5/6 of the countries (83%), and these interviews were based on an interview form.

Almost all of the drug-related issues listed in the PCNE classification were addressed in a type III medication review. Only the drug and treatment costs were not addressed in 2/6 countries

(Croatia and Spain). In all countries patient's medication record was reconciled when conducting a type III review. A case report on findings to the physician and a written follow up plan or medication action plan was also always made. A case conference with the physician to decide on actions was included in 4/6 of the countries (67%). In all 6/6 type III medication review procedures, physician/general practitioner was responsible for making clinical decisions. In 3/6 (50%) of the countries pharmacist also shared responsibility and in 1/6 (17%) a nurse (see Table 3).

Written instructions or guidelines related to type III medication review services were available in 5/6 (83%) of the countries. Also in 67% there was a postgraduate training on medication review type III for pharmacists. The ECTS credits for this training varied from 0.5 in the Netherlands to 35 in Finland.[22] In 50% there was a payment for a type III medication review. Two countries answered that the fee was not publicly available or that it depended on the third party payers.

The open comments provided additional information about since when medication review procedures had been available, what were special patient groups targeted and intervals for reaccreditation of pharmacists conducting medication reviews (Table 6).

Discussion

This is the first published inventory on medication review practices in European countries. The high response rate indicates timeliness and popularity of the subject and gives a good understanding of collaborative medication review procedures developed in a wide range of European countries. Almost two thirds of the 25 countries, which responded, indicated having at least one type of medication review procedure in their country. This shows that the medication review procedures are becoming common in health care throughout Europe. In the community setting the type I and type II medication reviews (prescription and adherence reviews) are the most common. More comprehensive type III clinical medication reviews requiring access to patient information (e.g., clinical conditions and laboratory test results) are still rare.

The primary purpose of type I medication review is to be a routine review of basic medication management issues, such as drug–drug interactions, duplications, appropriateness of dose and dosing time and treatment costs. Patient involvement in order to tell health care providers about their conditions are not always necessary for this type of prescription review.[12] Still, based on this study patient interview was included in more than half of the countries with type I procedure, and in two of the countries there was access to clinical conditions and laboratory tests. In most of the countries with type I medication review, the procedure did not include written reports or discussion with the physician. Thus, it is unclear how the findings of the medication reviews are communicated and implemented to patient care. As the issues addressed during type I medication review should be part of routine dispensing-related actions, the physician may be contacted on as needed basis.

According to previous literature, adherence and compliance review should take place in partnership with the patient or caretaker and the physician.[12] It enables the patient and the practitioner to jointly evaluate and negotiate patient's medicine taking. A type II review should ideally address both practical barriers to medicine taking and beliefs about medicines that may influence on medicine taking.[12] Thus, medication review type II is clearly targeted toward the patients. This was also seen in our results regarding to patient involvement in this type of medication reviews. On the other hand, communication with physicians in the form of case conferences was missing in most of the countries with medication review type II. Actually, some of the results regarding type II medication reviews were confusing. Patient interview, essential in this type of medication review, was missing in one country (The Netherlands), although they indicated to be checking patient dissatisfaction with the therapy. According to the information received from Bulgaria, their procedure does not include evaluation of adherence. These may be real deficiencies in the procedures or may reflect that the informants were not familiar with the terminology used in the questionnaire.

According to the literature, a type III review should always take place with the patient and with access to clinical patient information, such as information on clinical conditions and relevant laboratory tests.[12] Patient involvement is necessary to get a comprehensive understanding of the patient's health condition and how medication use is influencing it (i.e., what are the positive and negative outcomes of the medication use, how people manage medicine taking and follow up of their condition).[8] Denmark was the only country

Table 6
Summary of the additional information on type I–III medication review procedures provided by the informants in open comments

	Type I (prescription review)	Type II (adherence or compliance review)	Type III (clinical medication review)
Since when medication review procedures have been available	1985: The Netherlands (local)	1998: Denmark (national)	2000: Denmark (national)
	1990: The Netherlands (national)	2001: Finland (local + national)	2005: Finland (national[8])
	1996: Bulgaria (national)	2001: Portugal (national)	2008: Croatia (local)
	1997: Hungary (national)	2003: Sweden (local)	2009: The Netherlands (local)
	2001: Denmark (national)	2005: UK (national)	2010: The Netherlands (national)
	2001: Switzerland (national)	2007: Croatia (local)	
	2003:Sweden (local)	2008: Norway (local)	
	2005: Croatia (local)	2008: The Netherlands (local)	
	2005: Czech Republic (local + national)	2010: Switzerland (national)	
		2010: The Netherlands (national)	
Specific patients groups	Normally on patients with a complex medication (Sweden)	Especially asthma and chronic obstructive lung diseases (Sweden)	Especially elderly patients with a complex medication (Finland, Sweden)
		Hypertension, hyperlipidemia, asthma/COPD, diabetes, polymedication, patients ≥65 years (Portugal)	Chronical patients (Croatia)
		Patients with more than 3 medications for chronic treatments (Switzerland)	
		Patient/career decides, but pharmacist or physician may recommend/suggest a review (Norway)	
Intervals for reaccreditation of pharmacists conducting medication reviews - Croatia 6 years (type of the medication review not mentioned)			Finland: 5 years[8,22]

where patient interview was not included in the type III medication review. Another country (Sweden) did not have access to information on patient's use of non-prescription medicines. There is only limited number of countries with nationally agreed procedures/reimbursement systems.

Limitations

Some of the responses from the informants were not detailed enough to give a comprehensive understanding of the medication review practices available in that particular country. Some of the responses were also confusing: in some cases it was difficult to differentiate between standard dispensing or dose dispensing actions and medication reviews. This particularly concerned prescription reviews (medication review type I). The actions performed during standard dispensing differ in different countries. E.g., interaction checks by computerized systems are a daily routine in some countries, but are considered as

medication reviews in some other countries. Lack of guidelines and standardization of procedures in many countries can partly explain the variation in interpretations. Regardless of these limitations this study provides a needed overview of collaborative medication review practices in different European countries, which can be used by different stakeholders involved in health and pharmaceutical policy and service planning nationally and internationally.

Practical implications

This is the first European wide study on medication review procedures and practices. An inventory describing existing medication review procedures is essential in order to understand and compare literature that evaluates outcomes and effectiveness of medication review services in different countries.

Conclusions

Medication review procedures are becoming common in health care throughout Europe, however improving their comprehensiveness would require better access to patient information for those professionals conducting clinical medication reviews. Even though the survey had some contradicting results, it provides a general understanding of medication review practices in different countries. In addition to benchmarking, the inventory can enhance cooperation between countries and stakeholders involved in medication review practice development nationally and internationally.

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References

1. Lazarou J, Pomeranz BH, Corey PN. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. *J Am Med Assoc* 1998;279:1200–1205.
2. Beijer HJ, de Blaey CJ. Hospitalisations caused by adverse drug reactions (ADR): a meta-analysis of observational studies. *Pharm World Sci* 2002;24:46–54.
3. van der Hooft CS, Dieleman JP, Siemes C, et al. Adverse drug-reaction-related hospitalizations: a population-based cohort study. *Pharmacoepidemiol Drug Saf* 2008;17:365–371.
4. Berenguer B, La Casa C, de la Matta MJ, Martin-Calero MJ. Pharmaceutical care: past, present and future. *Curr Pharm Des* 2004;10:3931–3946.
5. Shaw J, Seal R, Pilling M. *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*. London: Medicines Partnership; 2000.
6. Vinks T, de Koning F, de Lange T, Egberts T. Identification of potential drug-related problems in the elderly: the role of the community pharmacist. *Pharm World Sci* 2006;28:33–38.
7. Cipolle R, Strand L, Morley P. *Pharmaceutical Care Practice: The Patient-centered Approach to Medication Management*. 3rd ed. New York: McGraw Hill Professional; 2012.
8. Leikola S, Tuomainen L, Peura S, et al. Comprehensive medication review: development of a collaborative procedure. *Int J Clin Pharm* 2012;34(4):510–514.
9. Lyles A, Sleath B, Fulda TR, Collins TM. Ambulatory drug utilization review: opportunities for improved prescription drug use. *Am J Manag Care* 2001;7:75–81.
10. Harjivan C, Lyles A. Improved medication use in long-term care: building on the consultant pharmacist's drug regimen review. *Am J Manag Care* 2002;8:318–326.
11. Fulda TR, Lyles A, Pugh MC, Christensen DB. Current status of prospective drug utilization review. *J Manag Care Pharm* 2004;10:433–441.
12. Clyne W, Blenkinsopp A, Seal R. *A Guide to Medication Review 2008*. NHS, National Prescribing Centre, 2008. Available at: http://www.npc.co.uk/review_medicines/intro/resources/agtmr_web1.pdf. Accessed 05.05.13.
13. Leikola S. *Development and Application of Comprehensive Medication Review Procedure to Community – Dwelling Elderly, Doctoral Dissertation, University of Helsinki*, 2012. Available at: https://helda.helsinki.fi/bitstream/handle/10138/30203/developm.pdf?sequence=1. Accessed 11.02.13.
14. Blenkinsopp A, Bond C, Raynor DK. Medication reviews. *Br J Clin Pharmacol* 2012 Oct;74(4):573–580.
15. Australian Government, Department of Human Services. Home Medicines Review (HMR). Available at: http://www.medicareaustralia.gov.au/provider/pbs/fifth-agreement/home-medicines-review.jsp; Accessed 04.06.13.
16. Christensen DB, Roth M, Trygstad T, Byrd J. Evaluation of a pilot medication therapy management project within the North Carolina State Health Plan. *J Am Pharm Assoc* 2007;47:471–483.
17. Noyce PR. Providing care through community pharmacies in the UK: policy, practice and research. *Ann Pharmacother* 2007;41:861–868.

18. Pharmaceutical Society of Australia. *Professional Practice Standards Version 4*, 2010. Available at: http://www.psa.org.au/site.php?id=6040. Accessed 11.02.13.
19. Bluml BM. Definition of medication therapy management: development of profession wide consensus. *J Am Pharm Assoc* 2005;45:566–572.
20. American Pharmacists Association; National Association of Chain Drug Stores Foundation. Medication therapy management in pharmacy practice: core elements of an MTM service model (version 2.0). *J Am Pharm Assoc (2003)* 2008;48:341–353.
21. Hakkarainen K. *Models of Pharmacists-conducted Medication Review – An International Comparison* [Master's Thesis]. University of Helsinki; 2008.
22. Leikola S, Tuomainen L, Ovaskainen H, et al. Continuing education course to attain collaborative comprehensive medication review competencies. *Am J Pharm Educ* 2009;73(6):108.
23. Pharmaceutical Care Network Europe Foundation. *PCNE Classification for Drug Related Problems V 6.2*, 2010. Available at: http://www.pcne.org/sig/drp/documents/PCNE%20classification%20V6-2.pdf. Accessed 11.02.13.
24. Pharmaceutical Care Network Europe Foundation. *The PCNE Classification for Drug Related Problems V 5.01*, 2006. Available at: http://www.pcne.org/sig/drp/documents/PCNE%20classification%20V5.01.pdf. Accessed 11.02.13.