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Patient participation in medication reviews is desirable but not evidence-based: a systematic literature review

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SUMMARY

Aim

The aim of this systematic literature review is to investigate which types of patient participation in medication reviews have been practiced and what is known about the effects of patient participation within the medication review process.

Methods

A systematic literature review was performed in multiple databases using an extensive selection and quality assessment procedure.

Results

In total, 37 articles were included, most were assessed with a weak or moderate quality. In all studies patient participation in medication reviews was limited to the level of information giving by the patient to the professional, mainly on actual drug use. Nine studies showed limited results of effects of patient participation on the identification of drug related problems.

Conclusions

The effects of patient participation are not frequently studied and poorly described in current literature. Nevertheless, involving patients can improve patients' knowledge, satisfaction and the identification of drug related problems. Patient involvement is now limited to information sharing. The profit of higher levels of patient communication and shared decision making is until now, not supported by evidence of its effectiveness.

What is known about this subject

- In general, patient participation in healthcare is considered to improve quality and safety of health care.
- Patient participation in medication reviews is acknowledged in international guidelines.

What this study adds

- Few studies have evaluated the effects of patient participation in medication reviews and available results are poorly reported in current literature.
- Involving patients in medication reviews may result in improved knowledge and satisfaction of patients and better identification of drug related problems.

INTRODUCTION

Patient participation is seen as the key to modern health care and has been widely implemented in medical decision-making and the management of chronic diseases. [1] The World Health Organization (WHO) programme Patients for Patient Safety also emphasizes the central role patients should play in efforts to improve the quality and safety of health care. [2] Positive effects of a structured two-way communication between patients and healthcare professionals can be increased patient knowledge, adherence, and satisfaction. [3] With respect to pharmaceutical care, patient participation is thought to improve concordance between the patient and the healthcare provider on the pharmacotherapy. [3] It is also suggested that involvement of patients in pharmaceutical interventions, such as medication reviews, is important for motivation to change and long-term effectiveness of pharmacotherapy. [4] The UK National Prescribing Centre defines a medication review as ‘a structured, critical examination of a patient’s medicines with the objective of reaching an agreement with the patient about treatment, optimising the impact of medicines, and minimising the number of drug related problems’. [5] Drug related problems (DRPs) frequently occur in elderly and can be drug interactions, inefficacy of treatment, adverse drug reactions, prescription errors but also noncompliance with treatment and user problems. The medication review definition includes patient participation in the medication review process and agreement between patient, physician and about the treatment.

The definition of patient participation is not self-evident. Patient participation, patient collaboration, patient involvement, partnership, patient empowerment or patient-centered care, are used interchangeably. [1] Street and Millay defined patient participation in medical consultations as “the extent to which patients influence the content and the structure of the interaction as well as the health care provider’s beliefs and behaviour by, for example, asking questions, descriptions of health experiences, expressing concerns, giving opinions, making suggestions and stating preferences”. [6]

Thompson et al. 2007 defined levels of patient involvement from the patient perspective. [7] Parallel to a literature-based ranking of professional-determined levels of involvement, Thompson, on the basis of a comprehensive qualitative data, defined several levels of patient-desired involvement (table 1).

This follows the three decision making models, paternalistic, informed and professional-as-agent of Charles et al. [8] Participation is seen as being co-

determined by patients and professionals and occurring only through the reciprocal relationships of dialogue and shared decision making. In a dialogue the patient gives information and there is consultation by the professional, in shared decision making the professional acts as agent. The model and definition of Thompson is used in this research. [7]

Furthermore, giving information during a dialogue between patient and caregiver has a different purpose than shared or informed decision making. In the context of medication reviews, patient input is needed as preparation for the medication review, to incorporate the patient's perspective. The purpose of information giving by the caregiver is mainly educational. On the other hand there is the decision making process, where the purpose is to make a joint decision.

Active patient participation in medication reviews is increasingly recognized as a prerequisite for a successful medication review and consequently in optimal pharmacotherapy and acknowledged in international and recent Dutch guidelines. [5,9-11]

In the field of treatment counselling, especially for oncology and e.g., there is indeed evidence that the involvement of patients and shared-decision making led to more satisfied patients, better adherence to therapy and better health outcomes.[12-14] However, little is known about the effects of patient participation in medication reviews on patient outcomes. Before studying possible effects of patient participation, the different types of patient participation researched must be identified.

The aim of this systematic literature review is to investigate which types of patient participation in medication reviews have been practiced and what is known about the effects of patient participation within the medication review process. The following research questions were formulated:

1. Which types of patient participation in medication reviews have been researched?
2. What are the effects of patient participation in medication reviews on drug related problems (DRPs) and other patient outcomes?

METHODS

A systematic literature review was conducted following the PRISMA statement. [15] A literature search was performed in the databases PubMed, EMBASE, CINAHL, and Cochrane Library in July 2013. A search strategy was developed by the first author (FW) and an experienced information specialist (Supplement I). The search strategy combined different synonyms and related terms of patient participation with synonyms of medication reviews. Inclusion- and exclusion criteria for articles are displayed in box 1. In addition, the references from all included articles were also examined for relevant articles.

Three types of medication reviews can be distinguished based on the data used: 1) clinical medication reviews are based on medication records, medical records and patient data, 2) concordance and compliance medication reviews are based on medication records and patient data, and 3) prescription reviews are based on medication records only, so without patient data. [16] In the present literature review only clinical medication reviews or concordance and compliance reviews [6], have been included. According to Thompson's model of patient participation (table 1),

patient participation starts at the level of information giving to the healthcare professional by the patient or his carer. [7]

[BOX 1]

Selection procedure

The selection procedure of relevant articles included three steps, 1. Screening of title and abstract, 2. Full-text based selection, and 3. Quality assessment (figure 1). References of selected articles were also screened for relevant articles and extra articles could be added on the basis of expert opinion. Two authors (FW, PJME) screened all 1,257 titles and abstracts independently. In case of doubt, an article was included for full-text review. The first 50 titles and abstracts were screened and discussed to reach agreement on interpretations, definitions and in- and exclusion criteria. After screening all titles and abstracts, consensus was reached in a consensus meeting for all disagreements. In total, 133 articles were selected for full-text review. The measure of agreement between the reviewers, Cohen's Kappa (κ) was calculated.

The first author screened all 133 full-text articles on in- and exclusion criteria according to box 1. In case of any doubt, the full-text article was discussed with at least one other author. In total, 37 articles were selected for quality assessment and included in this literature review, of which one was obtained from the references of the selected articles, and one article was added on the basis of expert opinion.

Quality assessment

Quality assessment was carried out independently by three authors (FW, PJME, JGH) for all 37 articles. One reviewer (FW) assessed all relevant full-text articles and two other reviewers (PJME, JGH) assessed both half of the articles, independently of each other.

The complexity and heterogeneity of the articles for the first research question required a specific qualitative assessment based on the description of information about patient participation and whether an evaluation was carried out. Mainly, the completeness of reporting was assessed, assuming a correlation with the quality of reporting and the quality of the study. For the second research question, again articles were very heterogenic, and studies were mainly of an observational or qualitative nature. Existing tools were used, with minimally adaptations, to assess the quality of the article. Three checklists are used, dependent on the literature review objective and whether the results were quantitative or qualitative (box 2).

Strong, moderate or weak final ratings were given based on predefined criteria. Quality assessment tools were piloted with ten articles by the reviewers and differences in assessment were discussed. Disagreements in final ratings were discussed with a fourth reviewer (FGS).

[BOX 2]

Data extraction and analyses

Data extraction was carried out for all included articles by the first author (FW) in evidence tables. For every article, general characteristics and the type of medication review were extracted. Secondly, the description of patient participation was extracted for four components, when available, as follows:

1. Level of participation according to Thompson et al. [7] (see table 1);
2. Type of information given by the patient for the medication review;
3. Kind of consultation by the professional to the patient on the medication;
4. Evaluation of the patient participation.

Qualitative studies are described separately in overview tables with the description and evaluation of the patient participation. When present, data on the effects of patient participation was collected, specifically on DRPs and possible other outcomes. All data were analysed in a descriptive manner for the results section and summarized in overview tables.

RESULTS

General characteristics of publications

The authors who reviewed all titles and abstracts, reached strong agreement (Cohen's $\kappa=0.73$). General characteristics of all 37 included publications are presented in table 2. [20-56] All studies described medication reviews, but none of the studies was an RCT on the effectiveness of patient participation. In total, 30 studies were of a quantitative nature with different study designs, six publications had qualitative designs. Half of the studies were carried out in Europe, mainly the UK, The Netherlands and Norway, the other half was mainly from the USA and Australia. Almost all studies were carried out in elderly with a variety of risk factors for medication problems, such as polypharmacy, multi-morbidity, recent hospital admission or specific diseases. More than a third of the quantitative studies were small scale or pilot studies with less than 100 participants. The majority of the medication reviews was carried out by pharmacists or pharmacists in cooperation with general practitioners (GPs).

Of the 30 articles assessed with the checklist for quantitative studies on description and evaluation of patient participations, 20 articles had a final moderate rating, five a strong rating and five a weak rating. All but one of the qualitative studies were assessed with a strong rating. Of the nine articles that were assessed with the quality assessment for effects of patient participation, five articles had a moderate and four a weak rating.

Type of patient participation

The type of patient participation in medication reviews has been summarized in table 3 for quantitative studies and, in table 4 for qualitative studies. Overall, the description of the involvement of patients in the medication review process in all publications was minimal. Only studies in which the patient gave information to the professional (level 2 in table 1) were found.

Of the 37 publications, 14 studies included home visits, 14 included patient interviews at the pharmacy or in the GP office, four studies involved patients during or at discharge of their hospital stay and five studies used mixed or other methods to involve the patient. Communication with the patient, especially as preparation before the medication review, was most often carried out by the pharmacist or jointly by the pharmacist and GP. Furthermore, one third of the studies mentioned the duration of the patient contact with the healthcare professional; the time investment ranged between 15-90 minutes per patient.

Information exchange between patient and healthcare professional

In all studies patients provided information about their actual drug use. Additional information included knowledge about the medicines they used, adverse drug events, allergies, adherence and compliance, perceived effectiveness, practical or management problems, lifestyle and social support related, hoarding problems and attitude towards certain medicines.

Healthcare professionals counseled patients often about proposed changes in medication, education on their medication, lifestyle or health problems and gave follow-up instructions for medication monitoring, laboratory tests or new visits.

Evaluation of patient participation

In some studies the involvement of patients during medication reviews was evaluated. Information on actual drug use often added new information to the records e.g. on prescribed drugs, over the counter (OTC) drugs, compliance, adherence or other drug user problems. [27,28,31,34,41,52] Several studies carried out a satisfaction survey among patients who participated in medication review programs. The majority of the patients was satisfied with the review services and indicated to have increased knowledge and was able to ask questions about their medications. Two British qualitative studies [36,46] observed that patients were not actively involved in the consultations with pharmacists for their medication review and did ask very few questions. Furthermore, in three qualitative studies [21,44,46], patients called on the higher authority of the GP or specialist above the pharmacists to discuss their medicines (table 4).

Effects of patient participation

The effects of patient participation in medication reviews on DRPs or other patient outcomes have been described in nine studies (table 5). [24,30,31,33-35,43,54,55] Of all DRPs identified, 27% to 73% were found as result of a patient interview. Many of these problems would not have been identified if only medication or medical records were used. In two Dutch studies [31,34], the DRPs identified in the interviews were also assigned a higher priority or the recommendations based on patient information were more often implemented than problems identified through medication records or in the medical history. Some other studies mentioned the type of DRPs, which was interpreted as originating from the patient interview. [25,27,28,41] However, these results are not included in this literature review to answer the effects research questions, because it is not described how and if patient's involvement led to these effects. The studies that showed effects on DRPs were assessed with higher quality on description and evaluation of patient participation than studies that reported no effect data.

One study found no difference in quality of life after the medication review between patients who were enabled to participated and control patients. However, in this study very few patients actively participated in the medication review process and the sample size was too small to assess quality of life differences. [41]

There was no difference in effects or level of patient involvement between different care settings, e.g. hospital or community, or for specific patient groups versus less specific, general polypharmacy or multi-morbidity patients.

DISCUSSION

Discussion

The type of patient participation commonly practiced in the studies reviewed was information giving and was often the starting point in a medication review. Other types of patient participation were not found. The information given by the patient was mainly on actual drug use and adherence problems. In most studies the professional was a pharmacist who interviewed or counseled patients at home, in the pharmacy or in the hospital. The involvement of patients led to identification of more drug related problems. These DRPs were considered more relevant, had a higher priority and treatment recommendations based on these problems had a better implementation rate. Both patients and professionals indicated to be satisfied with the patient participation. Some studies suggested increased medication knowledge and patients' understanding.

The effects of patient participation is hardly studied and poorly described in current literature. We found no evidence the patient involvement in medication reviews went further than information exchange during dialogues or interviews between patients and caregiver. It remains unclear how patients participate in subsequent stages of the medication review with regard to the sharing of information, decision-making, counseling and implementation of possible medication changes.

The exact contribution of patient participation to the effects of the study was mostly unclear. Studies with higher quality often reported effects of patient participation on the identification of DRPs. Weaker quality studies reported good patients' satisfaction, increased medication knowledge and patients' understanding. These outcomes, however, were measured in surveys with low response rates, which could have led to response bias.

In national and international guidelines, patient participation in a medication review process is a prerequisite for a successful medication review. [5,9,11] However, guideline recommendations to involve patients are not based on evidence but on prevailing societal considerations expert opinions. [11] Apparently, there is a discrepancy between patient-centeredness and evidence-based care. Patient participation is a concept that already arises from the sixties, when the consumer protection rights were introduced in the US Congress; "the right to safety, the right to be informed, the right to choose and the right to be heard". [57] This also implicates that patient participation is more a right

and largely justified on humane reasons than an evidence-based means to improve treatment outcomes, as is questioned before. [58,59]

The use of medication reviews, particularly with active patient involvement, as an intervention to improve treatment results is a fairly recent development in pharmaceutical care. This may partly explain the absence of good quality literature clearly describing involvement of patients in medication reviews and its effects. Furthermore, implementing patient participation is strongly dependent on overcoming healthcare professionals' obstacles such as time constraints and finances, societal norms and the tendency of caregiver to maintain control. [1] Particularly, the time investment to involve patients in the medications reviews process is considerable, and hence costly. In this literature review, it varied between 15-90 minutes for patients interviews aimed only to inform caregivers on actual drug use and experiences.

As compared to younger patient, elderly are known to participate less in care and self-management and have different preferences for involvement and decision making.[60] This literature review consisted of studies almost solely in elderly subjects, which is the main target group for medication reviews. This means that the patient group described in this literature study is already less prone to participate and to a lesser extent wants to be involved in medical decisions. Not all patients want to or can be involved and the extent to which involvement is useful may depend on age, disease severity, acuteness of the disease, cognitive state, comorbidity, health literacy, socio-economic status, type and impact of decision, attitudes towards medication and prevention, patient-professional relationships and other personal preferences. [1,7] Previous research also indicated that patients have a desire to participate in the consultation, but do not always feel a need to be involved in medical decision and patient involvement was limited to information sharing.[59,61-63] This means that we may have to reconsider how and which patients should be involved in a medication review.

Data on the gain of patient participation in terms of effects is scarce and existing literature has a weak quality. The evidence for the effects on clinical patient outcomes such as quality of life, hospitalisation and mortality of medication reviews themselves is limited. [64] Although, patient participation in consultations has been suggested to improve e.g., adherence, long-term effects of pharmacotherapy and thereby indirect patient outcomes. [3,4] However no evidence was found for this in the context of medication reviews. There are some limitations to discuss. The taxonomy by Thompson [7] used in this study is not very discriminative. There may be other in-between combinations applicable, however others also recognize that labelling these would not be very useful since one always deals with specific situational contexts. [65] This emphasizes the complexity of studying patient participation. Although an extensive search strategy in four literature databases was used and an additional hand search in reference lists was performed, relevant articles may have been missed. The complexity of patient participation in medication reviews makes it difficult to design comparative studies. Moreover, it is difficult to measure to specific contribution of patient participation on treatment outcomes. To study whether e.g. shared-decision making is carried out in practice, a qualitative study design may be needed. With qualitative observational research one could study whether patients really influence the content and structure of the interaction of a consultation or decision, like Street and Millays' definition of patient participation. [6] To study whether patient participations also results in effects, future research should focus on designs, possibly comparative, with a mixed character with relevant, quantitative patient outcomes such as adherence, quality of life, adverse drug events and patient satisfaction and qualitatively on the level of involvement of patients by observing consultations.

CONCLUSION

To conclude, patient participation in medication reviews is important to gain information about patient preferences and relevant drug related problems. Patient participation is not common and not always desirable in decision making in the last phase of a medication review. As there is often no clear decision as with treatment counselling and the target group for medication reviews, vulnerable elderly, does not always have the wish to be involved in the actual decision. Patient satisfaction and

knowledge seem to improve when patients are more involved, however no effects in health outcomes have been observed.

Patient participation in medication reviews is desirable and may improve patient outcomes, but is presently based on expert opinions and ethical considerations for modern healthcare, rather than on evidence. Considering the time investment and limited evidence of patient participation in medication reviews efficient methods targeted at the right patients seem appropriate. The profit of higher levels of patient communication and shared decision making is until now, not supported by evidence of its effectiveness. Since patient involvement limited to information sharing seems more appropriate, efficient methods to involve patients in medication reviews are topic for future research and practice innovations. In this way, clinical medication reviews will become more feasible for GPs and pharmacists.

Practice implications

Our results may have potential implications for pharmacists, GPs or other physicians who perform medication reviews. Patient participation at the level of information giving, may improve information of the professionals and identification of DRPs and may contribute to improved patient knowledge, understanding and patients' satisfaction. Physicians and pharmacists have to keep in mind that involvement of patients during decision making is not primarily evidence-based to improve the outcomes of both medication review outcomes as well as and patient outcomes and is not always needed in this type of decisions. Based on the literature, information giving participation during medication reviews improves the medication review process and identification of drug related problems, however evidence regarding the effectiveness of higher levels are lacking and might not be needed at all times and at all costs.

Competing Interests Statement

All authors have completed the Unified Competing Interest form at http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: FW had support from a research grant by the Dutch Organization for Health Research and Development (ZonMw) for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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Tables

Table 1. Levels of patient involvement in healthcare consultations

Patient-desired level	Patient-determined	Co-determined (participation)	Professional-determined
4	Autonomous decision-making		Informed decision making
3		Shared decision making	Professional-as-agent
2	Information-giving	Dialogue	Consultation
1	Information-seeking/receptive		Information-giving
0	Non-involved		Exclusion

Adapted from: Thompson et al. (7)

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Table 2. General characteristics of the included publications

Reference; country	Study design	Patient characteristics	Setting	MR carried out by
Leendertse et al. 2013; (36)	Open controlled	674 elderly, using ≥ 5 drugs, at risk for hospital admission	Home dwelling in primary care	Pharmacists and GPs
Kilcup et al. 2013; (31)	Retrospective	494 elderly, at risk for hospital readmission	Home dwelling recently discharged from hospital	Pharmacists
Olsson et al. 2012; (42)	Randomized controlled	150 elderly, using ≥ 5 drugs	Home dwelling recently discharged from hospital	GPs
Akazawa et al. 2012; (20)	Prospective intervention	508 elderly	Home dwelling	Pharmacists
Kwint et al. 2012; (33)	Cross-sectional	155 elderly, using ≥ 5 drugs	Home-dwelling visiting community pharmacists	Pharmacists and GPs
Elliot et al. 2012; (22)	Prospective randomized	80 elderly, using ≥ 2 drugs	Home-dwelling referred to Aged Care Assessment Teams	Pharmacists or GPs
Willoch et al. 2012; (53)	Prospective randomized	77 elderly rehabilitation patients, using ≥ 3 drugs	Patients admitted to a rehabilitation ward	Clinical pharmacist
Stewart et al. 2012; (50)	Observational case series	219 adults	Ambulatory care patients	Pharmacists
Swain 2012; (51)	Prospective case series	56 elderly neurological patients	Ambulatory neurologic patients	Pharmacists
Sheridan et al. 2012; (48)	Qualitative	27 patients with ≥ 1 risk factors for drug problems	Independently-living patients	Pharmacists
Lam. 2011; (34)	Cross-sectional	43 adults and elderly, with ≥ 1 chronic disease, using ≥ 4 drugs	Patients in an on-going RCT in pharmacies	Pharmacists
Niquille et al. 2010; (41)	Cross-sectional	85 elderly cardiovascular patients, using ≥ 1 cardiovascular drugs	Home-dwelling outpatients visiting community pharmacies	Pharmacists
Granas et al. 2010; (24)	Retrospective evaluation	73 elderly, using ≥ 2 diabetic type II drugs	Diabetic type II patients visiting the pharmacy	Pharmacist
Hernandez et al. 2010; (27)	Observational	35 middle-aged and elderly heart transplantation patients	Hospitalised heart transplantation patients	Pharmacist
Hugtenburg et al. 2009; (28)	Controlled intervention	715 elderly, using ≥ 5 drugs	Patients discharged from hospital	Pharmacists
Karapinar-Carkit et al. 2009. (30)	Prospective observational	262 pulmonology patients, using ≥ 1 drugs	Patients discharged from the pulmonology ward	Pharmacists
Pindolia et al. 2009; (44)	Retrospective analysis	520 elderly, ≥ 2 chronic diseases, using ≥ 2 drugs	Primary care	Pharmacists
Latif et al. 2008 ; (35)	Qualitative	Purposeful sample of 54 adult and elderly	Patients counseled at community pharmacies	Pharmacists
Moultry et al. 2008; (37)	Cross-sectional	30 elderly, 60% is using ≥ 7 drugs	Patients identified for medication management services	Pharmacists
Bissell et al. 2008 (55)	Qualitative	49 coronary heart disease patients	General practice patients recruited within an RCT	Pharmacists
MEDMAN 2007; (56)	Randomised controlled	1493 coronary heart disease patients	General practice patients	Pharmacists
Salter et al. 2007; (45)	Qualitative	29 elderly	Hospitalized patients recruited within an RCT	Pharmacists
Nguyen et al. 2007; (40)	Prospective uncontrolled	24 elderly, ≥ 1 risk factor for medication misadventure	Patients discharged from hospital	Pharmacists
Viktil et al. 2006; (52)	Prospective multicenter	96 hospitalized elderly, using mean 4.7 drugs	Hospitalized patients; internal medicine and rheumatology	Pharmacists
Sorensen et al. 2004; (24)	Randomized controlled	400 patients with ≥ 1 risk factor for inappropriate medication use	Community dwelling patients (rural and urban)	Pharmacists and GPs
Griffiths et al. 2004; (25)	Pre-post test + cross-sectional	24 elderly; diminished knowledge/management of medication	Patients receiving regular community nursing care	Community nurses
Petty et al. 2003; (43)	Qualitative	18 elderly, using mean 5.5 drugs	Ambulatory patients attending a medicine review clinic	Pharmacists
Naunton et al. 2003 ; (39)	Randomised controlled	121 elderly, using ≥ 4 drugs	Discharged from hospital	Pharmacists
Gilbert et al. 2002; (23)	Implementation trial	1000 patients at risk for DRPs	Community dwelling patients identified by GPs	Pharmacists and GPs
Zermansky et al. 2001; (54)	Randomised controlled	1188 elderly using ≥ 1 drugs	Community dwelling patients visiting GPs	Pharmacists
Jameson et al. 2001; (29)	Randomized controlled	168 patients, using ≥ 5 drugs	Ambulatory care patients	Pharmacists and GPs
Krska et al. 2001; (32)	Randomized controlled	332 elderly, with ≥ 2 chronic diseases, using ≥ 4 drugs	Ambulatory care patients	Pharmacists
Sellors et al. 2001 ; (47)	Randomized controlled	132 elderly , using ≥ 4 drugs	Patients visiting GPs	Pharmacists
Grymonpre et al. 2001 ; (26)	Prospective randomised controlled	135 elderly, using ≥ 2 drugs	Community dwelling ambulatory care patients	Pharmacists
Chen et al. 2000; (21)	Qualitative	25 patients referred for medication review	Patients from community pharmacies and GPs	Pharmacists
Nathan et al.	Qualitative	20 elderly or middle-aged, using	Patients who had 3-9 months	Pharmacists

Reference; country	Study design	Patient characteristics	Setting	MR carried out by
2000; (38)		long-term medication	ago a medication review	
Schneider et al. 1994 ; (46)	Prospective un-controlled and qualitative	39 elderly, using mean 6 drugs	Housebound patients, referred by GP	Pharmacists

*Clinical medication review; availability of data: Patient interview, medical records and medication records.

* Concordance and compliance review; availability of data: Patient interview and medication records.

DRP=Drug Related Problem; GP=General practitioner; MUR=Medicines Use Review; MR=Medication Review; RCT=Randomized Controlled Trial

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Table 3. Type of patient participation in medication reviews –quantitative studies–

Reference	Type of communication and by whom	Information given by patient to professional	Consultation by professional	Evaluation of patient participation	Quality assessment
Leendertse et al. 2013 (36)	Interview by pharmacist, follow-up of plan by GP and follow-up in time by pharmacist	- Actual drug use - DRPs that involved the patient (not further defined)	Follow-up evaluation of the advised pharmacotherapy changes as agreed with the patient in the pharmaceutical care plane	-	Moderate
Kilcup et al. 2013 (31)	Telephone interview with pharmacist	- Actual drug use - Unexplained discrepancies - Drug related problems	Opportunity to ask questions on: - understanding of medication - how medication intended to work - common safety concerns - how to take medication as intended	-	Moderate
Olsson et al. 2012 (42)	Home visit by study nurse	- Actual drug use - Compliance	Written drug regimen was provided to enable patient participation	-	Weak
Akazawa et al. 2012 (20)	Visit at pharmacy (brown bag method)	- Actual drug use - Reason for choosing OTCs - Adherence - Storage	- Appropriate feedback - Potential safety issues	>90% had ≥1 positive responses (ease concerns on interaction or ADE or duplications, get confirmation, better understanding, others) 45% had ≥1 negative responses (tiresome to bring, time, insufficient advice, others)	Moderate
Kwint et al. 2012 (33)	Home-visit by community pharmacist	- Actual drug use	Not described	-	Strong
Elliot et al. 2012 (22)	Home-visit by clinical pharmacist or GP	- Actual drug use	Not described	- Pharmacist home visit is more feasible than by GP - Satisfied patients with home-visit	Strong
Willoch et al. 2012 (53)	Interview with standardized form during hospital stay and follow-up home visit by clinical pharmacist	- Actual drug use - Medication knowledge - Adverse drug effects - Efficacy - Post-discharge effects	Targeted counselling talk on medications and medication changes by pharmacist.	-	Moderate
Stewart et al. 2012 (50)	Interview at care centre by (student-)pharmacist	- Actual drug use	Not described	-	Weak
Swain 2012 (51)	Interview at clinic by pharmacist	- Actual drug use	Education and counseling on medication while ensuring safety and effectiveness	97% of patients was satisfied with consult Time: interview mean 38 min	Moderate
Lam. 2011 (34)	Web-cam enabled video-conferencing by pharmacist	- Actual drug use - Awareness of treatment goals - Perception of disease control and health care needs - Adherence (questionnaire)	- Answering of questions - Patient-centred education - Medication and life-style recommendations - Instructions and confirmation of understanding	All respondents agreed or strongly agreed that answers to their questions were helpful and they had better medication knowledge. Time: interview 45-60 min	Moderate
Niquille et al. 2010 (41)	Interview at the pharmacy by community pharmacist	- Medication experiences - Medication knowledge/ skills - Adherence - Attitude towards prevention	Not described	-	Weak
Granas et al. 2010 (24)	Interview at the pharmacy by community pharmacist	- Actual drug use - Compliance issues	Medication advice on paper form	- 98% of patients said they benefited from the review - Time: median consultation 60 min	Moderate
Hernandez et al. 2010 (27)	Interview in hospital with standardized questionnaire by hospital pharmacist	- Actual drug use - Adherence - Possible allergies - Adverse drug effects	- Printed: prescription, schedule, indications, (contra-) interactions, ADE - Drugs and usage recommendations (knowledge of disease,	- All respondents could ask (almost) all questions - All respondents rated the treatment as (very) good Time: 24 counselling mean 26 min	Moderate

Reference	Type of communication and by whom	Information given by patient to professional	Consultation by professional	Evaluation of patient participation	Quality assessment
			treatment and ADE)		
Hugtenburg et al. 2009 (28)	Counsel at home , in pharmacy or by phone by pharmacist	- Actual drug use	- Printed: daily medication intake scheme - Counseling	40% of the patients mentioned a medication problem or raised questions	Moderate
Karapinar-Carkit et al. 2009 (30)	Counseling at discharge by pharmaceutical consultants	- Actual drug use - Considering continuing need - Practical problems - Adverse drug effects - Forgetting of medication	- Education	-	Moderate
Pindolia et al. 2009 (44)	Telephone contact by pharmacist and/or GP	- Actual drug use - Determine health goals - Concerns about treatment	- Explain the drug change(s) - In-depth counselling on medications/ health - Follow-up instructions (lab, GP visit, drugs)	- 90% found the telephone discussion convenient and was provided with the necessary education - Time: 2.5 hrs/ patient, mainly by pharmacist	Strong
Moultry et al. 2008 (37)	Home-visit by consultant pharmacist	- Actual drug use - Medical history (self-reported) - Allergies - Adverse effects	- Drug information (verbally and written) - Action plan - Emergency medication-kit and education	- Almost all patients were satisfied or some-what satisfied with the service - All patient felt more knowledgeable after home-visit - Time: Home-visit: 15-60 min	Moderate
MEDMAN 2007 (56)	Consultation according to pharmacist-determined patient need	- Actual drug use - Compliance - Lifestyle and social support	Not described	Not described	Weak
Nguyen et al. 2007 (40)	Home-visit 2 days after discharge by pharmacist	- Actual drug use - Medication knowledge	- Education on medication knowledge	In 73/98 of identified DRPs the information given by the patient was new to the GP	Weak
Viktil et al. 2006 (52)	Interview at hospital by pharmacist	- Actual drug use - Medication handling (adherence, knowledge, practical, efficacy)	Not described	- Only 50% of intended interviews were conducted. Feasibility was difficult. - Time: Interview mean 20.3 min (range 5–60 min)	Moderate
Sorensen et al. 2004 (49)	Home-visit by pharmacist and consult with GP	- Actual drug use	Not described	-	Moderate
Griffiths et al. 2004(25)	Interview at unknown location by community nurse	- Actual drug use - Allergies - Side effects	- Educational support (Medilist) - Compliance aid support.	-	Moderate
Naunton et al. 2003 (39)	Home-visit 5 days after discharge by pharmacist	- Adherence - Info to identify DRPs	- Education (medications and compliance) - Compliance devices, when needed	94% was satisfied with the home-visit Time: visit median 50 min	Moderate
Gilbert et al. 2002 (23)	Home-visit by community pharmacist and follow-up by GP	- Actual drug use - Knowledge on medication - Demo of administration devices	- Dosing instructions - Education - Assisted with dose administration - Informed choice is mentioned	In 31 cases the patient refused to follow-up the advice on which the GP and pharmacist agreed upon	Moderate
Zermansky et al. 2001 (54)	Home-visit community pharmacist and follow-up by GP	- Actual drug use - Confirm indications still valid - Adherence - Unaddressed problems	Not described, however negotiation with the patient is mentioned in the methods	- Time: mean 20 min for pharmacist	Strong
Jameson et al. 2001 (29)	1. telephone questionnaire 2. Interview in GP office by GP 3. Counselling by GP	- Actual drug use - Understanding of medication	- Explain drug changes - Counselling or instructions on medication and lifestyle, when needed	- 70% of consult group patients said that they benefited from the consult - Time: Face-to-face interviews: 45-60 min	Strong
Krska et al. 2001 (32)	Home-visit by pharmacist	- Actual drug use - Effectiveness	Not described	-	Moderate
Sellors et al. 2001	Interview at GP office by	- Actual drug use - Adherence	Not described	-	Moderate

Reference	Type of communication and by whom	Information given by patient to professional	Consultation by professional	Evaluation of patient participation	Quality assessment
(47)	pharmacist	(questionnaire)			
Grymonpre et al. 2001; Canada (26)	Home-visit by trained staff or volunteers Patient counselling by physician	<ul style="list-style-type: none"> - Actual drug use - Daily routine - Adherence - Adverse drug events - Allergies and intolerances - Other possible DRPs 	<ul style="list-style-type: none"> - Counselling with written information with physician at practice or at home - Follow-up with pharmacist at home to identify and resolve new issues. 	-	Moderate
Schneider et al. 1994 (46)	Home-visit by community pharmacist	<ul style="list-style-type: none"> - Actual drug use - Medication knowledge - Medication management and adherence (incl. hoarding) - Adverse drug effects - Practical problems 	When needed, advice on medication and follow-up visit	<ul style="list-style-type: none"> - From qualitative interviews several benefits were identified for patients, GPs and pharmacists due to the home visits - Time: Home visit mean 56 min. 	Moderate

ADE= Adverse Drug Effects; DRPs=Drug Related Problems; GP=General Practitioner

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Table 4. Type of patient participation and evaluation in medication reviews –qualitative studies–

Reference	Type of communication and by whom	Information given by patient to professional	Consultation by professional	Process or evaluation outcomes	Quality assessment
Sheridan et al. 2012 (48)	Interview in pharmacy by pharmacist	- Actual drug use - Adherence - Side effects - Effectiveness - Storage - Use of equipment	Education	- All but one patient were happy with the home visit - Nearly all respondents felt that they had enough time to discuss relevant questions, and were responded adequately - Patients did not report specific health gains directly from the MUR, however, knowledge and comfortable to discuss health or medication issues in the future with pharmacists were mentioned - Pharmacists did believe that the MUR could have improved outcomes for patients - The consultation lasted <30 min-1hr	Strong
Latif et al. 2008 (35)	Home-visits by pharmacist	- Actual drug use - Medication knowledge	Education	- 40-60% of the patients did not ask any questions during the MUR - Little room for open questions, OTC discussion offered more scope for participation	Strong
Bissel et al. 2008 (55)	Consultation with pharmacist	- Actual drug use - Compliance - Lifestyle and social support	Not described	- Majority expressed ambivalent views about the service, overall cautiously more positive than negative - Helpful reassurance on illness and therapy - Positive about the consultation with the pharmacist but reservations about them making recommendations. Many regard the doctor as the health professional in charge. - Patient felt more knowledgeable on their medicines	Strong
Salter et al. 2007 (45)	Home-visits by pharmacist	- Actual drug use	Advice, information, and instruction on medicines	- Advice was often resisted or rejected and created interactional difficulties and awkward moments - Almost no patient initiated requests for advice or information - Calling on the higher authority of the doctor was prevalent - Consultation time: mean 45 min	Strong
Petty et al. 2003 (43)	Interview in clinic by clinical pharmacist	- Actual drug use - Medication issues	Explanation, not further defined	- Some patients welcomed the opportunity to have questions answered - Healthcare professional must judge who needs more detailed information and who not - Not everybody accepted the advice given by the pharmacist	Strong
Chen et al. 2000 (21)	Interview in pharmacy by clinical pharmacist	- Effectiveness perception - Side effects - Adherence	Not described	- Better understanding of patient's perspective, would facilitate concordance - Consultation duration ranged from 15-90 minutes	Moderate
Nathan et al. 2000 (38)	Interview in pharmacy by pharmacist	- Actual drug use	Not described	- Expression of satisfaction and gratitude - Better understanding of medicines - Re-assurance (for patients) that they were taking medicines correctly - Learning things about medications that they not knew before	Strong

OTC=Over The Counter medicines; MUR=Medication Use Review

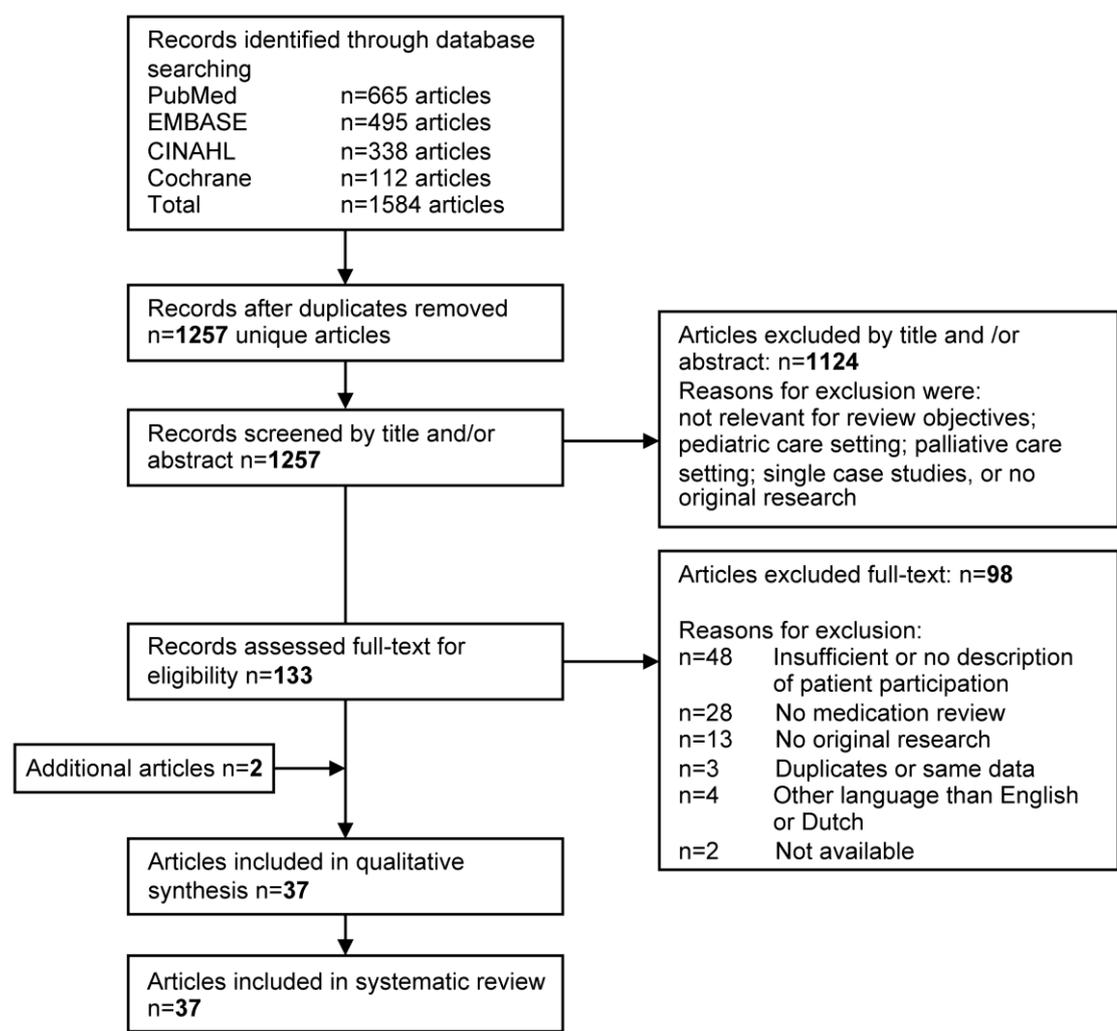
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Table 5. Effectiveness of patient participation in medication reviews –quantitative studies–

Reference	Type of patient participation	Outcomes	Quality assessment
Olsson et al. 2012 (42)	Information giving on actual drug use and compliance, during a home visit from a study nurse. Patients were enabled to participate, they received a current and comprehensive medication record	No difference in QoL between the group that received a medication record to enable participation and the group that did not. Only 8 of 21 returned medication records were used, with accompanying messages listing forgetfulness, feeling unaccustomed to participating and fear to causing trouble.	Weak
Kwint et al. 2012 (33)	Information giving on actual drug use, during a home visit from a community pharmacist	27% of all identified DRPs were identified through patient interview and were assigned a higher priority. DRPs identified during patient interviews were more frequently assigned a high priority, associated with recommendations for drug change and were implemented recommendations for drug change.	Moderate
Willoch et al. 2012 (53)	Information giving on actual drug use, knowledge, adverse events, and efficacy during hospital stay and follow-up home visit by clinical pharmacist on post-discharge effects	30% of all DRPs at admission were identified through patient interviews, mainly medication chart errors, compliance problems and adverse drug reactions. Many DRPs identified during the home visits were compliance problems; 20% of DRPs was related to patient knowledge and skills (derived from home visit)	Weak
Lam. 2011 (34)	Information giving through web-cam enabled video-conferencing on actual drug use, awareness of treatment goals and adherence	Most prevalent patient-centred DRP was lifestyle-related non-adherence (40/43-93%). Non-adherence to medications was present in 32/43 (74.4%), with forgetfulness as most frequently cited.	Weak
Karapinar-Carkit et al. 2009 (30)	Information giving on actual drug use and DRPs, at a counselling at discharge by pharmacist consultants.	With patient counselling, 8.8% more patients benefited in correction of discrepancies (interventions in 72.5% vs. 63.7%). 9.1% more patients benefited in optimizing the pharmacotherapy (interventions in 76.3% vs. 67.2%).	Moderate
Viktil et al. 2006 (52)	Information giving on actual drug use and drug(problem) handling during an interview with the pharmacist in the hospital.	39.9 % of total DRPs were found during the interview, significantly more DRPs were found in interviewed group vs. non-interview group.	Moderate
Gilbert et al. 2002 (23)	Information giving on actual drug use and knowledge with the purpose of an informed choice during a home-visit by community pharmacist and follow-up by GP.	On average 2.5 DRPs were identified. Of which 20% related to patient knowledge and skills.	Weak
Jameson et al. 2001 (29)	Information giving on adverse events and the understanding of medications during a telephone interview, face-to-face interview with GP and follow-up counselling by the GP.	73% of the interventions were recognized only through patient interview (unplanned outcome of the study).	Moderate
Krska et al. 2001 (32)	Information giving on actual drug use and effectiveness during home-visit by pharmacists.	Pharmaceutical Care Issues were in 29.4% of the cases identified during the patient interview. Of all the PCI, 21% were resolved by information found in notes and 8.5% in patient interviews.	Moderate

DRP= Drug Related Problem; GP=General Practitioner; PCI= Pharmaceutical Care Issue; QoL= Quality of Life

Identification
Screening
Eligibility
Included



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