

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

Floor Willeboordse,^{1,2} Jacqueline G. Hugtenburg,³
François G. Schellevis^{1,2} & Petra J. M. Elders¹

¹Department of General Practice & Elderly Care Medicine, EMGO+ Institute for Health and Care Research, VU University Medical Center, Amsterdam, ²NIVEL, (Netherlands Institute for Health Services Research), Utrecht and ³VU University Medical Center, Clinical Pharmacology and Pharmacy, Amsterdam, The Netherlands

Correspondence

Mrs Floor Willeboordse MSc PhD candidate, Department of General Practice & Elderly Care Medicine, EMGO+, Institute for Health and Care Research, VU University Medical Center, Van der Boechorststraat 7, 1081 BT Amsterdam, The Netherlands.
Tel.: +31 20 444 5584
Fax: +31 20 261 0437
E-mail: f.willeboordse@vumc.nl

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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 and 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.

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 health care professionals can be increased patient knowledge, adher-

ence, and satisfaction [3]. With respect to pharmaceutical care, patient participation is thought to improve concordance between the patient and the health care 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, optimizing

the impact of medicines, and minimizing the number of drug related problems' [5]. Drug related problems (DRPs) frequently occur in the elderly and can be drug interactions, inefficacy of treatment, adverse drug reactions, prescription errors but also non-compliance 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-centred care, are used interchangeably [1]. Street & 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 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 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, 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 (Appendix S1). 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

Table 1

Levels of patient involvement in health care consultations

Patient desired level	Patient determined	Co-determined (<i>participation</i>)	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 [7]. Reprinted from *Social Science & Medicine*, Vol. 64, AGH Thompson, 'The meaning of patient involvement and participation in health care consultations: A taxonomy', Pages 1297–1310, Copyright 2007, with permission from Elsevier.

Box 1. In addition, the references from all included articles were also examined for relevant articles.

Box 1

Inclusion and exclusion criteria

<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Original research AND; • Medication review with any type of patient participation AND; • Adult or elderly population.
<p>Exclusion criteria</p> <ul style="list-style-type: none"> • No original research, editorials, letter to the editors, comments, conference abstracts; • Single case studies; • Study design articles, without any results; • Medication review without any type of patient participation, care in which the patient does not give any information and is not involved at all; • Insufficient description of the patient participation, unable to define the level by Thompson [7] • Child or adolescent population; • Studies in the palliative care setting. • Articles in other languages than English or Dutch

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 health care professional by the patient or his carer [7].

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 1257 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 inclusion and exclusion criteria. After screening all titles and abstracts,

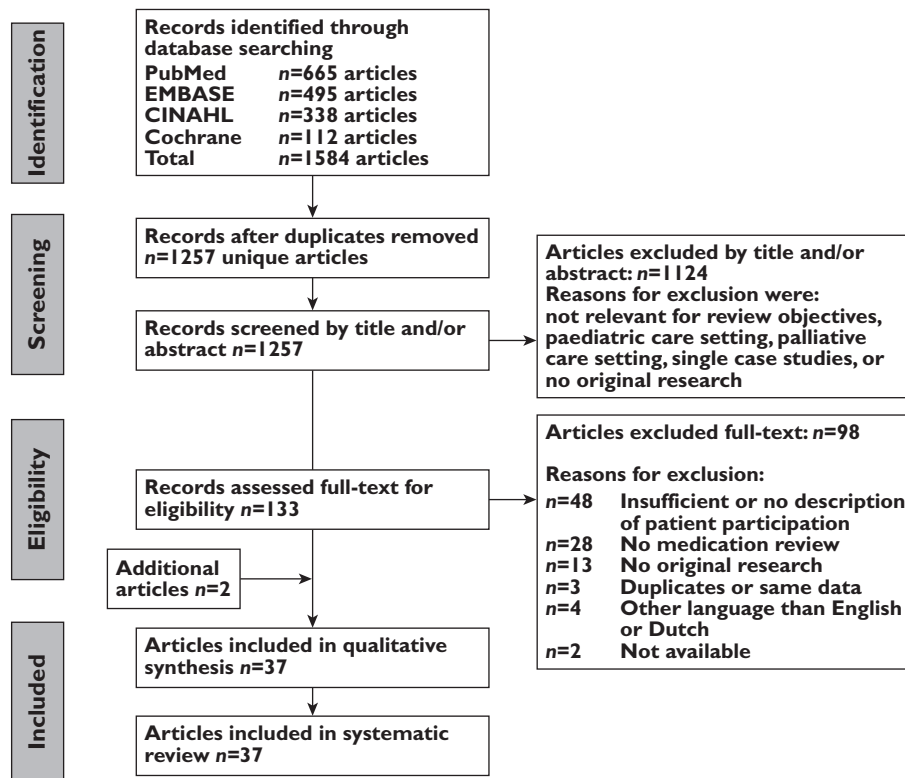


Figure 1

Flow diagram of selection process

Box 2

Checklists for quality assessment

- 1. Checklist for description and evaluation of patient participation:** Qualitative assessment on adequacy of the description of patient participation and evaluation of patient participation. The following questions were included in the checklist, which consisted of two sub ratings; description and evaluation of patient participation.

 1. Description of patient participation
 - 1.1 Is there sufficient information to derive a level of participation?
 - 1.2 Is there information on type of communication?
 - 1.3 Is there information on which health care professional is involved?
 2. Evaluation of patient participation
 - 2.1 The study describes how often patient participation is carried out according to protocol
 - 2.2 The study evaluated the health care professional-patient communication
 - 2.3 The study evaluated the patient input in the medication review
 - 2.4 Information on time consumption of the patient participation
 - 2.5 Information on the costs of patient participation
 - 2.6 Information on other evaluation topics of patient participation

Explanation and exact interpretation of all questions were discussed among the reviewers. Weak, moderate and strong ratings were assigned to the articles based on the sub ratings. In total, all 30 quantitative articles were assessed with this checklist.
- 2. Checklist for quantitative studies:** Methodological quality of studies on the effects of patient participation. This checklist is based on the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool [63]. This tool has been judged suitable to be used in systematic literature reviews of effectiveness, had fair inter-rater agreement in individual domain scoring and excellent agreement in final grade assigned to among raters and has been reported to have content and construct validity [64]. The questions on blinding were not applicable for this topic. Nine articles were assessed with this checklist.
- 3. Checklist for qualitative studies:** Methodological quality of studies on the evaluation of patient participation. This checklist is based on the detailed questions of the CASP qualitative checklist. The CASP checklists have been evaluated, pilot tested in workshops, including feedback and review of materials, using successively broader audiences. Weak, moderate and strong ratings were assigned based on the number of 'yes answers' [65]. Seven qualitative articles were assessed with this checklist.

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 inclusion 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) both assessed 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 minimal adaptations, to assess the quality of the article. Three checklists were 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 10 articles by the reviewers and differences in assessment were discussed. Disagreements in final ratings were discussed with a fourth reviewer (FGS).

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 [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 analyzed 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 [17–53]. All studies described medication reviews, but none of the studies was a randomized controlled trial (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 were mainly from the USA and Australia. Almost all studies were carried out in the 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 were 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 health care professional. The time investment ranged between 15–90 min per patient.

Information exchange between patient and health care 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.

Health care professionals counselled 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 [23, 24, 27, 30, 37, 48]. Several studies carried out a satisfaction survey among patients who participated in medication review programmes. The majority of the patients were satisfied with the review services and indicated to have increased knowledge and were able to ask questions about their medications. Two British qualitative studies [38, 48] observed that patients were not actively involved in the consultations with pharmacists for their medication review and asked very few questions. Furthermore, in three qualitative studies [40, 42, 52], 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) [20, 26, 27, 29–31, 39, 49, 50]. Of all DRPs identified, 27% to 73% were found as a result of a patient interview. Many of these problems would not have been identified if only medication or medical records were

Table 2

General characteristics of the included publications

Reference	Study design	Patient characteristics	Setting	MR carried out by
Leendertse <i>et al.</i> [33]	Open controlled	674 elderly, using ≥5 drugs, at risk for hospital admission	Home dwelling in primary care	Pharmacists and GPs
Kilcup <i>et al.</i> [28]	Retrospective	494 elderly, at risk for hospital readmission	Home dwelling recently discharged from hospital	Pharmacists
Olsson <i>et al.</i> [39]	Randomized controlled	150 elderly, using ≥5 drugs	Home dwelling recently discharged from hospital	GPs
Akazawa <i>et al.</i> [17]	Prospective intervention	508 elderly	Home dwelling	Pharmacists
Kwint <i>et al.</i> [30]	Cross-sectional	155 elderly, using ≥5 drugs	Home dwelling visiting community pharmacists	Pharmacists and GPs
Elliot <i>et al.</i> [19]	Prospective randomized	80 elderly, using ≥2 drugs	Home dwelling referred to Aged Care Assessment Teams	Pharmacists or GPs
Willoch <i>et al.</i> [50]	Prospective randomized	77 elderly rehabilitation patients, using ≥3 drugs	Patients admitted to a rehabilitation ward	Clinical pharmacist
Stewart <i>et al.</i> [47]	Observational case series	219 adults	Ambulatory care patients	Pharmacists
Swain [48]	Prospective case series	56 elderly neurological patients	Ambulatory neurologic patients	Pharmacists
Sheridan <i>et al.</i> [45]	Qualitative	27 patients with ≥1 risk factors for drug problems	Independently living patients	Pharmacists
Lam [31]	Cross-sectional	43 adults and elderly, with ≥1 chronic disease, using ≥4 drugs	Patients in an on-going RCT in pharmacies	Pharmacists
Niquille <i>et al.</i> [38]	Cross-sectional	85 elderly cardiovascular patients, using ≥1 cardiovascular drugs	Home dwelling outpatients visiting community pharmacies	Pharmacists
Granas <i>et al.</i> [21]	Retrospective evaluation	73 elderly, using ≥2 diabetic type II drugs	Diabetic type II patients visiting the pharmacy	Pharmacist
Hernandez <i>et al.</i> [24]	Observational	35 middle-aged and elderly heart transplantation patients	Hospitalized heart transplantation patients	Pharmacist
Hugtenburg <i>et al.</i> [25]	Controlled intervention	715 elderly, using ≥5 drugs	Patients discharged from hospital	Pharmacists
Karapinar-Carkit <i>et al.</i> [27]	Prospective observational	262 pulmonology patients, using ≥1 drugs	Patients discharged from the pulmonology ward	Pharmacists
Pindolia <i>et al.</i> [41]	Retrospective analysis	520 elderly, ≥2 chronic diseases, using ≥2 drugs	Primary care	Pharmacists
Latif <i>et al.</i> [32]	Qualitative	Purposeful sample of 54 adult and elderly	Patients counselled at community pharmacies	Pharmacists
Mouly <i>et al.</i> [34]	Cross-sectional	30 elderly, 60% is using ≥7 drugs	Patients identified for medication management services	Pharmacists
Bissell <i>et al.</i> [52]	Qualitative	49 coronary heart disease patients	General practice patients recruited within an RCT	Pharmacists
MEDMAN [53]	Randomized controlled	1493 coronary heart disease patients	General practice patients	Pharmacists
Salter <i>et al.</i> [42]	Qualitative	29 elderly	Hospitalized patients recruited within an RCT	Pharmacists
Nguyen <i>et al.</i> [37]	Prospective uncontrolled	24 elderly, ≥1 risk factor for medication misadventure	Patients discharged from hospital	Pharmacists
Viktil <i>et al.</i> [49]	Prospective multicentre	96 hospitalized elderly, using mean 4.7 drugs	Hospitalized patients; internal medicine and rheumatology	Pharmacists
Sorensen <i>et al.</i> [21]	Randomized controlled	400 patients with ≥1 risk factor for inappropriate medication use	Community dwelling patients (rural and urban)	Pharmacists and GPs
Griffiths <i>et al.</i> [22]	Pre-post test + cross-sectional	24 elderly; diminished knowledge/management of medication	Patients receiving regular community nursing care	Community nurses
Petty <i>et al.</i> [40]	Qualitative	18 elderly, using mean 5.5 drugs	Ambulatory patients attending a medicine review clinic	Pharmacists
Naunton <i>et al.</i> [36]	Randomized controlled	121 elderly, using ≥4 drugs	Discharged from hospital	Pharmacists
Gilbert <i>et al.</i> [20]	Implementation trial	1000 patients at risk for DRPs	Community dwelling patients identified by GPs	Pharmacists and GPs
Zermansky <i>et al.</i> [51]	Randomized controlled	1188 elderly using ≥1 drugs	Community dwelling patients visiting GPs	Pharmacists
Jameson <i>et al.</i> [26]	Randomized controlled	168 patients, using ≥5 drugs	Ambulatory care patients	Pharmacists and GPs
Krska <i>et al.</i> [29]	Randomized controlled	332 elderly, with ≥2 chronic diseases, using ≥4 drugs	Ambulatory care patients	Pharmacists
Sellers <i>et al.</i> [44]	Randomized controlled	132 elderly, using ≥4 drugs	Patients visiting GPs	Pharmacists
Grymonpre <i>et al.</i> [23]	Prospective randomized controlled	135 elderly, using ≥2 drugs	Community dwelling ambulatory care patients	Pharmacists
Chen <i>et al.</i> [18]	Qualitative	25 patients referred for medication review	Patients from community pharmacies and GPs	Pharmacists
Nathan <i>et al.</i> [35]	Qualitative	20 elderly or middle-aged, using long term medication	Patients who had 3–9 months ago a medication review	Pharmacists
Schneider <i>et al.</i> [43]	Prospective uncontrolled and qualitative	39 elderly, using mean 6 drugs	Housebound patients, referred by GP	Pharmacists

DRP, drug related problem; GP, general practitioner; MR, medication review; RCT, randomized controlled trial.

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 <i>et al.</i> [33]	Interview by pharmacist, follow-up of plan by GP and follow-up in time by pharmacist	<ul style="list-style-type: none"> 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 plan	–	Moderate
Klicup <i>et al.</i> [28]	Telephone interview with pharmacist	<ul style="list-style-type: none"> Actual drug use Unexplained discrepancies Drug related problems 	Opportunity to ask questions on: <ul style="list-style-type: none"> understanding of medication how medication intended to work common safety concerns how to take medication as intended 	–	Moderate
Olsson <i>et al.</i> [39]	Home visit by study nurse	<ul style="list-style-type: none"> Actual drug use Compliance 	Written drug regimen was provided to enable patient participation	–	Weak
Akazawa <i>et al.</i> [17]	Visit at pharmacy (brown bag method)	<ul style="list-style-type: none"> Actual drug use Reason for choosing OTCs Adherence Storage 	<ul style="list-style-type: none"> Appropriate feedback Potential safety issues 	<ul style="list-style-type: none"> >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 <i>et al.</i> [30]	Home-visit by community pharmacist	<ul style="list-style-type: none"> Actual drug use 	Not described	–	Strong
Elliot <i>et al.</i> [19]	Home-visit by clinical pharmacist or GP	<ul style="list-style-type: none"> Actual drug use 	Not described	<ul style="list-style-type: none"> Pharmacist home visit is more feasible than by GP Satisfied patients with home-visit 	Strong
Willoch <i>et al.</i> [50]	Interview with standardized form during hospital stay and follow-up home visit by clinical pharmacist	<ul style="list-style-type: none"> Actual drug use Medication knowledge Adverse drug effects Efficacy Post-discharge effects 	Targeted counselling talk on medications and medication changes by pharmacist	–	Moderate
Stewart <i>et al.</i> [47]	Interview at care centre by (student)-pharmacist	<ul style="list-style-type: none"> Actual drug use 	Not described	–	Weak
Swain [48]	Interview at clinic by pharmacist	<ul style="list-style-type: none"> Actual drug use 	Education and counselling on medication while ensuring safety and effectiveness	<ul style="list-style-type: none"> 97% of patients was satisfied with consult Time: interview mean 38 min	Moderate
Lam [31]	Web-cam enabled video-conferencing by pharmacist	<ul style="list-style-type: none"> Actual drug use Awareness of treatment goals Perception of disease control and health care needs Adherence (questionnaire) 	<ul style="list-style-type: none"> Answering of questions Patient-centred education Medication and life style recommendations Instructions and confirmation of understanding 	<ul style="list-style-type: none"> 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

Table 3
Continued

Reference	Type of communication and by whom	Information given by patient to professional	Consultation by professional	Evaluation of patient participation	Quality assessment
Niquille <i>et al.</i> [38]	Interview at the pharmacy by community pharmacist	<ul style="list-style-type: none"> Medication experiences Medication knowledge/skills Adherence Attitude towards prevention Actual drug use Compliance issues 	Not described	–	Weak
Granás <i>et al.</i> [21]	Interview at the pharmacy by community pharmacist	<ul style="list-style-type: none"> Actual drug use Compliance issues 	Medication advice on paper form	<ul style="list-style-type: none"> 98% of patients said they benefited from the review Time: median consultation 60 min 	Moderate
Hernandez <i>et al.</i> [24]	Interview in hospital with standardized service questionnaire by hospital pharmacist	<ul style="list-style-type: none"> Actual drug use Adherence Possible allergies Adverse drug effects 	<ul style="list-style-type: none"> Printed: prescription, schedule, indications, (contra-) interactions, ADE Drugs and usage recommendations (knowledge of disease, treatment and ADE) 	<ul style="list-style-type: none"> All respondents could ask (almost) all questions All respondents rated the treatment as (very) good Time: counselling mean 26 min 	Moderate
Hugtenburg <i>et al.</i> [25]	Counsel at home, in pharmacy or by phone by pharmacist	<ul style="list-style-type: none"> Actual drug use 	<ul style="list-style-type: none"> Printed: daily medication intake scheme Counseling Education 	40% of the patients mentioned a medication problem or raised questions	Moderate
Karapinar-Carkit <i>et al.</i> [27]	Counselling at discharge by pharmaceutical consultants	<ul style="list-style-type: none"> Actual drug use Considering continuing need Practical problems Adverse drug effects Forgetting of medication 	Education	–	Moderate
Pindolia <i>et al.</i> [41]	Telephone contact by pharmacist and/or GP	<ul style="list-style-type: none"> Actual drug use Determine health goals Concerns about treatment 	<ul style="list-style-type: none"> Explain the drug change(s) In-depth counselling on medications/health necessary education Follow-up instructions (laboratory, GP visit, drugs) 	<ul style="list-style-type: none"> 90% found the telephone discussion convenient and were provided with the necessary education Time: 2.5 h/patient, mainly by pharmacist 	Strong
Moultry <i>et al.</i> [34]	Home-visit by consultant pharmacist	<ul style="list-style-type: none"> Actual drug use Medical history (self-reported) Allergies Adverse effects 	<ul style="list-style-type: none"> Drug information (verbally and written) Action plan Emergency medication kit and education 	<ul style="list-style-type: none"> Almost all patients were satisfied or somewhat satisfied with the service All patient felt more knowledgeable after home visit Time: Home visit: 15–60 min 	Moderate
MEDMAN [53]	Consultation according to pharmacist-determined patient need	<ul style="list-style-type: none"> Actual drug use Compliance Lifestyle and social support 	Not described	Not described	Weak
Nguyen <i>et al.</i> [37]	Home visit 2 days after discharge by pharmacist	<ul style="list-style-type: none"> Actual drug use Medication knowledge 	Education on medication knowledge	In 7398 of identified DRPs the information given by the patient was new to the GP	Weak

Viktil <i>et al.</i> [49]	Interview at hospital by pharmacist	<ul style="list-style-type: none"> Actual drug use Medication handling (adherence, knowledge, practical, efficacy) 	Not described	<ul style="list-style-type: none"> Only 50% of intended interviews were conducted. Feasibility was difficult. Time: Interview mean 20.3 min (range 5–60 min) 	Moderate
Sorensen <i>et al.</i> [46]	Home visit by pharmacist and consult with GP	<ul style="list-style-type: none"> Actual drug use 	Not described	–	Moderate
Griffiths <i>et al.</i> [22]	Interview at unknown location by community nurse	<ul style="list-style-type: none"> Actual drug use Allergies Side effects 	<ul style="list-style-type: none"> Educational support (Medlist) Compliance aid support. 	–	Moderate
Naunton <i>et al.</i> [36]	Home visit 5 days after discharge by pharmacist	<ul style="list-style-type: none"> Adherence Information to identify DRPs 	<ul style="list-style-type: none"> Education (medications and compliance) Compliance devices, when needed 	<ul style="list-style-type: none"> 94% were satisfied with the home visit Time: visit median 50 min 	Moderate
Gilbert <i>et al.</i> [20]	Home visit by community pharmacist and follow-up by GP	<ul style="list-style-type: none"> Actual drug use Knowledge on medication Demonstration of administration devices 	<ul style="list-style-type: none"> Dosing instructions Education Assisted with dose administration Informed choice is mentioned 	<ul style="list-style-type: none"> In 31 cases the patient refused to follow-up the advice on which the GP and pharmacist agreed upon 	Moderate
Zermansky <i>et al.</i> [51]	Home visit community pharmacist and follow-up by GP	<ul style="list-style-type: none"> Actual drug use Confirm indications still valid Adherence Unaddressed problems 	Not described, however negotiation with the patient is mentioned in the methods	<ul style="list-style-type: none"> Time: mean 20 min for pharmacist 	Strong
Jameson <i>et al.</i> [26]	1. telephone questionnaire 2. Interview in GP office by GP 3. Counselling by GP	<ul style="list-style-type: none"> Actual drug use Understanding of medication 	<ul style="list-style-type: none"> Explain drug changes Counselling or instructions on medication and lifestyle, when needed 	<ul style="list-style-type: none"> 70% of consult group patients said that they benefited from the consult Time: Face-to-face interviews: 45–60 min 	Strong
Kraska <i>et al.</i> [29]	Home visit by pharmacist	<ul style="list-style-type: none"> Actual drug use Effectiveness 	Not described	–	Moderate
Sellers <i>et al.</i> [44]	Interview at GP office by pharmacist	<ul style="list-style-type: none"> Actual drug use Adherence (questionnaire) 	Not described	–	Moderate
Grymonpre <i>et al.</i> [23]	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 <i>et al.</i> [43]	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.

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 <i>et al.</i> [45]	Interview in pharmacy by pharmacist	<ul style="list-style-type: none"> • Actual drug use • Adherence • Side effects • Effectiveness • Storage • Use of equipment 	Education	<ul style="list-style-type: none"> • 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–1 h • 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
Latif <i>et al.</i> [32]	Home visits by pharmacist	<ul style="list-style-type: none"> • Actual drug use • Medication knowledge 	Education	<ul style="list-style-type: none"> • 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
Bissel <i>et al.</i> [52]	Consultation with pharmacist	<ul style="list-style-type: none"> • Actual drug use • Compliance • Lifestyle and social support 	Not described	<ul style="list-style-type: none"> • 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
Salter <i>et al.</i> [42]	Home visits by pharmacist	<ul style="list-style-type: none"> • Actual drug use 	Advice, information, and instruction on medicines	<ul style="list-style-type: none"> • Some patients welcomed the opportunity to have questions answered • Health care professionals must judge who needs more detailed information and who does not • Not everybody accepted the advice given by the pharmacist • Better understanding of patient's perspective, would facilitate concordance • Consultation duration ranged from 15–90 min 	Strong
Petty <i>et al.</i> [40]	Interview in clinic by clinical pharmacist	<ul style="list-style-type: none"> • Actual drug use • Medication issues 	Explanation, not further defined	<ul style="list-style-type: none"> • 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 	Moderate
Chen <i>et al.</i> [18]	Interview in pharmacy by clinical pharmacist	<ul style="list-style-type: none"> • Effectiveness perception • Side effects • Adherence 	Not described		
Nathan <i>et al.</i> [35]	Interview in pharmacy by pharmacist	<ul style="list-style-type: none"> • Actual drug use 	Not described		

OTC, over the counter medicines; MUR, medication use review.

Table 5

Effectiveness of patient participation in medication reviews – quantitative studies

Reference	Type of patient participation	Outcomes	Quality assessment
Olsson <i>et al.</i> [39]	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 of causing trouble	Weak
Kwint <i>et al.</i> [30]	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 <i>et al.</i> [50]	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 were related to patient knowledge and skills (derived from home visit)	Weak
Lam [31]	Information giving through web-cam enabled video-conferencing on actual drug use, awareness of treatment goals and adherence	The 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 <i>et al.</i> [27]	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 <i>et al.</i> [49]	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 the interviewed group vs. the non-interviewed group	Moderate
Gilbert <i>et al.</i> [20]	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 <i>et al.</i> [26]	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 <i>et al.</i> [29]	Information giving on actual drug use and effectiveness during home-visit by pharmacists.	PCIs were identified in 29.4% of the cases during the patient interview. Of all the PCIs, 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.

used. In two Dutch studies [27, 30], 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 [21, 23, 24, 37]. However, these results are not included in this literature review to answer the effects of research questions, because it was not described how and if patients' 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 participate 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 [39].

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 vs. less specific, general polypharmacy or multi-morbidity patients.

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 counselled 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 that they were satisfied with the patient participation. Some studies suggested increased medication knowledge and patients' understanding.

The effects of patient participation are hardly studied and poorly described in the current literature. We found no evidence that 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, counselling 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 patient satisfaction, increased medication knowledge and patient 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, 10, 11]. However, guideline recommendations to involve patients are not based on evidence but on prevailing societal considerations and expert opinions [11]. Apparently, there is a discrepancy between patient centredness and evidence-based care. Patient participation is a concept that already arises from the 1960s, 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' [54]. 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 has been questioned before [55, 56].

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 health care 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 min for patient interviews aimed only to inform caregivers on actual drug use and experiences.

As compared with younger patients, the elderly are known to participate less in care and self-management and have different preferences for involvement and decision making [57]. This literature review consisted of studies almost solely in elderly subjects, which are 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 [56, 58–60]. 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, hospitalization and mortality of medication reviews themselves is limited [61]. Patient participation in consultations has been suggested to improve, for example, 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. Other in-between combinations may be applicable. However others also recognize that labelling these would not be very useful since one always deals with specific situational contexts [62]. 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 the specific contribution of patient participation on treatment outcomes. To study whether, for example, 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 & 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, the vulnerable elderly, do 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 health care, 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 topics 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 patient 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 patient outcomes and is not always needed in this type of decision. 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.

Author contributions

FW, JGH, FGS and PJME designed the study and research questions. FW and PJME performed the title and abstract screening and FW performed the full text selection. FW, JGH, FGS and PJME performed the quality assessment and FW carried out the data extraction. FW, JGH, FGS and PJME prepared the manuscript.

Competing Interests

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 organizations that might have an interest in the submitted work in the previous 3 years and no other relationships or activities that could appear to have influenced the submitted work.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1

PubMed search strategy