

## REVIEW

# Effectiveness of medication reviews in identifying and reducing medication-related problems among people with intellectual disabilities: A systematic review

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## Abstract

**Background:** Polypharmacy is common in people with intellectual disabilities. Using multiple medication may lead to unintended medication-related problems (MRPs). Medication review may serve as a tool to reduce MRPs. This systematic review assessed the scientific evidence for the effectiveness of medication reviews in identifying and reducing MRPs in people with intellectual disabilities.

**Method:** Literature databases were searched up to August 2017. Studies were selected that included the effect of medication reviews on identifying and/or reducing MRPs in people with intellectual disabilities with no restriction of type of medication, age and level of intellectual disabilities.

**Results:** The eight studies that fulfilled the inclusion criteria report that systematic medication reviews appear to assist in the identification and reduction of MRPs.

**Conclusion:** There is a lack of studies about the effect of medication reviews on identification and reduction of MRPs, especially health outcomes for people with intellectual disabilities. Further studies with long-term follow-up are needed.

## KEYWORDS

intellectual disabilities, medication review, medication-related problems, polypharmacy

## 1 | BACKGROUND

Intellectual disability is characterized by deficits in intellectual (IQ <70) and adaptive functioning presenting before 18 years of age, and has multiple aetiologies (American Psychiatric Association, 2013). People with intellectual disabilities have an increased risk of developing chronic somatic, psychiatric and psychological disorders (Häppler, Thome, & Reis, 2015), and often have multiple health conditions. As a result, a combination of medications is used over a long period of time to treat these different conditions.

Polypharmacy, defined as the concurrent use of five or more medications (Stortz, Lake, Cobigo, Ouellette-Kuntz, & Lunskey, 2014), is common among people with intellectual disabilities. A recent large-scale Dutch study, the "Healthy Ageing and Intellectual Disability" (HA-ID) study (Evenhuis & Hermans, 2012), reported polypharmacy in 40% of people with intellectual disabilities aged 50 years or over. A literature review in 2014 (Stortz et al., 2014) described the prevalence of polypharmacy among elderly people with intellectual disabilities, ranging from 11% to 60%, depending on the selection of the study sample. The prevalence of polypharmacy has been reported to be higher for people with intellectual disabilities living in residential

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settings compared to those living in the community, independently, or with family (McCarron et al., 2011).

Polypharmacy increases the risk of medication prescription errors (Zaal, Kaaij, Evenhuis, & Bemt, 2013) and inappropriate medication prescribing (prescribing medications that pose more risk than potential benefits; Beers, 1997). In addition, medication may have potential side effects and interactions with other medications used (Scheifes, Egberts, Stolker, Nijman, & Heerdink, 2016; Stortz et al., 2014). Therefore, with polypharmacy, the chance for medication-related problems (MRPs) is higher (Clyne, Bradley, Hughes, Fahey, & Lapane, 2012). According to the Pharmaceutical Care Network (PCNE), an MRP is "an event or circumstance involving medication therapy that actually or potentially interferes with desired health outcomes" (Pharmaceutical Care Network Europe, 2017). Studies (Leendertse, Egberts, Stoker, van den Bemt, & HARM Study Group, 2008; Passarelli, Jacob-Filho, & Figueras, 2005) found an increased risk of medication-related hospital admissions in elderly patients as a consequence of inappropriate medication prescribing, and nearly half of those cases would have been amenable (Leendertse et al., 2008). Polypharmacy can lead to increased mortality in the elderly living at home (Jyrkka, Enlund, Korhonen, Sulkava, & Hartikainen, 2009; Roberts et al., 2001) and among people in nursing homes (Onder et al., 2013). MRPs were frequently seen in people with intellectual disabilities with polypharmacy, and they have been found to be more prevalent with increasing age (Haider, Ansari, Vaughan, Matters, & Emerson, 2014). Polypharmacy has also been found to be a strong predictor for mortality in older adults with intellectual disabilities over a 5-year follow-up period (Schoufour et al., 2018).

Systematic medication reviews have been introduced as a procedure to optimize medication use and reduce MRPs. The used definition of a medication review is "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, minimizing the number of MRPs and reducing waste" (Shaw, Seal, & Pilling, 2002). Studies including elderly patients with polypharmacy showed that MRPs were reduced through identification by medication reviews and starting an alternate medication regime based on that (Holland et al., 2008; Lenander, Elfsson, Danielsson, Midlov, & Hasselstrom, 2014; Vinks, Egberts, Lange, & Koning, 2009).

Medication reviews are often performed by a multidisciplinary team including a medical doctor and pharmacist (Bell, McLachlan, Aslani, Whitehead, & Chen, 2005; Costa et al., 2015; Gallagher et al., 2011; Holland et al., 2008; Lenander et al., 2014; Liu et al., 2012; Rubio-Valera, Chen, & O'Reilly, 2014; Vinks et al., 2009; Wolf et al., 2015). It has been found that the multidisciplinary structured medication reviews that included a pharmacist improved the appropriateness of therapy and medication safety in psychiatric patients (Rubio-Valera et al., 2014; Wolf et al., 2015) in comparison with medication reviews without a pharmacist.

A recent narrative review (O'Dwyer, Mestrovic, & Henman, 2015) for people with intellectual disabilities explored the role and contribution of pharmacists to the care of people with intellectual disabilities as part of multidisciplinary teams. The authors suggested

that pharmacists have a positive contribution to the medication review team, but limited published evidence to support this notion is available.

In elderly patients with polypharmacy (Holland et al., 2008; Lenander et al., 2014; Vinks et al., 2009) and in psychiatric patients (Rubio-Valera et al., 2014; Wolf et al., 2015), medication reviews have identified MRPs, and with the proposed drug adaptations MRPs decreased. However, the effect of medication reviews for people with intellectual disabilities and polypharmacy is still unknown. This systematic review was performed to assess the effectiveness of medication reviews in identifying and reducing MRPs among people with intellectual disabilities.

## 2 | METHODS

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement was used as the basis for this systematic review (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009).

### 2.1 | Search method

A comprehensive literature search of the electronic library databases PubMed, MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Cochrane Library, Google Scholar and Web of Science was performed. These databases were searched until August 2017. Search terms used for each database included: "learning disabilities," "intellectual disabilities," "mental retardation," "developmental disabilities," "learning difficulties" and "pharmacist intervention," "medication review," "drug use utilization." Subject headings and truncated keywords related to pharmacy and medication management were used (See Appendix 1 for the full search strategy). Search strategies did not employ any restriction in time (year) of publication or study design. To identify as many studies as possible, the PubMed and EMBASE function "similar studies" was used. And the reference lists of included studies were screened.

### 2.2 | Selection of studies

#### 2.2.1 | Eligibility criteria

The following inclusion and exclusion criteria were employed.

##### Inclusion criteria

- Study sample with participants with intellectual disabilities, no restrictions on levels of intellectual disabilities, ages and gender.
- Study sample with participants who used medications for chronic conditions.
- Published in English or Dutch.
- Studies regarding the effect of pharmacist-led medication reviews and/or clinical/general physician-led medication reviews on identifying and/or reducing MRPs.

- Studies regarding comprehensive medication reviews of all medications or limited to certain medication groups were both included.

### Exclusion criteria

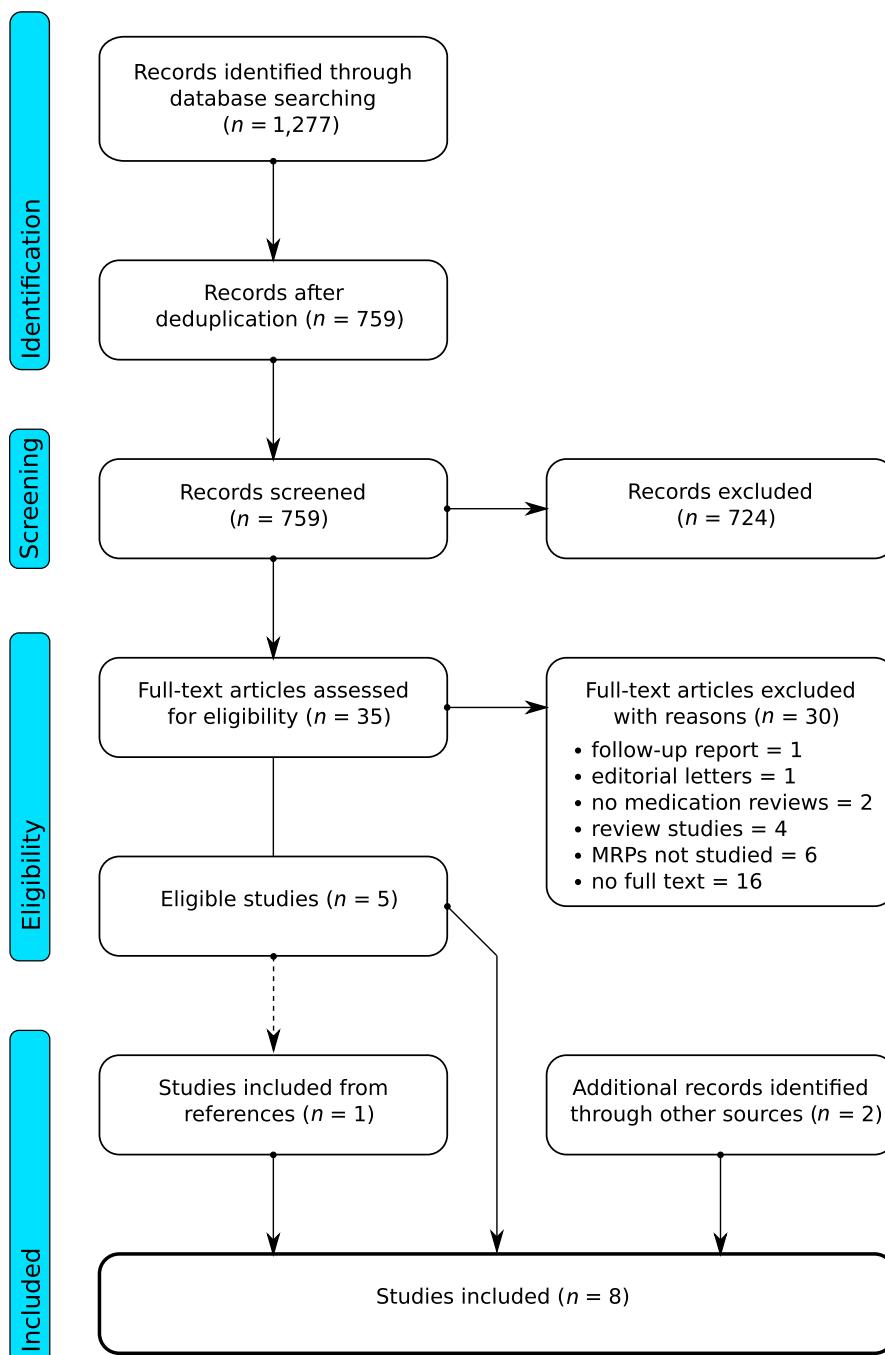
- Reviews, editorial letters, comments.
- No full text available.

Titles and abstracts were screened independently by two authors (AN and FB) for eligibility and relevance, and selected for full-text reading. Full text of the potential eligible studies was read using the inclusion and exclusion criteria mentioned above after which a decision was

made regarding inclusion. Disagreement between the two authors was resolved via a consensus discussion.

### 2.3 | Quality assessment

The Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (Kmet, Lee, & Cook, 2004) was used to assess the quality of the included studies. This tool contains quality criteria for both quantitative and qualitative studies. In this tool, quality is defined as “the extent to which the design, conduct and analyses minimized errors and biases.” The quality of all studies was independently assessed by two authors (AN and FB).



**FIGURE 1** Flow diagram of study selection process [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE 1** Characteristics of the studies included in the review (*n* = 8)

Author (year), country	Study aim	Study design	Sample size, age and level of intellectual disabilities	Medication review team	Type of medication reviewed	Outcome measures	Results	Conclusions
Berchou (1982), USA	To examine the effect of a multidisciplinary approach on medication use	Prospective longitudinal	<i>N</i> = 1764 Age: all ages Level of intellectual disabilities: all levels of intellectual disabilities	Physicians, nursing staff, clinical pharmacist	Antipsychotics, anticonvulsants, anxiolytics, long-term maintenance medications and combinations of the above	The mean dose of psychopharmaca, anticonvulsants and long-term medications determined twice, with a one-year interval	After intervention, polypharmacy decreased, significant increase in single medication therapy for antipsychotics (75%), and decrease in long-term medication therapy from 76% to 59%	Multidisciplinary medication reviews with a pharmacist can identify medication without indication and reduce MRPs
Hancock et al. (1991), USA	To determine changes in psychotropic agents utilization over 10-year period	Retrospective longitudinal	<i>N</i> = 139 Age: adults Level of intellectual disabilities: all levels of intellectual disabilities	Multidisciplinary treatment team including a pharmacist.	Psychotropic and anticonvulsant medications prescribed for behavioural problems.	The mean dose of psychopharmaca and anticonvulsants determined over a period of 10 years.	After intervention, 73% of psychopharmaca without indication were discontinued, psychopharmaca medication usage was decreased from 30% to 12%.	Continuous multidisciplinary medication reviews can have a positive impact on minimizing MRPs and off-label prescribing.
McKee (1994), USA	To determine the impact of medication reviews on medication regimen in a care facility for people with intellectual disabilities	Prospective longitudinal	<i>N</i> = 446 Age: all ages Level: all levels of intellectual disabilities	Multidisciplinary team: nurse pharmacist, physicians	All medication regimens	Client medication regimen, indication schedule of administration, appropriate medication therapy monitoring, MRPs and pharmacy costs	After intervention, medication doses per client day decreased from 16.1 to 9.8, potential MRPs decreased, saving nursing time (1.057 hr each month) and reduced pharmacy costs by 18.3%	Multidisciplinary medication review can reduce MRPs and pharmacy costs
Brašić et al. (2000), USA	To develop a procedure to improve the quality of psychoactive medication use	Descriptive	<i>N</i> = 767 Age: all ages Level: all levels of intellectual disabilities	Pharmacist, clinical reviewer, neurologist and psychiatrist	Psychoactive medications	Daily dose of psychopharmaca and MRPs	Medication dosage survey reduced medication errors (MRP), 5 doses of 395 appeared unusual	Medication reviews can identify MRPs and improve the quality of psychoactive medication use

(Continues)

**TABLE 1** (Continued)

Author (year), country	Study aim	Study design	Sample size, age and level of intellectual disabilities	Medication review team	Type of medication reviewed	Outcome measures	Results	Conclusions
Zaal et al. (2013), the Netherlands	To determine the prevalence of prescription errors in older adults with intellectual disabilities, and identify potential risk factors for these prescription errors	Cross-sectional	N = 600 Age: ≥50 years Level of intellectual disabilities: all levels	Hospital pharmacist, clinical pharmacist and Master's student pharmacy	All medication regimens	Prescription errors: dosage errors, unnecessary medication therapy, interaction, contraindication, (pseudo) duplication therapy, lack of monitoring	47.5% of the clients had one or more prescription errors, 26.8% required a change of pharmacotherapy	Higher age, less severe intellectual disabilities and polypharmacy showed a significant association with both all prescription errors and relevant errors. Higher BMI and frailty index were associated with all prescription errors (MRPs)
Thomsen et al. (2014), Denmark	To increase medication safety	Explorative pilot	N = 47 Age: all ages Level of intellectual disabilities: all levels with mental illness and persons with physical and/or intellectual disabilities	Multidisciplinary team: including caregivers, a pharmacist and if possible the client	All medication regimens	Performance/efficacy of the medication care service: Number of medication reviews, number of dialogues with the team of health care, identified MRPs and reduction of MRPs	Sixty-six MRPs were identified. AMRs were the most frequent problems (32%), followed by improper medication selection (18%), subtherapeutic dosage (18%) and inappropriate medication (10%)	Medication reviews can identify and reduce MRPs
Scheifes et al. (2016), the Netherlands	To examine the effects of structured medication reviews on improving psychopharmacotherapy	Descriptive	N = 55 Age: adults Level of intellectual disabilities: mild to borderline intellectual disabilities	Nurse, psychiatrist and pharmacist	All medication regimens	MRPs: duplication, outdated medication, lack of indication, contraindication, interaction, inappropriate dosage, frequency, inappropriate monitoring, non-adherence, unclear utilization information	Of 284 medication over a 3-month period, 34% had MRPs. Medication reviews formulated 102 actions of which 57% were executed. This study did not look at health outcomes after the execution of the recommendations	The structured medication reviews can identify and reduce MRPs

(Continues)

**TABLE 1** (Continued)

Author (year), country	Study aim	Study design	Sample size, age and level of intellectual disabilities	Medication review team	Type of medication reviewed	Outcome measures	Results	Conclusions
Zaal et al. (2016), Netherlands	To assess the effect of annual medication reviews on identifying and reducing MRPs	Explorative pilot	N = 27 Age: adults Level of intellectual disabilities: all levels with intellectual disabilities	Pharmacist, intellectual disabilities-physician, caregivers	All medication regimens	The number and type of identified MRPs using the STRIP method	127 MRPs were identified. After the recommended interventions based on the medication reviews, 15.7% of these MRPs had been partially or completely corrected	Medication review using the STRIP method can be used in adults with an intellectual disabilities to identify and reduce MRPs

Note. ICF/MR: intermediates care facility/mental retardation; MRPs: medication-related problems; AMRs: adverse medication reaction.

The individual criteria were scored with a 2 for “yes,” 1 for “partial” and 0 for “no.” The sum of the scores on the applicable criteria divided by the maximum possible score on the applicable criteria gave the relative ranking of the study in the range 0–1 (low to high quality). Disagreement was resolved in a consensus discussion.

## 2.4 | Data extraction

The first author (AN) extracted the data from all included studies. Extracted data included information regarding the aim, study design, study population, type of medication review and outcome measures.

## 3 | RESULTS

### 3.1 | Search and selection strategy

A total of 1,277 studies were identified through the literature search. After deduplication, 759 studies remained, of which 35 were selected based on title and abstract. Of these 35 studies, 30 were excluded based on the exclusion criteria (review studies, MRPs not studied, editorial letters or not available in full text). Five studies were included (Brašić, Furman, Conte, Baisley, & Jaslow, 2000; McKee, 1994; Scheifes et al., 2016; Thomsen, Rossing, Trier, Faber, & Herborg, 2014; Zaal et al., 2016). Through reference lists, one other study (Zaal et al., 2013) was included. Two other studies (Berchou, 1982; Hancock, Weber, Kaza, & Her, 1991) were included through the literature search engine marked as similar studies. This resulted in a total of eight included studies (Berchou, 1982; Brašić et al., 2000; Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Thomsen et al., 2014; Zaal et al., ) (Figure 1).

### 3.2 | Study characteristics

Tables 1 and 2 present the characteristics of the included studies. Four studies were performed in the United States of America (Berchou, 1982; Brašić et al., 2000; Hancock et al., 1991; McKee, 1994), three in the Netherlands (Scheifes et al., 2016; Zaal et al., ) and one in Denmark (Thomsen et al., 2014). Three studies (Berchou, 1982; Hancock et al., 1991; McKee, 1994) were over 20 years old, and the other five were published in the past 18 years (Brašić et al.,

**TABLE 2** Quality of included studies

Study	Quality assessment/ranking
Zaal et al. (2013)	0.82
Zaal et al. (2016)	0.73
Scheifes et al. (2016)	0.73
Berchou (1982)	0.55
Thomsen et al. (2014)	0.55
Brašić et al. (2000)	0.50
McKee (1994)	0.41
Hancock et al. (1991)	0.32

2000; Scheifes et al., 2016; Thomsen et al., 2014; Zaal et al., ). One study was cross-sectional (Zaal et al., 2013), two were explorative pilot studies (Thomsen et al., 2014; Zaal et al., 2016), three were longitudinal studies with a prospective design (Berchou, 1982; Hancock et al., 1991; McKee, 1994) and two were descriptive studies (Brašić et al., 2000; Scheifes et al., 2016) (Table 1). Seven studies were quantitative (Berchou, 1982; Brašić et al., 2000; Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Zaal et al., ), and one study was both quantitative and qualitative (Thomsen et al., 2014).

The quality of the eight studies ranged from 0.34 to 0.86, from a possible maximum score of 1 (Table 2).

### 3.3 | Study participants and study setting

Four studies included people with all levels of intellectual disabilities and all ages (Berchou, 1982; Brašić et al., 2000; Zaal et al., 2016). Two studies (Brašić et al., 2000; Thomsen et al., 2014) did not specify participant's characteristics such as age and/or level of intellectual disabilities. Two studies included people with both intellectual disabilities and behavioural disorders (Scheifes et al., 2016; Thomsen et al., 2014). One study only included people over 50 years of age, with polypharmacy (Zaal et al., 2013). All participants of the included studies lived in residential settings.

### 3.4 | Medication review team and review method

Medication reviews differed in used methodology, composition of the teams, institution types, study time and included pharmacy service (e.g., community pharmacy or clinical pharmacist).

Six of the included studies reviewed all medications (Berchou, 1982; McKee, 1994; Scheifes et al., 2016; Thomsen et al., 2014; Zaal et al., ), while two studies only reviewed psychotropics and anticonvulsants (Brašić et al., 2000; Hancock et al., 1991; See Table 1).

All studies were performed in multidisciplinary settings by a team that consisted of a pharmacist and medical staff or caregivers. Three of the studies included a hospital pharmacist (Brašić et al., 2000; Scheifes et al., 2016; Zaal et al., 2013), and five studies included a community pharmacist (Berchou, 1982; Brašić et al., 2000; Hancock et al., 1991; McKee, 1994; Zaal et al., 2016). A multidisciplinary medication review took more time when more professionals participated (Scheifes et al., 2016; Zaal et al., 2016). Two studies (Berchou, 1982; Zaal et al., 2016) noted that the initial medication reviews per patient required more time than subsequent reviews.

In one study (Berchou, 1982), medical staff and caregivers were specifically trained to identify MRPs of psychotherapeutic agents. The authors suggested that the training could contribute to the quality of the input that the caregivers could provide during the medication reviews, and enhancing the effectiveness of the medication reviews. In another study (Hancock et al., 1991), pharmacists provided, besides medication reviews, a combination of medication monitoring, patient education and patient follow-up. Two studies (Berchou, 1982; McKee, 1994) provided education during the medication reviews to improve knowledge of the caregivers.

Four studies (Brašić et al., 2000; McKee, 1994; Scheifes et al., 2016; Zaal et al., 2016) described how medication reviews were performed and which steps were involved. One study (Scheifes et al., 2016) used three main steps for identifying and reducing MRPs in structured medication reviews: (a) Review current medication and identify potential MRPs, (b) Define actual MRPs and formulate a new care plan and (c) Execute and monitor new care plan, evaluate executed and non-executed actions. Another study (McKee, 1994) used the "Drug Regimen Review by Objective" method. This method is used to assure each medication has a clear indication throughout the therapy, continuous monitoring and avoid polypharmacy. In one study (Brašić et al., 2000), the pharmacist and the clinical reviewer would evaluate monthly to ensure the medication doses were within the usual therapeutic range. Another study (Zaal et al., 2016) used the Systematic Tool to Reduce Inappropriate Prescribing (STRIP) method in five steps which includes the existing methods Screening Tool to Alert doctors to Right Treatment (START) and the Screening Tool of Older Peoples Prescriptions (STOPP). The STRIP method is the key point addressed in the guideline "polypharmacy in the ageing population" in the Netherlands for older patients with polypharmacy in the general population to identify MRPs.

### 3.5 | Identification and reduction of MRPs

All of the included studies (Berchou, 1982; Brašić et al., 2000; Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Thomsen et al., 2014; Zaal et al., ) focused on the identification of MRPs. The majority of the studies (Berchou, 1982; Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Zaal et al., 2016) focused on reduction of MRPs.

#### 3.5.1 | Identifying MRPs

Eight included studies reported that medication reviews performed by multidisciplinary teams could identify MRPs.

Identified MRPs in the included studies were side effects (Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Thomsen et al., 2014; Zaal et al., 2016), errors in the administration of psychoactive medication (Brašić et al., 2000), medication prescription without clear diagnosis (off-label) or current indication (Berchou, 1982; Scheifes et al., 2016; Zaal et al., ), prescribing errors such as incomplete or unreadable orders (Brašić et al., 2000; Zaal et al., ) and overprescription of psychotropic medications (high doses or excessive number of doses).

One study (Scheifes et al., 2016) did not describe any side effects but noted that underreporting of side effects and wrong interpretation of side effects could potentially have led to missing MRPs. In the study that identified errors in the administration of psychoactive medication (Brašić et al., 2000), a procedure was developed to identify MRPs as part of the medication review to verify that the clients at the facility did not receive excessive doses of medications and that the sum of the medications of the same class did not exceed safe levels. This study recommends a monthly medication review to identify MRPs.



Three studies reported the prevalence of MRPs that were found by the medication reviews; 34% (Scheifes et al., 2016), 47% (Zaal et al., 2013) and 100% (Zaal et al., 2016).

### 3.5.2 | Reducing MRPs

Four out of eight included studies (Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Thomsen et al., 2014) found that medication reviews can minimize side effects such as extrapyramidal symptoms (tardive dyskinesia) (Hancock et al., 1991). Data extracted from these studies indicate that medication reviews led to changes in medication regimen and a general decrease in medication dosage. None of the studies described how the side effects of the medications were measured.

## 4 | DISCUSSION

To our knowledge, this is the first systematic review concerning the effect of medication reviews on the identification and reduction of MRPs for people with intellectual disabilities. This systematic review examined the evidence from eight studies, predominantly conducted in the United States and Europe, reported between 1982 and 2017.

The overall finding of this review is that systematic medication reviews performed by a multidisciplinary team appear to assist in the identification and reduction of MRPs. However, limited evidence is available regarding the impact of medication reviews on the identification and reduction of MRPs in people with intellectual disabilities, to draw firm conclusions.

Many studies in general practice settings, the elderly and psychiatric patients describe medication reviews as an effective tool for identification and reduction of MRPs (Bell et al., 2005; Blenkinsopp, Bond, & Raynor, 2012; Mao, Vu, Xie, Chen, & Tang, 2015). The results of this review seem to support this finding for people with intellectual disabilities.

### 4.1 | Client population

All studies included people living in residential care settings. People with intellectual disabilities living at home receiving their main care of a general physician were not included. This limits the generalizability of the results of this review. It could be argued that medication of people who do not live in residential settings might be less often reviewed, increasing the chance of missing MRPs.

### 4.2 | Review team

All studies used a multidisciplinary team including a pharmacist. The actual team composition varied in all of the included studies but identifying the optimal team composition was not part of the objectives.

The majority of included studies (Berchou, 1982; Brašić et al., 2000; Hancock et al., 1991; McKee, 1994; Scheifes et al., 2016; Thomsen et al., 2014; Zaal et al., 2016) support the role of

pharmacists in optimizing medication reviews. According to these studies, a pharmacist has more detailed knowledge of medications and a pharmacist can have a positive role in improving medication use. One study (Berchou, 1982) that included caregivers in the medication review had given specific training regarding identification of medication side effects to these caregivers. Other studies did not mention special education for the review process. Even though the studies were not designed to evaluate the composition of the review team and the relative contribution of the team members, the multidisciplinary nature of the team is expected to be important. It could be speculated that addition of individual members such as a psychologist or behavioural scientist on the multidisciplinary team can contribute to successful reduction in off-label psychotropic medication in people with intellectual disabilities after the medication review.

The articles found with this systematic review did not report on international policies regarding multidisciplinary medication reviews.

In the Netherlands, policymakers believe that a multidisciplinary medication review is an important tool to optimize medication use and safety. Since 2010, annual medication reviews with a pharmacist are mandatory by order of the healthcare inspectorate (Inspectie voor de Gezondheidszorg IGZ) (Inspectie voor de Gezondheidszorg, 2010). Therefore, multidisciplinary medication review teams including physician and pharmacist should be present in all care organizations for people with intellectual disabilities in the Netherlands.

### 4.3 | Identification and reduction of MRPs

#### 4.3.1 | Identification of MRPs

Inappropriate medication prescription can lead to MRPs. The studies in this review show that MRPs can be identified with a medication review. Some studies focused mainly on medication side effects, lack of indication, contraindication, medication interactions or prescribing errors. This underlines the need to periodically perform medication reviews, as an important tool for clinical practitioners to identify MRPs (Scheifes et al., 2016; Zaal et al., ). Medication reviews can be time triggered or triggered by care staff observations of medication side effects.

In people with intellectual disabilities, antipsychotics are commonly prescribed off-label, mostly for behavioural problems, such as aggression or agitation. Studies in both community (17%–27%) and residential (32%–56%) settings have shown that the prevalence of antipsychotics use in people with intellectual disabilities is high and off-label use should be identified as an MRP (de Kuijper et al., 2010; Sheehan et al., 2015). Clarifying indications by using medication reviews could be the solution to reduce off-label prescribing.

#### 4.3.2 | Reduction of MRPs

This review found that similar benefits from medication reviews are seen in people with intellectual disabilities as in the general population. Medication reviews can lead to interventions which reduce MRPs, polypharmacy and optimization of medication use.



#### 4.4 | Health outcomes

The ultimate goal of medication reviews is to improve the health and quality of life of people with intellectual disabilities. However, none of the studies were designed to measure the effect of the medication reviews in terms of health outcomes or improvements of quality of life. Most of the studies did not measure long-term benefits. None of the studies described improvements of patient well-being as a result of medication adjustments following a medication review. It is therefore recommended to assess this in future studies.

#### 4.5 | Cost of medication reviews (costs of team, reduction medication costs and reduction in costs caused by MRPs)

Medication reviews should be based on a justifiable cost-benefit analysis. Medication reviews in some studies in older people and general practice appear to be cost-effective, with improved patient well-being at reduced cost (Pacini, Smith, Wilson, & Holland, 2007; Sorensen et al., 2004). None of the included studies included a cost-benefit analysis. One study (McKee, 1994) reported reduced cost for client medication, but this study did not measure the costs of the medication reviews themselves or the effects on patient well-being. Another pilot study (Zaal et al., 2016) could not find conclusive evidence that medication reviews were cost-effective for identification and reduction of MRPs.

Two studies (Berchou, 1982; McKee, 1994) used education programmes during the medication reviews to update the expertise of the caregivers in medication therapy. Caregivers recognizing side effects could improve early signalling and optimizing medication therapy in care facilities for the elderly and people with intellectual disabilities. Education is expected to be cost-effective in the long term for this population (O'Dwyer et al., 2015; Roberts et al., 2001).

In some studies in elderly and general practice settings, medication reviews have been found to be cost-effective (Pacini et al., 2007; Sorensen et al., 2004), with improved patient well-being at reduced cost. Future studies are needed to also assess cost-effectiveness of medication reviews in people with intellectual disabilities.

#### 4.6 | Medication review and national policy

Policies to support the monitoring and reduction of polypharmacy for people with intellectual disabilities are currently in development. Medication reviews are also seen as an important tool by health policymakers.

In the Netherlands, there is a lot of attention for appropriate medication use. The Ministry of Public Health, Well-being and Sport is working on reducing off-label prescribing of psychotropic medications for people living in residential settings (van Rijn, 2016). Also a "Multidisciplinary Guideline Problem Behavior in Adults with intellectual disabilities" is being developed in the Netherlands, which includes guidelines on prescription of psychotropic medications. This guideline is scheduled to be implemented in 2019.

Other countries already have implemented guidelines for reducing medication use. In 2016, the Royal College of Psychiatrists in the United Kingdom published a guideline for prescribing psychotropic medications for people with intellectual disabilities (The Royal College of Psychiatrists, 2016).

In the United Kingdom, there is also a large-scale project for stopping over medication for people with intellectual disabilities, autism or both (STOMP) (NHS England, 2018). Many different medical and non-medical organizations pledge to work together to find non-medication therapies and practical ways of supporting people with intellectual disabilities.

All these national policies call for awareness and a change of culture in order to reduce psychotropic medications use.

Medication reviews are recommended or even required as an effective tool to reduce inappropriate medication use.

#### 4.7 | Limitations

Very few studies are published regarding the effect of medication reviews on the identification and reduction of MRPs in people with intellectual disabilities. Additionally, the scope of the included studies in this review was diverse and the sample size in most of the studies was small. The studies did not explicitly address health outcomes after the interventions that were performed based on the findings in the medication reviews. There are no known clinical randomized controlled or controlled prospective trial studies for this review to include. In conclusion, there is insufficient evidence to determine whether the use of medication reviews significantly leads to a reduction of MRPs and prescribing errors.

#### 4.8 | Final comments and recommendations

Polypharmacy is a common problem among people with intellectual disabilities with a high risk of MRPs. Optimization of the quality of pharmacotherapy is recommended. This review found that multidisciplinary medication reviews can be used to identify and reduce MRPs. However, there is a lack of studies that study the effect and impact on different health outcomes and cost-effectiveness of this tool in people with intellectual disabilities.

Regular medication reviews should be part of medical policy to optimize medication management in residential settings for people with intellectual disabilities. However, future studies are necessary to determine the best fitting medication review procedure and frequency for people with intellectual disabilities in different care settings, sub groups and available health professionals for the multidisciplinary teams. Scientific evidence is needed regarding effectiveness of systematic medication reviews on health outcomes and costs.

Future long-term studies would be needed to determine:

1. If the identification of MRPs leads to adjustment of medication regime.
2. If the suggested medication interventions lead to long-term implementation of the adjustments.

3. If the medication adjustments lead to improved health conditions and well-being.
4. If different groups can be identified with different levels of health benefits resulting from medication reviews (e.g., groups with polypharmacy or groups with psychopharmac). Cost-benefit analysis may also differ between groups.

In other populations, medication reviews are used to optimize the medication regime with a good result (Holland et al., 2008; Lenander et al., 2014; Rubio-Valera et al., 2014; Vinks et al., 2009; Wolf et al., 2015).

Medication reviews are potentially a good tool for clinicians to raise awareness of excessive medication use in people with intellectual disabilities. Based on medication reviews, potential MRPs may be reduced. Randomized clinical trials concerning health outcomes with long-term follow-up are needed to demonstrate the exact benefits of medication reviews as a standard intervention tool for people with intellectual disabilities.

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## CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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## APPENDIX 1

LITERATURE REVIEW AMAL NABHANIZADEH 7  
AUGUST 2017

Embase.com	358	352
Medline ovid	177	33
Web-of-science	172	51
Cochrane	10	2
psycINFO ovid	213	100
Cinahl ebsco	147	74
Google scholar	200	147
Total	1277	759

## Embase.com

('intellectual impairment'/de OR 'mental deficiency'/exp OR 'developmental disorder'/de OR 'learning disorder'/exp OR (((mental\* OR intel\* OR learning\*) NEAR/3 (defic\* OR disab\* OR retard\* OR handicap\* OR impair\* OR defect\* OR dysfunction\*)) OR ((development\* OR learning\*) NEAR/3 (disorder\* OR disab\* OR retard\*))) :ab,ti) AND ('medication therapy management'/exp OR ((drug\* NEAR/3 (utilization\* OR use OR usage) NEAR/3 (review\* OR evaluat\* OR manag\* OR audit\*)) OR ((medication\* OR prescrib\* OR prescrip\*) NEAR/3 (review\* OR evaluat\* OR manag\* OR audit\*))) :ab,ti)

## Medline ovid

(exp "Intellectual Disability"/ OR "Developmental Disabilities"/ OR "Learning Disorders"/ OR (((mental\* OR intel\* OR learning\*) ADJ3 (defic\* OR disab\* OR retard\* OR handicap\* OR impair\* OR defect\* OR dysfunction\*)) OR ((development\* OR learning\*) ADJ3 (disorder\* OR disab\* OR retard\*))) :ab,ti) AND ("Medication Therapy Management"/ OR "Drug Utilization Review"/ OR ((drug\* ADJ3 (utilization\* OR "use" OR usage) ADJ3 (review\* OR evaluat\* OR manag\* OR audit\*)) OR ((medication\* OR prescrib\* OR prescrip\*) ADJ3 (review\* OR evaluat\* OR manag\* OR audit\*))) :ab,ti)

## psycINFO ovid

(exp "Intellectual Development Disorder"/ OR "Developmental Disabilities"/ OR "Learning Disorders"/ OR (((mental\* OR intel\* OR learning\*) ADJ3 (defic\* OR disab\* OR retard\* OR handicap\* OR impair\* OR defect\* OR dysfunction\*)) OR ((development\* OR learning\*)

ADJ3 (disorder\* OR disab\* OR retard\*))) :ab,ti) AND ("Utilization Reviews"/ OR ((drug\* ADJ3 (utilization\* OR "use" OR usage) ADJ3 (review\* OR evaluat\* OR manag\* OR audit\*)) OR ((medication\* OR prescrib\* OR prescrip\*) ADJ3 (review\* OR evaluat\* OR manag\* OR audit\*))) :ab,ti)

## Cinahl ebsco

(MH "Intellectual Disability+" OR MH "Developmental Disabilities" OR MH "Learning Disorders" OR (((mental\* OR intel\* OR learning\*) N2 (defic\* OR disab\* OR retard\* OR handicap\* OR impair\* OR defect\* OR dysfunction\*)) OR ((development\* OR learning\*) N2 (disorder\* OR disab\* OR retard\*))) AND (MH "Utilization Review+" OR ((drug\* N2 (utilization\* OR "use" OR usage) N2 (review\* OR evaluat\* OR manag\* OR audit\*)) OR ((medication\* OR prescrib\* OR prescrip\*) N2 (review\* OR evaluat\* OR manag\* OR audit\*)))

## Cochrane



## Web-of-science

TS=((((mental\* OR intel\* OR learning\*) NEAR/2 (defic\* OR disab\* OR retard\* OR handicap\* OR impair\* OR defect\* OR dysfunction\*)) OR ((development\* OR learning\*) NEAR/2 (disorder\* OR disab\* OR retard\*))) AND (((drug\* NEAR/2 (utilization\* OR use OR usage) NEAR/2 (review\* OR evaluat\* OR manag\* OR audit\*)) OR ((medication\* OR prescrib\* OR prescrip\*) NEAR/2 (review\* OR evaluat\* OR manag\* OR audit\*)))

## Google scholar

"mentally|mental|intellectually|intellectual deficit|disabled|disability|disabilities|retardation|retarded|handicap|handicapped|impaired|"developmental|development|learning disorder" "drug utilization|use review|evaluation|"medication review|evaluation"