



The use of goal attainment scaling during clinical medication review in older persons with polypharmacy



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ABSTRACT

Background: Studies have shown that a clinical medication review (CMR) reduces drug-related problems (DRPs), but the effects on clinical outcomes are less clear. Perhaps, CMRs in older persons could be more effective when they focus on patients' personal goals and health-related complaints.

Objective: The aim of this study was to investigate whether goal attainment scaling (GAS) is a useful tool for determining goals and monitoring their attainment during CMR.

Methods: This study was an analysis based on data of the intervention group of the DREAMeR-study; a randomised controlled trial investigating the effects of CMR in primary care. 315 persons aged ≥ 70 years using ≥ 7 drugs were randomised to the intervention: a CMR focused on personal goals using GAS. Outcome measures were: percentage of persons with health-related goals, attainment of goals measured with GAS-scores after three and six months, type of health-related goals and implementation rates of recommendations for GAS-related DRPs and other DRPs.

Results: A total of 406 health-related goals were set for 283 of 315 included persons (90%). Of the 350 evaluated goals (86%), 37% was attained after three months and 43% after six months. The goals 'reduce pain' ($n = 66$, 16%), 'improve mobility' ($n = 57$, 14%) and 'reduce number of pills' ($n = 37$, 9.1%) were most prevalent. The implementation rate of recommendations for GAS-related DRPs was 81% compared to 62% for not GAS-related DRPs ($p < 0.05$).

Conclusion: Goal setting is important for prioritizing the most important problems during clinical medication review and Goal Attainment Scaling seems to be a useful tool for monitoring the attainment of these goals.

Introduction

A clinical or comprehensive medication review (both abbreviated with CMR) is a structured critical examination of a patient's drug treatment. During a CMR both pharmacist, physician and patient are involved.^{1–3} CMR can identify and resolve drug-related problems (DRPs) in older persons with polypharmacy.^{4–7} The effectiveness of CMR on clinical outcomes is still sparse.^{5,8–10} This could be explained by the fact that CMR is a complex and multifactorial intervention provided across a range of different settings.^{5,10,11} The heterogeneity of the DRPs and interventions during CMR makes it difficult to choose a generic outcome that measures the effects of CMR.

In previous studies, the focus of CMR was often on prescribing

omissions based on guidelines and inappropriate prescribing.^{10,12–14} Several tools, like STOPP/START criteria were developed to use during CMR to facilitate the detection of these problems.^{15,16} However, older persons with polypharmacy are often frail, suffer from multimorbidity, have complex health problems and subsequently may have various health-related complaints.¹⁷ Therefore CMR in older persons could be more effective when they focus on patients' health-related complaints and goals. Several studies have shown that DRPs identified during a patient interview are the most important for the older persons.^{18–20} Besides that, different studies in the geriatric field recommend a shift to goal oriented patient care and outcomes, which should be performed in a collaborative setting, where both patient and health care providers are involved.^{21,22} A CMR could be an excellent multidisciplinary

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intervention to address goal setting during the patient interview.

One way to measure the outcome of goal setting, and other heterogeneous individual complex interventions, is the use of Goal Attainment Scaling.²³ In contrast to generic measures in which the same scale items are used for all patients, Goal Attainment Scaling (GAS) is an individualized goal-setting and measurement approach that is useful for patients with multiple, individualized health problems.^{24,25} GAS is a clinometric score that uses the baseline score of an individual as reference.^{26,27} Goalsetting can help prioritize the most important problems for patients and the scale can help to quantify the extent of attainment of the proposed goals. GAS can be individualized for each patient to document progress but may also be indexed to measure effectiveness of an intervention on a population base. This could be useful for CMR where the interventions are very diverse; e.g. ranging from adding statins as preventive therapy to discontinuation of anti-hypertensive drugs because of side effects like ankle oedema or dizziness. These variations in interventions during CMR complicate comparison of currently used outcomes.

GAS was first described by Kiresuk and Scherman in 1968. They used GAS as a method for evaluation of mental health treatment.²³ Almost 50 years later, GAS has been applied in various fields including nursing, rehabilitation, pain management and geriatric care.^{25,28–32} A previous study showed that older persons diagnosed with complex chronic health conditions are able to set personal health related goals.³¹ The authors suggest that GAS assessment could facilitate patient-centred care by focusing care on what patients want and judging performance by how patients' goals are met.^{21,26,31,33}

Although GAS has been recommended to measure the results of medication therapy management services, like CMR, there are no studies which have used this outcome measure in this setting yet.³² Therefore the aim of this study was to investigate whether GAS is a useful clinical tool for determining goals during CMR and in monitoring their attainment in older persons with polypharmacy.

Design and methods

Study design and setting

The DREAMeR-study is a randomised controlled trial investigating the effects of a CMR focused on personal goals, on health-related quality of life and health-related complaints in older persons with polypharmacy. The extensive study protocol of the DREAMeR-study has been published elsewhere.³⁴ Sample size calculations were performed on the primary outcomes in the RCT. The present study is an analysis based on data of the 315 patients randomised to the intervention group of the DREAMeR-study. Participants were included between April 2016 and February 2017. Outcomes were evaluated at three and six months. The study was conducted in 35 community pharmacies of the franchise formula Service Apotheek, located in both rural and urban areas spread throughout the Netherlands. In total, 43 community pharmacists working in 35 community pharmacies and 113 GPs participated in this study.

Participants

Patients aged ≥ 70 years and using seven or more chronic drugs were eligible for the study. Chronic drug treatment was defined as at least three prescriptions in the 12 months before the start of the study or a prescription for 90 days in the four months before the start of the study. Patients were excluded when they had an expected life expectancy shorter than six months, a hospital admission within one month before the inclusion date, a received CMR in the past 12 months and patients where the general practitioner (GP) was not the primary caregiver (patients receiving repeat prescriptions solely from a specialist).

Ethics

The study design, study protocol, procedure and informed consent of the DREAMeR-study were approved by the Medical Ethics Committee of the University Medical Centre of Utrecht (protocol number 15/737). Participation was voluntary and all participants have signed informed consent. All data were anonymised using a randomly assigned subject number.

Pharmacists and training

Participating community pharmacists were accredited to perform CMR and had performed at least 25 CMRs annually over the past three years. Moreover all pharmacists received an additional training about the use of Goal Attainment Scaling (GAS), including how to communicate GAS to patients during a CMR. The implementation of GAS during the study was monitored by monthly webconferences with groups of 8–10 pharmacists. In these webconferences participating pharmacists presented case studies about a performed CMR and explained how they applied GAS in these cases. Also a helpdesk was available to help the pharmacists with cases and proposing GAS.

Intervention

The intervention was a clinical medication review focused on personal goals. (The stepwise process is shown in [Supplementary Figure S1](#)).³ The CMR started with a patient interview by the pharmacist at the patients home or in the pharmacy. All medications in use (including effectiveness, side effects, usage, compliance and over the counter medication) and health-related complaints were discussed. At the end of the interview, one or more personal health-related goals were formulated by the pharmacist and the patient, based on the most important discussed issues. These goals were diverse and could focus on improving activities of daily living, reducing health-related complaints or reducing the number of pills for example.

After the patient interview, the pharmacist summarised all the DRPs. These DRPs could be related to the goals that were set, but also other DRPs could be identified (e.g. non-adherence to prescribing guidelines), because full medication records and clinical records (disease history and laboratory values) were available at the start of the CMR. The pharmacist formulated recommendations to solve the DRPs and to attain the goals. Subsequently the health-related goals, DRPs and recommendations were discussed with the GP. A pharmaceutical care plan was composed including which actions should be carried out when and by whom. This care plan was then discussed with the patient by the pharmacist or the GP and the actions were implemented gradually. Two follow-up moments were scheduled (within approximately three months), in which the pharmacist evaluated the agreed actions and proposed goals with the patient and, if necessary, adjusted the care plan.

Goal attainment scaling

The goal attainment scaling used in this study was based on a 6-point scale (-3 to $+2$) as used in previous studies and recommended in Dutch guidelines.^{29,35} To support the pharmacists, a database with 50 common goal types with GAS-scales (from -3 to $+2$) was composed (see examples in [Supplementary Figure S2](#)). This database was further expanded during the study based on performed CMR. The goals were formulated SMART: specific, measurable, acceptable, realistic and time-bound. All the proposed goals with associated GAS-scales were checked by the coordinating researcher (SV) before the assessment took place. After three and six months, different research assistants interviewed the patients about the attainment of their goals and subsequently assigned a GAS-score (-3 to $+2$). They asked open questions, like: "at the start of the medication review you scored your pain with a VAS-score of 8, how

would you rank your pain today?” They also added a free text description of the patient's current health status in order to facilitate validation of the assigned scores.

Outcome measures

Primary outcomes were: percentage of patients with health-related goals, attainment of goals measured with GAS-scores after three and six months. Attainment of health-related goals was defined as a GAS score of 0, +1 or +2. Improvement of health-related goals was defined as: a GAS-score of -1, 0, +1 or +2. Secondary outcome measures were: number and type of health-related goals, number and type of GAS-related DRPs and other DRPs, recommendations to solve DRPs and implementation rates of these recommendations. DRPs were classified according to an adapted version of Hepler and Strand which is described in the STRIP-method of the Dutch multidisciplinary guideline Polypharmacy in the elderly.^{3,36} The implementation rate was defined as the percentage of the recommendations that were fully or partly (e.g. dose change when cessation of drug was proposed) accepted by pharmacist, GP and patient.

Data collection and analysis

Health-related goals with associated GAS and scores on GAS were recorded in an Excel-database. The pharmacists used medication review software (Service Apotheek Medication Review Tool (SAMRT), NControl, Amersfoort) to register GAS-related DRPs and other DRPs and interventions during the CMR.⁴ Drug dispensing data were collected from the pharmacy information systems. In addition demographic characteristics: sex, age, ethnicity, living situation and ISCOPE-score³⁷ (Integrated Systematic Care for Older People-score, which determines the domains of complex problems) were collected. Health-related goals were grouped into type of goals by two researchers (SV and TV). We considered the type of health-related goal as the primary objective mentioned by the older patient. For example, when a patient could not walk to the supermarket because of pain, this goal was categorized under mobility and not under pain. Differences were discussed until consensus was reached.

Statistical analysis

Descriptive statistics were used for basic characteristics. Frequencies and percentages were reported for categorical variables. Chi-square tests were used to compare differences in prevalence and implementation rates between GAS-related DRPs and other DRPs. The data were analysed using IBM SPSS Statistics 24.0 (IBM Corporation, Armonk, NY, USA). A p-value < 0.05 was considered statistically significant.

Results

Of the 2290 patients that were invited for the study, 707 (31%) consented to participate, 78 persons withdrew before the start of the study, which resulted in 629 patients that were randomised. Of these, 315 patients in the intervention group received a CMR in 35 community pharmacies (mean 9 CMRs per pharmacy (SD 4.4)). Eight patients were lost to follow up after three months and 13 patients after six months. In total 294 patients completed the study (93%). Patient characteristics are shown in Table 1.

Number and type of health-related goals

In total 406 goals were set (mean 1.4 per patient (SD = 0.52)). There were 283 (90%) patients who had at least one health-related goal. From these patients, there were 163 patients with one goal (58%), 117 patients with two goals (41%) and three patients with three goals

Table 1

Demographics of participants in the intervention group of the DREAMeR-study.

Characteristic	N = 315	
Sociodemographic		
Age, median (IQR), y	80 (76–84)	
Sex, female (%)	56%	
Ethnicity, European (%)	97%	
ISCOPE, complex problems (score 3,4) (%)	25%	
Living situation, alone (%)	44%	
Drug related		
Number of medications, median (IQR)	9.0 (7.5–10.5)	
Multidose Drug Dispensing system in use	27%	
Drug classes (ATC)		
A02B	Drugs for peptic ulcer and GORD	83%
B01A	Antithrombotic agents	79%
C10A	Lipid modifying agents	71%
C07A	Beta blocking agents	60%
C08C	Selective calcium channel blockers	32%
A10B	Oral blood glucose lowering drugs	31%
C09A	Ace inhibitors	30%
C09C	Angiotensin II antagonists	29%
A11C	Vitamin a and d	25%
C03C	High-ceiling diuretics	23%

Abbreviations: SD = standard deviation; ATC = Anatomical Therapeutical Chemical; GORD = gastro-oesophageal reflux disease; CMR = clinical medication review; ISCOPE = Integrated Systematic Care for Older People (determines the domains of complex problems). NB. every demographic has no more than 5% missing values.

Table 2

Top 10 of most prevalent types of health-related goals with percentage of attainment at 3 and 6 months.

Type of health related goal	N	% Goals attained (score 0,1,2)	% Goals attained (score 0,1,2)
		T = 3 months	T = 6 months
1 Reduce pain	66	31%	36%
2 Reduce number of pills	57	23%	21%
3 Improve mobility (walking stairs/certain distance)	37	24%	40%*
4 Reduce fatigue	28	14%	25%
5 Reduce practical problems with administration/intake drugs	26	67%	74%
6 Improve activities of daily living/participate in activities	25	63%	75%
7 Reduce problems with diarrhoea or obstipation	23	63%	75%
8 Reduce dry mouth	22	9.1%	27%
9 Other	17	35%	35%
10 Reduce dizziness	14	43%	57%

NB. * p-value < 0.05; indicating a significant change in percentage attained goals between t3 and t6.

(1.1%).

The ‘top-10 type of health-related goals’ according to prevalence are shown in Table 2. The goal to ‘reduce pain’ (n = 66, 16%), ‘improve mobility’ (n = 57, 14%) and ‘reduce the number of pills’ (n = 37, 9.1%) were the three most prevalent goals. Underlying problems for mobility issues were mainly because of pain or dyspnoea. Underlying problems for the goal about doing activities were mainly problems with incontinence or dyspnoea. The distribution of all types of health-related goals can be found in Supplementary Table S1.

Attainment on goal attainment scales

350 of 406 proposed health-related goals (86%) in 256 patients were evaluated after three months, 347 goals (86%) in 247 patients after six months and there were 327 goals who had both a three and six month measurement. The results of the scores on the GAS of the

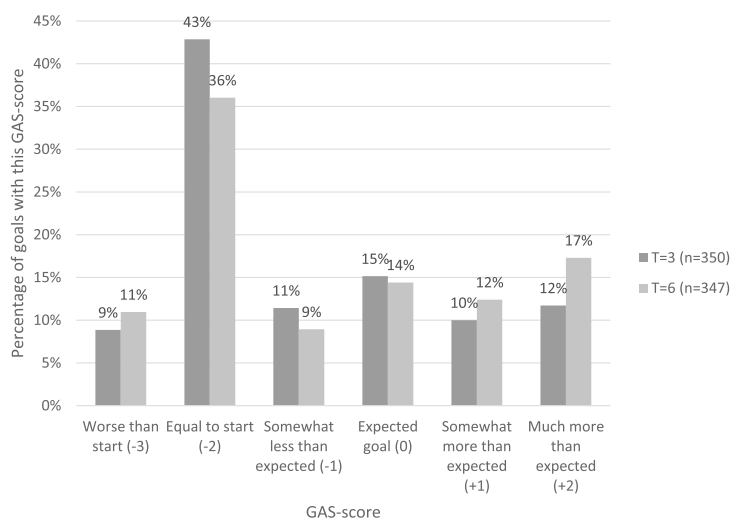


Fig. 1. Frequencies of outcomes in GAS-scores for all evaluated goal attainment scales after 3 and 6 months.

evaluated goals after three and six months are shown in Fig. 1. Of all the evaluated goals, 37% was attained after three months and 43% after six months (defined as GAS-score 0, +1, +2). Patients showed improvement (defined as GAS-score -1, 0, +1 and +2) on 48% of the goals after three months and on 52% of the goals after six months. Of the 37% attained goals at three months, 86% sustained and 14% declined at six months. Besides that, there were 42 goals who were only attained after six months, and not yet after three months.

When looking at the ‘top-10 type of goals’ according to attainment, the most frequently attained goals after six months were related to: reduction of practical problems (74% attained), improvement of activities, which were mainly due to complaints with incontinence or dyspnoea (75% attained) and reduction of problems with obstipation or diarrhoea (75% attained).

Relation of health-related goals and drug-related problems

The mean number of DRPs per patient was 5.8 (SD = 2.1). From the 1751 identified DRPs, 490 DRPs (28%) were related to a health related goal and 1261 were other DRPs (72%). The different types of DRPs and the implementation rates of the recommendations associated with those DRPs, stratified into GAS-related DRPs and other DRPs, are shown in Table 3. The DRP type: adverse effect was relatively more frequent (22% vs. 13%; p < 0.05) among GAS-related DRPs compared to other DRPs and suboptimal therapy was relatively less frequent among GAS-related DRPs than other DRPs (25% vs. 33%; p < 0.05).

Recommendations, interventions and implementation rates

The implemented recommendations are shown in Table 4. The overall implementation rate was 67.3%. 197 drugs were ceased in 130 patients (43% of patients) and 209 drugs were added in 149 patients (50% of patients). The difference in implementation rate for recommendations associated with GAS-related DRPs was 81% compared to 62% for recommendations associated with other DRPs (p < 0.05).

Discussion and implications

This study shows that healthcare providers are able to formulate goals with older persons with polypharmacy during CMR, because ninety percent of the participants managed to set at least one goal. Goalsetting helps to identify the most important problems during CMR, because it leads to a high percentage of resolved DRPs. Additionally, GAS is useful as outcome measure to evaluate the attainment of health-related goals in CMR. The results of this study demonstrate an

Table 3 Classification and solving of drug-related problems.

DRP type	Identified (n, %)		Resolved (%)	
	GAS-related	Other	GAS-related	Other
Suboptimal therapy	123 25%	414 32%*	82%	50%*
Overtreatment	98 20%	237 19%	71%	54%*
(potential) adverse effect	110 22%	162 13%*	76%	70%
Drug not effective	55 11%	112 8.9%	89%	70%*
Drug interaction	1 0.20%	20 1.6%*	100%	80%
Contra-indication	5 1.0%	27 2.1%	60%	63%
Dose too high	7 1.4%	42 3.3%*	71%	74%
Dose too low	19 3.9%	45 3.6%	95%	76%
Non-compliance	13 2.7%	25 2.0%	100%	100%
Inconvenience of use	29 5.9%	70 5.6%	90%	77%
Wrong dosage form	2 0.41%	43 3.4%*	100%	86%
Other**	3 0.61%	22 1.7%	100%	91%
No DRP***	20 4.1%	42 3.3%	100%	50%*
Total	490	1261	81%	62%

Abbreviations: GAS = Goal Attainment Scale; DRP = Drug Related Problem. * = p-value < 0.05 ** “Other” consisted mainly of problems about necessary laboratory control (sodium, potassium and renal function) and updates of the pharmaceutical patient files. *** No DRP consisted of other problems that were not directly related to the drugs in use, but to other topics like economic efficacy, cognition, loneliness and adding aids like incontinence materials. NB. For 15 participants (4.8%) these data were missing.

attainment of health-related goals of 42% after six months and improvement of 52% after six months.

As far as we know, this is the first study investigating GAS as tool and outcome measure in CMR.³² This is surprising, because GAS has been studied in other interventions in geriatric care and seemed to be useful in this population.^{24,31,38,39} Besides that, a CMR identifies various problems and leads to many heterogeneous interventions, from adding preventive therapy to providing instruction on the use of complex medication such as inhalers.^{4,20,40} Moreover GAS has been used to evaluate diverse interventions, like complex mental health programs, and has been suggested to be useful for the evaluation of services delivered to complex patients with multiple conditions.^{23,32} The multi-disciplinary character of a CMR and possibility for shared decision making about the optimal therapy for an individual patient, makes CMR a suitable intervention to apply GAS.⁴¹ One study showed that pharmacists are capable to set goals with patients, however these goals were mainly focused on lifestyle and condition management in cardiovascular risk management and diabetes.²² The attainment of 42% of goals in this study cannot be compared directly with other studies,

Table 4
Type of recommendations and associated implementation rates.

Type of recommendation	N	%	N	%	Implementation rate (%)	
	Related to GAS		Other		Related to GAS	Other
Drug related						
Addition of drug	109	22%	345	27%*	80%	48%*
Cessation of drug	127	26%*	243	19%	75%	54%*
Replacement of drug	58	12%	119	9.4%	71%	36%*
Dosage change	95	19%*	192	15%	80%	70%
Other						
Performance of (laboratory) monitoring	33	6.7%	182	14%*	100%	84%
Providing information/advice	50	10%	99	7.9%	100%	92%
Adjustment of dosage form	8	1.6%	50	4.0%*	88%	76%
Synchronization of drugs**	6	1.2%	18	1.4%	100%	89%
Other	4	0.8%	13	1.0%	100%	62%
Total	490		1261		81%	62%*

Abbreviations: GAS = Goal Attainment Scale; * p-value < 0.05; **In 8/24 cases this consisted of the addition of a multidose drug dispensing system.

because all studies were performed in different settings, like geriatric day hospitals or nursing homes and these studies presented GAS-results only as t-scores.^{24,26,31,39,42} Moorhouse et al. showed a comparable mean number of goals per geriatric patient (1.6) and showed that 86% of patients improved on total GAS at discharge.²⁶ However these goals and interventions were different and broader than the goals in this study, because they were performed in a geriatric day hospital by multiple specialists. The goals that were set during the CMR in this study, could only be attained by medication-related interventions.

The most frequent types of health-related goals in this study were pain reduction, improvement of mobility and reduction of number of pills. GAS has already been demonstrated as a useful tool in pain management in different settings.^{30,43} Pharmacist-led interventions have been shown to lead to improvements in pain management.⁴⁴ The results of this study showed that 35% of patients attained their goal to reduce pain. This is lower than another study investigating goal attainment in pain management in which 76% of participants met their goals of pain management. However, the sample size in this study was low and the intervention consisted of several additional interventions, such as exercise and distraction.⁴³ Improvement of mobility is a goal that has also been described in other GAS-studies in this population, especially in geriatric day hospitals.^{24,39} This study has shown that 40% of patients attained their mobility goals after six months. The wish to reduce number of pills has not been described in GAS-studies before. This study shows that 20% of the wishes for reduction of the number of pills were attained. This relatively low percentage could be explained by the fact that during the CMR also many drugs were added, for example preventive drugs such as vitamin D or symptomatic treatment like analgesics. Several studies have shown that health care providers are often reluctant to discontinue medication.^{45,46} It seems that additional attention is needed for “deprescribing”, or discontinuing medication, especially when this is a specific wish of older patients.^{47–49}

During CMR, the use of different outcome measures (process and clinical outcomes) remain necessary to evaluate the heterogeneous interventions and effects.⁵⁰ DRPs are established process outcome measures during CMR.^{5,10} We saw that 28% of all DRPs was related to GAS. Mainly, the DRP type “adverse effect” was more prevalent among GAS-related DRPs. The high implementation rate of GAS-related DRPs suggests that GAS helps prioritizing the most important problems for patients and probably GPs and patients are more motivated to accept the recommendations in the pharmaceutical care plan.

Strengths and limitations

There were several strengths in this study. The first one is the innovative design using GAS during CMR in a large sample of older persons, which was not investigated before. Second, this study was part

of pragmatic trial, performed in daily clinical practice, which makes the generalizability of the results more likely. Third, the attainment of GAS was independently evaluated and scored by research assistants. This suggests that use of GAS is possible in research setting and this leads to less bias in the assessment of GAS scores compared to assessment by the health-care providers themselves.⁵¹

There were also some limitations in this study. The most important methodological limitation is that we did not use GAS in a the control group. Therefore, it cannot be excluded that the attainment of goals was caused by the natural course of the patient's condition. However, using GAS in the control group of the DREAMeR-study was not possible, because proposing goals during the CMR was an important aspect of the intervention, in which GAS was used to evaluate the attainment of the goals that were set. Therefore, only the outcomes of GAS in the intervention group are reported. We recommend that GAS should always be used next to other outcomes, which could be tested in a control group like HR-QoL. Second, the concept of GAS was new for pharmacists and GPs in this study. There could have been a learning curve effect in the proposing of goals and the SMART formulation of goals together with the patients. However, despite the unfamiliarity with the concept of GAS pharmacists were able to set at least one health related goal in 90% of the patients. The number of goals may become even higher when pharmacists become more experienced. Finally, although we used independent research assistants, they were not blinded to the baseline situation of the patients.

Conclusion

Older persons and pharmacists are able to set health-related goals during clinical medication review. Drug-related problems associated with health-related goals are more likely to be solved compared to other DRPs. Therefore, goal setting is important for prioritizing the most important problems during the patient interview in the CMR. Goal Attainment Scaling showed to be a useful tool to evaluate the attainment of health-related goals after CMR, but in explanatory studies, GAS should be combined with other patient-reported outcomes.

Disclosures

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Conflicts of interest

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 the following: SV received unconditional grants from KNMP and Service Apotheek as part of her total PhD project for the submitted work, SV had no financial relationships with any organisations that might have an interest in the submitted work; no other relationships or activities that could appear to have influenced the submitted work. JB, TV, HFK, JG and MB, declare that they have no conflict of interests that are directly relevant to the content of this study.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.sapharm.2018.11.002>.

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