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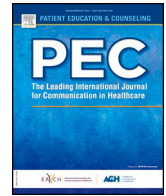
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Development of a blended communication training program for managing medically unexplained symptoms in primary care using the intervention mapping approach

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ABSTRACT

Background: General practice (GP) training in how to communicate with patients with medically unexplained symptoms (MUS) is limited.

Objective: Development, implementation and evaluation of an evidence-based communication training program for GP residents focused on patients with MUS in primary care.

Methods: We used the intervention mapping (IM) framework to systematically develop the MUS training program. We conducted a needs assessment to formulate change objectives and identified teaching methods for a MUS communication training program. Next, we developed, implemented and evaluated the training program with 46 residents by assessing their self-efficacy and by exploring their experiences with the training.

Results: The resulting program is a blended training with an online course and two training days. After attending the training program, GP residents reported significantly higher self-efficacy for communication with patients with MUS at four weeks follow up compared to baseline. Furthermore, GP residents experienced the training program as useful and valued the combination of the online course and training days.

Conclusion and practice implications: We developed an evidence-based communication training program for the management of patients with MUS in primary care. Future research should examine the effect of the training on GP residents' communication skills in MUS consultations in daily practice.

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1. Introduction

Medically unexplained symptoms (MUS) are physical symptoms for which no pathological cause can be found. Patients with MUS are common in primary care with a prevalence of 3–10% [1–3]. Prevalence rates of MUS in primary care vary a lot in different studies, depending on the criteria for MUS. Important here are differences between self-limiting MUS (often requiring only one consultation), persistent/recurrent MUS or somatic symptom disorder [4]. In primary care, persistent/recurrent MUS is the most important problem, while somatic symptom disorder has a much lower prevalence.

Concerning persistent/recurrent MUS, Verhaak [1], as well as Aamland [3] defined MUS in the severe end (i.e. at least 3 months and significant loss of functioning) and found prevalence rates of 3%. Other studies with less rigorous criteria (i.e. including patients with self-limiting MUS) showed prevalence rates after GP assessment of 12–19% [5,6]. Haller et al. analyzed the prevalence rates of MUS in primary care and found a percentage between 40.2% and 49% [7]. Many general practitioners (GPs) experience difficulties in the management of patients with severe MUS [8,9] and these patients are often not satisfied with the care they receive [10]. Although GPs have a central role in the management of MUS [11], many GPs find the care for patients with MUS challenging [12].

Several primary care studies of enhanced care, which includes techniques of reattribution or cognitive behavioral therapy, have been designed to improve MUS patients' outcomes [13–18]. These communication training programs did not affect patients' outcomes

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significantly. One of the causes of the lack of effectiveness is that focusing on enhanced care interferes too much with the normal flow of the consultation [19]. Previous research has shown positive effects on patients' health outcomes of improving communication during the different stages of the consultation [20–22]. These findings suggest that improving GP's communication skills in MUS consultations could benefit outcomes for MUS patients and fit in the workflow of primary care.

In previous research, we identified relevant communication elements according to patients with MUS and problems that GPs and patients with MUS experience in the communication in MUS consultations [23–25]. Next, we identified five most important learnable communication elements that should be taught and trained to GPs and that can be changed or adapted in order to improve communication skills in MUS consultations: (1) a thorough somatic and psychosocial exploration, (2) communication with empathy, (3) creating a shared understanding of the problem, (4) providing a tangible explanation, and (5) taking control [26].

However, teaching about MUS in medical education is limited [27,28]. It is not known how (well) GP's and GP residents are trained in the management of MUS patients. A widely used indicator to evaluate the impact of a communication training program is self-efficacy [29]. Self-efficacy is the person's own belief in his or her ability to perform a specified task successfully. Self-efficacy is believed to have a direct influence on personal performance in specific contexts. It remains unknown whether improved training of GP residents increases their self-efficacy to manage patients with MUS. Based on these findings, we aimed to develop an evidence-based training program for the management of patients with MUS in primary care. Our second aim was to evaluate the training program by measuring the GP residents' self-efficacy and by exploring their experiences with the training.

2. Methods

We used the intervention mapping (IM) framework to systematically develop the communication training program in six steps [30] (Fig. 1). The results of Step 1 and Step 2 have been described in detail elsewhere [23–26]. IM is a framework for health education intervention development that provides a systematic procedure for intervention development, implementation, and evaluation in six steps. We obtained the information for the needs assessment of step 1 from a literature study and four previous publications in which we identified relevant communication elements and problems in the communication in MUS consultations [23–26]. Step 2 contained the description of the change objectives, and this was obtained from a previous publication about focus groups with MUS experts to select the most important learnable communication elements [26]. Based on the results of a literature study and our previous focus group study [26], in step 3 we selected theory-based intervention methods. In step 4 we developed the content of the training program, based on the results of step 1 and 2. In the step 5, we implemented the training program in the GP training and in step 6 we evaluated the training as experienced by the residents quantitatively with a pre- and post-training assessment of self-efficacy and qualitatively with individual interviews.

2.1. Step 1: Needs assessment

In the needs assessment, we conducted (1) interviews with patients with MUS and GPs to find relevant communication elements and problems in the communication in MUS consultations [23–25], (2) a review of the scientific literature for relevant communication elements for MUS consultations (appendix A), and (3) a focus group study among MUS experts [26]. In our previous studies we described the procedures more in detail [23–26]. The findings of these

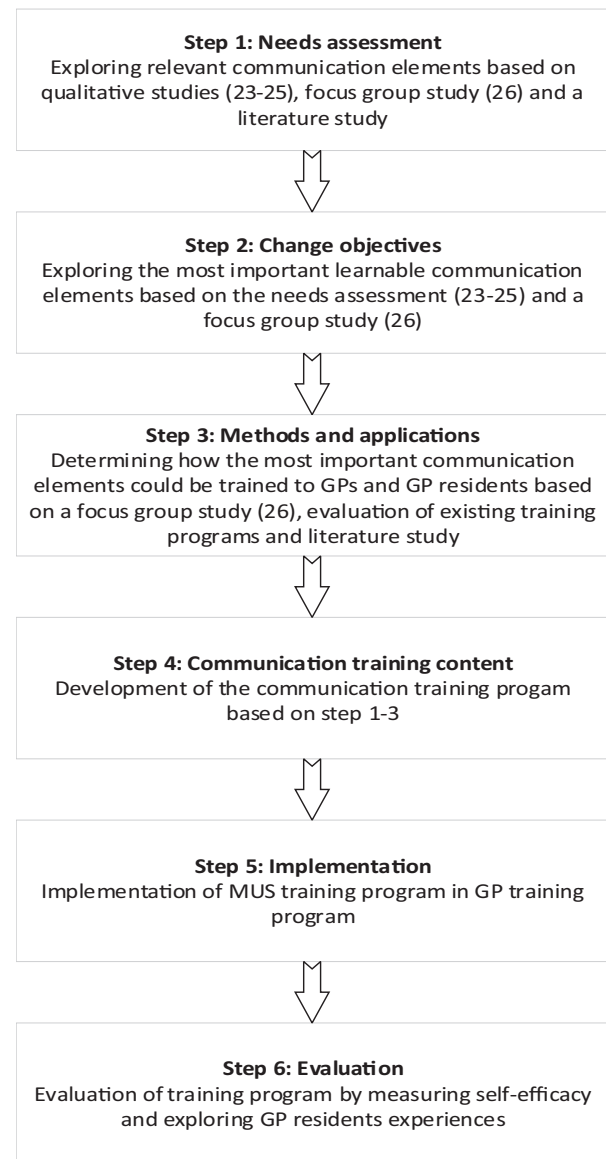


Fig. 1. Model of intervention mapping.

qualitative studies and the literature review resulted in a list with relevant communication elements for MUS consultations in primary care which is presented in Table 1.

2.2. Step 2: Change objectives

In the focus group session with MUS experts, we asked them to select the most important learnable communication elements [26]. These MUS experts were invited by two researchers (JH and ToH) by phone or by email. MUS experts were defined as GPs or medical specialists with special interest for patients with MUS and/or delivering care for specific MUS patients and/or researchers who had published about MUS. In our focus group study, MUS experts identified the most important learnable communication elements during MUS consultations (change objectives) which should be taught and trained to GPs to improve their communication skills in MUS consultations. The choice of the change objectives was based on a list with relevant communication elements (Table 1) resulting from the needs assessment from other previous research. We have described the procedure more in detail in previous research [26]. We

Table 1

List of identified relevant communication elements. Most of them were indicated by both patients with medically unexplained symptoms (MUS) and general practitioners (GPs), some by patients with MUS or by GPs only.

GPs and patients with MUS	Only by patients with MUS	Only by GPs
Knowing the person	Avoid giving the patient an unpleasant feeling	Following the patient
Empathy	Avoid being prejudiced	Take charge
Open and approachable	Preparation of the consultation	Create self-awareness
Dialogue	Acknowledge uncertainty about the origin of the symptoms	
Time and space		
Clarity		
Equality		
Quiet atmosphere		
Shared problem definition		
Shared decision making		
Exploration		
Identification of cause		
Explanation		
Structuring		
Reassurance		
Non-verbal behavior		
Connecting somatic and psychological symptoms		
Match with patient's agenda		
Offer a specific management plan		

considered these elements as the change objectives that should be incorporated into the communication training program.

2.3. Step 3: Methods and applications

To determine how the most important learnable communication elements should be taught to GPs and GP residents, we performed a focus group study [26] and a literature study (appendix B). In the focus group study [26], teachers explored how the most important communication elements should be taught to GPs and GP residents. Next, we analyzed other MUS training methods including an existing online interprofessional course on MUS (developed at University Medical Centre Groningen (UMCG) by JR) [31]. This online course was developed in order to promote patient-centred care for patients with MUS and to teach healthcare providers' knowledge, skills and attitude they need in the management of MUS. The findings of the focus group study [26] and the literature review about training methods for GPs for consultations with MUS patients were used to identify appropriate methods.

2.4. Step 4: Communication training content

Based on the findings from steps 1 and 2, we developed the content for an evidence-based, blended communication training program. We combined the content of the training with the methods resulting from step 3. We incorporated the five most important communication elements, as described in the change objectives, into the communication training program. We discussed all elements of the training program with the members of the research group to reach consensus on its content. We also discussed the draft versions of the training program with teachers of the primary care residency program of Radboud university medical center (Radboudumc).

2.5. Step 5: Implementation

The implementation of the training program was realized in cooperation with the Departments of primary care of UMCG and Radboudumc. We approached teachers affiliated with the primary care residency training program of these Departments. At the UMCG, all GP residents, whose teachers had consented to be involved, participated in the training. At the Radboudumc, GP residents registered themselves voluntarily for the training program, independent of whether their teachers consented to participation.

2.6. Step 6: evaluation

First, we evaluated the training program *quantitatively* by assessing residents' self-efficacy (SE-12 [29], range 1–12, appendix C) at three moments: before the start of the training program (t_0), at the start of first training day (t_1), and four weeks after completing the training program (t_2). For the analysis, we used one-way repeated measures ANOVA. GP residents who did not complete all three questionnaires were excluded from the analyses. A single missing value in the SE-12 questionnaire was imputed by the average score on the other questions at that specific moment. This occurred twice. Data were analysed using IBM Statistical Package for Social Sciences (SPSS Statistics for Windows, Version 25.0. IBM Corp., Armonk, NY, USA). A p-value of < 0.05 was considered to be statistically significant, based on two sided tests.

Second, we evaluated the training program *qualitatively* by exploring the GP residents' experiences with the training. GP residents who agreed to be interviewed after the training were questioned by phone by one of the researchers (JH). The interviews were semi-structured by using an interview guide (appendix D). The audio-recorded interviews were transcribed verbatim. These transcripts were analyzed according to the principles of constant comparative analysis [32]. The transcripts were analyzed and coded independently by two researchers (JH and a medical student). To this purpose, Atlas.ti version 8.4.20, a software program to analyze qualitative data, was used. The two researchers read the transcripts iteratively to familiarize themselves with the data. They coded relevant elements of the interviews and discussed the results in a consensus meeting. New codes emerging in the consensus meeting were applied to the transcripts. The researchers defined categories independently of each other and discussed these until consensus was reached. They coded all interviews and reached saturation after the 19th interview. The remaining six interviews did not reveal new codes. We used the COREQ guideline for the reporting of this study (Appendix E) [33].

3. Results

3.1. Step 1 and 2: Needs assessment and change objectives

The needs assessment generated a list with relevant communication elements in primary care MUS consultations (Table 1). Based on this list, MUS experts prioritized five categories of communication elements (change objectives) which should be taught and trained to GPs to improve their communication skills in MUS consultations: (1) a thorough

Table 2
Overview of the communication training program and the corresponding change objectives.

Online course (5–7 h)	Change objectives
E-learning: Interprofessional online course on MUS	A thorough somatic and psychosocial exploration, communication with empathy, creating a shared understanding of the problem, providing a tangible explanation, and taking control.
First training session (3 h) Formulating individual learning objectives (10 min) Role-play with actor (3 h)	A thorough somatic and psychosocial exploration, communication with empathy, creating a shared understanding of the problem, providing a tangible explanation
Second training session (3 h) Plenary discussion: theme attitude (30 min) Role-play with peers: exploration and shared understanding of the problem (30 min) Role-play with peers: explanation (30 min) Role-play with actor: taking control (1 h)	Communication with empathy A thorough somatic and psychosocial exploration, creating a shared understanding of the problem Providing a tangible explanation Taking control

somatic and psychosocial exploration, (2) communication with empathy, (3) creating a shared understanding of the problem, (4) providing a tangible explanation, and (5) taking control.

3.2. Step 3: Methods and applications

Teachers suggested the following training methods for the change objectives: role-play with simulation patients, reflection on video-recorded consultations, and joint consultations with the supervisor. Role-play, feedback on audio- or video-recorded consultations, theoretical presentations, discussions and guided practice are most commonly used training methods according to the literature (28). Finally, the existing online course [31] already met most of our learning objectives. Based on new insights from our previous studies, we renewed some parts of the course and made new videos regarding psychosocial exploration, creating a shared understanding, and providing a tangible explanation which were added to the online course.

3.3. Step 4: Communication training content

Based on the results from step 1,2 and 3, we developed a blended learning communication training program with an online course and two training days (face to face education) for groups of 5–7 residents, each day comprising two 3-hour modules. Table 2 gives an overview of the training program.

3.4. Online interprofessional course on MUS

The online course consists of seven modules of 45–60 min and each module contains different types of assignments: videos, discussion boards, reading assignments, polls and quizzes. The modules and the corresponding change objectives are presented in Table 3.

3.5. 4.2: Two training days (6 h)

The groups were supervised by a GP or a medical behavioral scientist. They started the first training day with an exercise in which the GP residents formulated their learning objectives based on their self-

perceived communication gaps and discussed these objectives with their supervisor and an actor. During the role-play with the actor, GP residents were stimulated to focus on their personal objectives. The residents rotated during the role-play, especially when someone experienced problems in the communication. The actor and supervisor provided feedback, specifically focused on their learning objectives and on the problems they identified in the communication.

The second training day started with a plenary session in which the GP residents were invited to discuss their own feelings, thoughts and attitudes towards patients with MUS. They were invited to give ten positive and ten negative associations with respect to the management of patients with MUS. They discussed the influence on communication and possible origins of these associations with the aim to become more aware of their own attitude towards patients with MUS. Next, the residents followed three modules supervised by the same GP or medical behavioral scientist. The residents specifically practiced in role-plays with each other. The GP residents worked in pairs, taking turns in being “doctor” and “patient”. The last module of the training program consisted of a role-play with an actor. Again, the actor and supervisor provided feedback.

3.6. Step 5: Implementation

The training program was implemented in the GP training at the UMCG (three groups, 34 GP residents) in 2019 and Radboudumc (one group, 12 GP residents) in 2020.

3.7. Step 6: Evaluation

We evaluated the training as experienced by the residents quantitatively with a pre- and post-training assessment of self-efficacy and qualitatively with individual interviews. Forty-six GP residents started with the training program and 38 of them completed the program.

3.8. Self-efficacy

Fifteen GP residents did not complete all three SE-12 questionnaires and were excluded from the analyses. Of these 15 GP

Table 3
Overview of the modules of the online interprofessional course on medically unexplained symptoms (MUS) and the corresponding change objectives.

Module	Change objective
1. Introduction (awareness of attitude towards patients with MUS, ten misconceptions about MUS)	Communication with empathy
2. Basic knowledge (terminology, prevalence, prognosis and etiology of MUS)	
3. Assessment (exploration, diagnostic testing, minimize chance of misdiagnosis)	A thorough somatic and psychosocial exploration
4. Consultation (recognize that a patient feels unheard, using physical examination to reassure the patient, explanation, preventing negative interaction pattern, shared understanding)	Creating a shared understanding of the problem Providing a tangible explanation
5. Treatment in primary care (assess severity, motivate patients' behavior change, treatment goals)	Taking control
6. Psychological treatment (DSM 5 classification, coping with disagreement with patients with MUS, personalized explanation and treatment plan). This module was optional.	
7. Collaboration (improve communication and collaboration with other healthcare workers, key elements in a referral letter, when and how to refer a patient with MUS)	Taking control

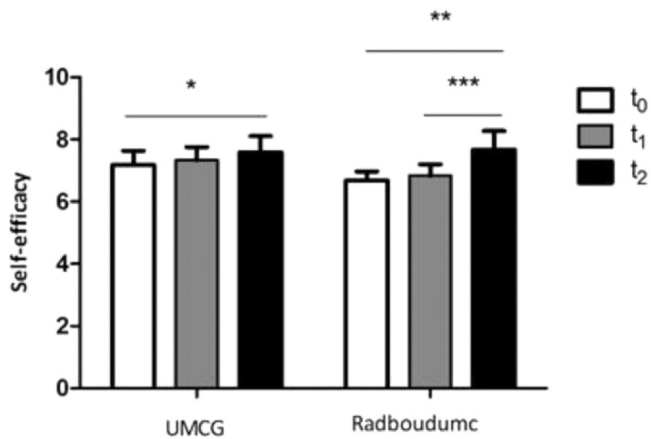


Fig. 2. The self efficacy at three different moments. T₀ = baseline before online course, T₁ = at the start of the first training day, T₂ = 4 weeks after the training program. *p < 0.05, **p < 0.01, ***p < 0.001. UMCG = University Medical Center Groningen.

residents, 14 participated in the training program at the UMCG and one at the Radboudumc. Of the GP residents who completed all three SE-12 questionnaires (n = 31), a significant increase in self-efficacy across time points was measured. Mean self-efficacy scores at four weeks follow up (UMCG 7.59 (SD 0.51) and Radboudumc 7.67 (SD 0.60)) increased significantly compared to baseline score (UMCG 7.18 (SD 0.46) and Radboudumc 6.68 (SD 0.29) (see Fig. 2).

3.9. Interviews

We interviewed 25 GP residents; 16 of them followed the training program at the UMCG and the other nine at the Radboudumc. By exploring the GP residents' experiences with the training program, we identified three themes: (1) the benefit of blended learning (education that integrates e-learning and face-to-face education), (2) the acquisition of skills, and (3) recommendations for adjustments to the training program.

3.10. The benefit of blended learning

GP residents greatly appreciated the blended character of the training. They experienced the online course as a good theoretical preparation for the training days, in which they practiced the theory, their knowledge and their individual learning goals. According to them, the content of the online course corresponded with their experiences in daily care for patients with MUS. GP residents experienced the training days as valuable and specifically mentioned the role-plays with actors as helpful in becoming more aware of learning needs.

3.11. The acquired skills

From the training program, GP residents reported to have learned how to do a thorough exploration of patients' MUS symptoms. Furthermore, GP residents said that the training program helped them to become more aware of their language use, especially during the physical examination stage. According to them, they became more aware of using positive instead of negative wording. The residents also learned about the importance of a shared understanding. Furthermore, GP residents stated they became acquainted of several explanatory models during the training program and they learned how to improve their referral letters to medical specialists. The GP residents considered it important to mention the working hypothesis MUS, as this may improve the collaboration with medical specialists with respect to the management of patients with MUS.

Finally, GP residents said they became more aware of their personal attitude towards patients with MUS.

3.12. Recommendations for adjustments to the training program

Although GP residents said they learned several explanatory models, some of them suggested to focus more on practicing explanatory models as they still experience difficulties in giving an acceptable explanation in daily practice. Furthermore, some GP residents experienced the e-learning as very extensive and time-consuming. GP residents indicated that it took them seven hours to complete the online module. Some of them suggested that it would be better to focus only on parts that would meet their individual learning points instead of doing the whole online module (tailoring). Finally, some GP residents experienced the role-play in which they practiced on each other as ineffective. According to them, this role-play was less representative for daily practice. GP residents recommended to practice the learning points in a role-play with training actors.

4. Discussion and conclusion

4.1. Discussion

This paper described the stepwise development of an evidence-based communication training program for GP residents to be applied in consultations with patients with MUS. After attending the training program, GP residents reported increased self-efficacy. GP residents experienced the training program as useful and especially valued the combination of the online course and the training days. Although they recommended some adjustments, GP residents indicated they learned the following skills in the management of MUS: a thorough exploration of symptoms, using positive wording, creating a shared understanding, giving a tangible explanation, improving their referral letters to medical specialists, and becoming more aware of their attitude towards patients with MUS.

Our study has a number of strengths. First, we used the IM framework to develop the training program. The purpose of IM is to provide health education program planners with a framework for effective decision making at each step in the intervention development process. The use of IM to plan implementation strategies will probably improve the appropriateness, quality, and impact of these strategies on implementation outcomes and will optimize the effectiveness of the intervention. Consequently, this will lead to increased adoption, implementation, and sustainment of evidence based interventions. IM has been utilized widely across multiple health domains, populations, and settings all over the world [34,35]. An IM approach is characterized by three perspectives, applied during the program planning process: participatory planning, eclectic use of theory, and an ecological and systems approach for understanding health problems and intervening to address them. Participatory perspectives emphasize equity in decision making and community and stakeholder engagement in all phases of planning. Additionally, IM guides the use of theories to understand the behavioral and environmental causes of health problems, identify their determinants, and select change methods to address them. An ecological and systems perspective recognizes that social and physical environmental conditions may have an even stronger impact on behaviors than do factors related to individuals [34,35]. Although previous literature reported evaluation models, such as the Re-AIM model [36] and the MRC guidance [37], we used the IM framework as it was our intention to systematically develop a training program for residents. The IM framework provides a systematic procedure for development, implementation, and evaluation of a new intervention. Second, we evaluated the training program among a substantial group of GP residents. Third, we used both quantitative and qualitative methods to evaluate the training program. Fourth, patients

with MUS were directly involved in the first (needs assessment) and second (change objectives) step by reflecting on their own video consultation and by participating in a focus group, respectively. We used the input from both steps for the development of our communication training program.

Our study also has some limitations. First, the evaluation of the training program was based on self-report, which can be seen as a limitation. We did not examine the effect of the training program on the GP residents' communication skills in MUS consultations in daily practice. To evaluate the impact of the training program, we decided to use self-rated self-efficacy in our pilot evaluation of the training program. Self-efficacy is an intermediate outcome measure and may affect patients' health outcome. However, the use of self-rated self-efficacy is a limitation of our study since a systematic review showed weak or no association between physicians' self-rated assessments and external assessments [38]. Furthermore, studies on reattribution interventions in MUS showed an improvement in GPs communication with patients but no impact on patient outcomes [15]. To evaluate the effect of training, a cluster randomized trial would be needed in which patient outcomes will be compared between practices that did have the training and control practices without training. Second, we did not measure patient outcomes. Further, in contrast to the enhanced care interventions, we did not train supervisors before the training program. We decided to regard them as process supervisors and not as MUS experts. For further optimization of the training program, we may consider teaching the trainers in advance. Fourth, there could be a selection bias in the Radboudumc group as the GP residents registered voluntarily. We assume that the GP residents who are less interested in MUS did not participate in the Radboudumc group. As a consequence, we might have overestimated the results of the Radboudumc group. By comparing the self-efficacy score (pre- and post-training) for all GP residents, we could detect a large Cohen's effect size of 0.92. Fifth, the 31 GP residents who completed all three SE-12 questionnaires represent a small sample. Therefore, we have to be cautious with the interpretations of these findings. However, our main aim was to systematically develop a training program for residents, based on the scientific literature and the opinions of patients, teachers and experts, and to do a first exploratory study of the effect on self-efficacy in residents concern consultations with MUS patients. Finally, we excluded fifteen GP residents from the analyses as they did not complete all three SE-12 questionnaires. Compared to the GP residents who completed all three questionnaires, the excluded residents reported a significantly lower self-efficacy at baseline, while there were no differences after the training program. As a consequence, we might underestimate the effect of the training program.

Finally, we cannot exclude the possibility of a Hawthorne effect (i.e. type of reactivity as the consequence of being studied in combination with the absence of a control group).

A Cochrane review about enhanced care examined the effectiveness of several training programs for managing patients with MUS in primary care [39]. These enhanced care interventions focused on a model based on reattribution and did not affect clinical outcome [39]. The lack of treatment effects might have been caused by patients' resistance towards explicit psychosomatic attributions, the lack of involvement of patients with MUS in the development of treatment interventions, or the disturbance of the normal flow of the consultation. In contrast to this, our training program focussed on (enhancing) communication strategies that are an integral part of the consultation process. Moreover, our training program focussed on the clinical assessment of symptoms and non-specific elements and aimed for shared problem understanding. In addition, we involved patients with MUS in the needs assessment on which the development of our communication training program was based. Incorporating the identified important communication elements in the consultation process will probably ensure that our communication intervention will be acceptable for patients with MUS and feasible in a

primary care setting. Previous studies on enhanced care interventions did not assess intervention acceptability in GPs, nor whether GPs had the necessary skills to perform the intervention. These omissions might have contributed to the lack of effect of enhanced care interventions [39]. Examining GP-related outcomes, and specifically the assessment of skills, is therefore an important intermediate step to determine whether the intervention works. After attending our training program, GP residents reported a significantly increased communication self-efficacy.

A strength of our training program is the blended learning: a combination of a diversity of methods (training days and an online module). Blended learning appears, compared with didactic learning, significantly more effective in teaching evidence-based medicine to medical students; it changes the attitude towards evidence-based medicine (EBM) and self-reported use of EBM in clinical practice more effectively [40]. Furthermore, GP residents in our training program completed a standardized online module. In order to provide a more personal learning environment, a more personally tailored, adaptive e-learning environment (AEE) might better reflect trainees' individual learning needs. A disadvantage of this method could be that residents are not aware of their own blind spots.

4.2. Conclusion

We developed an evidence-based, blended communication training program for the management of patients with MUS in primary care, using the IM approach. Future research should examine the effect of the training program on the GP residents' communication skills in MUS consultations in daily practice.

4.3. Implications for clinical practice and research

This study described the development of an evidence-based blended communication training program for the management of patients with MUS in primary care. Based on our results, it would be premature to conclude that the communication training will improve GP residents' skills in clinical practice. To evaluate the effect of training, a cluster randomized trial would be needed in which patient outcomes will be compared between practices that did have the training and control practices without training. Patients with MUS will be recruited from participating GP practices before randomisation. All patients will be followed for two years and will be asked to complete questionnaires at baseline, six, twelve, eighteen, twenty-four months. Primary outcomes are symptom severity and patient-specific functioning and disability, secondary outcomes are quality of doctor-patient relationship, quality of life and patient satisfaction. If the randomized trial demonstrates sufficient effectiveness and efficiency of the training programme, the intervention could be embedded in the GP training.

Ethical approval

The research ethics committee of the Radboud University Nijmegen Medical Center concluded that the study could be carried out in accordance with the applicable rules in the Netherlands.

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CRediT authorship contribution statement

SvD, ToH and PL developed the protocol for the study. JH and HS recruited the GP trainers. JH collected all the data. JH, analysed the data. SvD, JR, OB, PL, ToH and HS contributed to interpreting the

findings and the final manuscript's content. All authors read and approved the final manuscript.

Declaration of Competing Interest

None declared.

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Appendix A. Literature search performed in step 1

Search question: To explore relevant communication elements according to patients with MUS, GPs and researchers and the problems that patients with MUS and GPs experience in MUS consultations in primary care.

Methods:

Literature search in Pubmed, PsychInfo, and Cochrane database.

Search string:

("Medically Unexplained Symptoms"[Mesh] OR Medically Unexplained Symptom*[tiab] OR Somatic Symptom*[tiab] OR "Somatoform Disorders"[Mesh] OR Somatoform Disorder*[tiab] OR Medically Unexplained Syndrome*[tiab] OR Somatization Disorder*[tiab] OR Briquet Syndrome [tiab] OR Pain Disorder*[tiab] OR "Psychophysiologic Disorders"[Mesh] OR psychophysiologic disorder*[tiab] OR psychophysiological disorder*[tiab] OR psychosomatic disorder*[tiab] OR medically unexplained physical symptom*[Title/Abstract]) AND ("Communication"[Mesh] OR Personal Communication[tiab] OR Misinformation[tiab] OR Communication Program*[tiab] OR Communications Personnel[tiab] OR "Physician-Patient Relations"[Mesh] OR Physician-Patient Relation*[tiab] OR Physician Patient Relationship*[tiab] OR Physician Patient Relation*[tiab] OR Doctor Patient Relation*[tiab] OR Doctor-Patient Relation*[tiab]) AND ("General Practitioners"[Mesh] OR General Practitioner*[tiab] OR General Practice Physician*[tiab] OR "Physicians, Family"[Mesh] OR Family Physician*[tiab] OR "Primary Health Care"[Mesh] OR Primary Health Care[tiab] OR Primary Healthcare[tiab] OR Primary Care[tiab] OR "Physicians, Primary Care"[Mesh] OR Primary Care Physician*[tiab] OR GP[Title/Abstract]).

Limits: English language, adults.

Results:

We found a total of 369 studies. After removing duplicates and filtering for English language and adult patients, 165 studies remained. We screened titles and abstracts for relevance, based on which, 130 studies were excluded. From the remaining studies, another 19 were excluded after reading the full text. From the remaining 16 studies, we identified several important communication elements in MUS consultations according to patients with MUS, GPs and researchers. The complete list of communication elements is shown here.

Positive elements – according to GPs.

Concrete exchange of symptom and diagnosis interpretation [41], negotiating original explanations [41], explicit validation for suffering [42,43], managing patient expectations [42], listening attentively [44], validating patient symptoms [44], clear demonstration of commitment [44], explaining medical reasoning [44], investment in doctor-patient relationship [45] and a biopsychosocial approach [45].

Positive elements - according to patients with MUS.

Listening to patients' experiences [46], listening to patients' feelings [47] and taking concerns seriously [47].

Positive elements - according to researchers.

Normalization with effective explanation [48].

Negative elements - according to GPs.

Structuring a consultation [42], providing an explanation [49] and fishing for psychosocial causes [45].

Negative elements - according to patients with MUS.

Unsatisfying explanation [50], communication not personalized enough [51], GPs don't take patient seriously [52], patient is not involved in decisions regarding treatment of complaints [52], no open-minded attention to individual needs [45].

Negative elements - according to researchers.

No exploration of reason for encounter [53], no initiation of discussion of beliefs and concerns by GP [53], insufficient discussion of consequences of symptoms on patients' daily lives, activities, social environment and illness behavior [53], insufficient in-depth inquiry of presented symptoms [53], absence of structuring techniques [54], less patient-centered communication compared to patient with medically explained symptoms [55], insufficient verbal empathy [56], ambivalent explanations [56], explanations not tailored to patients' stated concerns [57], GPs' fail to respond to cues about emotional or social problems [57], normalization of symptoms without explanation or with ineffective explanation [48].

Conclusion.

The results of the literature do not show new communication elements. We concluded that the pre-existing list (based on our qualitative studies) with relevant communicational elements was exhaustive.

Appendix B. Literature search performed in step 3

Search question: Which education methods are used for training physicians in the management of patients with MUS in primary care and if reported, what is their effectiveness?

Methods:

Literature search in Pubmed, Psychinfo, Cochrane database and Eric.

Search string:

("Teaching/methods"[Mesh] OR Training Technique*[tiab] OR Training Technic*[tiab] OR Pedagogy[tiab] OR Pedagogies[tiab] OR Teaching Method*[tiab] OR Academic Training*[tiab] OR Training Activities[tiab] OR Training Activity[tiab] OR Educational Technic*[tiab] OR Educational Technique*[tiab] OR "Education/methods"[Mesh] OR Workshop*[tiab] OR Training Program*[tiab] OR Educational Activities[tiab] OR Educational Activity[tiab]) AND ("Medically Unexplained Symptoms"[Mesh] OR Medically Unexplained Symptom*[tiab] OR Somatic Symptom*[tiab]) OR "Somatoform Disorders"[Mesh] OR Somatoform Disorder*[tiab] OR Medically Unexplained Syndrome*[tiab] OR Somatization Disorder*[tiab] OR Briquet Syndrome[tiab] OR Pain Disorder*[tiab]).

Limits: English language, adults.

Results:

We found a total of 149 studies, of which 61 remained after filtering for English language and adult patients. After screening titles and abstracts for relevance removing duplicates, we excluded 56 studies. We analyzed the teaching methods in the remaining five training programs and, where applicable, reviewed their effectiveness as reported in the research papers.

Conclusion:

No new teaching methods were identified apart from the ones already known from the MUS trainings as described in the Cochrane review enhanced care [39]. Effectiveness was reported in all but one study. However, since, many training programs did not specify their objectives beforehand, the significance of these effects is questionable.

Appendix C. Self-efficacy (SE) questionnaire

Communication with the patient

The following questions concern selected communication skills regarding the conversation with the patient. Please answer every question, and only use the 'not relevant' box if the question asked does not apply to you in your daily work.

On a scale from 1-10, 1 = very uncertain 10 = very certain:

1	How certain are you that you are able to successfully identify the issues the patient wishes to address during the conversation?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2	How certain are you that you are able to successfully make an agenda/plan for the conversation with the patient?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

3	How certain are you that you are able to successfully urge the patient to expand on his or her problems/worries?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

4	How certain are you that you are able to successfully listen attentively without interrupting or changing of focus?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

5	How certain are you that you are able to successfully encourage the patient to express thoughts and feelings?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

6	How certain are you that you are able to successfully structure the conversation with the patient?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7	How certain are you that you are able to successfully demonstrate appropriate non-verbal behavior (eye contact, facial expression, placement, posture, and voicing)?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8	How certain are you that you are able to successfully show empathy (acknowledge the patient's views and feelings)?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9	How certain are you that you are able to successfully clarify what the patient knows in order to communicate the right amount of information?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10	How certain are you that you are able to successfully check patient's understanding of the information given?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11	How certain are you that you are able to successfully make a plan based on shared decisions between you and the patient?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12	How certain are you that you are able to successfully close the conversation by assuring, that the patient's questions have been answered?											
	Very uncertain										Very certain	Not relevant
	1	2	3	4	5	6	7	8	9	10		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix D. Interview guide

1. How did you experience the online module on MUS? What could be improved or did you miss anything?
2. Do you think that the online module on MUS is in line with the daily MUS patient care?
3. How did you experience the two education days? What could be improved or did you miss anything?
4. How did you experience the actors and the supervisors? Did they have sufficient knowledge and did they guide the program well?
5. Was something of the program unnecessary?
6. Did you agree with the content of the program?
7. Was there something you want to change?
8. What was the most important and yearful (training days, online module)?
9. Did you learn you own learning goals? And how was this possible?
10. Which skills did you learn, can you mention at least three examples?
11. After attending the program, what is the difference in clinical practice with respect to the management of patients with MUS?
12. Was the time investment in line with the things you learned?

Appendix E. COREQ guidelines

1. Interviewer/facilitator: *JH interviewed the GP residents*
2. Credentials: *JH, PhD, general practitioner*
3. Occupation: occupation of JH: *general practitioner*
4. Gender: *male*
5. Experience and training: *The researcher followed the CaRe course in qualitative research.*
6. Relationship established: *There was no relationship established prior to study commencement.*
7. Participant knowledge of the interviewer. What did the participants know about the researcher? *The participants knew the goal of the study: evaluation of the training program by exploring the GP residents' experiences with the training*
8. Interviewer characteristics: What characteristics were reported about the interviewer/facilitator? e.g. *See answers question 2, 4*
Domain 2: study design
Theoretical framework
9. Methodological orientation and Theory, What methodological orientation was stated to underpin the study? *Evaluation of the training program by exploring the GP residents' experiences with the training*
10. Sampling. How were participants selected? *We approached all residents, 25 of were available.*
11. Method of approach. How were participants approached? *GP residents who agreed to be interviewed after the training were questioned by phone by one of the researchers*
12. Sample size. How many participants were in the study? *25 GP residents*
13. Non-participation How many people refused to participate or dropped out? *In total, 36 GP residents participated. All of them agreed to be interviewed after the training, but 25 of them were available.*
14. Setting of data collection, Where was the data collected? *general practice training*
15. Presence of non-participants. Was anyone else present besides the participants and researchers? *No.*
16. Description of sample. What are the important characteristics of the sample? *All of them are GP in training, 16 of them followed the training program at the UMCG and the other nine at the Radboudumc. Seven were male, the other 18 residents were female.*
Data collection
17. Interview guide. Were questions, prompts, guides provided by the authors? Was it pilot tested? *Interview guide: we performed semi-structured interviews with an interview guide (see Appendix D). No pilot was tested.*
18. Repeat interviews. Were repeat interviews carried out? If yes, how many? *No, repeat interviews were not carried out.*
19. Audio/visual recording. Did the research use audio or visual recording to collect the data? *Yes, we made use of audio recorder during interviews.*
20. Field notes. Were field notes made during and/or after the interview or focus group? *Yes, during interviews field notes were made*
21. Duration What was the duration of the interviews or focus group? *About 15 min for each interview.*
22. Data saturation. Was data saturation discussed? *Yes, saturation has been discussed and achieved.*
23. Transcripts returned. Were transcripts returned to participants for comment and/or correction? *No, transcripts were not returned to participants.*
Domain 3: analysis and findings
Data analysis
24. Number of data coders. How many data coders coded the data? *For all interviews two data coders.*
25. Description of the coding tree. Did authors provide a description of the coding tree? *Yes, we did.*
26. Derivation of themes, Were themes identified in advance or derived from the data? *Yes.*
27. Software. What software, if applicable, was used to manage the data? *Atlas.ti*
28. Participant checking. Did participants provide feedback on the findings? *Member check was not done.*
Reporting
29. Quotations presented, Were participant quotations presented to illustrate the themes / findings? *No, we did not*
30. Data and findings consistent. Was there consistency between the data presented and the findings? *Yes.*
31. Clarity of major themes. Were major themes clearly presented in the findings? *Yes.*
32. Clarity of minor themes. Is there a description of diverse cases or discussion of minor themes? *Yes.*

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