Original Research

Effects on Knowledge and Attitudes of Using Stages of Change to Train General Practitioners on Management of Depression: A Randomized Controlled Study

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Objective: To assess the impact on knowledge and attitudes of a tailored educational intervention on depression using a modified version of the Prochaska stages of change model, compared with standard continuing medical education, for general practitioners (GPs) in primary care in Iran.

Method: Using a randomized controlled trial, a total of 192 GPs were evenly randomized to intervention or control arm. The topic for the educational intervention was depressive disorders. The participants were divided in to small and large groups, depending on their initial stage of change. The GPs' knowledge and skills regarding management of depressive disorders were assessed through a questionnaire with 7 multiple choice questions, 11 Likert statements, 3 case vignettes, and 1 essay question. Attitudes toward management of depressive disorders were also assessed. Both questionnaires were validated.

Results: There was a significant improvement in knowledge mean scores regarding multiple choice and Likert questions (intervention effect 6%; $P = 0.002$), as well as for the case vignettes and essay question (intervention effect 12%; $P = 0.011$) in the intervention arm, in comparison with the control arm. There were significant changes in mean attitude scores in both study arms, but no difference between them.

Conclusions: A theoretical model of medical learning and behavioural change can be used to devise educational formats that suit different stages of learning. Such tailored educational formats can improve GPs' knowledge and skills regarding management of depressive disorders.

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Clinical Implications

- GPs provide most of the treatment for depression, and could benefit from improved skills.
- GP knowledge and skills regarding management of depression can be improved through tailored education.
- Using an randomized controlled trial, our study established that a stages of change model in learners can substantially alter knowledge and skills.

Limitations

- The length of courses may have been low to get a more substantial impact on GPs' knowledge and skills.
- There was a high initial attrition.

Conventional CME has largely failed to improve professional practice and health outcome.[1,2] More sophisticated approaches to educating physicians now emphasize multifaceted learning methods, as these have been shown to improve skills and behaviour.[3,4] Similarly, adult learning theory suggests connecting the education to the learners' experience, as in CPD. Linking learning to experience enhances the chances of changing clinical behaviour in practice, but changing behaviour requires appreciation of how such changes may occur.

The Prochaska model describes 5 stages of change: precontemplation, contemplation, preparation for action, recent change, and maintenance.[5] The model postulates that people are at different stages of readiness to change and that effective interventions must assess the participants' stages and assist them to move from one stage to the next, thus promoting behavioural change. The model has most commonly been applied in health behaviour contexts, such as treatment of different kinds of addiction, and in health promotion.[5,6] More recently, the model has been suggested to provide a deeper understanding of participants' response to knowledge translation within the CPD context, and educational methods customized to the learners' stage of readiness to change have been proposed.[4,7,8] Studies on the effects of tailored interventions based on the Prochaska model have been suggested in the literature.[5,9,10]

A modified Prochaska model was developed and used as an evaluation tool to assess the participants' stages of readiness to change in a research transfer training program.[7] The original 5 stages were collapsed into 3 stages—attitude, intention, and action—and used in the MPQ. In the attitude stage, there is awareness of a problem but no commitment to take action. In the intention stage, the participant has prepared for behaviour change, while in the action stage, such change has already taken place.

Although CME has been compulsory for all doctors in Iran for more than 15 years, there is now an identified need to improve it.[11] Therefore, consistent with the Prochaska model, we designed a multifaceted intervention that included several novel features for Iran: standardized patients, highly interactive educational methods, and attention to the

Abbreviations used in this article

CME	continuing medical education
CPD	continuing professional development
GP	general practitioner
MPQ	Modified Prochaska Questionnaire
TUMS	Tehran University of Medical Sciences

stages-of-change learning theory. Depressive disorders were chosen as the topic of the educational program because it is common and frequently unrecognized among GPs working in primary care in Iran as well as worldwide,[12] and most patients do not receive adequate treatment.[13]

Using a randomized controlled trial design, we tested the hypothesis that participants' knowledge and attitudes in an intervention group based on readiness to change would improve to a significantly higher extent, compared with a control group participating in traditional CME.

Method

The method and findings are reported in agreement with the Consolidated Standards of Reporting Trials requirements.[14]

Study Area

Iranian GPs' working in the catchment area of TUMS was chosen. TUMS is responsible for the CME for all GPs in southern Tehran (1614 GPs were registered at the start of our study). Most of the GPs' (80%) worked in a private clinic, while 20% were employed at public clinics and hospitals. Most were men (74%) and the mean age was 38 years (SD 9.3). The mean level of experience was 7 years (SD 8.3).[11]

Participants

The calculated sample size was 164, based on an estimated improvement of 20 percentage points in the intervention arm and assuming 80% power at a 5% significant level. Considering about 20% attrition, we increased the desired sample size to 200. We added an extra 50% to allow for up to one-third of the invited doctors not accepting participation.

Initially, 300 GPs, who were registered in the TUMS district, were randomly selected and invited to a meeting to get information about the project, with 220 GPs attending the meeting. However, 98 of them did not have a clinic or worked outside the target area and were thus not eligible. Therefore, another 200 GPs were randomly sampled and invited to a meeting where 185 of them attended. Again, those who did not have a clinic or worked outside the target area ($n = 115$) were excluded. The remaining 192 GPs were informed about the objectives of our study and methods used and that participation would exempt them from having to pay the usual participation fee for the education. After signing an informed consent, all of them filled in the MPQ, and the knowledge and attitude questionnaires. The MPQ had previously been validated and tested for reliability in the Iranian context.[15]

Randomization Procedure

The 192 GPs were first grouped according to their stages of readiness to change and stratified based on sex, age (3 levels), and length of work experience (3 levels). Thereafter, they were randomly allocated within each subgroup to the

intervention ($n = 96$) or the control arm ($n = 96$). Most of the GPs were in the attitude stage (intervention arm = 77%; control arm = 76%), while the others were in the intention stage (intervention arm = 23%; control arm = 24%). None of them were in the action stage.

Intervention Process

Eight CME teachers from the department of psychiatry were trained at a 1-day workshop on the application of interactive educational methods. After training, they conducted 2-day courses for the GPs in intervention groups. The courses were conducted for about one-half a day on 2 consecutive days. Two-day courses for the GPs in the control group were directed before the trainers workshop.

The same educational background material was used in both groups: a book with comprehensive evidence-based guidelines for GPs regarding the diagnosis and treatment of depressive disorders. The book had been compiled by members of the research group, based on World Health Organization documents[12] and the *World Psychiatric Association Bulletin* on depressive disorders[16] as a content of CPD approach. The educational methods used in the intervention group were based on the participants' stage of readiness to change, while the control group followed a current CME program. The 2-day education for the control group was conducted before the workshop for the trainers.

Intervention Arm

GPs in the attitude stage ($n = 74$) were allocated to large group education, where the diagnosis of depressive disorders was emphasized. Interactive educational methods relevant for a large group were used, such as programmed lectures, modified buzz groups, and lectures followed by videos and discussion. GPs in the intention stage ($n = 22$) were allocated to a small group in a workshop setting, mainly using case illustrations presented through standardized patients, role playing, jigsaw, buzz groups, and snowball techniques, all emphasizing novel treatments of depressive disorders and differential diagnosis. The total education time in both groups in the intervention arm was 12 hours, but the contact time with the teachers was only 8 hours.

Control Arm

The number of doctors in both the large and small group tallied with the intervention groups, but both diagnosis and treatment of depressive disorders were emphasized in both groups. The reasons for introducing a small group in the control arm was to partly control for the potential bias of a presumed better effect if the learning takes place in a small group setting, All GPs in the intention stage ($n = 23$) were allocated to the large group, which took part in a current CME program on depressive disorders using conventional teacher-centred educational methods, such as lectures. A corresponding number of the 52 GPs in the attitude stage were randomly assigned to the small group, participating in a workshop, where current CME methods for small groups were applied, such as mini-lectures followed by questions and answers. The total education time in both groups was 8 hours, corresponding to the total contact time with the teachers.

Risk of Contamination

Tehran is a big city with a large population of 15 million inhabitants, with most living in the southern part of Tehran, where TUMS is responsible for providing health services. The GPs who are working in separate offices in this area have no formal meeting except with participation in different CME courses. Further, the content of education in both intervention and control groups was the same, which makes the issue of contamination less important.

Measures

The knowledge and attitude questionnaire was combined and the development was based on 3 sources: published articles[17,18]; guidelines for management of depression in primary care compiled by the research group; and experts' consensus.[16]

The effects were assessed and related to knowledge and attitudes of GPs.

Knowledge Questionnaire

The knowledge questionnaire consisted of participants' demographic characteristics, 7 multiple choice questions related to management of depression, 11 statements rated on a 5-point Likert scale from strongly disagree to strongly agree assessing participants' knowledge about the treatment of depressive disorders, and 1 open-ended question exploring the GPs' more active knowledge about symptoms of depression. The last part of the questionnaire related to 3 case vignettes describing different types of patients, asking about the diagnosis and suggested treatment for each. All multiple choice questions were designed by experts within the group, but the Likert questions were based on published research.[17] The vignettes were derived from one published article[18] and were then modified and adapted to the context of Iranian GPs.

Different types of questions were designed to assess GPs' knowledge and skills. Knowledge was assessed related to the factual and application domain. The multiple choice and Likert questions refer to factual knowledge, and the vignettes and essay refer to applied knowledge.

A broad range of content was also captured by the questions. Most of the multiple choice and Likert questions were related to treatment of depressed patients. The essay question related to the diagnostic criteria of depression, while the vignettes

were related to the diagnosis and treatment of 3 different scenarios with depressed patients.

Validity and Reliability of Knowledge Questionnaire

The validity and reliability of the questionnaires were assessed in a pilot study. The difficulty and discrimination indices were assessed regarding each question. The content validity of the instrument was ensured through group discussions within the team of experts, who received the pilot groups' results analysis and made subsequent modifications. The team of experts was comprised of 3 psychiatrists, 2 specialists in medical education, 1 epidemiologist, and 1 specialist in public health and family medicine.

In our study, an item analysis for the knowledge and attitudes questionnaires was performed. The accepted score based on consensus in the expert group for difficulty indices was considered 0.30 to 0.85 and for discrimination indices was 0.25 to 0.80.

For assessing reliability during the pilot phase, the test–retest technique was used in a group of GPs attending other CME programs in TUMS. The first test was run by sending the questionnaires to the participants by trained carriers. The retest was distributed and gathered 3 to 7 days after the first. The mean kappa coefficient regarding all knowledge questions was 0.75.

We scored the essay question and the vignettes based on guidelines for correction compiled by the psychiatrists in the research group. The reliability of the scoring was tested through comparison with scores given by one of the psychiatrists. This testing showed a high degree of correlation between the 2 ($\kappa = 0.92$).

Attitude Questionnaire

The attitude questionnaire was initially based on 13 statements, assessing GP's attitude regarding depression. This questionnaire has been used in many studies.[19] It was adapted to the Iranian context based on the results of the pilot study. The validation procedure was the same as for the knowledge questionnaire; the required modifications were made consequently within the team of experts. The final attitude questionnaire version had 10 items on a Likert scale, with 5 steps from strongly agree to strongly disagree.

One month after the educational intervention, a postintervention assessment was performed by sending the knowledge and attitudes questionnaires to all participants (both intervention and control arm) by trained carriers. The carriers were instructed to collect the test 20 minutes after delivery.

Data Analysis

The data were entered by the use of SPSS software (SPSS Inc, Chicago, IL), version 13. The paired t test was used for comparing the knowledge and attitude scores before and after the

interventions in both arms. Student t test and analysis of variance were also used for comparing change of scores between the 2 study arms. Multiple regression was used to compare between subgroups, with significance set for P values of less than 0.05. Bonferroni corrections were applied to control for multiple comparisons. We used a general linear model repeated measurement for assessing the effect of the education model between groups by showing the effect by consideration of time and repeated measure.

Results

Ninety-five GPs (19%) did not respond to the invitation to participate in our study. The cooperation rate among those 192 who consented to participate was 81% (78 GPs) in the intervention arm and 84% (81 GPs) in the control arm. All GPs took part in the educational programs and answered the questionnaires both before and after. There were no significant differences between the GPs in the intervention and control arm regarding proportion of men (75% and 71%, respectively), mean age (40 and 41 years, respectively), or work experience (12 years in both arms).

Table 1 shows the results of GPs' knowledge regarding depressive disorders, divided into 2 parts: the first including the multiple choice and Likert scale questions, the second including the 3 vignettes and the essay question. There was significant improvement in knowledge mean scores regarding the multiple choice and Likert questions ($P = 0.002$) as well as case vignettes and the essay question ($P = 0.01$) in the intervention arm, compared with the control arm. The intervention effect regarding the first part was 6 percentage points and for the second part 12 percentage points. Table 2 shows the differences between the subgroups. Regarding the multiple choice and Likert questions, a significant improvement was detected in the small intervention group, compared with the large intervention group, and both control groups ($P = 0.02$). The results regarding the case vignettes and essay question showed numerically positive changes in the small intervention group, compared with the small and large control groups, but these changes were not statistically significant ($P = 0.05$). The intervention effect of the multiple choice and Likert questions between the small groups was 14 percentage points and between the large groups was 4 percentage points. The intervention effect regarding case vignettes and the essay question was 5 percentage points between the small groups and 13 percentage points between the large groups.

The attitude statements improved significantly in both study arms toward more positive views on treatment of depressive patients. However, there were no differences between the intervention and the control arm.

Table 1 Changes of GPs' knowledge scores about different types of questions for the total of the intervention and control arms, including percentages of maximum score

Knowledge test	Intervention		Control		Difference between intervention and control groups
	Preintervention Mean (SD)	Postintervention Mean (SD)	Preintervention Mean (SD)	Postintervention Mean (SD)	
Multiple choice and Likert	10.4 (2.1) 58%	14.4 (1.7) 80%	10.2 (1.9) 57%	13.1 (2.1) 73%	
Difference pre- and postintervention	4.0 (22%) ($t = 12.7$, $df = 77$, $P < 0.001$)		2.9 (16%) ($t = 9.5$, $df = 80$, $P < 0.001$)		1.1 (6%[a]) $P = 0.002$
Case vignettes and essay question	3.6 (2.0) 45%[b]	4.9 (1.8) 61%[b]	3.5 (1.9) 44%	3.8 (1.6) 48%	
Difference pre- and postintervention	1.3 (16%) ($t = 5.2$, $df = 77$, $P < 0.001$)		0.3 (4%) ($t = 1.3$, $df = 80$, $P < 0.18$)		1.0 (12%[a]) $P = 0.01$

[a] Percentage of maximum score

[b] Intervention effect

Discussion

This is the first study of its kind, according to the international literature. We found a significant, although modest, impact on GPs' level of knowledge in the field of management of depressive disorders linked to participation in a tailored education activity based on a needs assessment using a modified trans-theoretical model in comparison with a traditional CME program.

Tailoring of the Education

Based on the model, the desired outcome for GPs in the attitude stage[7,9] were improvements in understanding related to general diagnosis. Therefore, the educational strategy in the large intervention group, based on the CPD approach, was interactive education, such as programmed lectures, and the content stressed recognition and diagnosis rather than treatment.[4] The Prochaska model postulates that physicians already in the intention stage of change should be given material that emphasizes practical treatment strategies and clarification of differential diagnoses. Further, the theory has been linked to specific educational formats depending on the stage. Therefore, we applied a workshop setting, with multifaceted communications in the small intervention group. It has been theorized that people may change their thinking (mental models) when their previous ideas have been diagnosed, activated, and made overt to discussion and feedback to foster reflection.[20,21]

Pretest Comparisons

There were no differences between scores of multiple choice and Likert questions in the small and large groups in the 2 study arms before the intervention. However, the mean scores of essay and vignettes in the pretest were significantly different in the small intervention group, compared with the control arm. The main reason is presumably that the participants in the small intervention group were all in the intention stage, while the participants in the control small group were in the attitudes stage, according to the design of the study, and it can be expected that they respond differently to the questions.

Results and Learning Theory

The overall results regarding different types of knowledge questions revealed a relation to both the specific issues and the format of the education session. The scores of the essay question (focusing on diagnosis) and the vignettes (focusing on the diagnosis and treatment of depression) showed more improvement in the small intervention group, compared with the control groups, although the difference was not significant. Moreover, the multiple choice and Likert questions, which showed significant improvements in the small intervention group, compared with other subgroups, were designed to cover the treatment of depressive disorders, which was particularly focused in the small intervention group. These findings are thus consistent with the theory that learning is enhanced through focusing on different issues in the respective groups based on GPs' stages of change. This

Table 2 Changes in GPs' knowledge scores in the large and small groups in the intervention and control arms (Bonferroni correction test)

Knowledge questions	Intervention		Control		F, df, P
	Small group	Large group	Small group	Large group	
Preintervention Mean (SD)					
Treatment	10.4 (2.1)	10.4 (2.2)	10.4 (2.2)	10.2 (1.9)	0.159; 3,2; 0.92
	58%[a]	58%[a]	58%[a]	57%[a]	
Diagnosis	5.2 (1.2)	3.2 (2.0)	3.4 (2.0)	3.5 (1.9)	5.34; 3,2; 0.002
	65%[a]	40%[a]	43%[a]	44%[a]	
Postintervention Mean (SD)					
Treatment	15.4 (1.5)	14.1 (1.6)	12.9 (2.3)	13.2 (2.0)	8.43; 3,2; 0.001
	86%[a]	78%[a]	72%[a]	73%[a]	
Diagnosis	6.3 (1.6)	4.5 (1.7)	4.1 (1.6)	3.7 (1.7)	11.47; 3,2; 0.001
	79%[a]	56%[a]	51%[a]	46%[a]	

[a] Percentage of maximum score

Small intervention group, compared with other groups.

Intervention effect between small groups regarding MPQ and Likert questions is 14%. Intervention effect between large groups regarding MPQ and Likert questions is 5%. Intervention between small groups regarding case vignettes and essay questions is 5%. Intervention between large groups regarding case vignettes and essay question is 13%.

new approach of needs assessment seems to be applicable for improving GPs' knowledge and understanding.

In a similar study, assessing the effects of a World Psychiatry Association short-term educational program regarding management of depression based on GPs' knowledge, attitude, and practice, it was shown that the GPs' knowledge improved, but their attitudes changed only slightly.[22] Other studies[23–25] involving educational interventions for psychiatric disorders have demonstrated significant shifts in knowledge, but the magnitude of such shifts appears smaller than in our study.

We found no significant change between the 2 study arms regarding the attitude statements, although there were significant improvements between pre- and posttest in both arms. This is in contrast with the results of a review article[24] which concluded that short-term educational interventions had no effect on the GPs' attitudes to psychiatry patients. One conclusion from our findings could be that the duration of the program should be longer or probably repeated if a more substantial effect on attitudes is the goal.

Methodological Considerations
It may be seen as a limitation of our study that the GPs in the intervention arm actively participated in 12 hours of training, compared with 8 hours in the control arm. However, the time of teacher involvement was the same in all groups in both

arms. The difference between traditional and activating methods was that the methods in the intervention arm were intended to help the participants to learn from peers during their group work. The simple delivery of the content in either group did not call for more than 8 hours. It was considered that the extra peer group activities in the intervention groups were only for elaborating the topics, typical for a workshop. The control groups also had the option for individual study and elaboration. A second limitation was the attrition in both study arms from randomization to start of the intervention, although it was similar in the 2 arms. Notably, the final sample size of 159 GPs corresponded well with the originally calculated necessary sample size of 164. The potential bias of better effect if the learning takes place in a small group was partially controlled for by also introducing small group teaching in the control arm of the study. Full control could not be reached as the educational methods were different. However, it should be emphasized that the comparison is between these different methods. The assignment of participants in the intention stage in the intervention arm to the small group was a consequence of using the stages of change model, including appropriate learning methods for each stage. Although the participants were randomly selected among all GPs working in southern Tehran, the external validity is partially reduced because 2 out of 5 of the initially selected GPs did not respond

to the invitation. However, the participating GPs match reasonably well with the total population of GPs regarding age, sex, and length of work experience.

Conclusions

Strengths of our study include the rigorous design and that the measuring instrument had previously been adapted to and validated in the Iranian context. The final sample size also constitutes the largest such study found in the literature. We have thus demonstrated that a theoretical model of medical learning and behavioural change can be used to develop educational formats that suit different stages of learning and that participation in such tailored education can help GPs in primary care to change knowledge regarding management of depressive disorders. Our findings have practical implications for how CME shifts toward the broader context of CPD programs in Iran and are possibly also applicable in other parts of the world.

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Résumé : Les effets sur les connaissances et les attitudes de l'utilisation des étapes du changement pour enseigner aux omnipraticiens la prise en charge de la dépression : une étude randomisée contrôlée

Objectif : Évaluer l'effet sur les connaissances et les attitudes d'une intervention pédagogique personnalisée sur la dépression qui utilise une version modifiée du modèle des étapes du changement de Prochaska comparativement à la formation médicale continue régulière des omnipraticiens (OP) dans les soins primaires, en Iran.

Méthode : À l'aide d'un essai randomisé contrôlé, un total de 192 OP ont été également affectés aléatoirement à l'intervention ou au groupe témoin. Le sujet de l'intervention pédagogique était les troubles dépressifs. Les participants ont été divisés en groupes petits et grands, selon l'étape initiale du changement. Les connaissances et les compétences des OP à l'égard de la prise en charge des troubles dépressifs ont été évaluées par un questionnaire à 7 questions de choix multiple, 11 énoncés de Likert, 3 vignettes de cas, et 1 question à développement. Les attitudes à l'endroit de la prise en charge des troubles dépressifs ont aussi été évaluées. Les 2 questionnaires ont été validés.

Résultats : Il y a eu une amélioration significative des scores moyens des connaissances aux questions de choix multiple et de Likert (effet d'intervention 6 %; $P = 0,002$), ainsi qu'aux vignettes de cas et à la question à développement (effet d'intervention 12 %; $P = 0,011$) dans le groupe de l'intervention, comparativement au groupe témoin. Il y a eu des changements significatifs des scores moyens des attitudes dans les deux groupes de l'étude, mais aucune différence entre eux.

Conclusions : Un modèle théorique d'apprentissage médical et de changement de comportement peut servir à définir des formules pédagogiques qui conviennent aux différentes étapes d'apprentissage. Ces formules pédagogiques personnalisées peuvent améliorer les connaissances et les compétences des OP à l'égard de la prise en charge des troubles dépressifs.