

# Communication Skills Training for Physicians Improves Health Literacy and Medical Outcomes among Patients with Hypertension: A Randomized Controlled Trial

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## Research article

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# Abstract

**Background:** Improving the training of physician about communication skills and patient health literacy (HL) is a major priority that remains an open question. We aimed to examine the effect of communication skills training for physicians on the HL skills and hypertension outcomes among patients with uncontrolled blood pressure (BP). **Methods:** A randomized controlled trial method was conducted to enroll 242 hypertensive patients and 35 physicians from healthcare clinics in the Mashhad, Iran. Regression model and bivariate analysis were used to assess whether the physician training improved physicians-patient communication skills, hypertension outcomes, self-efficacy, and patient medication adherence after intervention. **Results:** after the physician communication training, there was significant improvement in physicians-patient communication skills, hypertension outcomes, medication adherence, and self-efficacy among the patients being managed by the physicians receiving training, compared to the control group. **Conclusion:** The educational intervention leads to better BP control; it may have been sufficient training of physicians change to impact counseling, HL and self-efficacy and adherence. The quality of physician-patient relationship is an important modifiable element of the medical communication that may influences health outcomes in hypertensive Iranian patients. **Trial registration:** Iranian Registry of Clinical Trials (IRCT), IRCT20160710028863N24. Registered April 4, 2018 [retrospectively registered].

## Background

Hypertension is an important chronic disease with a high rate of mortality globally [1, 2], which has affected about 1 billion people, and over 7 million people die from it in the world, annually. According to the recent studies, hypertension affects approximately 25–35% of the middle aged people in the Iran [3, 4] which is introduced as the first cause of mortality in Iran [5, 6].

There is growing evidence that developing patient experience and is a potential way to improve the clinical health outcomes and quality of life for patients with chronic condition; in part this may be due to increasing patient cooperation in the treatment process [7, 8]. Today, patient's cooperation in the treatment process is not only considered as a certain right, but is also known as an international golden standard for providers of medical care service who are expected to achieve it [6, 9]. Thus, patients with chronic diseases need adequate HL skills to control their disease and relevant side effects of disease [10]. Several studies showed that effective physician-patient communication have a strong incentive to improve medical outcomes, patient HL, safety patient adherence and psychosocial support [9, 11]. However, there are few organizations with wide communication skills improvement programs, therefore, studies are limited to case context.

In recent decade, health organizations have focus on using HL-informed provider–patient communication strategies as a “universal precautions” approach. Furthermore, they tried to develop an inter-professional care environment and a collaborative practice, which occur when physician and healthcare providers work with patients from outside their profession and within their own profession. This approach is sensitive to health professional's education program, and are in the pathway linking medical outcome to

medical education interventions [12]. According to these strategies, health professionals can be trained to make better use of their knowledge and skills and they are able to more effectively coordinate health care according to patients' needs [13], therefore, patients could receive higher quality of health care.

Poor physician-patient communication has been implicated as a main barrier to improve HL and blood pressure control in the Iranian population [14, 15]. Despite the medical importance of communication skills training, however, little experimental research has linked skilled physician communication with patient HL and medical outcomes. Further, the interaction between HL skills development and health education interventions have not been well investigated [9, 16] because it is unclear how/where physicians' communication skills can influence patient HL skills and medication adherence to control blood pressure targets [17, 18]. Thus, there is an increasing need for assessments of strategies, which improve physician-patient communication quality, patient HL and health outcomes in medical care context [11, 19].

In this study, the primary objectives were to evaluate the effectiveness of physician communication training on hypertension outcome and level of HL skills among hypertensive patients. Our hypothesis was that there is a direct association between effective physician communication training and successful therapeutic for patients with hypertension. It is also postulated that because medical system training can overcome most of the theoretical complexities that directly link physician education to successful therapeutic. However, the link between health outcomes and physician-patient communication skills is still unpredictable and thus available data are rare.

## Methods

### Design

A randomized controlled clinical trial was done from September 2013 to August 2014, among governmental physicians, working in the six primary care clinics in Mashhad, Iran. In this study, physicians and hypertensive patients were allocated at random into an educational intervention group and control group. We tried to determine the impact of physician communication training on hypertension outcomes and patient HL skills.

## Characteristics of Participants

### Physician

Physicians were 35 primary care doctors (21 female and 14 male) from six primary care clinics selected if they (a) did not attend in the communication skills training, (b) participated as member in the Ministry of Health (MOH) sites, and (c) have experience to provide health care services to at least five patients with blood pressure. Physicians' ages ranged from 26 to 51 ( $32.03 \pm 9.12$ ); they were residents and they

provide primary care services, diagnosis and treatment for patients in the clinics. Clinics were randomly assigned (as the unit of randomization) to either control with usual care (n = 3 clinics) or the training intervention (n = 3). We used simple random sampling to assign eligible physicians in the intervention (n = 17) and control groups (n = 18).

## Patients

This study involved 242 patients in interaction with the study physicians. At baseline, prior to perform the intervention, all eligible patients were identified to all clinics. To be eligible for this work, patients had to be (a) have uncontrolled blood pressure; (b) carry a diagnosis of hypertension on at least five previous clinic visits; (c) used at least one antihypertensive medication in the last three months; and (d) were age 18 or older. They were excluded if patients (a) did not give informed consent; (b) had suffered other disease or disability. Data collection and recruitment are conducted based on standard guidelines which is described in detail elsewhere [20]. As shown in Figure 1, 242 patients with hypertension were randomly assigned to intervention (n = 121) and control (n = 121) groups. After the physicians training, eligible patients returned to the health care clinics (both control and intervention) for routine medical visits and completed baseline and follow up survey.

## Outcome assessments

In this study, we used guidelines for the cross-cultural adaptation (CCA) to translate all questionnaires into Persian [21]. Blood pressure (BP) clinical data extracted from the national health network. In this work, uncontrolled BP was considered as an " average systolic BP exceeded 140 mm/Hg or diastolic BP above 90 mm/Hg; or BP above 130/80 for patients with diabetes or renal insufficiency" [20]. We used an automated BP monitor (Snoqualmie, WA, USA, BPTru device) to read the BP at the medical checkup [22]. Measurements were completed for eligible patients in both the control and experimental groups at baseline (before intervention), and at 1 and 6-months follow-up.

## Physician communication skills

Health Literacy Assessment Questions (HLAQs) were used to examine physician's communication skills at baseline and follow-up [23, 24]. This is a reliable and valid instrument in the health care concepts to assess provider-patient communication skills. This tool includes three sections (spoken, written, and communication skills, patient-provider collaboration and support of patient) with a total of 33 items. Responses for the all items range from 0 = poor, to 4 = excellent and higher scores suggesting physicians have sufficient skills to improve patients' communication needs, quality of care (e.g., respect and friendliness) and health-literacy limitations, and successfully address them [24]. In this investigation, the content validity ratio (CVR) and content validity index (CVI) for the HLAQs were 88% and 87%, respectively. Likewise, the reliability coefficient for the HLAQs scale was 89%. All eligible patients completed HLAQs test to assess physician-patient communication skills before and after the intervention.

## Patient health literacy

The Chew's Screening Questions (CSQ) was used to examine patients' HL level. This scale has been developed based on the rapid estimate of test of functional HL in adults (TOFHLA) and adult literacy in medicine (REALM) [25, 26]. This questionnaire includes 3 questions related to problem learning about medical condition, confident to fill medical forms and help read hospital material. Responses for the all items range from 0 = never, to 4 = always, which combined into a single patient satisfaction composite with good reliability ( $\alpha = 0.98$ ). The higher scores reflecting patients have great HL limitations [25, 26].

## Medication adherence

We used the Adult Primary Care Questionnaire to examine the effect of physicians' communication training on improving medication adherence through 29 items [27]. Responses for the 2 items were bi-optional (1 = no, 2 = yes), while others items was 4-points Likert Scale. These items asked the patients to assess whether or not physicians guide them to hypertension-related issues in improving medical care and patient concerns about medications. [24, 28]. The average CVR, CVI, and Cronbach's alpha coefficient for this questionnaire were 91%, 89%, 91%, respectively.

## Patients' self-efficacy

The Chronic Disease Self-efficacy Questionnaire was implemented to examine patients' confident related to their regularity task or certain activities [29]. This tool included 33 items to examine the following scales: patients' information about disease, exercise, communicate with physician, manage disease, obtain help from community, social activities, depression items and manage/control symptoms and shortness of breath. All these items are scored based on five points- Likert from 1 (not at all confident) to 5 (totally confident) [29]. Likewise, the average CVR, CVI, and Cronbach's alpha coefficient for this questionnaire were 82%, 86.2%, 93%, respectively.

## Physician communication training

The educational training was conducted based on 3 sessions of Focus –Group Discussion (FGD) and 2 workshops (10 hours per session) for physicians in the intervention group. On these discussion sessions, physicians expressed their views and experiences of HL improvement in health care clinics with focusing on social problem and patient's communication needs. In FGD session, physicians also discussed the existing challenges used to create a successful therapeutic physicians-patient relationship. At third session, they concluded that poor clinician support system, patient HL skills and physician communication abilities (medical writing skill, verbal ability, and collaboration) are main barriers to control BP because physician do not regularly use HL informed skills in communicating with patients and their families (*Table 1*).

Training program were designed according to the potential communication gaps with main focus on Health Literacy in Practice (HLP) strategies to promote physician-patient communication skills. HLP is a facilitated method to increase medication adherence and patients' self-efficacy among patient with chronic disease. Based on this method, physicians must first understand their patients' HL limitations and communication needs to effectively communicate with them. Likewise, this method emphasizes on patients' understanding of the self-management abilities and patients' concerns (side effect and medications) in order to teach them correct methods to take medications [23, 24].

In experimental group, the physician's training was conducted using a self-assessment checklist and training package. Experts in medicine led the training workshop. The main target of these workshops was enhancing the physicians' counseling skills that affect the behavior change in hypertensive patients. All physicians were trained to: help the patient in overcoming barriers to hypertension treatment, improve engagement with patients, advice the patient about a specific health behavior, detect the patient's sources in changing this behavior, and improve patient skills to take higher responsibility for their own self-care behaviors (*Table 1*).

## Statistical analyses

In present study, the bivariate analyses (t-test, chi-square, ANOVA) was use to compare clinical and socio-demographic characteristics between experimental and control groups. The linear regression testing the effects of selected covariates (patient's HL, patient's communication skill) on dependent variable (medication adherence, self-efficacy, diastolic blood pressure (DBP) and systolic blood pressure (SBP) scores). The random effects least squares regression model was conducted to cluster patients within physician. This model included the main effects of study arm assignment (control vs. intervention), time period (baseline vs. follow-up), and their interaction. Statistical Package for Social Sciences software (SPSS 16, Chicago, Illinois) and R version 3.0.2 were used to produce accurate estimates.

## Results

### Physician and patients characteristics

In this study, the majority of eligible physicians were female (64%), had a mean age of  $37.08 \pm 7.52$  years with more than 8 years experience to provide primary health care. Majority of hypertensive patients were female (77.34%), married (82.3%), had a mean age of  $54.8 \pm 11.5$ , less than diploma degree (42.8%) and employed (86.7%) with an income of 100–200\$ monthly (52.1%). Clinically, a high percentage of patients had diabetes (43.6%) and some patients were diagnosed with other comorbid conditions (*Table 2*).

At baseline, 70% of hypertensive patients showed the inadequate and marginal levels of HL (Chew) (*Table 2*). The results of the physician-patient communication skills showed that 66.7 % of the patients needed more support from physician and they had difficulty in written (49.2% of patients) and spoken communication (66%). Self-efficacy was poor (58%; n = 139) or moderate (40.8%; n = 98) for most

patients and good for only 1.2% (n = 3). The level of adult primary care questionnaire was low (160 patients; 67%) for most of patients, while it was temporarily acceptable for 12.4% (30 patients).

Based on our results, patients with adequate HL were significantly showed better medication adherence ( $\beta = 0.19, p = 0.001$ ), self-efficacy ( $\beta = 0.14, p = 0.023$ ), DBP ( $\beta = 0.13, p = 0.032$ ) and SBP ( $\beta = 0.12, p = 0.03$ ) scores than patients who have lower level of HL and communication skills. Similarly, educational attainment was significantly associated with patients' HL ( $\beta = 0.15, p = 0.02$ ) (*Table 1S*).

## Educational intervention

A significant difference ( $p < 0.05$ ) was found between participants (physicians and patients) of intervention versus control groups at follow-up, and in change from baseline to follow-up in all scores including physician's communication skills, patient's HL skills, medication adherence, patients' self-efficacy, SBP and DBP (*Table 3*). Random effects least squares regressions models also showed the significant evidence in the change in physician's communication skills (CI: 0.27, 0.91, P: 0.00), patient's HL (CI: 0.22, 0.83, P: 0.00), medication adherence (CI: 0.20, 0.67, P: 0.00), patients' self-efficacy (CI: 0.14, 0.65, P: 0.002), SBP (CI: -1.02, -0.31; P: 0.00) or DBP (CI: -1.32, -0.49; P: 0.00), from baseline to follow-up, in the intervention compared to the control group (*Table 4*).

## Discussion

Our finding showed that physician communication training could be effective on the delivery of hypertensive outcome (DBP and SBP) and patient HL. Further, this communication training for physician in this study can lead to improvement of medication adherence, physician-patient communication skills, and self-efficacy among hypertensive patient. In fact, this training has led to physicians engaging via talking about their concerns (medication, side effects, social and financial and problem), which help the physician to modify their counseling behaviors, change medication, and communication skills which leads to better BP control [30, 31]. This result is in agreement with several studies of educational interventions that found effective physician-patient communication is the heart of medicine in the delivery of health care [9, 11, 32]. In a sample of diabetic patients, 11% absolute modification in medication was observed in patients who perceived by their physician to be an effective communication behaviors [33]. Similarly, Schneider et al. in 2004 found that higher level of the physician-patient adherence dialogue about chronic disease treatment, evaluated as the ability to understand problems, the quality of physician's information sharing methods, and suggest help with medications, described the main variance between medication adherence and perceived quality of the physician-patient communication [34].

Furthermore, we found that patients with higher education was significantly associated with high level of HL and better medication adherence, which is in contrast with recent studies in hypertensive patients [30, 31]. These studies indicated that usually patients with lower educational qualifications observed to be

less knowledge about medical care, less healthy, to have lower HL skills and more difficulties to understand and read health care information [11, 35, 36].

This study is the first evaluation of communication skills training implemented for physicians, which examine the association between physician-patient communication skills and medical outcomes among hypertensive patients with low HL skills, who at much greater risk for poor quality of life and medication adherence to treatment than that other populations [6, 24]. This study indicates the short-term experiential physician communication skills training to modify medical outcome, patient HL for up to 6 months. This intervention program seemed to benefit all health professional, irrespective of baseline patient experience/HL skills.

An additional strength was that we have made adjustments for main covariates such as patient's HL, medical comorbidity, and self-efficacy that could be effective to explain modifiable linkage between medication adherence and better physician-patient communication for patients with BP (13, 25).

Some limitations are worth noting. First, the duration of the medical communications between the physician and patient was not evaluated. The importance of regular primary care provider is well documented in hypertensive patients because lead to significant patient satisfaction with the diagnostic than who do not have a continuity of care [6, 37]. Second, a self-report item was used to determine medication adherence and HL skills, which may overestimation of each scores level. Although, we checked overall authenticity responses and we approved that these responses are closely linked to clinical characteristics of patients. Further study is still required to consider the strengths of subjective and objective assessment to detect the relevant compounds that modify physician-patient communication and make actual health outcomes. Likewise, future investigation would benefit from evaluating patient and physicians characteristics (e.g., race, personality traits, age).

These findings highlighted the urgent need to develop effective interventions program during routine practice to improve collaboration between patient and physician. Despite the negative implications of low physician-patient communication skills and patient's health HL on health outcomes, physicians and other health care providers are usually unaware of HL problems in their patients. Most of physicians few recommend appropriate educational strategies, and overestimate patient's understanding of health information. Therefore, physicians need be, first, aware of what HL skills is, and how it can compromise caregivers' ways to modify health outcomes in their patients. Secondly, physician should be able to identify patients with low HL skills, and to plan appropriate educational health education. In addition, training program must be systematically implemented for graduate medical education to achieve effective collaborative communication by physician and other health providers. This is important to increase opportunities for medical students to use open discussions and narratives into the curricula because use of these narratives are more likely to encourage their self-reflection during residency, value shared decision-making, increase their satisfaction and confidence when using these communication skills during patient interactions.

## Conclusion

This communication training intervention for physician offer multiple benefits including: improved patient HL, medical outcomes, medication adherence, and self-efficacy. Our finding showed that physician with high communication skills with their patients was associated with better HL skills to improve their medical care. Therefore, physician communication skills training appear to be an efficient way to clarify the needs of patients with limited HL, and improve communication challenges between patients and their physicians.

## List Of Abbreviations

HLP: Health Literacy in Practice, HL: Health literacy, HLAQs: Health Literacy Assessment Questions, MOH: Ministry of Health, EHRs: the electronic health records, CSQ: Chew's Screening Questions, CVR: The content validity ratio, CVI: and content validity index, CCA: face and content.

## Declarations

Ethics approval and consent to participate:

This study was conducted after the approval and permission of Mashhad University of Medical Sciences Research Committee and was conducted with consideration of Helsinki Declaration in all phases of the study [39]. The participants were informed orally and in writing about voluntary participation and the possibility of withdrawing at any time, with no consequences for their treatment and care. Confidential data treatment was guaranteed. Written informed consent was obtained from the participants. Moreover, they were assured that all the information would be kept confidential and would not be revealed unless for research purposes and in an anonymous form.

Consent for publication:

Not Applicable.

Competing interests:

The authors have no competing interests to declare

Availability of data and materials:

Data and materials can be requested from the corresponding author

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Authors' contributions:

SB TS, prepared the first draft of the paper and analyzed of data. NP, designed and implemented of the project. F B, performed education intervention in health care clinics; G F, reviewed the full-texts of the papers for data extraction. All authors read and approved final manuscript. The authors declare that they have no competing interests.

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## Tables

Table 1: Data Analysis Evaluation Plan for Intervention

Process	Objectives	Procedures	Material
FGD1	<p><b>First Session:</b> Focusing on primary care and communication needs</p> <p><b>Second Session:</b> Developing focused questions to solve problems</p> <p><b>First Session:</b> Identifying the targets for intervention</p>	<p>-Identification of problem and causes of low physicians-patient communication skills</p> <p>-Elicits beliefs, values, about problem</p> <p>-Where does the issue of health literacy come into play?</p> <p>-Why should anyone care if low health literacy exists?</p> <p>-How does clinical support system information improve problem?</p> <p>-How does support of physician impact patients communication skills?</p> <p>- Discuss available therapies, services</p> <p>- What frustrations do physicians experience with their patients?</p> <p>-How much effort are physician willing to solve the low-health literacy problem?</p> <p>-To identify potential communication gaps to resolve differences of opinion</p> <p>-Offer of help, support of doctor</p> <p>-Offer of improve providers-patient communication skill and clinical support system.</p>	<p>- Didactic presentations</p> <p>- Open-ended questions</p>
<b>Educational Intervention</b>			
Providers is taught based on key communication strategies of HLP model to increase patients' understanding			
<p><b>First Workshop (10 hours)</b></p>	<p><b>Spoken Communication</b></p> <p><b>Written Communication</b></p>	<p>- The teach-back method, tips for communicating clearly, medication reviews, language differences, and other considerations</p> <p>- How to talk with patients (e.g. does not use medical jargon and talk too fast)</p> <p>- How to used audio, visual aids/video materials to improve their communication with patients (e.g., model of body part, instructional health videos, food models for portion sizes)</p> <p>- How to ask questions by using simple and friendly words</p> <p>-Designing easy-to-read tools,</p> <p>-Using health-education signs effectively</p> <p>- Creating a welcoming atmosphere with written materials knows</p> <p>-How to simplify u80and identify materials to easier read?</p> <p>-Consultant assesses educational materials and client forms for readability</p>	<p>-Teach-back video,</p> <p>-Follow-up Instruction Form,</p> <p>-MedCard,</p> <p>-Brown-bag medication</p> <p>- Review poster</p> <p>-Release of medical information</p> <p>-Lab-results letter</p> <p>-Helpful posters</p> <p>-Educational materials</p>
<p><b>Second Workshop (10 hours)</b></p>	<p><b>Collaboration skill</b> To improve self-care behavior and medication adherence</p>	<p>- How to encourage their patients get involved with their care and ask questions</p> <p>- Develop action plans to change patient's behavior and discuss health care priorities with them</p> <p>-How to teach their patients about taking medications correctly (pill chart and box), offers patients assistance</p>	<p>-Teach-back video</p> <p>PowerPoint</p> <p>- Ask Me poster</p> <p>- Med card</p> <p>- Pill chart</p> <p>- Didactic presentations</p>

		setting up a system, and reviews medications with patients (by health physician)	
		-How to teach their patients about self-management skills (e.g., using a inhaler or glucometer, exercise activity, and dietary advice)	
		-Contacts with patients to understand or to follow up on plans made during the visit. • Getting patient feedback	
	<b>Primary care support</b>	-Assist patients in overcoming barriers to pharmacologic treatment and to understand their insurance forms and medical bills	-Medical progress notes -Role play exercises -Didactic presentations
	To develop physician counseling skills and patients self-efficacy	- Assesses patient's non-medical barriers to provide appropriate referrals - Support the patient in the use of community-based programs (e.g., weight loss, health literacy, and stop smoking)	
<b>Post test (1-6 months follow up)</b>	To evaluate effect of educational intervention	- To assess communication skills between patient and physicians, patients' self-efficacy and medication adherence, hypertension outcomes, and patient HL	*HLAQs, CSQ, Adult Primary Care, self-efficacy scales and measurement diastolic, systolic

\*Chew's Screening Questions (CSQ): Health Literacy Assessment Questions (HLAQs)

Table 2: Patients socio-demographic and clinical characteristics

Characteristics	Total <i>n</i> =240 (%)	Experimental <i>n</i> =121 (%)	Control <i>n</i> =119 (%)	<i>P</i> - value <sup>a</sup>
<b>Mean Age (±SD)</b> range: 22–89 years	54.8 ± 11.5	53.8 ± 8.4	54.1 ± 10.1	0.81
<b>Gender</b>				
Female	77.34%	78.2	80.2	
Male	22.66%	21.8	19.8	0.701
<b>Marital status</b>		81.0	85.7	
Married	82.3%			
Widows	11.7%	11.6	10.2	0.326
Divorced	6.26%	8.4	4.1	
<b>Education</b>		40.5	42.0	
Illiterate	37.5%			
< High school	42.8%	38.0	43.7	0.326
> High school	19.7%	21.5	14.3	
<b>Employment</b>		89.1	86.8	
Employed	86.7			0.745
unemployed	13.3	10.9	13.2	
<b>Income per month</b>				
< \$100	26.7	25.6	27.7	0.245
100-200\$	52.1	48.8	55.5	
>\$200	21.2	25.6	16.8	
<b>Comorbid conditions</b>				
Congestive heart failure	3.9	3.4	3.6	0.89
Diabetes	43.6	52.6	46.7	0.26
Coronary artery disease	12.5	12.3	13.9	0.69
Nicotine dependence	3.5	2.9	3.2	0.91
Cerebrovascular disease	6.7	5.7	9.2	0.21
<b>Health literacy</b>				
Inadequate	55.3%	55.15	48.87	
Borderline	14.7%	10.9	14.5	0.321
Adequate	30%	27.4	25.3	
<b>Physician-Patient communication skills</b>				
<sup>b</sup>	66.7	68.4	70.2	0.710
Limited	33.3	35.6	26.7	
Adequate				

\*Significant at the  $p < 0.05$  level, <sup>a</sup>Testing significant differences between control and experimental groups; <sup>b</sup> using HLAQs for patients with BP, comprised of 33 items scored on a 4 point scale, higher scores indicate physicians are proficient to improve patients' communication needs and health-literacy limitations.

## Figures

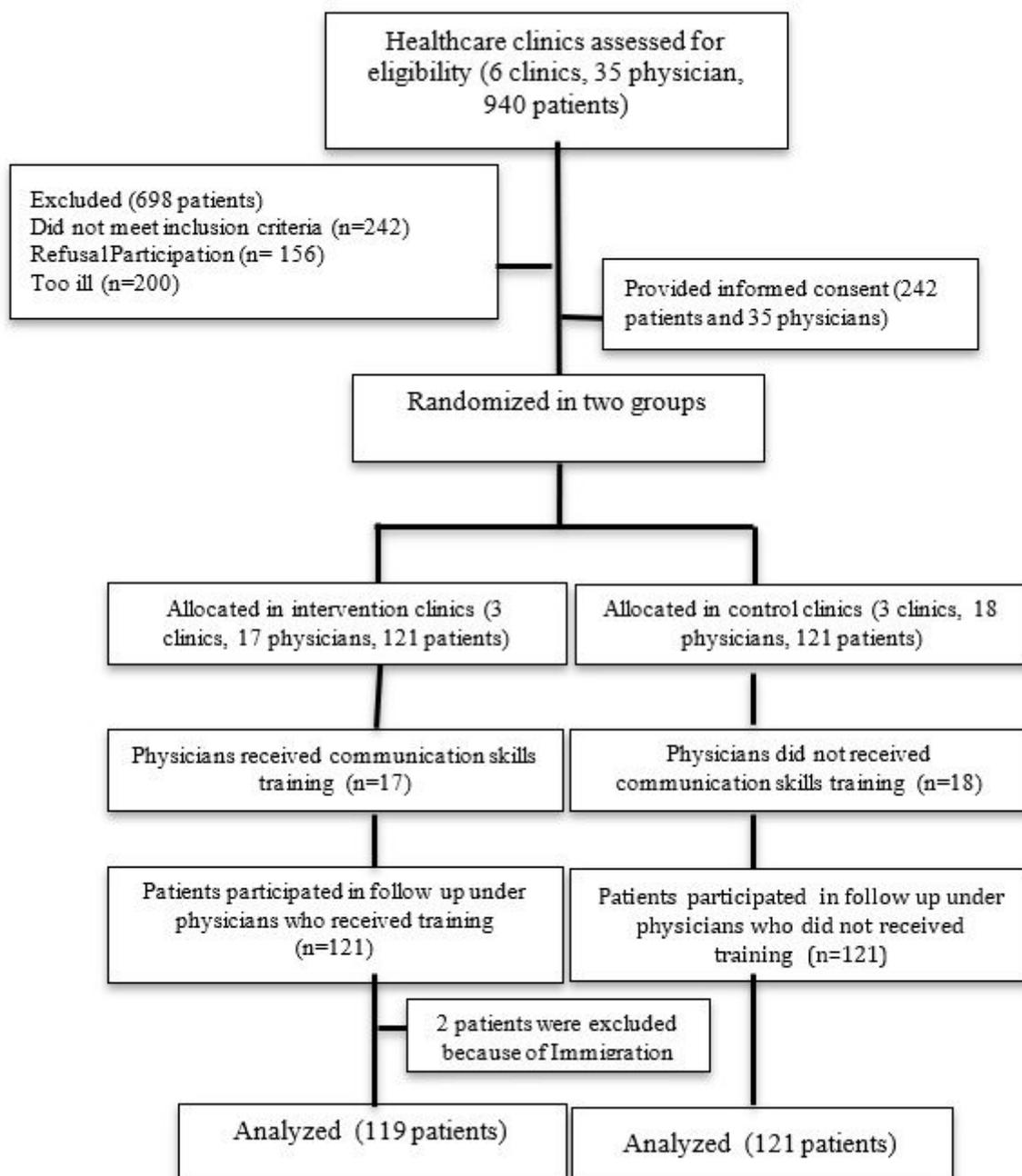


Figure 1

Figure 1: Participants flow chart

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [supplement1.docx](#)