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ORIGINAL ARTICLE

EDUCATIONAL MODEL DEVELOPMENT FOR PATIENTS AND FAMILIES WITH HYPERTENSION IN PRIMARY HEALTH SERVICES: A MIXED METHOD STUDY

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ABSTRACT

The global risk of morbidity and mortality due to hypertension highlights the importance of optimizing nurses' roles in controlling hypertension through education. This study aims to develop educational models for patients and families with hypertension. A sequential mixed-method research design was used. Focus group discussions and in-depth interviews were conducted with 28 participants to explore the phenomenon and health education needs of patients and families with hypertension, and the data were analyzed thematically. A survey of 40 people was conducted to identify the elements of a workable model using SEM analysis. The researchers then used an integration matrix to perform the data integration. Seven themes were revealed from the qualitative phase: (1) health problems, (2) scope of educational services, (3) primary service activities, (4) health education methods, (5) information needs, (6) management support, and (7) barriers. The following sub-components were also obtained from the analysis: (1) Health Education Approach, (2) Health Education Program, and (3) Learning Process. The educational model for patients and families with hypertension is complex, and nurses require support to implement such a model. Further research is needed to prove the model's effect on the personal and interpersonal conditions of hypertensive patients.

Keywords: *Health education; hypertension; model; nurses; primary health services*

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INTRODUCTION

Hypertension is a highly prevalent degenerative disease with high morbidity and mortality risks. The World Health Organization (WHO) estimated that 2.83 billion persons globally between the ages of 30 and 79 have hypertension, with the majority (i.e., two-thirds) residing in low- and middle-income countries (WHO, 2023). The Basic Health Research in Indonesia showed that 34.1% of the country's population has hypertension (Ministry of Health, 2018). According to various studies, despite the global increase in life expectancy, hypertension is still a severe problem due to its relation to cerebrovascular damage, cognitive impairment, and death (Gupta et al., 2020; Iadecola et al., 2016; Kitt et al., 2019). Previous studies have also explored the awareness of hypertension treatments and control efforts in various regions worldwide. Among individuals with hypertension, the standardized rates of awareness, treatment, and control of hypertension were 44.9%, 36.5%, and 24.3%, respectively (Lv et al., 2018). A previous study also found that 87.1% of their sample had low awareness of hypertension treatment (Khoiry et al., 2022).

There has been a significant rise in higher blood pressure in low- and middle-income countries in recent decades. Nevertheless, only one in three of these countries are aware that they have hypertension, and only around 8% have their blood pressure under control (Schutte et al., 2021). Therefore, nurses need to provide education to patients and families with hypertension to help them keep their condition under control. Nurses in clinical and community settings are responsible for improving the quality of life of hypertension patients, overcoming the various problems related to managing hypertension holistically, and designing specific interventions for controlling hypertension. Previous studies showed that patient-oriented efforts are a key feature of effective care models that improve the quality of care services and help control morbidity and mortality due to hypertension (Himmelfarb et al., 2016).

Research on nurses' roles in improving hypertension control has provided a more specific view of what nurses must do within the primary care scope. Various studies show that blood pressure monitoring and patient education are among the most widely used effective strategies for improving hypertension control. Public health management and patient education are hypertension management aspects related to nurses (Himmelfarb et al., 2016). Personalized health education is a clinically effective nursing intervention (Falcão et al., 2023). Good education is determined by personal involvement in the educational program being run. Existing studies found that needs-based education is needed to achieve optimal health education outcomes for hypertension patients (Myanganbayar et al., 2018). Other studies also show that face-to-face education within treatment programs for individuals with hypertension is attributed to reducing the patient's blood pressure values (Falcão et al., 2023).

The current methods and strategies nurses employ as patient educators are not yet optimal in increasing patients' understanding and ability to care for themselves independently. Therefore, it is necessary to develop an evidence-based model for patient and family education that focuses on optimizing the role of nurses in nursing intervention strategies for controlling hypertension. This study developed an education model for patients and families with hypertension in primary care by exploring and analyzing participant perspectives qualitatively and quantitatively. This model also serves as evidence and contributes to strengthening the body of knowledge on the role of nurses as educators of patients and families with hypertension in primary care.

METHOD

Study design

This study employed a sequential mixed-method design. This method was selected to obtain adequate and relevant data on the conditions and viewpoints of the research participants. The data obtained was used to formulate a health education model for patients and families with hypertension. The linkage and integration of results in the qualitative and quantitative phases through exploratory sequential design, as explained by Creswell (2018), aims to form categories of information that are further explored and validated through the quantitative phase.

Participants

The participants in the quantitative and qualitative phases were selected based on the following inclusion criteria: patients, family members, health cadres, or hypertension program managers for at least the last year. After the researcher explained the research, the participants signed an informed consent form. A total of 28 participants, consisting of 13 nurses, 10 health cadres, and five hypertensive patients, were involved in the qualitative phase, and two experts and 40 nurses were involved in the quantitative phase. The sample for the qualitative phase was determined by the purposive sampling method based on the following inclusion criteria: community nurses working in any public health center in Palembang City, serving as the main person in charge of the non-communicable disease prevention and control program, have experience as the person in charge of the program for at least one year.

Instruments

The qualitative phase comprised Focus group discussions (FGDs) and in-depth interviews using 12 semi-structured and open-ended questions. Next, quantitative surveys using instruments developed by researchers based on themes found in the qualitative phase were distributed. The survey instrument consisted of 22 question items. The complete model was then validated with face validity involving two nursing management and community nursing experts.

Data collection

This research was conducted in 10 community health centers in urban areas in Indonesia. The participants were recruited using a snowball sampling approach. The difficulty in finding participants who met the criteria caused the researcher to use references from previous participants for potential informants who met the criteria to be interviewed. The qualitative phase of the research was conducted to explore the phenomenon and health education needs in patients with hypertension. FGDs were conducted for 60–90 minutes with program managers and health cadres. Meanwhile, in-depth interviews were conducted for 45–60 minutes with patients and families with hypertension. Next, the survey distributed in the quantitative phase was developed by the researchers based on the results and instruments tested in the qualitative phase.

Data analysis

Qualitative data analysis was performed using a thematic analysis, which involved finding meaning from transcripts, identifying keywords, formulating categories through managing keywords with a uniform meaning, forming subthemes from several categories, forming themes from subthemes that have similar relevance and meaning, and linking the suitability of the themes in the theme cluster with the research objectives.

Furthermore, survey items were developed by the researchers based on the synthesis and integration conducted. The health education model for hypertensive patients and their families was developed by (1) combining the results of exploratory research with theoretical concepts, (2) validating the model qualitatively by asking for input from two experts in community nursing and nursing management, and (3) validating the survey results in the form of confirmatory factor analysis using Structural Equation Modeling (SEM).

The qualitative findings were synthesized with theories and concepts and reduced to items developed in the survey for the quantitative phase. These findings became the basis for a substantial explanation of the model components tested in the quantitative phase. The valid and fit model components were then used to describe the model, and its completeness was evaluated by two experts in community nursing and nursing management. This process was conducted to ensure that the model can be read and understood clearly by nurses as the model's users.

Trustworthiness

In the qualitative phase, the research team frequently discussed the data analysis of the findings, from the transcription of the results to the theme analysis. The research team also relied on the themes set for the category identification of the results to improve trustworthiness.

Ethical consideration

This study was conducted with the ethical clearance approval of the Health Research Ethics Committee of the Health Polytechnic of Palembang 2543/KEPK/Adm2/V/2022.

RESULT

Qualitative Phase

Table 1. The characteristics of nurses in charge of the non-communicable diseases program (N = 13)

Participant	Age (year)	Gender	Education	Working experience (year)	In charge (year)
P1	38	Female	Bachelor	7	3
P2	34	Female	Bachelor	10	2
P3	27	Female	Diploma	4	2
P4	38	Female	Bachelor	16	5
P5	32	Female	Diploma	9	1
P6	36	Female	Bachelor	3	1
P7	37	Female	Master	5	5
P8	43	Female	Master	17	2
P9	42	Female	Bachelor	16	1
P10	32	Female	Diploma	5	3
P11	39	Female	Diploma	3	3
P12	28	Female	Bachelor	3.5	3.5
P13	47	Male	Master	20	4

On average, the participants were 36 years old and had worked in primary care for an average of 8.85 years, with 2.46 years in charge of non-communicable disease (NCD) prevention and control programs.

Table 2. The characteristics of health cadres (N = 10)

Participant	Age (year)	Gender	Education	Work experience as health cadre (year)
P14	39	Female	Senior high school	10
P15	51	Female	Senior high school	12
P16	55	Female	Senior high school	15
P17	47	Female	Senior high school	12
P18	63	Female	Senior high school	18
P19	67	Female	Senior high school	36
P20	47	Female	Bachelor	11
P21	52	Female	Senior high school	20
P22	49	Female	Senior high school	15
P23	44	Female	Senior high school	14

The participants who are health cadres are, on average, older adults aged 51.4 years with an average experience as a health cadre of 16.4 years.

Table 3. The characteristics of patients with hypertension (N = 5)

Participant	Age (year)	Gender	Marital status	Education	Long of hypertension period (year)
P24	78	Male	Married	Bachelor	8
P25	62	Female	Married	Senior high school	4
P26	60	Male	Married	Senior high school	5
P27	58	Female	Married	Senior high school	6
P28	59	Female	Married	Senior high school	4

The hypertensive participants were in the older adult category with a duration of hypertension of 5-6 years.

The thematic analysis revealed seven themes. These themes were synthesized and integrated with theories and influenced the item design used for the survey in the quantitative phase, as shown in Table 4.

The qualitative phase obtained the following themes: (1) the physical and psychological health problems of hypertensive patients; (2) service areas for hypertensive patients in the community health center category and outside the community health center building; (3) primary service activities including the screening and assessment of hypertension and risk factors, health education, treatment, referral; (4) health education method implemented by cadres and health workers, conducted repeatedly and consistently, learning aids, evaluation of the information submitted; (5) the information needs of hypertensive patients such as signs and symptoms, treatment, and care of hypertension; (6) disease management support that does affect policy changes, the role of society, government, patient groups, and families; (7) obstacles in hypertension management including low compliance of hypertensive patients, lack of health cadre participation, limited human resources, and high achievement targets.

Theories and concepts were synthesized by integrating themes with the following theoretical concepts: Patient Family Education (PFE) from Marshall (2015), the Basic Information Process from Driscoll (Gurbin, 2015), and the System Model from Neuman and Fawcett (Alligood, 2021).

The qualitative data phase produced the data used for model development. Theories and concepts were combined to create survey items, which were used to validate the model components. They were also used to formulate the model descriptions and complete the model intervention tools (Table 4). The integration of theories with qualitative research results revealed the following components of the health education model for hypertension patients and their families: (1) Health

Education Approach, (2) Health Education Program, and (3) Learning Process.

Quantitative Phase

Each component of the draft education model for patients and families with hypertension was then validated with the test results (Figure 1). The resulting components of the Health Education Model for Hypertension Patients and Families in Primary Health Care were then analyzed using Structural Equation Modeling to obtain the following results:

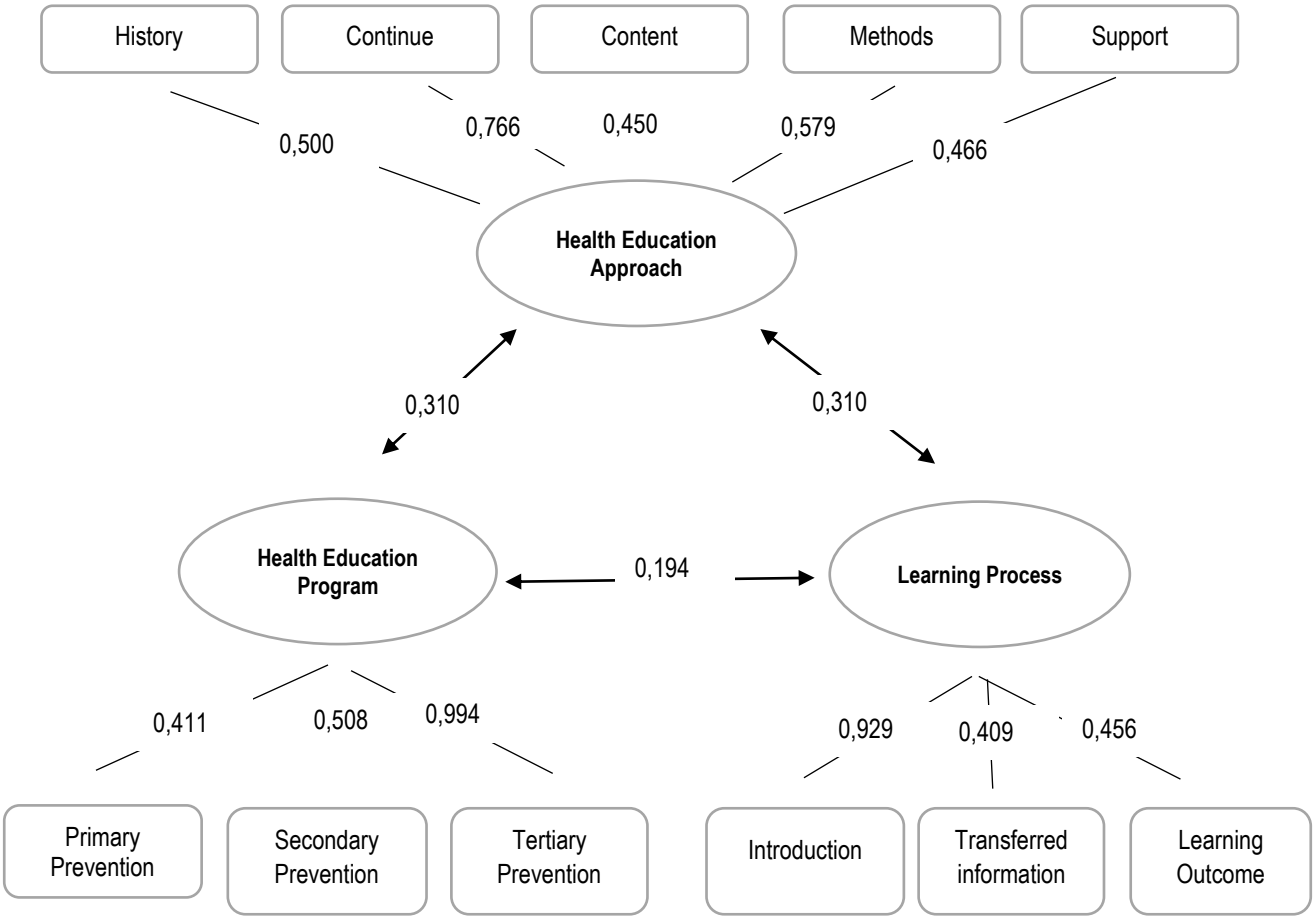

Figure 1. Health education model for hypertension patients and families in primary health care

The model comprises three main components: (1) the *Health Education Approach* with five sub-components, i.e., history, continue, content, methods, and support; (2) the *Health Education Program* components with sub-components of primary prevention, secondary prevention, and tertiary prevention; and (3) the *Learning Process* component with sub-components of introduction, transferred information, and learning outcome. All components have loading factor values close to 0.4 and over 0.5. These three components have a significant relationship with a p-value of < 0.05, the R-value of 0.310, 0.194, and 0.310. The factor loading analysis and correlation results between components show that the developed model has a good fit.

Table 4. Attachment

Qualitative phase		Theory and concept	Quantitative phase	Sub component	Component
Category	**Theme**		**Developed survey items**		
1. Physical and psychological problems 2. Recognition of signs and symptoms 3. Hypertension treatment	Health problems of hypertension patients Information needs of hypertension patients	Introduction: Health education information needs (Masrhall, 2015)	Before education was conducted, it is necessary to examine the problems caused by hypertension and the educational needs required by hypertensive patients	Introduction	Learning process
1. Lack of motivation 2. Non-compliance with treatment 3. Lack of cadre participation	Barriers to program implementation	Introduction: Motivation of patients and health workers (Yoshida et al., 2021)	It is necessary to emphasize the importance of motivation to change and the targets to be achieved before providing education to avoid obstacles to the education process		

Qualitative phase		Theory and concept	Quantitative phase	Sub component	Component
Category	**Theme**		**Developed survey items**		
4. Limited human resources 5. Tough program achievement targets					
1. Direct health education by cadres 2. Health Education by Health professional 3. Carried out repeatedly and consistently	Health education methods	Providing information and controlling the information providing process, The basic information process from driscoll (Gurbin, 2015)	During the education process, information relevant to the educational needs of hypertensive patients needs to be prepared and assessed to what extent it influences patient compliance.	Transfer information	
1. Requires learning aids 2. Evaluate compliance with the information provided			Availability of clear educational tools with a consistent recurring schedule		
1. Non-compliance with the treatment program	Evaluation of hypertension health education achievements	Learning achievement in the form of understanding and changing behavior The basic information process from driscoll (Gurbin, 2015).	Achievement indicators as the output of the education provided are the key to the success of the education process for hypertension patients	Learning outcome	
2. Carried out during Posbindu/Posyandu 3. Requires cooperation from patients, cadres and health workers			The involvement of patients, health cadres, and nurses determines the educational outcomes provided to hypertensive patients		
1. Health education	Primary Care Activities for hypertension patients	Primary prevention, secondary prevention and tertiary prevention the system model from Neuman and Fawcett (Alligood, 2021)	Health education to reduce risk factors is an important educational material	Primary prevention	Health education program
2. Maintenance			Maintaining a healthy lifestyle is a basic prevention effort		
1. Identify the incidence of hypertension			Identifying the incidence of hypertension through screening is part of an education program related to early detection	Secondary prevention	
2. Screening 3. Identify risk factors			Educational programs regarding the identification of important risk factors are carried out to anticipate early findings of hypertension		
1. Treatment			Education regarding appropriate treatment efforts and programs is needed to maintain the quality of life of hypertension patients	Tertiary prevention	
2. Reference			A good referral system is an educational point in the context of preventing		

Qualitative phase		Theory and concept	Quantitative phase	Sub component	Component
Category	Theme		Developed survey items		
			complications due to hypertension		
1. Has a long history of illness	Characteristics of hypertensive patients	Health education requires an introduction to disease history, continuity of care; accuracy of learning content (health literacy); Learning methods (management knowledge and skills) and learning support (Marshall et al, 2015)	Treatment history is one of the focuses of attention in hypertension patient education	History of hypertension	Health education approach
2. Requires continuous treatment			A history of hypertension and comorbidities needs to be educational material for hypertensive patients		
3. Sufferers from old adulthood to the elderly			Focus on hypertension education from old adulthood to the elderly	Continue	
4. Limited knowledge about care and treatment			Limited knowledge regarding the treatment and care of hypertensive patients is a material for continuing education		
1. Physical (headache, dizziness, nausea, vertigo, fatigue/weakness)	Hypertension health problems		The physical problems felt by hypertensive patients are important educational material to discuss	Contents	
2. Psychology (emotional changes, anxiety, fear			The psychological problems felt by hypertensive patients are important educational material to discuss		
1. Continuous treatment	Need for hypertension services		Self-care management and ongoing medication in the management of hypertension should be discussed with the patient and family	Methods	
2. Consistent self-care/management					
3. Health education for managing risk factors			Management of risk factors needs to be discussed in hypertension patient education programs		
1. Health program policy	Learning support		Education for hypertensive patients needs to be supported by relevant policies from the government and stakeholders	Support	
2. Government					
3. Community participation			Involvement of communities, groups and families with hypertension is an important approach for the success of the health education provided		
4. Group					
5. Family of hypertension patient					

DISCUSSION

Hypertension patients need comprehensive access to health services to maintain their health and well-being. Nevertheless, the patients and their families need to understand independent self-care so that they can manage changes and adapt their long-term hypertension-related care. Nurses play a role in educating patients and families to make them more adaptable to their illnesses and improve their physical and mental resilience.

The health education model for hypertensive patients and their families in primary care focuses on providing health education through building a relationship between health workers, including those in charge of the program, health professionals, and health cadres with patients and families. The model aims to improve the patients and their families' care skills. The developed health education model comprises learning process components, health education approaches, and health education programs.

The learning processes. The learning process begins with an introduction to the learning needs and motivations of hypertension patients and health professionals involved in the health education process. In any effort to prevent and control hypertension, it is necessary to understand the patients' needs (Khalsa et al., 2014). Koivisto et al.'s (2020) study found that lack of knowledge received through health education was associated with disease complications.

Moreover, the patient's education level and the level of knowledge received may be associated with post-discharge complications. In addition, Stuij et al. (2018) concluded that developing learning methods are considered effective if they meet individual learning needs, allow feedback on competence aspects, and provide opportunities for significant input from others, including experts, peers, or patients.

Furthermore, motivation is a critical element in implementing health education. There is a significant influence between transfer mechanism and motivation factors on knowledge sharing (Iskandar et al., 2014). Fronzetti Colladon et al. (2023) explored knowledge sharing among healthcare professionals, emphasizing the importance of open, non-hierarchical advice and idea-sharing structures. Their research used social network analysis to observe how healthcare workers form dynamic, flexible networks that facilitate effective communication, highlighting the role of both direct and indirect professional connections. This structure supports continuous learning and information flow, essential for quality improvement in healthcare settings. Meanwhile, the patient's motivation level will influence their self-training abilities and daily life activities (Yoshida et al., 2021).

Health education aims to provide information that increases understanding about hypertension. There has been an increase in the knowledge of hypertensive patients by providing information via online methods (Mahadewi et al., 2021). Providing health information to hypertensive patients increases their knowledge, forms positive attitudes, and influences changes in attitudes towards smoking, the salt content in their diet, and physical exercise (Haryani et al., 2016). Studies have demonstrated that developing health education strategies for hypertensive patients, such as creating posters, can effectively raise their knowledge (Ulya & Iskandar, 2017).

The learning process also includes a monitoring and evaluation stage in the form of an assessment to measure the participants' increased understanding and changes in behavior due to hypertension. This stage requires participation and awareness from various stakeholders, particularly when learning collaboratively. Therefore, it is important to share thoughts, perspectives, and ideas during the learning process (Wongtschowski et al., 2016). Additionally, behavior change is a vital component that is the ultimate goal in every activity of providing health information (Akuiyibo et al., 2022).

Health education program. The study results illustrate that one of the components of the health education model for hypertensive patients and their families is a health education program, which includes primary, secondary, and tertiary prevention. According to Newman (1970) in George (2014), primary prevention comprises early detection and risk recognition. For example, blood pressure screening can facilitate early diagnosis and reduce the risk of hypertension-related complications (Gulec, 2013). Early detection of increased blood pressure is the key to prevention and management of hypertensive patients before microvascular and macrovascular damage occurs (Howard et al., 2018; Khalsa et al., 2014).

Next, a secondary prevention health education program focuses on preventing further problems from occurring due to the illness experienced. In this health education model for hypertensive patients, secondary prevention efforts include providing information on hypertension treatment and care. Hypertensive patients can manage their conditions through lifestyle modifications, medications, and adherence to hypertension treatment (Unger et al., 2020).

Finally, a tertiary prevention health education program is a health activity or effort that helps patients adapt to hypertension-related changes or conditions. Self-management information is needed to help patients adapt to hypertension conditions.

Approaches to health education. The health education approach is a component of the developed educational model for hypertensive patients and their families. The health education approach includes introducing the health history of hypertensive patients and helping patients and their families understand the sustainability of hypertension management. This approach requires educating patients and their families about their treatments and care over a long period, conveying accurate health information and methods, and supporting health education efforts.

The health information provided needs to consider the patient's history of hypertension (Marshall, 2015). A history of hypertension can be due to changes in the individual's organ systems, such as the kidneys, heart, brain, eyes, or other organs (Alexander, 2022). Hypertension requires a long treatment regimen and requires consistency and adherence to medication and treatment. Additionally, continuity of care and treatment requires persistent and consistent information (Marshall, 2015). A previous study has also found that family-based interventions can increase compliance with the care and treatment of hypertensive patients (Damayanti et al., 2020).

Health education with counseling as needed significantly increases medication compliance in hypertensive patients (Prihanti et al., 2020) (Marshall, 2015). Health information material and the use of appropriate methods also help patients to manage changes caused by hypertension.

Furthermore, health education requires policy support, as well as government, community, and family participation. Collaboration between the government and educational institutions and broad community involvement is needed to develop awareness and community movement in hypertension prevention behavior (Mahadewi et al., 2021). The chronic patient care model requires collaboration between patients, health service providers, and health service systems to support hypertension control on multiple levels (Carey et al., 2018).

The family plays a vital role in reducing or increasing the progression of hypertension. Family influence can be summarized in the following subcategories: the main family support system, financial stability, health control, and well-being are subcategories of family influence on hypertension (Efendi, 2017). The limitations of this study include the fact that the research was limited to one urban area, so it does not represent the patients and families in rural areas.

CONCLUSION AND RECOMMENDATION

This qualitative and quantitative study explored the perspectives of patients, health cadres, and nurses. The results were used to formulate a health educational model for hypertension patients and families in primary care. The complex model comprises health education program components, approaches to health education, and learning process components. The results highlight the importance of building adequate support for the model's implementation and conducting further tests to prove its personal and interpersonal effects on patients with hypertension.

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