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# The effect of self-management program with tele-nursing based on the Roper-Logan-Tierney model on self-care of hypertensive patients: a randomized controlled trial

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## Abstract

**Objective** To examine the effect of tele-nursing and self-management programs based on the Roper-Logan-Tierney Model on the self-care of hypertension patients.

**Material and method** The population of this randomized controlled interventional study consisted of hypertension patients who applied to the cardiology outpatient clinics of Van Regional Training and Research Hospital between September and December 2022. The sample consisted of 60 hypertensive patients over 18 who met the study criteria and agreed to participate. Data were collected with the "Patient Information Form" and "Self-Care Management in Chronic Diseases Scale". Patients were randomized and divided into groups. Pre-test data for both groups were collected face-to-face. The intervention group received blood pressure measurement training with the "Hypertension Education Booklet" and self-management support with tele-nursing two times a week for 12 weeks. The control group did not receive any intervention. At the end of 6 weeks, interim tests were completed online, and after 12 weeks, post-tests were completed face-to-face. Data evaluation was performed with the blinding method.

**Results** It was determined that the differences between the mean scores of the intervention and control groups on the "Self-Care Management Scale in Chronic Diseases" midterm and posttest were statistically significant ( $p < 0.05$ ).

**Conclusion** It was concluded that self-management support affects the self-care management of hypertension patients.

**Trial Registration** This research is a randomized controlled study. Therefore, a registration number was applied for at ClinicalTrials.gov. The registration number was obtained with the number "NCT05316454". (First Posted 2022-04-07).

**Keywords** Nursing, Hypertension, Self-management support, Tele-nursing, Self-care management

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## Introduction

Hypertension (HT) is a chronic disease that affects 1.39 billion people worldwide, and its prevalence increases with age [1]. The Turkish Heart Disease and Risk Factors in Adults study, the most comprehensive study conducted in our country, reported that its prevalence was high (33.7%) and 1 out of every three individuals had HT [2].

For a healthy society, individuals must make efforts to protect their health. The individual should have the necessary knowledge and skills to maintain self-care. Patients who need to be adequately informed show adequate compliance and adverse health outcomes. With effective self-care management, hypertension control will be achieved, hospital admissions will decrease, side effects will be limited, quality of life will increase, and health expenditures will decrease [3]. Nurses who spend more time with patients than other healthcare professionals are healthcare team members responsible for continuity of care and patient education [3]. The independent roles of nurses include protecting and improving the health of society, improving the quality of life, coping with the problems arising from the disease, and providing counseling on self-care. Nurses' essential duties and responsibilities are to monitor individuals with chronic diseases, provide them with education and counseling, and ensure that they develop the necessary care skills [4].

Nursing care in hypertension includes BP control and prevention of complications. Symptoms such as anginal pain, dyspnea, nosebleeds, visual changes, and dizziness should be evaluated. The patient and family should be informed about BP measurement and lifestyle changes (weight control, salt restriction, exercise, stress management, healthy diet, smoking and alcohol cessation) [5].

Nurses have benefited from models and theories that provide a systematic approach to care, improve the nurses' perspective, and increase the quality of care in their services to individuals, families, and society [6]. One of these models, the Life Model developed by Roper Logan and Tierney, aims to recognize the individual as a whole, to identify and solve the problem, and to provide care to the individual with a holistic and humanistic approach, which is the basic philosophy of nursing [7]. In this model, it is emphasized that health is only possible by performing daily life activities independently. Therefore, nurses will provide a conceptual framework that can increase independence by evaluating patients as a whole with the Life Model. Nurses should ensure that hypertension patients receive effective education to meet their basic needs and that they can be independent, self-sufficient, and integrated with society in their future lives [8]. The use of these technological approaches in studies targeting education and behavior change facilitates the

equal delivery of health resources and access to health services to everyone, including groups disadvantaged in accessing health services due to their place of residence or economic reasons [9].

Telehealth is a telehealth method that can effectively provide healthcare services to patients and give an advantage to face-to-face education.

Telehealth can be beneficial for people with mobility limitations, living in remote and rural areas, and people with chronic conditions (such as hypertension) [10]. In addition, telehealth can effectively provide medical consultations and shared learning, improve access to health services, reduce health inequalities, and ultimately lower health costs [7].

Self-care and self-care management are essential in increasing or progressing chronic diseases. For this reason, the importance of interventions in managing the disease process or increasing compliance with treatment is rising. Self-care practices include many factors, such as ensuring compliance with treatment, performing and managing disease-related life activities, regular use of medications, exercise, and diet compliance [11, 12].

Özdelikara et al. stated that many factors will affect compliance with the disease and self-care in individuals with chronic disease. Therefore, patient assessment should be multidimensional; issues affecting the patient's self-care and compliance with the disease should be determined, and education should be given about the patient's deficient issues. They also stated that individuals' compliance may increase or decrease over time and that nurses should evaluate patients with specific periods [12]. Therefore, this study was conducted to evaluate the level of self-care of hypertension patients with self-management support provided by tele-nursing.

## Research hypotheses

H1. Self-management support provided to hypertension patients by tele-nursing increases the self-care level of patients.

## Material and method

### Type of research

This randomized controlled trial is a pretest–posttest design. Therefore, we applied for a registration number from ClinicalTrials.gov. A registration number was obtained with the number "NCT05316454".

### Place and time of the study

The data were collected from patients who applied to the cardiology outpatient clinic at Van Regional Training and Research Hospital between September and December 2022 and met the research criteria (Fig. 1).



CONSORT 2010 Flow Diagram

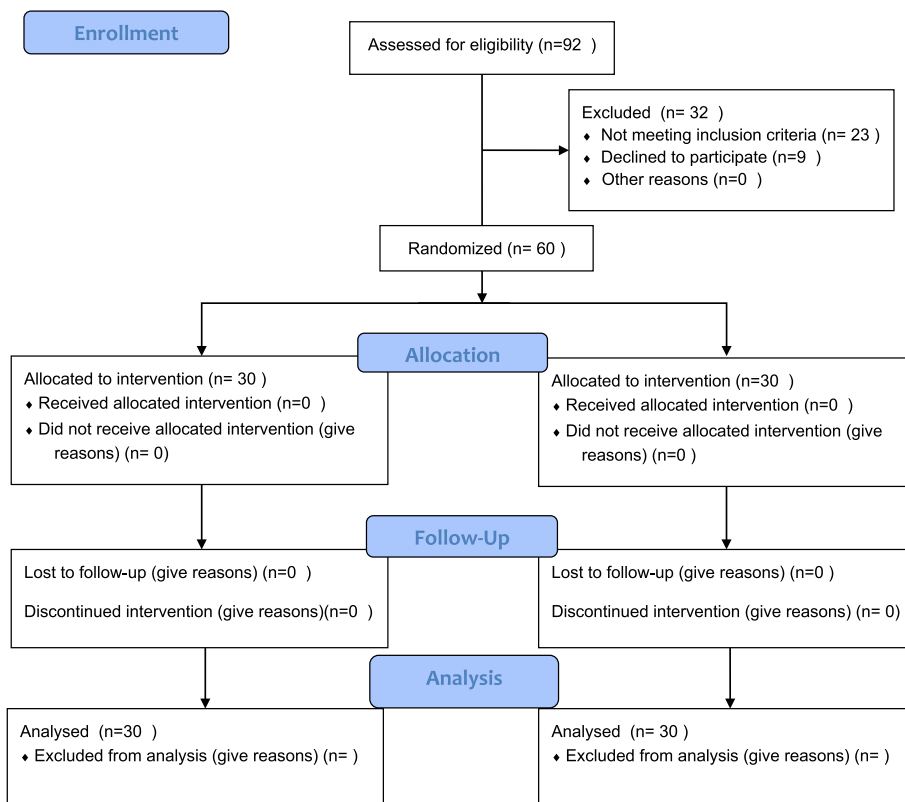


Fig. 1 CONSORT Flow Diagram

**Study population and sample**

The study population consisted of hypertension patients who applied to Cardiology outpatient clinics in Van Regional Training and Research Hospital between September and December 2022. The power analysis was performed to ensure adequate sample size for detecting statistically significant differences, minimizing the risk of Type II errors, and enhancing the study’s reliability. The study sample consisted of 60 hypertension patients who met the research criteria and agreed to participate. An a priori power analysis was performed to determine the sample size, and it was established that at least 28 hypertensive patients were needed for each of the intervention and control groups to achieve 80% power at a 95% confidence interval, a 0.05 significance level, and a medium effect size. Considering the potential for data loss, the

sample size was increased to 30 participants per group, resulting in a total of 60 patients. No missing data were encountered during the study, as all participants completed the intervention and follow-up assessments.

**Inclusion criteria**

- Duration of essential hypertension diagnosis of at least six months.
- Use of antihypertensive drugs,
- No change in antihypertensive drug treatment for the last one month,
- No mental or communication problems,
- Having technological devices such as computer/tablet/smartphone, etc., to watch videos,

- Internet access: Required for the 6th-week online test and tele-nursing communication.
- Over 30 years of age,
- Education level should be at least primary education,
- Not being pregnant or lactating.

### Data collection

#### *Data collection tools to be used in the research*

"Patient Information Form" and "Self-Care Management in Chronic Diseases Scale" were used.

### Patient information form

The patient information form developed by the researchers included the patients' socio-demographic characteristics and characteristics related to their diseases.

### Self-care management scale in chronic diseases

The Turkish validity and reliability study of the scale developed by Jones et al. to evaluate self-care management in individuals with chronic diseases was conducted by Hançerlioğlu and Şenuzun Aykar [13, 14]. The scale consists of 2 sub-dimensions and 35 items. The scale was developed on a 5-point Likert scale. The scale is scored between 35–175 points. Questions 3, 15, 19, and 28 of the scale are test scores. The scale has two sub-dimensions: self-protection and social protection. An increase in the score obtained from the scale indicates an increase in the individual's self-care management. Hançerlioğlu and Şenuzun Aykar determined that the overall Cronbach Alpha value of the scale was 0.75. This study determined that the Cronbach Alpha values of the Self-Care Management Scale in Chronic Diseases and its sub-dimensions ranged between 0.514–0.778.

### Materials used for self-management support

#### *Hypertension education booklet*

The Hypertension Education Booklet, created by the researchers in the literature review, includes information on hypertension and treatment, treatment methods, practical lifestyle changes for managing hypertension, the importance of treatment compliance, and home blood pressure measurement.

For the booklet, expert opinions were obtained from 1 internal medicine specialist physician, three nurse faculty members, and one specialist nurse. In addition, the booklet was presented to 3 hypertension patients to test its comprehensibility and edited according to their suggestions.

### Blood pressure measurement device

2015 Hypertension Guidelines in the Canadian Education Program recommend using an automatic

sphygmomanometer for office blood pressure measurement, given the fact that the accuracy of the measurement is not ensured by auscultation [15]. A BP meter with an upper arm cuff is used for HBP measurement [16]. For this reason, a suitable sphygmomanometer with BAP project number TSA-2021–8985, which enables self-measurement of blood pressure at home, was procured within the project's scope. The BP meter works with the oscillometric measurement method and has an LCD screen, low battery, and time display. The device has a warning feature for heart rhythm disorders and works with an AA battery. Measurement range Cuff pressure is 0–300 mmHg, systolic 60–280 mmHg, and diastolic 30–200 mmHg. The cuff width is between 22–36 cm, and it can show the average of the last three measurements. The device complies with European Norm EN60601-1–2.

### Telephone

Patients in the intervention group were called twice a week and warned, "Do not forget to measure your blood pressure in the morning and evening!" They were also educated on nutrition, medication use, fluid intake, exercise, smoking and alcohol use, and weight monitoring. Patients' questions about their diseases were answered.

### Tele-nursing implementation

Patients in the intervention group were followed up regularly through structured phone calls conducted twice weekly for 12 weeks. Each call lasted approximately 10–15 min and provided tailored guidance on key aspects of hypertension management. Topics included blood pressure measurement techniques, medication adherence, dietary adjustments, physical activity, and smoking cessation. The calls also addressed stress management and fluid intake, offering a comprehensive approach to hypertension care. Patients were allowed to ask questions and receive personalized support, ensuring the intervention met their specific needs.

In the sixth week, an online survey was conducted to evaluate patients' adherence and progress. This survey was a critical tool for monitoring behaviors such as blood pressure control, medication use, and lifestyle modifications. Patients with Internet access participated seamlessly in this process, ensuring reliable data collection and timely feedback. The intervention was further supported by a Hypertension Education Booklet, which served as a comprehensive guide for patients. The booklet provided detailed instructions on blood pressure monitoring, healthy eating habits, exercise recommendations, and the importance of adhering to prescribed medication regimens. This resource complemented the tele-nursing

sessions by reinforcing the information provided and empowering patients to take an active role in their care.

This structured tele-nursing approach ensured regular monitoring, guidance, and patient support throughout the intervention. Additionally, tele-nursing demonstrated its value as an innovative and accessible healthcare model, enabling effective self-management of hypertension. This approach proved especially beneficial when face-to-face healthcare services were limited, providing a sustainable and impactful method for delivering care.

#### **Follow-up period**

The intervention was conducted over a 12-week period, which is consistent with the durations employed in similar studies evaluating self-care management in hypertension patients. The existing literature supports that a 12-week timeframe is sufficient for achieving significant improvements in self-care behaviors and related outcomes [17, 20–23]. This duration allows participants to effectively engage with the intervention while providing adequate time for the intended effects to manifest. Additionally, the 12 weeks were chosen based on practical considerations to ensure the feasibility of the study within its resource constraints.

#### **Implementation of the study**

All patients in the intervention and control groups who met the inclusion criteria were verbally informed about the study's purpose and method. Then, "Informed Voluntary Consent Forms" were filled out for the patients who agreed to participate in the study. The pre-test form was completed using a face-to-face interview method for all patients in the intervention and control groups. Integrating internet-based tools within the tele-nursing program supported the intervention's continuity and efficiency. By enabling online assessments and interactive communication, internet access played a critical role in aligning the tele-nursing approach with the principles of chronic disease management.

#### **Separation of groups/randomization**

In the study, randomization was determined using a computer program (researcher randomizer), provided that the number of individuals in the intervention and control groups was equal, regardless of the qualifications of the participants, such as age and gender.

#### **Blinding**

Double blinding was employed in this study to minimize potential biases and ensure methodological rigor. While participant blinding was not feasible due to the nature of the intervention, measures were taken to mitigate

bias in other critical aspects of the study. The researcher responsible for data collection was blinded to the group assignments to prevent any influence on the data collection process. Moreover, the tele-nursing intervention was delivered by a separate individual who was not involved in data collection, ensuring segregation of intervention delivery and assessment. Additionally, the statistician performing the data analysis was blinded to the group allocations, guaranteeing an objective evaluation of the study outcomes. These strategies were implemented to enhance the reliability and validity of the findings.

#### **Intervention group**

The ECG room in the outpatient clinic, suitable for patient education, was used for patient education and blood pressure measurement training. Patients were educated with the "Hypertension Education Booklet." Then, the patient was trained to measure BP independently using the demonstration method. The patient was asked to perform the same procedure. In case of errors or deficiencies, the researcher re-trained the patient. The training continued until the patient made the correct measurement. The training lasted approximately half an hour. The sphygmomanometer was given to the patients for HBP measurement.

Patients were asked to measure BP at home twice daily during the study and to note the measurements. Patients in the intervention group were called by phone twice a week for 12 weeks to remind them of the blood pressure measurement, information about the research process was obtained, and the patient's questions were answered.

At the end of the sixth week, the Patient Information Form and the Self-Care Management in Chronic Diseases Scale were completed through an online survey. Internet access was essential for completing the online mid-test during the 6th week and for maintaining regular communication between the nursing team and participants throughout the tele-nursing program. This access allowed nurses to provide reminders, answer participant questions, and ensure adherence to the intervention. By utilizing online tools, the tele-nursing program facilitated accessible and continuous care, aligning with its goal of supporting self-management in chronic disease patients. At the end of the third month, the Patient Information Form and the Scale of Self-Care Management in Chronic Diseases were completed by calling the patients to the outpatient clinic and interviewing them face to face.

The "Hypertension Education Booklet" prepared by the researcher was handed over to the patients so they could refer to it wherever they got stuck and create a guide. The patient was also explained how to use the education booklet.

### Intervention details

The self-management program in the intervention group was supported by the following components:

1. **Materials Provided:** Participants were given a Hypertension Education Booklet, which included comprehensive guidance on managing hypertension. The booklet covered topics such as blood pressure measurement techniques, dietary modifications, physical activity recommendations, medication adherence, smoking cessation, and stress management strategies.
2. **Goals and Activities:** The program aimed to improve participants' self-care skills by promoting regular blood pressure monitoring, adherence to prescribed medications, healthy lifestyle changes, and effective management of stress. Specific activities included setting personal goals for physical activity, meal planning, and tracking medication use.
3. **Adherence Monitoring:** Adherence to the program was monitored through structured phone calls conducted twice weekly for 12 weeks. During these calls, participants were asked about their adherence to the recommended self-care practices, and any challenges they faced were addressed. An online survey was also conducted in the sixth week to evaluate participants' progress and engagement with the program.

### Control group

The control group did not receive any additional intervention beyond the standard care typically provided in the cardiology outpatient clinic, which included routine follow-up appointments and basic counseling on hypertension management, such as medication adherence and lifestyle modifications. This approach ensured that differences between the groups could be attributed solely to the tele-nursing intervention. After the control group's pre-test data were collected face-to-face, no intervention was made for the control group. At the end of the sixth and twelfth weeks, the same forms were filled out again as mid-test and post-test data.

### Pre-application

To evaluate the comprehensibility of the questions in the data collection form, the researcher asked two patients who applied to the outpatient clinic to read and answer the questionnaire questions before the study. All questions were found to be understandable and sufficient in scope. The data of the patients who participated in the pre-application were not included in the study data.

### Data evaluation

The SPSS (Statistical Package for Social Sciences for Windows, Version 22.0) program evaluated the data. Descriptive statistical methods (number, percentage), Pearson chi-square test, Fisher-freeman-halton exact test, and Fisher exact test were used to analyze the distribution of socio-demographic and disease-related characteristics of the patients in the intervention and control groups. Friedman and one-way ANOVA tests were used to determine the difference between repeated measurements. Post-hoc analysis (Bonferroni) was used to determine which measurements caused the difference. Mann-Whitney U and t-tests in independent groups were used to compare the mean scores of two independent groups. The statistical significance limit value was accepted as  $p < 0.05$ . This study primarily focused on predefined primary outcomes, and no multiple comparisons were performed, thus eliminating the need for adjustments such as Bonferroni correction.

### Ethical principles of the study

The Atatürk University Faculty of Medicine Ethics Committee obtained ethical permission to implement the study. Institutional permission was obtained from the hospital where the research would be conducted. In addition, informed consent was obtained from the participants who agreed to participate in the study. The Declaration of Helsinki was followed in the study.

### Findings

The study's findings, which examined the effect of tele-nursing and self-management programs based on the Roper-Logan-Tierney Model on the self-care of hypertension patients, are given below.

In the intervention group, 43.3% of the patients were 36–50 years old, 50% were female, 80% were married, 60% were primary school graduates, 53.3% were not working, 40% had been diagnosed with HT for 25 months or more, 66.7% used one blood pressure medication, 40% used blood pressure medication for 25 months or more, 80% used hypertension medications regularly, and 63.3% did not smoke.

In the control group, 50% of the patients were 61 years of age or older, 60% were female, 80% were married, 66.7% were primary school graduates, 73.3% were not working, 50% had been diagnosed with HT for 25 months or more, 56.7% used one blood pressure medication, 53.3% used blood pressure medication for 25 months or more, 73.3% used hypertension medications regularly, and 76.7% did not smoke. Chi-square analysis results showed that the intervention and control groups were similar in terms of sociodemographic variables ( $p > 0.05$ ) (Table 1).

**Table 1** Distribution of the descriptive characteristics of the patients (n = 60)

| Variables  |                            | Groups                |      |                  |      | Test Value and Significance     |
|--|----------------------------|-----------------------|------|------------------|------|---------------------------------|
|  |                            | Intervention (n = 30) |      | Control (n = 30) |      |                                 |
|  |                            | n                     | %    | n                | (%)  |                                 |
| Age  | 36–50                      | 13                    | 43,3 | 8                | 26,7 | $\chi^2 = 4.629$<br>$p = 0.099$ |
|  | 51–60                      | 10                    | 33,3 | 7                | 23,3 |                                 |
|  | 61 and above               | 7                     | 23,3 | 15               | 50,0 |                                 |
| Sex  | Female                     | 15                    | 50,0 | 18               | 60,0 | $\chi^2 = 0.606$<br>$p = 0.436$ |
|  | Male                       | 15                    | 50,0 | 12               | 40,0 |                                 |
| Marital Status                                   | Married                    | 24                    | 80,0 | 24               | 80,0 | $\chi^2 = 0.001$<br>$p = 1.000$ |
|  | Single                     | 6                     | 20,0 | 6                | 20,0 |                                 |
| Education  | Primary School             | 18                    | 60,0 | 20               | 66,7 | $\chi^2 = 0.287$<br>$p = 0.592$ |
|  | Secondary school and above | 12                    | 40,0 | 10               | 33,3 |                                 |
| Employment status                                | Working                    | 14                    | 46,7 | 8                | 26,7 | $\chi^2 = 2.584$<br>$p = 0.108$ |
|  | Not working                | 16                    | 53,3 | 22               | 73,3 |                                 |
| Time to diagnosis                                | 6–12 months                | 11                    | 36,7 | 7                | 23,3 | $\chi^2 = 1.289$<br>$p = 0.525$ |
|  | 13–24 months               | 7                     | 23,3 | 8                | 26,7 |                                 |
|  | 25 months and above        | 12                    | 40,0 | 15               | 50,0 |                                 |
| Hypertension medication number                   | 1                          | 20                    | 66,7 | 17               | 56,7 | $\chi^2 = 0.635$<br>$p = 0.426$ |
|  | 2 and above                | 10                    | 33,3 | 13               | 43,3 |                                 |
| Duration of hypertension medication used (Month) | 6–12 months                | 11                    | 36,7 | 9                | 30,0 | $\chi^2 = 1.105$<br>$p = 0.576$ |
|  | 13–24 months               | 7                     | 23,3 | 5                | 16,7 |                                 |
|  | 25 months and above        | 12                    | 40,0 | 16               | 53,3 |                                 |
| Regular use of hypertension medication           | Yes                        | 24                    | 80,0 | 22               | 73,3 | $\chi^2 = 0.373$<br>$p = 0.542$ |
|  | No                         | 6                     | 20,0 | 8                | 26,7 |                                 |
| Smoking status                                   | Yes                        | 11                    | 36,7 | 7                | 23,3 | $\chi^2 = 1.270$<br>$p = 0.260$ |
|  | No                         | 19                    | 63,3 | 23               | 76,7 |                                 |

The mean scores of the "Self-protection" sub-dimension of the intervention group were  $45.47 \pm 7.29$  in the pre-test,  $48.82 \pm 7.11$  in the mid-test, and  $49.55 \pm 8.65$  in the post-test. The mean score of the "Social Protection" subscale of the intervention group was  $49.58 \pm 7.12$  in the pre-test,  $49.13 \pm 8.20$  in the mid-test, and  $51.37 \pm 8.45$  in the post-test. The mean score of the intervention group in the "Self-Care Management in Chronic Diseases Scale" was  $95.05 \pm 8.37$  in the pre-test,  $97.95 \pm 11.98$  in the mid-test, and  $100.92 \pm 12.98$  in the post-test.

The mean scores of the "Self-protection" sub-dimension of the control group were  $44.52 \pm 6.11$  in the pre-test,  $45.27 \pm 8.03$  in the mid-test, and  $41.16 \pm 6.52$  in the post-test. The mean score of the "Social Protection" sub-dimension of the control group was  $48.97 \pm 5.52$  in the pre-test,  $45.48 \pm 7.25$  in the mid-test, and  $47.61 \pm 6.22$  in the post-test. The mean score of the "Self-Care Management Scale in Chronic Diseases" of the control group was  $93.48 \pm 6.92$  in the pre-test,  $90.76 \pm 11.93$  in the mid-test, and  $88.97 \pm 7.42$  in the post-test.

When the in-group mean scores of the intervention group were compared, it was determined that the

difference between the mean scores of the "Self Protection" sub-dimension pre-test, mid-test, and post-test was statistically significant ( $p < 0.05$ ). It was determined that the difference between the mean scores of the "Self Protection" sub-dimension was due to the difference between the pre-test—mid-test and pre-test—post-test. It was determined that there was no statistically significant difference between the "Social Protection" sub-dimension pre-test, mid-test, and post-test mean scores of the intervention group ( $p > 0.05$ ). There was a statistically significant difference between the pre-test, mid-test, and post-test mean scores of the "Self-Care Management Scale in Chronic Diseases" of the intervention group ( $p < 0.05$ ). It was determined that the difference between the mean scores of the "Self-Care Management Scale in Chronic Diseases" of the intervention group was due to the difference between pre-test and post-test and mid-test and post-test.

When the mean scores of the control group were compared for the group, it was determined that the difference between the pre-test, mid-test, and post-test mean scores of the "Self-Protection" sub-dimension

**Table 2** Comparison of the Self-Care Management in Chronic Diseases Scale and subscale scores of the patients within and between groups

|  |                                | Groups                           |                                  | Between Groups Test value and Significance |
|--|--------------------------------|----------------------------------|----------------------------------|--|
|  |                                | Intervention                     | Control                          |  |
|  |                                | X±SD                             | X±SD                             |  |
| Self Protection                                | Pre test <sup>1</sup>          | 45.47±7.29                       | 44.52±6.11                       | t=-0.595<br>p=0.554                        |
|  | Intermediate test <sup>2</sup> | 48.82±7.11                       | 45.27±8.03                       | t=-1.971<br>p=0.053                        |
|  | Post test <sup>3</sup>         | 49.55±8.65                       | 41.16±6.52                       | <b>t=-4.513</b><br><b>p=0.001</b>          |
|  | Difference                     | 1-2, 1-3                         | 1-3, 2-3                         |  |
| Within-group Test Value and Significance       |                                | <b>F=5.269</b><br><b>p=0.018</b> | <b>F=5.314</b><br><b>p=0.020</b> |  |
| Social Protection                              | Pre test <sup>1</sup>          | 49.58±7.12                       | 48.97±5.52                       | t=-0.398<br>p=0.692                        |
|  | Intermediate test <sup>2</sup> | 49.13±8.20                       | 45.48±7.25                       | t=-1.971<br>p=0.053                        |
|  | Post test <sup>3</sup>         | 51.37±8.45                       | 47.61±6.22                       | <b>t=-2.108</b><br><b>p=0.039</b>          |
|  | Difference                     |                                  | 1-2, 2-3                         |  |
| Within-group Test Value and Significance       |                                | F=2.012<br>p=0.141               | <b>F=3.838</b><br><b>p=0.027</b> |  |
| Self-Care Management Scale in Chronic Diseases | Pre test <sup>1</sup>          | 95.05±8.37                       | 93.48±6.92                       | t=-0.851<br>p=0.397                        |
|  | Intermediate test <sup>2</sup> | 97.95±11.98                      | 90.76±11.93                      | <b>t=-2.526</b><br><b>p=0.014</b>          |
|  | Post test <sup>3</sup>         | 100.92±12.98                     | 88.97±7.42                       | <b>t=-4.818</b><br><b>p=0.001</b>          |
|  | Difference                     | 1-3, 2-3                         |                                  |  |
| Within-group Test Value and Significance       |                                | <b>F=5.139</b><br><b>p=0.023</b> | F=3.349<br>p=0.060               |  |

t Independent Groups T Test, F One Way Anova Test

<sup>1</sup> Pre test, <sup>2</sup>Intermediate test, <sup>3</sup>Post test

was statistically significant ( $p < 0.05$ ). It was determined that the difference between the mean scores of the "Self Protection" sub-dimension was due to the difference between the pre-test and the mid-test post-test. The difference between the "Social Protection" sub-dimension pre-test, mid-test, and post-test mean scores of the control group was statistically significant ( $p < 0.05$ ). It was determined that the difference between the mean scores of the "Social Protection" sub-dimension was due to the difference between the pre-test—mid-test and mid-test—post-test. The difference between the pre-test, mid-test, and post-test mean scores of the "Self-Care Management Scale in Chronic Diseases" of the control group was not statistically significant ( $p > 0.05$ ).

When the comparison of the mean scores between the groups was examined, it was determined that the difference between the "Self-protection" sub-dimension pre-test mean scores of the intervention and control groups was not statistically significant ( $p > 0.05$ ). The difference

between the "Self-protection" sub-dimension mid-test mean scores of the intervention and control groups was not statistically significant ( $p > 0.05$ ). The difference between the "Self-protection" sub-dimension posttest mean scores of the intervention and control groups was statistically significant ( $p < 0.05$ ).

The difference between the "Social protection" sub-dimension pre-test mean scores of the intervention and control groups was not statistically significant ( $p > 0.05$ ). The difference between the intervention and control group's "Social protection" sub-dimension mid-test mean scores was not statistically significant ( $p > 0.05$ ). The difference between the posttest mean scores of the "Social protection" sub-dimension of the intervention and control groups was statistically significant ( $p < 0.05$ ).

The difference between the pre-test mean scores of the intervention and control groups on the "Self-Care Management Scale in Chronic Diseases" was not statistically significant ( $p > 0.05$ ). The difference between the

intervention and control group's "Self-Care Management in Chronic Diseases Scale" midtest mean scores was statistically significant ( $p < 0.05$ ). The difference between the posttest mean scores of the "Self-Care Management Scale in Chronic Diseases" of the intervention and control groups was statistically significant ( $p < 0.05$ ) (Table 2).

## Discussion

This study's findings, which examined the effect of tele-nursing and self-management programs based on the Roper-Logan-Tierney Model on the self-care of hypertension patients, were discussed in light of the literature.

When the self-management levels were compared between the intervention and control groups, it was determined that there was no significant difference between the groups in the pre-tests, and the self-care management levels were at an intermediate level (Table 2). Similarly, Kurt and Gürdoğan (2022) and Runa and Bahar (2023) reported that the self-care power of patients with hypertension was at an intermediate level in different studies [17, 18]. This indicates that both groups had similar needs for self-care management at baseline and provides an appropriate basis for evaluating the effect of the self-care management program to be applied to the intervention group. These results highlight the importance of self-care management programs and indicate that self-care management should be improved, especially by using innovative approaches such as tele-nursing. Moderate levels of self-care management suggest that these patients require more support and guidance in their care process. In this context, tele-nursing practices can improve patients' self-care management. Especially during the pandemic, tele-nursing practices can be used when face-to-face health services are limited.

When the post-test self-management levels of the intervention and control group patients were compared, it was determined that after 12 weeks of tele-nursing training based on the Roper, Logan, and Tierney model, the self-care power of the intervention group patients increased significantly, while the self-care power of the control group patients decreased significantly (Table 2). Kurt et al. determined that self-care management support given to hypertension patients significantly increased self-care management and treatment compliance levels [17]. Zhu et al. found that the nurse-led hypertension management model, which includes decision support, clinical information, and self-management support in hypertensive patients, significantly improved patients' hypertension-related self-care behaviors [19]. Similarly, Yatim et al., Ozoemena et al., Darrat et al., and Saldana et al. reported that training for hypertensive patients increased their self-care levels [20–23]. Rujiwat-thanaokorn et al. examined the effect of a hypertension

self-management program on self-care. The program positively and significantly affected patients' hypertension-related self-care knowledge and ability [24]. Özdelikara et al. stated that many factors will affect compliance with the disease and self-care in individuals with chronic disease. Therefore, patient assessment should be multidimensional; issues affecting the patient's self-care and compliance with the disease should be determined, and education should be given about the patient's deficient issues. They also stated that individuals' compliance may increase or decrease over time and that nurses should evaluate patients at specific intervals [25]. In addition, Runa and Bahar stated in their study that nurses working with hypertension patients should assess the patients at particular intervals [18]. Research has shown that self-management support increases medication adherence, motivates individuals to manage the disease, and provides individual self-confidence [23, 26–28].

It is seen that the studies in the existing literature are in parallel with the results of this research. According to the research results, tele-nursing is an application that improves nursing practice and facilitates patients' access to health services. This method saves time and resources and can contribute to protecting and promoting health by addressing the self-care needs of patients and healthy individuals. Telenursing practices based on the Roper, Logan, and Tierney model offer a structure that facilitates patients' access to health services by improving nursing practice. This model guides patients in identifying their health needs and creating customized care plans to address them. Tele-nursing methods offer opportunities to regularly monitor patients' health status, provide education, intervene remotely, and optimize intervention plans by analyzing data. The integration of the Roper, Logan, and Tierney model in this context explains how the self-management support offered by tele-nursing contributes to patients' self-care skills. The model guides nurses in developing patients' self-care skills and enables effective management of this process. This approach also increases the efficiency of health services by saving time and resources. Focusing on the self-care needs of patients and healthy individuals can make essential contributions to protecting and promoting health.

The reported confidence intervals provide valuable insights into the precision and reliability of the findings, highlighting their robustness in clinical interpretation. While  $p$ -values and confidence intervals were reported, future studies should include effect sizes, such as Cohen's  $d$ , to better evaluate the clinical significance of the findings. Additionally, a more detailed interpretation of confidence intervals will enhance the discussion of precision and reliability.

Although randomization was employed to minimize bias, it cannot fully account for residual confounders such as variability in participants' adherence to the intervention and differences in baseline characteristics. These factors could have impacted the outcomes. Future studies should aim to monitor adherence more closely and include strategies to control for baseline differences to enhance the reliability of findings. Addressing these factors will ensure more robust conclusions and further validate the effectiveness of tele-nursing interventions in improving self-care management.

### Limitations of the study

This study has several limitations. Only individuals with internet access and the ability to use computers or related programs were included, which may have excluded hypertensive patients with limited technological resources or skills. Additionally, the study population was geographically limited to a single region, resulting in a lack of demographic diversity. These factors limit the generalizability of the findings to all hypertensive patients. However, the results provide valuable insights into the effectiveness of the intervention in improving self-care behaviors and lay the groundwork for future research. Future studies should include larger and more diverse populations to enhance the applicability and generalizability of the findings.

### Conclusions and recommendations

This study examined the effects of a tele-nursing self-management program based on the Roper-Logan-Tierney Model on hypertension patients' self-care management. The findings show that such programs effectively increase patients' self-care. Significant improvements were observed in self-care management and self-protection sub-dimensions in the intervention group, while these scores decreased in the control group. The findings indicate that the intervention improved self-care behaviors in hypertensive patients during the 12-week period. However, further research is needed to assess the long-term sustainability of these behavioral changes.

Since tele-nursing practices facilitate patients' access to healthcare services and improve care processes, such programs should be expanded. Self-care education and guidance services for hypertension patients should be increased, and patients should be trained at regular intervals. More research should be conducted on tele-nursing and self-care management, and the effectiveness of such programs in different chronic disease groups should be examined. Tele-nursing programs can also integrate tailored social support mechanisms to address patients' individual needs more effectively. Future research should

also investigate the longitudinal impact of tele-nursing programs to understand their sustainability in improving self-care behaviors and overall health outcomes. This study shows that tele-nursing-supported self-care programs significantly improve hypertension patients' care processes. Such innovative approaches should be encouraged to improve the efficiency of health care and enhance patients' self-care skills.

### Acknowledgements

The authors gratefully would like to thank the patient participating in the research.

### Authorship statement

All listed authors meet the authorship criteria, and all authors are in agreement with the content of the manuscript.

### Authors' contributions

Study conception and design: ÖS, ÇB, SA, AG, Data collection: ÖS, ÖE, EY. Data analysis and interpretation: ÖS, ÇB. Drafting of the article: ÇB, EY. Manuscript writing: ÇB, EY, YGN, Critical revision of the article: YGN, SA.

### Funding

The Research Atatürk University Scientific Research Projects funded the research (BAP project number TKP-2022–10221).

### Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### Declarations

#### Ethics approval and consent to participate

This study received 30/012/2021 dated, and B.30.2.ATA.0.01.00/55 numbered approval was taken from Atatürk University Faculty of Medicine Ethical Board. Project number: TKP-2022–10221. All study participants provided informed consent before their inclusion. They were informed about the research's purpose, methodology, and potential implications. They were assured that their responses would be kept confidential and that they could withdraw from the study without consequence. Written consent forms were collected by the requirements of the University's Ethics Committee.

#### Consent for publication

Not applicable. This manuscript does not include identifying images or personal or clinical details of participants that compromise anonymity.

#### Competing interests

The authors declare no competing interests.

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Received: 22 November 2024 Accepted: 17 February 2025

Published online: 25 March 2025

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