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Perceptions of Patients with Chronic Diseases on Telenursing in Selected Hospitals of Shandong Province, China: A Comparative Study

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Abstract: *Objectives:* To explore the perception of telenursing among patients with chronic diseases in the selected community hospitals only in Shandong Province, China, and to compare the differences in perception of telenursing among patients with different chronic diseases. *Methods:* The purpose sampling method was adopted in this study, and questionnaires were distributed to 324 chronic disease patients in OPD hospitals. *Results:* Patients with chronic diseases have higher awareness and acceptance of telenursing, and there are significant differences in their cognition of telenursing needs. *Conclusion:* The disease characteristics of patients with different chronic diseases and their different needs for telenursing require more considerations in the design and use of telenursing services.

Keywords: Chronic disease; Telecare; Cognition

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1. Introduction

Telemedicine is the provision of computerized healthcare, telemedicine, and other services to patients outside of a medical facility. Telenursing is a new form of medical care based on telemedicine. Approximately $250 billion in healthcare spending has been permanently shifted to online care in the United States alone. From 2017 to the end of 2020, the proportion of telemedicine services provided by public medical institutions above the second level in my country increased from 43.3% to 63.2%.

Chronic disease is a disease with a long course of disease and usually slow development. According to the relevant data from the World Health Organization, about 41 million people die from chronic diseases every year, accounting for 74% of the global death toll. According to the data from the China Statistical Yearbook, chronic diseases are showing a trend of younger age.

Hypertension, diabetes, and cardiovascular disease rank among the top three chronic diseases in my country. Telenursing can improve medication adherence in hypertensive patients, improve disease status, improve quality of life [1], maintain blood pressure in the normal range, and reduce BMI in prehypertensive patients [2]. Telenursing can improve the self-efficacy of type 2 diabetes patients and improve the blood sugar

level of patients [3]. Additionally, remote nursing can actively and effectively control the complications of diabetes. Remote nursing can slow down the progression of diabetic retinopathy, control the level of blood sugar indicators, and reduce the possibility of re-hospitalization [4]. Telenursing can provide effective nursing support services for cancer patients, reduce SCNs of cancer patients, and improve the accessibility of medical care and quality of life for cancer patients [5].

2. Materials and methods

2.1. Study design and locale

This study is a comparative study. This study will be conducted in the OPD department of the hospital to better collect data.

2.2. Sample size and sampling

In this study, a purposive sampling method was used to select the appropriate sample size. The sample size calculation was performed by the Sample Size Calculator by Raosoft, Inc. in this study. When using the Sample Size Calculator by Raosoft, Inc. [6], the margin of error is 5%, the confidence level is 93%, the corresponding distribution is 50%, the population size is 20000, and the final sample size is 324.

2.3. Inclusion and exclusion criteria

Inclusion criteria: (1) Living in Shandong for a long time, living for more than three years, aged 18-50, diagnosed with one or more chronic diseases in the past year; (2) receiving relevant treatment in the hospital, the disease is under control, and still needs to be managed after discharge chronically ill patients; no any altered mental, cognitive, and consciousness.

Exclusion criteria: (1) those who could not understand the content of the questionnaire due to various factors; (2) those who quit halfway or filled in the questionnaire incompletely or did not cooperate with this researcher.

2.4. Research instruments

The study will use a questionnaire, which has undergone reliability and validity testing with promising results. The overall standardized reliability coefficient stands at 0.909, indicating high reliability. The Kaiser-Meyer-Olkin (KMO) test yielded a coefficient of 0.926, further supporting the questionnaire's validity.

The questionnaire consists of three parts: general information, basic cognition of telenursing, and cognition of needs. To assess the demand for telenursing among chronically ill elderly participants, a 5-point Likert scale will be employed. This section consists of 9 items, ranging from "very low" to "very high." Each response will be assigned a score from 1 to 5 points, with higher scores indicating greater demand. Additionally, the following scoring system will be implemented (**Table 1**):

Table 1. Demand cognition scoring system

Numerical scale	Mean interval scale	Mean descriptive equivalent
1	1.00 – 1.80	Very low
2	1.81 – 2.60	Low
3	2.61 – 3.40	Average
4	3.41 – 4.20	High
5	4.21 – 5.00	Very high

2.5. Data analysis

Researchers will analyze the data using the Statistical Package for Social Sciences (SPSS) software. The results will be presented using descriptive statistics, including frequency, percentage distribution, mean scores, and standard deviation. Moreover, the Kruskal-Wallis test will be used to compare the cognition of telenursing among patients with different chronic diseases. Descriptive analysis will describe and analyze the sociodemographic and clinical characteristics of patients with chronic diseases and their perceptions of telenursing. Since the data does not conform to a normal distribution, using the Kruskal-Wallis test will minimize the deviation, resulting in a more accurate analysis.

3. Results

3.1. Questionnaires collected

A total of 324 questionnaires were sent out in this study, and 314 were effectively collected, with an effective recovery rate of 96.91%.

3.2. General information on chronic disease patients

Among the samples collected this time, there were 130 male patients with chronic diseases, accounting for 41.4%; and 184 female patients with chronic diseases, accounting for 58.6%. Among them, there were 158 (50.3%) patients with chronic diseases who had a family history of chronic diseases. In terms of the duration of chronic diseases, 92 (29.3%) patients had chronic diseases for ≤ 5 years; 174 (55.4%) patients had chronic diseases for 5–10 years; and 48 (15.3%) patients had chronic diseases for ≥ 10 years. Among them, there were 62 patients with hypertension, accounting for 19.7%; 48 patients with chronic gastritis, accounting for 15.3%; 78 patients with joint disease, accounting for 24.8%; and 16 patients with chronic renal failure, accounting for 5.1%; There were 34 cancer patients, accounting for 10.8%, which may be related to the aging of the population, dietary habits, and environmental factors (**Table 2**).

Table 2. General information

Variable	Categories	Frequency	Percentage
Age	< 20	84	26.75%
	20–40	138	43.95%
	41–50	92	29.30%
Gender	Male	130	41.40%
	Female	184	58.60%
Marital status	Unmarried	108	34.39%
	Married	138	43.95%
	Divorced	42	13.38%
	Widowed	20	6.37%
	Others	6	1.91%
Education	Junior high school and below	26	8.28%
	High school or technical secondary school	54	17.20%
	Junior college	78	24.84%
	Undergraduate	134	42.68%
	Master and above	22	7.01%

Table 2 (Continued)

Variable	Categories	Frequency	Percentage
Average annual income per person (CNY)	≤ 10,000	36	11.46%
	10,000–30,000	52	16.56%
	30,000–50,000	80	25.48%
	≥ 50,000	146	46.50%
Payment methods for medical expenses	Self-pay	92	29%
	Medical insurance	196	62%
	Public expense	26	8%
Annual expenditure on disease treatment (CNY)	≤ 2,000	102	32.48%
	2,000–4,000	82	26.11%
	4,000–6,000	92	29.30%
	≥ 6,000	38	12.10%
Economic burden of disease treatment	Light	98	31.21%
	Normal	146	46.50%
	Heavy	70	22.29%
Current residence	Urban	138	43.95%
	Rural	176	56.05%
Residence status	Living alone	72	22.93%
	Living with others	242	77.07%
Daily caregivers	Spouse	38	12.10%
	Children	62	19.75%
	Nanny	10	3.18%
	Self-contained, no need for others	204	64.97%
Can you use new media equipment independently?	Yes	280	89.17%
	No	34	10.83%
Occupation	Enterprise	122	38.85%
	Institution	82	26.11%
	Freelance	92	29.30%
	Student	18	5.73%
The number of operations that will be performed using new media devices	≤ 1	24	7.64%
	2–4	48	15.29%
	5–7	64	20.38%
	All will	178	56.69%
Whether there is a family history of chronic diseases	Yes	158	50.32%
	No	156	49.68%
Chronic disease course	≤ 5	92	29.30%
	5–10	174	55.41%
	≥ 10	48	15.29%

Table 2 (Continued)

Variable	Categories	Frequency	Percentage
Current health status	Good	168	53.50%
	Average	92	29.30%
	Poor	54	17.20%
Types of chronic diseases	Hypertension	62	19.75%
	Diabetes	24	7.64%
	Coronary heart disease or chronic heart failure	8	2.55%
	Chronic bronchitis or asthma	36	11.46%
	Chronic gastritis	48	15.29%
	Osteoarthritis	78	24.84%
	Chronic renal failure	16	5.10%
	Tumor	34	10.83%
	Others	8	2.55%

3.3. Perception of telenursing

At present, patients with chronic diseases mainly obtain relevant healthcare knowledge through introductions from doctors and nurses (38.9%), introductions from family members or friends (13.4%), and online inquiries (32.5%). This shows that the main information media have a strong interest in telenursing. Difficulties encountered in disease treatment and self-care at home are mainly difficulty in discerning the accuracy of information about the disease (17.8%), long waiting time for treatment (15.9%), anxiety/fear about the future development of the disease (25.3%), and inability to remember Proper medication use/medication errors (13.4%). This questionnaire has eliminated samples that do not accept telenursing services. Therefore, 314 samples are willing to accept telenursing services, but only 82 (26.1%) understand telenursing. This shows that patients with chronic diseases have a high demand for telenursing but do not understand it well [7,8]. The top concerns about telenursing are doubts about the professionalism of caregivers (35%), concerns about high costs (31.8%), and skepticism (16.6%) who have never had contact with them. Among the perceived needs for remote care, 166 cases (52.9%) had a high demand for telenursing. See **Table 3**.

Table 3. Perception of telenursing

Variable	Categories	Frequency	Percentage
The common way to acquire related disease healthcare knowledge	Introduction of doctors and nurses	122	38.9%
	Introduction of family members or friends	42	13.4%
	Health care institutions	10	3.2%
	Reading books and newspapers	14	4.5%
	Watching TV	24	7.6%
	Searching the Internet	102	32.5%

Table 3 (Continued)

Variable	Categories	Frequency	Percentage
Difficulties encountered in disease treatment and home self-care	The waiting time is long	50	15.9%
	The follow-up time interval and inspection items are not clear	26	8.3%
	The communication time with the medical staff is short	6	1.9%
	The precautions for home care are not clear	4	1.3%
	Will not use blood pressure monitors and other equipment	40	12.7%
	Unclear about the correct method of using medication	42	13.4%
	Difficulty in distinguishing the correctness of information about the disease	56	17.8
	Fear and anxiety about the future development of the disease	48	15.3%
	None of the above	42	13.4%
Telenursing understanding	Understand and participate in	82	26.1%
	Heard of it but have not participated in	158	50.3%
	Do not know	74	23.6
Telenursing services acceptance and chronic disease management participation	Yes	313	99.7%
	No	1	0.3%
Introduction of telenursing	Introduction by family or friends	66	21.0%
	Internet media	98	31.2%
	Paper media	20	6.4%
	TV report	8	2.5%
	Seen it with their eyes	38	12.1%
	Community development	20	6.4%
	Informed by medical staff during hospitalization	56	17.8%
	Other	8	2.5%
Accepting annual fee range for health management	≤ 500	74	23.6%
	500–1000	128	40.8%
	1000–2000	70	22.3%
	> 2000	42	13.4%
Service forms of telenursing	Voice call	58	18.5%
	Video call	74	23.6%
	Both are acceptable	182	58.0%
Telenursing concerns	Have never been in contact with it, and are skeptical	52	16.6%
	Worried about the high cost	40	12.7%
	Rarely exposed to new media, worried that they will not use it	32	10.2%
	Doubt about the professional level of nursing staff	110	35.0%
	The current disease control is stable, and no intervention is required	80	25.5%

3.4. Cognition of telenursing

According to the scoring criteria, the Mean Interval Scale ranges from 3.41 to 4.2, indicating high demand. The analysis results show the following means for various aspects of remote home care guidance for chronic diseases (**Table 4**): (1) Remote home care guidance for chronic diseases: 3.46; (2) Remote lectures on chronic disease-related knowledge: 3.53; (3) Dynamic recording and long-term monitoring of remote vital signs: 3.61; (4) Remote health status consultation: 3.56; (5) Remote medication reminder and guidance: 3.64; (6) Remote mental health analysis and guidance: 3.66; (7) Remote one-click emergency call and arrangement of assistance: 3.70; (8) Remote review visits and related health education: 3.67; (9) Online personal health information/ electronic medical record query: 3.62. The results indicate that patients with chronic diseases have a high demand for these programs, with the highest demand observed for remote one-click emergency calls and arrangements of assistance.

Table 4. Cognition of telenursing

Items	Percentage					Mean	Std. dev.
	Very low	Low	Average	High	Very high		
Remote home care guidance for chronic diseases	5.7	11.5	32.5	31.2	19.1	3.46	1.10
Remote lectures on chronic disease-related knowledge	5.7	10.8	29.3	33.1	21.0	3.53	1.11
Dynamic recording and long-term monitoring of remote vital signs	5.1	9.6	29.9	30.6	24.8	3.61	1.11
Remote health status consultation	3.8	13.4	27.4	33.8	21.7	3.56	1.09
Remote medication reminder and guidance	8.3	10.8	21.7	27.4	31.8	3.64	1.26
Remote mental health analysis and guidance	3.8	12.7	26.1	28.0	29.3	3.66	1.14
Remote one-click emergency call and arrange assistance	5.1	8.3	26.8	31.2	28.7	3.70	1.12
Remote review visits and related health education	5.7	9.6	26.1	29.3	29.3	3.67	1.16
Online personal health information / electronic medical record query	6.4	10.8	24.2	31.2	27.4	3.62	1.18

According to the results obtained by the Kruskal-Wallis test (**Table 5**), the following items show significant differences with $P < 0.05$: (1) Remote home care guidance for chronic diseases; (2) Remote lectures on chronic disease-related knowledge; (3) Dynamic recording and long-term monitoring of remote vital signs; (4) Remote health status consultation; (5) Remote medication reminder and guidance; (6) Remote mental health analysis and guidance; (7) Remote one-click emergency call and arrangement of assistance; (8) Remote review visits and related health education; (9) Online personal health information/electronic medical record query.

These results indicate that there are significant differences in the demand cognition for each item based on the diagnosed chronic disease. For the following items, the *P*-values are less than 0.001, indicating an extremely significant difference: (1) Remote home care guidance for chronic diseases; (2) Dynamic recording and long-term monitoring of remote vital signs; (3) Remote medication reminder and guidance; (4) Remote mental health analysis and guidance; (5) Remote one-click emergency call and arrangement of assistance; (6) Online personal health information/electronic medical record query.

Table 5. Kruskal-Wallis

	χ^2	df	*P*	ε^2
Remote home care guidance for chronic diseases	39.8	8	<0.001	0.1271
Remote lectures on chronic disease-related knowledge.	20.6	8	0.008	0.0657
Dynamic recording and long-term monitoring of remote vital signs	44.1	8	<0.001	0.1410
Remote health status consultation	25.9	8	0.001	0.0826
Remote medication reminder and guidance	39.9	8	<0.001	0.1275
Remote mental health analysis and guidance	53.0	8	<0.001	0.1692
Remote one-click emergency call and arrange assistance	27.1	8	<0.001	0.0864
Remote review visits and related health education	17.3	8	0.027	0.0552
Online personal health information/electronic medical record query	30.6	8	<0.001	0.0976

4. Discussion

4.1. Basic cognition of patients with chronic diseases on telenursing

This study found that most patients with chronic diseases had a low or even nonexistent understanding of telecare, which is consistent with the research results of Pan *et al.* [8]. The primary way patients learn about telecare is through the Internet, but the source and credibility of online information cannot be guaranteed. To promote telecare effectively in the future, the authenticity and credibility of online information should be ensured [9]. Additionally, publicity channels should be expanded to include TV reports and print media [10]. Simultaneously, reasonable regulations should be established for the cost of telecare to ensure the technical proficiency of telecare team members [10]. Implementing small-scale, fixed-point trials in communities could enhance the practical understanding of remote nursing for chronic disease patients, gradually expanding the promotion scope.

4.2. Patients with chronic diseases need recognition of telenursing

Patients with chronic diseases have a high awareness of the need for telenursing services, with the highest demand being for remote one-click emergency calls and assistance arrangements. Patients with chronic diseases may require emergency treatment at any time due to acute deterioration or complications [11]. Remote distress call systems can help patients manage acute events promptly, providing telemedicine support. Medical staff can assess patients' conditions through telephone or video calls, offering first aid guidance and treatment advice or arranging necessary medical assistance [12]. This capability increases the sense of security and confidence among chronic disease patients, knowing that medical help is readily available in emergencies, thereby reducing fear and anxiety about disease progression.

4.3. Differences in the cognitive needs of patients with chronic diseases for telenursing

Analyzing the telenursing needs of patients with different chronic diseases reveals significant differences, reflecting the specific needs of various chronic conditions in the management and treatment processes.

4.3.1. Personalized nursing content

Different chronic diseases require different management and clinical approaches. Telenursing programs

should offer personalized care content tailored to specific diseases, including monitoring indicators, treatment options, and nutritional recommendations. For instance, patients with hypertension and diabetes may need more monitoring of blood pressure, heart rate, blood glucose levels, and drug management. Cancer patients and their families need a deep understanding of the disease, with diverse and complex treatment and management needs, including nutrition management, symptom control, and psychosocial support [13].

4.3.2. Flexibility of the technology platform

Patients with different chronic diseases have varying levels of acceptance and preferences for technology. Remote care projects should offer multiple technology platforms and access methods, such as mobile applications, smart devices, and web pages, allowing patients to choose the appropriate access method based on their preferences. Digital literacy and technology acceptance are crucial factors influencing the implementation of telenursing projects [14], necessitating personalized training and support for different patient needs.

4.3.3. Healthcare experience and trust

Patients' experiences with healthcare and their trust in the healthcare system also influence their acceptance of telecare programs. Some patients may have better experiences and more trust in traditional face-to-face medical services, preferring the conventional medical model. According to a study by Liu, et al, patients' medical service experiences and trust significantly impact the acceptance and effectiveness of tele-care programs. Enhancing communication and explanation to patients is necessary to improve their trust in tele-care programs [15].

4.4. Difference analysis

The characteristics and severity of different chronic diseases, treatment methods, medication regimens, disease management, and recurrence prevention all influence patients' varying needs for telenursing. Additionally, personalized nursing content, the flexibility of the technology platform, and patients' healthcare experiences and trust impact the demand cognition of chronic patients for telenursing.

5. Conclusion

The disease characteristics of patients with different chronic diseases and their different needs for telenursing require more considerations in the design and use of telenursing services. Telenursing projects should provide personalized, flexible, and comprehensive nursing services, and carry out personalized design and customization according to the disease characteristics and needs of patients with chronic diseases to achieve better health management and disease control effects.

Disclosure statement

The authors declare no conflict of interest.

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