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ORIGINAL RESEARCH

A Survey on the Willingness of Ganzhou Residents to Participate in "Internet + Nursing Services" and Associated Factors

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Objective: To investigate the willingness of Ganzhou residents to participate in "Internet + Nursing services" and analyse the relevant influencing factors.

Methods: From May to June 2021, 426 Ganzhou residents were surveyed using an Internet + Nursing services questionnaire and the relevant influencing factors were analysed. The questionnaire comprised two parts: demographic characteristic section and a questionnaire on residents' willingness to participate in Internet + Nursing services including for dimensions (awareness, participation, trust and need), a 5-point Likert scale was used.

Results: A total of 397 valid questionnaires were recovered, and the total willingness of Ganzhou residents to participate in the service was derived as 11.59 ± 2.14. The results of multiple linear regression analyses showed that the presence of family members with a chronic disease or mobility difficulties, and an awareness and trust of Internet + Nursing services were influencing factors of residents' participation willingness ($P < 0.05$).

Conclusion: The participation willingness of Ganzhou residents in Internet + Nursing services is modestly low, and the reasons for participation varied. It is suggested that the government and pilot hospitals strengthen the publicity surrounding these services, improve safety measures, strengthen team training, and develop products suitable for the elderly to increase residents' participation willingness.

Keywords: internet + nursing services, willingness to participate, residents, trust, awareness

Introduction

By the end of 2020, the number of people aged ≥60 years in China reached 264 million, accounting for 18.7%[1] of the country's total population. The population ageing level is severe, and nursing services in the country are in short supply. Actively responding to the ageing population is in line with China's people-centred development ideology, and is of great significance for achieving high-quality economic development and maintaining the long-term stability of the country.[2] Therefore, it is urgent that the establishment of a high-quality and efficient medical service system be accelerated and that the reasonable supply of medical resources is realised to cope with the large service demand brought about by ageing.[3]

In this context, the concept of "Internet + Nursing services" have emerged. "Internet + nursing services" mainly refers to the use of registered nurses in medical institutions, relying on the Internet and other information technology, to provide chronic disease management, rehabilitation care, special care, health education, maternal and child care, Chinese medicine care, hospice care and other nursing services for patients discharged from hospitals or special groups of people suffering from illnesses and mobility problems, based on the mode of "online application and offline service". These services can facilitate patients' medical needs and integrate the use of nursing resources, which can reduce the stress on

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medical resources and better meet the diversified and multi-level health needs of the public.[4,5] The National Health Commission issued several documents emphasising the promotion of Internet + Nursing services to reduce the burden and pressure on families and society and to improve the use of public healthcare resources.[6,7] Experimental projects involving these services have been carried out in many first-tier cities in China with remarkable results. However, we found that these cities were mostly located in economically developed regions, while the less developed and rural regions remained in a "wait-and-see" situation. In these areas, the implementation of services lags significantly, giving rise to large regional variations in their development.[8]

To keep up with the progress of the times, the Health Commission of Jiangxi Province formulated an implementation plan for the experimental Internet + Nursing services project in Jiangxi Province in April 2021, taking into consideration the actual situation of the region. This determined Ganzhou city as the only viable pilot city in Jiangxi Province for implementing the project. In this study, to promote the experimental project, a survey was conducted to better understand residents' willingness to participate in Internet + Nursing services, analyse the influencing factors on their responses, and propose targeted improvement strategies aimed at providing a basis for the implementation of Internet + Nursing services in Jiangxi Province.

Materials and Methods

Research Participants

From May to June 2021, convenience sampling was applied to select participants from the vaccinated population at a coronavirus 2019 (COVID-19) vaccination site in a tertiary care hospital in Ganzhou, as well as from the residents of four communities, as the study population. The inclusion criteria were as follows: ① prospective participants were aged ≥18 years; ② conscious individuals can complete the questionnaire independently; ③ individuals who signed an informed consent form and were willing to cooperate with the research.

The exclusion criteria were as follows: prospective participants who had lived in Ganzhou city for <6 months. The sample size was taken as 5–10 times the number of independent variables, coupled with a 10–20% rate of participants lost to follow-up; thus, the minimum sample size was determined as 94 cases. Before formally distributing the questionnaire, the researcher determined the number of pre-survey respondents for a pre-survey, based on the total sample size, using the principle that the number of pre-survey respondents would be 10–20% of the total sample size.

Method

Survey Tool

By reviewing the literature[9–11] and referring to the relevant policy documents of the National Health Commission on the experimental project known as Internet + Nursing services, we designed a questionnaire to determine residents' willingness to participate in Internet + Nursing services in Ganzhou city following group discussions, consulting experts in related fields, and combining the data obtained with the purpose of the survey. The questionnaire had good reliability and validity; the overall Cronbach's alpha (α) coefficient of the questionnaire was 0.896, and the Cronbach's α coefficients for the three dimensions of awareness, participation, and trust were 0.945, 0.880, and 0.894, respectively. After two rounds of expert review, the content validity index (S-CVI) at questionnaire level was 0.905 and the I-CVI ranged from 0.875 to 1.000.

The questionnaire comprised two parts: (1) a general demographic information section that included data on gender, age, education level, marital status, number of children, monthly income, mode of payment for medical expenses, the presence of chronic diseases, whether there were individuals in the family with chronic diseases or mobility problems, primary caregivers, the number of medical visits in the past year, and whether the participant had used Internet + Nursing services and communication tools; (2) a questionnaire on residents' willingness to participate in Internet + Nursing services, which included 19 items in total in 4 dimensions, ie 5 items on awareness, 4 on participation, 7 on trust, and 3 items on demand. In awareness, participation and trust dimensions, each section included one non-directed multiple-choice question, and the rest were single choice questions; 3 non-directed multiple-choice questions were included in the demand dimension of the questionnaire. Percentages were calculated for all non-directed multiple-choice questions in the

questionnaire. A 5-point Likert scale (1 = strongly unwilling, 2 = unwilling, 3 = unsure, 4 = willing, 5 = very willing) was used to score all single-choice questions.

Data Collection and Quality Control Methods

From May to June 2021, four uniformly trained surveyors explained the background of the study, the content of the survey, and the criteria for completing the questionnaire to the survey respondents. The participants completed the questionnaire independently after providing signed informed consent for inclusion in the study, and all queries about completing the consent form were explained using consistent speech. Considering the age of the survey population and their use of smartphones, the questionnaire was distributed in a combination of online and paper forms, and there was no difference in the content of the two versions. The paper questionnaires were checked on the spot after completion to ensure effective responses. The online questionnaire was completed with the help of online survey software (Questionnaire Star), where each item was set as a compulsory question that required answering only once from the same IP and device. Finally, the returned questionnaires were systematically screened to eliminate those with a completion time <180 seconds and those that did not conform to the response logic to ensure the quality of the questionnaire data. The two researchers completed the scoring process of the questionnaire separately and when there was a scoring error, the two eventually agreed by looking at the raw data. A total of 426 questionnaires were distributed and 426 were collected (100% recovery rate); 397 questionnaires were valid (93.19% recovery efficiency rate).

Statistical Method

The SPSS 26.0 statistical software was used for conducting data analysis. Frequency, percentage, and mean ± standard deviation ($\chi\pm$ S) were used to express the general information of survey respondents; a *t*-test and analysis of variance were used to analyse the factors influencing residents' participation, and the results of a univariate analysis with statistically significant differences were included as independent variables in the stratified regression analysis. Differences were considered statistically significant at $P < 0.05$.

Results

A Comparison of Resident Participation Scores with Different Demographic Characteristics

The total score of Internet + Nursing services participation among Ganzhou residents was 11.59 ± 2.14, and the differences in participation among residents with different education levels, different monthly incomes, and whether there were people with chronic diseases or mobility problems in their family were statistically significant, with P-values of 0.0000, 0.043, and 0.001, respectively. Although the participation scores for resident on other demographic characteristics were not statistically significant, there was still a trend for higher age or higher number of visits in the past year to be associated with higher Internet + Nursing service participations scores. The detailed results are shown in Table 1.

Survey on Ways for Residents to Learn About Internet + Nursing Services, Reasons for Acceptance, and the Demand for Using Them

Among the survey respondents, 39% of Ganzhou residents had not heard of Internet + Nursing services and 25.90% had learned about the project through medical personnel. The top three reasons related to a willingness to accept these services were time and labour-saving-related and convenience, accounting for 65.00%, 46.90%, and 38.00%, respectively; 69.30% of the survey respondents made appointments through WeChat. The detailed results are shown in Table 2.

Analysis of the Influencing Factors on Residents' Willingness to Participate in Internet + Nursing Services

The total score of residents' participation in Internet + Nursing services was used as the dependent variable, and the three variables with statistically significant differences ($P < 0.05$) according to univariate analysis, ie education level, monthly income, and whether there were people with chronic diseases or mobility problems in the family, were used as control variables. The degree of awareness and trust were used as independent variables, which were included in a hierarchical

Table 1 Comparison of Internet + Nursing Service Participation Scores Among Residents with Different Demographic Characteristics

Items	Number of People	Total Participation Score (x±s)	t/F	*P*
Sex				
Male	138 (34.8)	11.60±2.17	0.030	0.976
Female	259 (65.2)	11.59±2.13		
Age				
18–44 years	245 (61.7)	11.51±2.18	2.465	0.086
45–59 years	95 (23.9)	11.47±2.16		
≥60 years old	57 (14.4)	12.18±1.85		
Education level				
Primary school and below	28 (7.1)	10.64±2.90	5.473	0.0000
Junior high school	155 (39.0)	11.20±2.03		
High school	78 (19.6)	11.81±1.85		
Junior college	66(16.6)	11.94±1.83		
Bachelor's degree and above	70(17.6)	12.30±2.33		
Marital status				
Unmarried	69(17.4)	11.59±2.30	0.602	0.614
Married	310(78.1)	11.60±2.04		
Widowed	10(2.5)	10.90±3.11		
Divorced	8(2.0)	12.25±3.11		
Number of children				
0	77(19.4)	11.79±2.30	2.010	0.112
1	111(28.0)	11.92±1.94		
2	160(40.3)	11.33±2.04		
3 and above	49(12.3)	11.45±2.54		
Monthly salary				
Under 3000	127(32.0)	11.46±2.27	2.487	0.043
3000–5000	178(44.8)	11.40±2.06		
5001–8000	60(15.1)	12.08±1.77		
8001–10,000	17(4.3)	11.94±2.93		
Over 10,000	15(3.8)	12.73±1.75		
Mode of payment for medical expenses				
Employee health insurance	210(52.9)	11.80±2.10	1.703	0.166
Resident health insurance	168(42.3)	11.33±2.18		
Commercial insurance	14(3.5)	11.50±2.28		
Self-financed	5(1.3)	12.20±0.45		
With or without chronic diseases				
Without	324(81.6)	11.52±2.12	−1.543	0.124
With	73(18.4)	11.95±2.18		
Whether there are people in the family with chronic diseases or mobility problems				
No	244(61.5)	11.32±2.01	−3.355	0.001
Yes	153(38.5)	12.05±2.26		
Primary caregiver				
Myself	195(49.1)	11.50±2.22	0.496	0.685
Spouse	100(25.2)	11.72±1.97		
Children	98(24.7)	11.63±2.13		
Other	4(1.0)	12.50±2.65		
Number of medical visits in the past year				
0 times	168(42.3)	11.38±2.20	1.203	0.309
1–3 times	187(47.1)	11.74±2.09		
4–6 times	25(6.3)	11.52±2.02		
7–10 times	6(1.5)	11.83±2.23		
>10 times	11(2.8)	12.55±2.07		

(*Continued*)

Table 1 (Continued).

Items	Number of People	Total Participation Score (x±s)	t/F	P
Have used "Internet+ nursing services"				
No	326(82.1)	11.59±2.10	−0.099	0.921
Yes	71(17.9)	11.62±2.31		
Communications tool				
Smartphone	390(98.2)	11.60±2.15	0.032	0.975
Mobile phone for elders	7(1.8)	11.57±1.40		

Table 2 Survey on Ways to Know the "Internet + Nursing Service" of Residents, Reasons for Acceptance and Demand for the Use of It

Items		Number of People	Percentage (%)
Ways to learn about the "Internet + nursing Services"	Never heard of it.	155	39.00
	Mobile Internet	87	21.90
	Television and print	15	3.80
	Community outreach	42	10.60
	Medical staff informed	103	25.90
	Other ways	70	17.60
Reasons for willingness to accept Internet+ nursing services	Save time: reduce waiting time for medical appointments	258	65.00
	Save energy: reduce commuting time	186	46.90
	Convenience: easy access process	151	38.00
	Good value for money	12	3.00
	Reduce length of hospital stay, financial burden and family burden	77	19.40
	Time independent	69	17.40
	Provide personalized services	78	19.60
	Meet the need for privacy	30	7.60
	Safe, avoiding risks on the way to the doctor	71	17.90
Safety and security measures	Establishment of specific laws and regulations	270	68.00
	Rigorous vetting of the qualifications and competencies of the visiting nurses	249	62.70
	Platform purchase of insurance	96	24.20
	Development of emergency plans	122	30.70
	Open channels for complaints	127	32.00
	Other	49	12.30
Reservation method	WeChat	275	69.30
	SMS	70	17.60
	Phone	158	39.80
	APP	105	26.40
	Community/others helping	39	9.80
Service provider	Community hospital nurses	97	24.40
	Nurses in secondary hospitals	66	16.60
	Nurses in tertiary hospitals	145	36.50
	Nurses who often go to the hospital themselves	111	28.00
	Nurses who live closer to hospital	173	43.60
Price setting for "Internet + nursing Services"	Reference to existing hospital charging standards	118	29.70
	The State sets special charging standards	205	51.60
	Platform independent pricing	27	6.80
	Platform and hospital pricing	15	3.80
	Platform and user bargaining	32	8.10

multiple regression analysis, and the results show that literacy, monthly income and people with chronic illnesses or mobility problems at home are the main factors affecting the willingness of community residents to participate. The results are shown in Table 3.

Discussion

Residents' Willingness to Participate in Internet + Nursing Services Was Modestly Low and the Reasons for This Were Diverse

According to the results of this study, the total willingness score of Ganzhou residents related to participation in Internet + Nursing services was 11.59 ± 2.14, which reflected a modestly low level. Additionally, 65% of residents stated that the main reason for participating in the services was time efficiency, 46.9% cited their reason as labour efficiency, and 38% ascribed their reasoning to convenience, reflecting the diversity of participant feedback. Internet + Nursing services are provided by nurses in the patient's home; accordingly, patients believed using the services could save time and labour because they did not have to wait in a hospital registration line. This may also have been related to the impact of the new coronary pneumonia epidemic, which has seen people gradually moving away from offline to online medical care and experiencing the benefits of doing so.[12] The Internet + Nursing services project can circumvent the time and spatial limitations of traditional medical services, thereby giving rise to convenience and making more people willing to engage with it.

Limitations Regarding the Primary Channels Through Which Residents Can Learn About Internet + Nursing Services

In this study, when excluding the three interference factors and including education level, monthly income, and whether there were people with chronic diseases or mobility problems in the family, residents who had a degree of knowledge

Table 3 Stratified Regression Results

Variable			Model 1		Model 2	
			Coefficient	Standardization Coefficient	Coefficient	Standardization Coefficient
Intercept	Educational level		12.421**		3.474**	
		Primary school and below	−1.491*	−0.179	−0.386	−0.046
		Junior high school	−0.630	−0.144	−0.022	−0.005
		High school	−0.155	−0.029	−0.092	−0.017
		Junior college	−0.021	−0.004	0.032	0.006
		Bachelor's degree and above	0.000			
Control variable	Monthly salary	Under 3000	0.000			
		3000–5000	−0.237	−0.055	−0.131	−0.030
		5001–8000	0.123	0.021	0.037	0.006
		8001–10,000	0.242	0.023	−0.277	−0.026
		Over 10,000	0.942	0.084	0.672	0.060
	Whether there are people in the family with chronic diseases or mobility problems	No	0.000			
		Yes	0.646*	0.147	0.578*	0.132
Independent variable	Awareness				0.096**	0.149
	Trust				0.341**	0.604
R^2			0.083		0.467	
F			3.870**		30.614**	
ΔR^2			0.083		0.384	
ΔF			3.870**		138.581**	
Dependent variable: degree of participation						

Note: N=397, *P<0.05, **P<0.001.

about Internet + Nursing services reflected a higher participation willingness ($P < 0.001$). This was consistent with the findings of Liu et al[11] and may have been because residents with a level of awareness were more cognisant of the meaning and advantages of these services and were more likely to accept this approach as a medical treatment option. The results of this study showed that 61% of residents were aware of Internet + Nursing services, of which 25.9% had been informed by medical staff and 21.9% through mobile phone internet publicity. This indicated that the information channels of Ganzhou residents have gradually changed from traditional to mixed media platforms. However, there are limitations within the primary channels aimed at delivering information to residents about Internet + Nursing services. The next step to remedy this may be the development and publicity of a programme that fully considers the characteristics of different groups of people and a variety of media platforms.

Residents Had Concerns About the Safety of Internet + Nursing Services

In this study, excluding three interference factors and including education level, monthly income, and whether there were people with chronic diseases or mobility problems in the family, residents who had a high level of trust in Internet + Nursing services were more willing to use them ($P < 0.001$). The reason for this may have been that residents with a stronger trust in these services believed it could meet their needs and ensure the medical safety of online medical care. In this study, 68% of the surveyed residents believed that laws and regulations related to Internet + Nursing services had to be established, and 62.7% believed that the qualifications of home nurses required strict examination; there were also strong calls for convenient complaint channels and emergency plans. As such, Ganzhou residents still had concerns about the safety of Internet + Nursing services.

How the Health Status of Family Members Affected Residents' Willingness to Participate in Internet + Nursing Services

Residents' willingness to participate in Internet + Nursing services was stronger when they had family members with chronic diseases or mobility problems ($P < 0.05$). The reason for this may have been related to the fact that most of the respondents in this study were young and middle-aged individuals (18–44 years). Although they did not have a strong demand for these services they represented individuals who were concerned about the health of their family members at home and, accordingly, had a strong willingness to participate in accessing these services.

Recommendations

Increase Promotion to Popularise Internet + Nursing Services

The Internet + Nursing services approach is new and requires more publicity. It is important to define the target audience, both for residents and nurses. Some studies[13–15] confirmed that nurses did not have a broad knowledge of these services. The most important way for Ganzhou residents to learn about these services is, however, to be informed by medical staff. For this reason, awareness of these services must be promoted among nurses, and a range of channels should be suitably employed to further promote them. This study showed that 98.2% of the surveyed residents used smartphones and 69.30% were more willing to use WeChat to make appointments. For this reason, WeChat can be used as a platform for promoting these services to residents. Additionally, lectures can regularly be conducted within the community to communicate with residents face-to-face and answer their questions. Furthermore, family bonds can be used to influence elderly members, ie by strengthening the promotion of services among younger family members, to gradually eliminate their rejection of Internet + Nursing services. Through publicity, the language of content related to Internet + Nursing services can be converted into easy-to-understand information. Furthermore, additional images and video can be used where relevant to replace wording to make it easier for residents to understand the information.

Improving Safety and Security Measures to Address Residents' Concerns

This study indicated that if residents had concerns about the safety of Internet + Nursing services their participation would also decrease. Therefore, it is necessary to improve safety measures to eliminate residents' concerns and increase

their trust in these services. The relevant departments should improve the applicable laws and regulations. The long-term development of Internet + Nursing services requires law-based support because implementing regulations can give it a basis to carry out and follow. Second, the platform must have a smoothly operating complaint channel with a special person in charge that must pay attention to user feedback, address complaints promptly, and complete regular summary evaluations. Furthermore, a protective wall to ensure information security must be established. Studies have shown that patients are increasingly aware of securing their information[9] and have a high demand for security related to diagnosis and treatment information. It is recommended that an information security platform be created and that the information security knowledge of residents, nurses, and third-party platform personnel be ensured to establish and enhance information security awareness and facilitate the development of Internet + Nursing services.

Develop Products That are Suitable for the Elderly and Simplify the Operational Process

The physiological functions of the elderly will gradually decline with age, as will their learning and memory abilities, making it difficult for them to use smart products and making it easy for them to become intimidated and retreat.[16] For this reason, intelligent, humanised, and simple products must be developed for the elderly to stimulate their desire to use them. This can be achieved by simplifying operational interfaces, using images instead of text, and using large fonts to overcome limitations linked to the decline of physical functions among the elderly, which may help to make them feel more at ease when using software programs. Furthermore, by simplifying the operational process, such as setting a one-key reservation function and using voice announcements, the software can be made easier to use for the elderly. Finally, we can set a function through which to connect to their children, so that when elderly users encounter a situation that they cannot manage, they can connect to their children using one key and in this way assist them to complete a specific operation.

Strengthening Team Training to Ensure Medical Safety

Medical risk is one of the main concerns of patients regarding Internet + Nursing services.[17] As a service provider, the nurse's ability is crucial for ensuring the medical safety of these services. Medical institutions should strictly examine the qualifications and abilities of home nurses,[18] select outstanding nursing talents according to the admission system, and establish an elimination mechanism to enhance the sense of responsibility and urgency of home nurses. Second, a training system for nurses should be created based on the Internet + Nursing services project. The model created by Taizhou and Ningbo in Zhejiang can be used as an example, give full play to the role of the nursing association, sets up a nursing talent pool, establishes a skills training centre,[19] unifies training content and standards, and conducts centralised training and assessment[20] to ensure the homogenisation of nursing quality within and outside of the hospital. In addition, it is necessary to build a service quality evaluation index system to improve the quality control of Internet + Nursing services, to detect hidden safety problems at an early stage, ensure the sustainable development of services, and to gain public trust in services and their quality.

Study Limitations

There are some limitations to this study. Convenience sampling was adopted, which made the determination of sample units arbitrary and the inferred overall affect poor. However, in the sample size calculation stage, the number of study variables and the size of the missing visit rate were fully considered to guarantee an adequate sample size; in the individual inclusion stage, a strict quality control program was developed to ensure the logic and accuracy of the data, which further compensated for the shortcomings of convenience sampling and improved the effectiveness of inferring where this was applied.

Conclusion

The results of this survey showed that the willingness of Ganzhou residents to participate in Internet + Nursing services was at a modestly low level. For participants who noted the presence of individuals with chronic diseases or mobility problems in their families, awareness and trust were the main factors affecting their willingness to participate. It is

recommended that Internet + Nursing services be publicised according to different demographic characteristics and that the awareness and trust of residents be enhanced by strengthening the training of visiting nurses, improving safety and security measures, and developing suitable products for the elderly. These measures can help to increase the awareness and trust of residents concerning these services, and improve the willingness of residents (particularly those in need of them) to participate in Internet + Nursing services.

This study only surveyed a selection of Ganzhou city residents; further expansion of the sample size is needed in future studies to provide a reliable basis for the development of Internet + Nursing services in the post-pandemic COVID-19 era.

Data Sharing Statement

All data generated or analyzed during this study are included in this published article.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the Declaration of Helsinki and approved by the ethics committee of Gannan Medical University.

Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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