

# Nurses' Willingness and Demand for Internet +home Care Services and Its Influencing Factors in Different Levels of Hospitals in China – A Nationwide Survey

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**Purpose:** The present study aimed to investigate nurses' willingness and demand for Internet +home care services in different levels of hospitals in China and analyze the influencing factors.

**Participants and Methods:** From October 1 to December 31, 2021, 5714 nurses from 15 hospitals in five regions of China were recruited in this cross-sectional study using a two-stage random sampling method. A self-designed questionnaire with good reliability and validity was used to measure nurses' willingness and demand for Internet +home care services.  $\chi^2$  test, Welch *t*-test, and multiple linear regression analyses were used to analyze the data.

**Results:** Nurses were highly willing to provide Internet +home care services. Statistical differences were found in the willingness to provide Internet +home care services and the preference for service distance, service platform, and single service fee between nurses in different levels of hospitals (both  $P < 0.05$ ). The willingness to provide "catheter maintenance service" and "rehabilitation nursing service" of nurses in different levels of hospitals were statistically significant (both  $P < 0.05$ ). Nurses' demand for Internet +home care services increased with the level of their hospital. Multiple linear regression showed that professional title, educational level, monthly family income, and mortgage or car loan influence nurses' demand for Internet +home care services.

**Conclusion:** Nurses' willingness and demand for Internet +home care services vary with the level of their hospitals. It is recommended that government and hospitals regulate the service items, the service distance, single service fee, and other contents according to nurses' willingness and demand and establish relevant laws and regulations to ensure the steady and orderly development of the Internet +home care services.

**Keywords:** Internet +home care services, transitional care, nurse, willingness, demand, influencing factors

## Introduction

Population aging is a vital issue worldwide, and it is also a severe challenge for China. By 2020, China's population aged 65 and above has reached 190.64 million, accounting for 13.4% of the total population, and 150 million elderly suffered from chronic diseases, accounting for 79% of the total elderly population.<sup>1</sup> The increase in the number of disabled and semi-disabled elderly has led to a dramatic increase in the demand for home care services. In February 2019, the National Health Commission released the "Internet +home care services Pilot Work Plan". This plan defined Internet +home care services, which refers to registered nurses providing door-to-door nursing services for discharged patients or patients suffering from certain diseases through the "online application, offline service" model. The Internet +home care services are considered a vital supplement and effective auxiliary means of traditional and transitional care,<sup>2</sup> because they can make the most of high-quality nursing talents, balance the distribution of nursing resources, and meet the multi-level

nursing needs of patients. Besides, this model enables nurses to arrange the working time and content reasonably, and flexibly increasing personal income and enhancing professional ability.<sup>3</sup>

Although some regions have achieved significant results through active exploration and practice, China's Internet +home care services are still in the initial stage. Some Internet +home care service-related problems exist, such as low nurses' awareness, imperfect security measures, and an imperfect service evaluation system.<sup>4</sup> Furthermore, nurses' multi-site practice is restricted by policy currently in China.<sup>5</sup>

As the main body of this service model, nurses' willingness and demand are of great significance to the large-scale development of Internet +home care services in China. Differences in hospital management and medical resource allocation may lead to different attitudes of nursing staff towards Internet +home care services. However, studies on nurses' willingness and demand for Internet +home care services in hospitals at different levels in China are limited. In this study, we designated hospitals directly under the jurisdiction of the county health commission as county-level hospitals, which mainly provide comprehensive health services and medical education for the county, township, and town residents. The hospitals directly under the jurisdiction of the Municipal Health Commission are designated as municipal-level hospitals. They are mainly located in cities and provide comprehensive medical services, emergency, and critical medical services, and specialized medical services to residents from cities; they also play a broader role in medical education and research on a regional basis. The hospitals directly under the jurisdiction of the Provincial Health Commission are called provincial hospitals, and the hospitals directly under the jurisdiction of the National Health Commission are called ministerial hospitals, collectively referred to as provincial and ministerial-level hospitals. They are usually located in the provincial capital and play an essential role in scientific research and teaching, which are medical centers providing medical services to multiple regions. We aimed to assess the current situation and differences in the willingness and demand for Internet +home care services among nurses in different levels of hospitals, and analyze the factors related to nurses' willingness and demand. The findings of the present study may provide a reference for the government and related institutions to formulate targeted policies and contribute to the development of Internet +home care services.

## Materials and Methods

### Study Design

This descriptive, cross-sectional study used a structured self-reported questionnaire to investigate Chinese nurses' Internet +home care services mode willingness, service contents willingness, and service demand.

### Setting and Participants

From October 1 to December 31, 2021, a two-stage random sampling method was adopted to select 15 hospitals in 32 provinces/autonomous regions/municipalities in China. A total of 5782 nurses from 15 hospitals were randomly selected as the survey subjects. The specific sampling method was as follows: In the first stage, one province/autonomous region/municipality was randomly selected from each of the five regions in China (eastern, western, southern, northern, and central regions) using the random number table. In the second stage, a county-level hospital, a municipal-level hospital, and a provincial-level (or ministerial-level) hospital were randomly selected using a random number table from each of the five provinces/municipalities/autonomous regions determined by the first stage sampling.

Registered nurses (RNs) who met the inclusion and exclusion criteria were recruited. The inclusion criteria were: (a) RNs aged more than 18 but less than 60 years old, (b) RNs engaged in clinical work, (c) RNs who can correctly understand the questionnaire content, (d) RNs were given informed consent and participated voluntarily, and (e) RNs with more than five years of clinical working experience or RNs with a professional title of "senior nurse". Exclusion criteria: (a) RNs on medication for mental illness, and (b) RNs absent from work due to sick leave, personal leave, study abroad, or other reasons.

The sample size of this study was calculated according to the Kendall estimation method: the sample size should be 20 times the number of questionnaire items (33 items in total), and it should be increased by 20% to ensure the recovery

rate. Besides, considering that three levels of hospitals were selected, the sample size should be multiplied by three. Therefore, the sample size of this study was calculated to be  $n=20 \times 33 \times (1+20\%) \times 3=2376$ .

## Ethical Considerations

The Medical Ethics Committee of Xiangya Hospital, Central South University, Changsha, China, approved this study (Ethics Review and Approval No: 202012191). Informed consent was obtained from all participants before data collection, and the clinical data and basic information of all participants were strictly confidential. All procedures complied with the Declaration of Helsinki.

## Study Tool

The questionnaire for this study was developed through literature review, focus group discussions, and Delphi expert consultation,<sup>6–11</sup> which consists of three sections. Section one is the General Information Collection Form, including gender, age, marital status, professional title, working years, and hospital levels. Section two measures nurses' willingness to provide Internet +home care services. This section has two dimensions: service mode and service contents. The service mode dimension has seven items, such as the preference for service distance, service platform, service time period. The service contents dimension has ten items, such as the willingness to provide the basic nursing service and the maternal-infant nursing service. All items in this section are either single choice questions or dichotomous option questions (willing or unwilling). Section three measures nurses' demand for Internet +home care services using seven items (eg, demand for clarifying the management system of the Internet +home care platform, standardizing the Internet +home care process, and ensuring the safety of Internet +home care staff). Likert 5-level scoring was adopted for all items in this section, with a score from 1–5 (from "not needed" to "very needed"). The demand score was the sum of the score of each item divided by the number of items. The higher the score was, the higher the demand was.

The questionnaire was confirmed to have good reliability and validity in the preliminary survey, with a Cronbach  $\alpha$  coefficient of 0.705 and content validity of 0.892, which can be used in relevant research and practice.

## Data Collection and Quality Control

Before the survey, researchers communicated with the nursing department directors of the 15 recruited hospitals by telephone or on-site visits and obtained their cooperation. A unified training was provided to these directors, explaining the study purpose, significance, method, and inclusion and exclusion criteria. Then, the directors helped to recruit potential eligible participants in their hospitals based on study inclusion, and exclusion criteria following the principles of informed consent and voluntary participation. After recruitment, a video conference was arranged for these potential eligible participants in batches; the study purpose, significance, method, possible benefits, and how to fill in the questionnaire were explained. The data was collected using an e-questionnaire via Wenjuanxing. The researcher set that one WeChat account can only submit the answer one time to prevent repeated responses. The respondents must answer all questions according to the relevant prompts before submission to ensure the integrity of the questionnaire collection. Two researchers double-checked the data after the questionnaires were collected and eliminated invalid questionnaires. A total of 5782 questionnaires were collected, and 68 were eliminated, with an effective recovery rate of 98.82%.

## Data Analysis

All the raw data in Wenjuanxing were exported and sorted out according to the hospital level. IBM SPSS 25.0 software was used for statistical analysis. The enumeration data's statistical description used frequency and composition ratio (%), and continuous variables were expressed as average  $\pm$  standard deviation. The differences in the willingness to provide the Internet +home care services between nurses in different levels of hospitals were analyzed using the  $\chi^2$  test. The difference in nurses' demand for Internet +home care services was analyzed using the Welch *t*-test (with uneven variance). Multiple linear regression analysis was used to analyze the influencing factors of nurses' demand. Before the multiple linear regression, univariate analysis, including analysis of variance, was used to screen the independent variables. The test level was  $\alpha=0.05$ , and  $P<0.05$  was considered statistically significant.

## Results

### Study Participants

A total of 5714 nurses completed the survey, among which 38.2% were from municipal-level hospitals, 34.3% were from provincial and ministerial-level hospitals, and 27.5% were from county-level hospitals. The majority were females (96.7%). The respondents were aged  $31.99 \pm 7.45$  years old. More than half of them (57.7%) had working seniority for five to ten years, and the others had working seniority for more than ten years. The majority got married (68.9%). More than 60% of participants exhibited a junior professional title (61.3%). More than 60% had a bachelor's degree (62.7%). About half of the participants (50.6%) had a monthly family income of 10,001–20,000 Chinese Yuan (CNY), and the others had a monthly family income of no more than 10,000 CNY (30.2%), 20,001–30,000 CNY (15.2%), and more than 30,000 CNY (4.0%). (Table 1).

### The Willingness of Nurses at Different Levels of Hospitals to Provide Internet +home Care Services

Table 2 shows the willingness of nurses at different levels of hospitals to provide Internet +home care services. More than 80% of the participants were willing to provide Internet +home care services. Statistical differences were found in the willingness to provide the Internet +home care services and the preference for service distance, service platform, and single service fee between nurses at different levels of hospitals (both  $P < 0.05$ ).

Regarding service contents (Table 3), the “health promotion service” exhibited the highest willingness rate, with 91.9% of participants willing to provide this service. Nevertheless, for “wound ostomy care”, the willingness rate was the lowest (69.3%). Statistical differences in the willingness to provide “catheter maintenance service” and “rehabilitation nursing service” were found between nurses at different levels of hospitals (both  $P < 0.05$ ). For “traditional Chinese medicine nursing”, “catheter maintenance”, “wound ostomy nursing”, and “rehabilitation nursing service”, nurses' willingness rate increased with the level of their hospital.

### Nurses' Demand for Internet +home Care Services at Different Levels of Hospitals and Influencing Factors

Table 4 presents nurses' demand for Internet +home care services in different levels of hospitals. The top three demands were “demand for protecting the privacy of patients and nursing staff” ( $4.46 \pm 0.967$ ), “demand for establishing a unified charging standard and incorporating it into medical insurance” ( $4.36 \pm 1.016$ ), and “demand for formulating relevant laws, regulations and emergency plans” ( $4.35 \pm 1.016$ ). Regarding various demands, the score exhibited by nurses in provincial/ministerial and municipal-level hospitals was higher than that reported by nurses in municipal and county-level hospitals, respectively. Statistical differences were found in some specific demands (ie, clarifying the management system of the Internet +home care platform, standardizing the Internet +home care process, ensuring the safety of Internet +home care staff, formulating relevant laws, regulations, and emergency plans, implementing the Internet +home care staff pre-job training and assessment, and establishing a unified charging standard and incorporate it into medical insurance), between nurses at different levels of hospitals (both  $P < 0.05$ ).

Regarding factors influencing nurses' overall demand for Internet +home care services, the univariate analysis showed that gender, age, marital status, professional title, working years, hospital level, educational level, family monthly income, and mortgage or car loan were potential influencing factors (both  $P < 0.05$ ). Multiple linear regression analysis showed that professional title, educational level, monthly family income, and mortgage or car loan were associated with nurses' demand for Internet +home care services, which explained 3.6% of the total variation (Table 5).

## Discussion

Our study found that most nurses (82.8%) were willing to provide Internet +home care services, which was similar to the result reported by Sheng.<sup>9</sup> The minority (17.2%) showed no interest, which may be explained by that the Internet +home care services have not been implemented nationwide yet; only some pilot work has been conducted in some cities.

**Table I** Demographics of the Participants (N=5714)

Category		Number	Percentage (%)
Gender	Male	190	3.3
	Female	5524	96.7
Age	20~30	2546	44.6
	30~40	2339	40.9
	40~50	829	14.5
Working years	5~10	3296	57.7
	11~20	1722	30.1
	≥20	696	12.2
Hospital level	County-level hospitals	1573	27.5
	Municipal-level hospitals	2180	38.2
	Provincial and ministerial-level hospitals	1961	34.3
Marriage	Married	3935	68.9
	Unmarried, divorced or widowed	1779	31.1
Job title	Nurse	1268	22.2
	Nurse practitioner	2235	39.1
	Nurse-in-charge	1887	33.0
	Associate professor of nursing	296	5.2
	Professor of nursing	28	0.5
Educational level	Junior college or below	2034	35.6
	Bachelor' s degree	3581	62.7
	Master' s degrees or above	99	1.7
Monthly family income	≤ 10,000 CNY	1725	30.2
	10,001~20,000 CNY	2893	50.6
	20,001~30,000 CNY	871	15.2
	30,001~40,000 CNY	146	2.6
	≥40,001 CNY	79	1.4
Mortgage or car loan	Yes	4126	72.2
	No	1588	27.8

**Abbreviation:** CNY, Chinese Yuan.

Therefore, some nurses may have little knowledge of Internet +home care services, especially if relevant publicity and promotion work have not been performed in their hospitals. It is recommended that local health departments follow the national policies closely and strengthen the publicity on Internet +home care services. Our research showed that nurses in provincial and ministerial-level hospitals are most willing to provide Internet +home care services. One possible reason is that these hospitals usually serve more patients and face the challenge of a shortage of inpatient beds; they may explore new models to alleviate the pressure of insufficient supply and demand and promote this new model more actively.

**Table 2** Willingness of Nurses at Different Levels of Hospitals to Internet +home Care Services Mode (n[%])

Variables	Classifications of Variables	County-Level Hospital Nurses (N=1573)	Municipal-Level Hospital Nurses (N=2180)	Provincial and Ministerial-Level Hospital Nurses (N=1961)	$\chi^2$	P
Willing to provide	Willing	1279(81.3)	1794(82.3)	1658(84.5)	7.056	0.029
	Unwilling	294(18.7)	386(17.7)	303(15.5)		
Service distance	Distance from departure point <5km	687(43.7)	1000(45.9)	933(47.6)	41.723	<0.001
	Distance from departure point 5~10km	341(21.7)	581(26.7)	527(26.9)		
	Distance from departure point >10km	545(34.6)	599(27.5)	501(25.5)		
Service platform	A platform independently developed by the hospital	478(30.4)	498(22.8)	413(21.1)	118.070	<0.001
	Government unified application platform	750(47.7)	905(41.5)	819(41.8)		
	Hospital collaborates with third-party information technology platform	345(21.9)	777(35.6)	729(37.2)		
Service time period	8:00–18:00	1121(71.3)	1556(71.4)	1392(71.0)	1.153	0.886
	18:00–20:00	319(20.3)	438(20.1)	414(21.1)		
	Others	133(8.5)	186(8.5)	155(7.9)		
Number of service	One week<5	1221(77.6)	1761(80.8)	1538(78.4)	8.727	0.068
	One week 5–10	207(13.2)	256(11.7)	271(13.8)		
	One week>10	145(9.2)	163(7.5)	152(7.8)		
Service times	<2hours	1278(81.2)	1781(81.7)	1631(83.2)	2.550	0.279
	>2hours	295(18.8)	399(18.3)	330(16.8)		
Service fee	≤100 CNY	178(11.3)	145(6.7)	117(6.0)	77.685	<0.001
	101–200 CNY	766(48.7)	1019(46.7)	827(42.2)		
	201–300 CNY	449(28.5)	673(30.9)	678(34.6)		
	>300 CNY	180(11.4)	343(15.7)	339(17.3)		

**Abbreviations:** N, number; CNY, Chinese Yuan.

Besides, hospitals' nursing resources and personnel reserves vary with the hospital levels, nurses in provincial and ministerial hospitals are mostly bachelor's degrees or above. Cho found that the education level of nurses ensures high-quality patient care.<sup>12</sup> Nurses with a higher education level tend to have a more vital professional ability and confidence in providing Internet +home care services.

According to the results of this study, nurses preferred the service time from 8:00 am to 6:00 pm, a single service duration less than 2 hours, the service distance within 5km, and a unified application platform developed by the government. According to Chinese policies, nurses who provide Internet +home care services should have more than

**Table 3** Willingness of Nurses at Different Levels of Hospitals to Internet +home Care Services Contents (n[%])

Classifications of Variables		Total Willingness	County-Level (N=1573)	Municipal-Level Hospital Nurses (N=2180)	Provincial and Ministerial-Level Hospital Nurses (N=1961)	$\chi^2$	P
Basic nursing	Willing	4872(85.3)	1360(86.5)	1837(84.3)	1675(85.4)	3.552	0.169
	Unwilling		213(13.5)	343(15.7)	286(14.6)		
Maternal-infant nursing	Willing	4477(78.4)	1244(79.1)	1703(78.1)	1530(78.0)	0.694	0.707
	Unwilling		329(20.9)	477(21.9)	431(22.0)		
Traditional chinese medicine nursing	Willing	4475(78.3)	1223(77.7)	1742(79.9)	1587(80.9)	5.573	0.062
	Unwilling		350(22.3)	438(20.1)	374(19.1)		
Catheter maintenance	Willing	4773(83.5)	1228(78.1)	1841(84.4)	1704(86.9)	51.598	<0.001
	Unwilling		345(21.9)	339(15.6)	257(13.1)		
Wound ostomy nursing	Willing	3962(69.3)	1073(68.2)	1489(68.3)	1400(71.4)	5.926	0.052
	Unwilling		500(31.8)	691(31.7)	561(28.6)		
Basic treatment	Willing	5102(89.3)	1421(90.3)	1938(88.9)	1743(88.9)	2.490	0.288
	Unwilling		152(9.7)	242(11.1)	218(11.1)		
Specimen collection	Willing	4751(83.1)	1279(81.3)	1785(81.9)	1598(81.5)	0.218	0.897
	Unwilling		294(18.7)	395(18.1)	363(18.5)		
Chronic disease management	Willing	4946(86.6)	1368(87.0)	1879(86.2)	1699(86.6)	0.488	0.783
	Unwilling		205(13.0)	301(13.8)	262(13.4)		
Rehabilitation nursing	Willing	4887(85.5)	1292(82.1)	1883(86.4)	1712(87.3)	20.875	<0.001
	Unwilling		281(17.9)	297(13.6)	249(12.7)		
Health promotion	Willing	5254(91.9)	1450(92.2)	2010(92.2)	1794(91.5)	0.875	0.646
	Unwilling		123(7.8)	170(7.8)	167(8.5)		

**Abbreviation:** N, number.

five years of clinical nursing experience or have a title of “senior nurse” or above. These nurses usually have heavy daily work, they tend to consider the service period, single service duration, and service distance when providing Internet +home care services. Daytime, short-term and small service radius can better ensure the safety of nurses.<sup>13</sup> A standardized platform can protect the privacy of nurses and patients. It is recommended that government standardize the Internet +home care platform and take measures to ensure nurses’ safety.<sup>14</sup> It is also suggested that the operation managers set the service time from 8:00 am to 6:00 pm, the single service duration less than 2 hours, and the service distance within 5km. Our study also found that nurses’ most preferred service times and fees were less than five times a week and 101 to 200 CNY per service. At the same time, it is recommended that government departments establish an Internet Nursing Alliance while dispatching orders according to patients’ needs and home addresses to control the service distance and service time. The development of the Internet +home care services may help improve the flexibility and autonomy of nurses’ work, thereby promoting the development of nurses’ multi-point practice. The hospitals are

**Table 4** Demand of Nurses at Different Levels of Hospitals for Internet +home Care Services ( $\bar{x} \pm s$ )

Classifications of Variables	County-Level (N=1573)	Municipal-Level (N=2180)	Provincial and Ministerial-Level (N=1961)	Total	Welch t	P
Demand for clarifying the management system of the Internet +home care platform	3.68±1.095	3.80±1.090	4.00±1.092	3.83±1.099	39.101	<0.001
Demand for standardizing the Internet +home care process	3.78±1.112	3.91±1.098	4.10±1.092	3.94±1.107	37.931	<0.001
Demand for ensuring the safety of Internet +home care staff	4.15±1.097	4.25±1.056	4.35±1.027	4.26±1.060	14.994	<0.001
Demand for formulating relevant laws, regulations, and emergency plans	4.26±1.042	4.34±1.012	4.43±0.992	4.35±1.016	11.712	<0.001
Demand for implementing the Internet +home care staff pre-job training and assessment	4.25±1.037	4.27±1.034	4.37±0.995	4.30±1.023	7.565	0.001*
Demand for protecting the privacy of patients and nursing staff	4.42±0.998	4.46±0.964	4.49±0.944	4.46±0.967	2.491	0.083
Demand for establishing a unified charging standard and incorporating it into medical insurance	4.29±1.042	4.34±1.026	4.43±0.979	4.36±1.016	8.381	<0.001

Note: \*P<0.01.

Abbreviation: N, number.

**Table 5** Multiple Linear Regression of Nurses' Demand for Internet +home Care Services

Independent Variable	$\beta$	SE	$\beta'$	t	P
(Constant)	24.673	0.844		29.241	<0.001
Professional title	0.897	0.132	0.119	6.823	<0.001
Educational level	0.413	0.128	0.040	3.234	0.001*
Monthly family income	0.775	0.093	0.098	8.312	<0.001
Mortgage or car loan	-0.453	0.154	-0.032	-2.946	0.003*

Note: \*P<0.01.

Abbreviations:  $\beta$ , Beta coefficients; SE, standard error;  $\beta'$ , Standardized Beta coefficients.

recommended to set the number of nurses' services to be less than five times a week and the service fee to be 101 to 200 CNY per service.

Our research found the most and most minor willing services nurses were willing to provide: "health promotion service" and "wound ostomy nursing service". Nurses' unwillingness to provide wound ostomy nursing maybe because it is highly specialized and has high technical requirements, only nurses with a professional certificate can take orders. Specialized nurses are encouraged to provide Internet +home care services. Besides, the training of specialized nursing operations needs to be strengthened to make nurses serve patients better. With the aging population and the opening of the two-child policy, Chinese residents have an increasing demand for health care and health promotion.<sup>15</sup> Chinese nurses take responsibility for patient care and undertake health promotion work, such as resident medical consultation, maternal-infant care, and health education for the elderly. Nurses provide health promotion services and improve the awareness of health management of people at home, promoting early detection,



early diagnosis, and early treatment of chronic diseases and infectious diseases. Our study showed that nurses at all levels of hospitals were highly willing to provide basic nursing, maternal-infant nursing, basic treatment, specimen collection, and chronic disease management service. The possible reason is that these are everyday clinical nursing operations with a low difficulty coefficient. Nurses have many operation opportunities in their daily work and have a high degree of mastery.

The research showed that the higher the hospital level nurses work, the higher their willingness to serve traditional Chinese medicine nursing, catheter maintenance, wound ostomy nursing, and rehabilitation nursing. The reason may be that hospitals with a higher level tend to have a higher allocation of resources, such as a high-quality nursing workforce with a strong nursing ability to deal with complex situations in-home nursing.<sup>12</sup> Besides, our previous study found that hospitals with a higher level usually provide more professional nursing skills training so that nurses' professional operation skills and confidence in specialized nursing operations can be improved.<sup>16</sup> It is recommended that government unify the Internet +home care service platform and rationally allocate service contents according to the willingness of nurses at different levels of hospitals to optimize the allocation of medical and nursing resources. At the same time, hospitals and nursing colleges should strengthen home-based nursing operation skills training and enhance operation ability.<sup>17</sup>

Our study found nurses' top three demands for Internet +home care services: "demand for protecting the privacy of patients and nursing staff", "demand for establishing a unified charging standard and incorporating it into medical insurance", and "demand for formulating relevant laws, regulations and emergency plans". China is gradually entering the information era, and information leakage is a severe problem. The big health data of Internet +home care services is vast and contains much private and medical information of nurses and patients, and medical staff must protect patients' privacy. Knowledge about privacy protection should be added to Internet +home care nurse training.<sup>18</sup> Hong's research indicates that patient satisfaction can be improved by effectively providing and pricing services in online healthcare services.<sup>19</sup> National policy orientation is that Internet +home care charges are priced independently. It is recommended that management departments formulate unified charging standards or use the market bargaining mechanism to establish a price and related payment guarantee mechanism to protect the rights and interests of nursing staff and patients and avoid disputes between nurses and patients.<sup>20</sup> It is suggested to establish and improve a medical insurance system with basic medical insurance as the main body, other forms of medical insurance, and commercial insurance as supplements to promote the Internet +home care services in a planned and step-by-step manner.<sup>20</sup> There are safety and workplace violence problems in home visiting nurses,<sup>21</sup> nursing management department should purchase insurance for nurses. Moreover, a One-Button Emergency Phone with GPS Tracker should be supplied to nurses to call for help when they are in danger.<sup>22</sup> It is suggested that relevant departments in China learn about the mature home care experience abroad and explore laws, regulations, and rules-based on China's actual situation to guide Internet +home care services legalization development.

The higher the nurses' hospital level, the higher the nurses' demand for Internet +home care services. Reasons may be related to the following aspects: First, provincial and ministerial-level hospitals actively respond to national medical policies, and medical care develops rapidly, which leads to higher awareness of safety and standardized management of nurses and higher demand for Internet +home care services.<sup>23</sup> Second, China's high-quality nursing resources are mainly concentrated in provincial and ministerial-level hospitals, which have a large proportion of nurses with high professional titles and degrees.<sup>12</sup> These nurses have strong acceptance and learning ability for emerging things and have a high demand for Internet +home care services. Third, the higher the hospital level, the higher the willingness of the nurses to provide Internet +home care services, the higher the expectation for the nationwide promotion of Internet +home care services, and the higher demand for the improvement of Internet +home care services.

Our study found that nurses' professional title, educational level, monthly family income, and mortgage or car loan affect nurses' demand for Internet +home care services. Previous studies also found that nurses with high professional titles and educational degrees have a higher demand for Internet +home care services.<sup>9</sup> These nurses can think systematically and innovatively and propose countermeasures from the commanding heights of nursing reform,<sup>24</sup> thus, they have a high demand for Internet +home care services. It is recommended that relevant departments prioritize the development of nurses with high education and high professional title to provide Internet +home care services, then

observe the results and take some action to promote the development of Internet +home care services. To avoid the loss of high-quality resources, hospitals usually increase the salary of nurses with higher education and professional title. Such nurses have higher monthly income and higher demand for Internet +home care services. Our study found that nurses with a mortgage or car loan have a higher demand for Internet +home care services. With the economic and social development and national two-child policy, the cost of housing, car loans, and raising children brings pressure on many nurses.<sup>25</sup> These nurses are willing to obtain additional income to relieve economic pressure, so there is a high demand for Internet +home care services. It is recommended that managers standardize the performance evaluation system of Internet +home care, assign orders reasonably, improve nurses' remuneration, and positively promote the development of Internet +home care services.

## Limitations

The limitations of this study cannot be ignored. This survey was conducted online. As a result, we could not observe whether participants took the survey seriously. However, we took some measures to ensure the authenticity of the data, such as strict inclusion and exclusion criteria. Besides, the self-designed questionnaire did not consider nurses' experience and dependability of internet services, we can make some improvements in further studies. Additionally, we only explored nurses' perspectives, and no data were collected from clients and their family members. Future exploration focusing on clients' and families' perceptions and the actual effectiveness of the program are necessary.

## Conclusion and Future Recommendations

Our study showed differences in the willingness and demand for Internet +home care services of nurses at different levels of hospitals. Based on the present study's findings, we recommended: (a) County and municipal government and hospitals vigorously publicize Internet +home care services. (b) Formulating a reasonable order dispatch system, limiting the single service fee to 101–200 CNY, regulating service distance within 5km, setting service duration less than 2 hours, and establishing other contents based on nurses' willingness and preference. (c) Hospitals should comprehensively consider the number of specialized nurses, adjust the Internet +home care contents, and increase specialized nursing training to expand specialized nurse reserve. (d) Regulating laws, regulations, and management systems, establishing a unified quality supervision system for Internet +home care services. (e) Improving nurses' working environment, remuneration, and workload stimulates nurses' enthusiasm to provide Internet +home care services.

This study is the first to analyze the differences in the willingness and demand for Internet +home care services among nurses at different levels of hospitals, which may provide ideas for further research on the formulation of Internet +home care services in a certain level of hospitals. The questionnaire designed in this study may provide a reference for further research on patients' and caregivers' willingness and demand for Internet +home care. Besides, this study's Internet +home care services contents may provide ideas for formulating related courses and training.

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## Disclosure

The authors report no conflicts of interest in this work.

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