ORIGINAL RESEARCH

Internet + Nursing Service Perception Among Nursing Staff: A Cross-Sectional Study at Guizhou Province, China

Yuan Li[1], Lu Li ⓘ[1,2], Renli Deng[1]

[1]Nursing Department, Affiliated Hospital of Zunyi Medical University, Zunyi, Guizhou, People's Republic of China; [2]School of Nursing, Zunyi Medical University, Zunyi, Guizhou, People's Republic of China

Correspondence: Renli Deng, Nursing Department, Affiliated Hospital of Zunyi Medical University, 149 Dalian Road, Huichuan District, Zunyi, Guizhou, 563003, People's Republic of China, Email 690891192@qq.com

Aim: The purpose of this study was to investigate the current situation of the "Internet + nursing service" in Guizhou Province, China, from the perspective of service providers, and to analyze its influencing factors to provide references for further promoting the implementation of related services in the province.

Methods: In this study, a questionnaire survey was conducted among nurses from 55 hospitals in Guizhou Province, China, through convenience sampling from September to December 2023.

Results: The findings showed that 85.45% of the hospitals had not yet carried out the "Internet + nursing service", 97.87% of the nursing staff expressed their willingness to participate in the service, but only 14.55% of the nursing staff actually participated in the service at their hospital. The participation rate of specialist nurses was just 50.00%. The findings also revealed the main issues of current concern, which included the support of relevant policy documents, the security risks of on-site services, and the pricing standards of service projects.

Conclusion: Research data indicate that while most hospitals have not implemented the service, there is a high willingness among nursing staff to participate, yet the actual participation rate is low. The participation rate of specialized nurses is also low, and there are issues related to policy support, safety risks, and pricing standards. It is recommended that Guizhou Province strengthen policy guidance to promote the implementation of "Internet + nursing services". Hospitals at all levels should focus on the training of specialized nursing talents, enhance service promotion, deepen personnel awareness, and optimize the home service system to meet patients' nursing needs.

Keywords: internet + nursing service, current situation, influencing factors

Introduction

The "Internet + nursing service"[1] refers to nursing services for specific groups of discharged patients that require off-site medical care. These services are provided by registered nurses from medical institutions who use information technology such as the Internet based on the "online application and offline service" model to deliver care.

In 2019, the National Health Commission issued a notice and accompanying pilot work plan for the "Internet + nursing service".[2] Six provinces and cities, including Beijing, conducted pilot programs, and provinces and cities across the country gradually promoted the "Internet + nursing service". Research data indicate[3–9] that the pilot work plan has achieved initial results, including the establishment of service processes and quality management systems in some provinces.[10] However, such studies have mostly conducted surveys or interviews from the patient's perspective, lacking research on nursing staff to understand their needs. Nonetheless, various issues, such as differences in service quality and charging standards, have hindered the healthy development of the "Internet + nursing service" model to a certain extent.

Guizhou Province is located in western China, where the level of medical care is relatively behind that of coastal cities.[11] The "Internet + nursing service" in Guizhou Province started late and has developed slowly. Therefore, the

purpose of this study was to investigate and analyze the current situation of the "Internet + nursing service" in this province from the perspective of nursing staffs to explore the necessary conditions for and possible obstacles to promoting the service, the findings of which will provide references and a basis for its further development.

Materials and Methods

Sampling and Recruitment

From September to December 2023, 73 nurses from 55 hospitals at all levels in Guizhou Province were selected through convenience sampling to participate in a questionnaire survey.

The inclusion criteria of the nursing staff were as follows: (1) had a nursing qualification certificate; (2) had engaged in nursing clinical work and nursing management for five years or more; and (3) had worked at the hospital during the investigation. The exclusion criteria included the following: (1) those who could not participate in the survey due to resignation, vacation, or involved in further study; (2) advanced learners in nursing; and (3) standardized training and/or practice nurses.

It is important to note that no formal sample size estimation was conducted for this study. However, strict inclusion and exclusion criteria were applied to the study participants.

Guizhou Province "Internet + Nursing Service" Implementation Survey Questionnaire

The questionnaire used in this study was jointly designed by members of the research team, specialized nurses in infusion therapy, and "Internet +" engineering technicians. After reviewing relevant literature on "Internet + nursing services", the researchers compiled an online questionnaire. The "Guizhou Province 'Internet + Nursing Service' Questionnaire" consists of 23 items, including general information (7 items), the development status of "Internet + nursing services" in hospitals in Guizhou Province (14 items), and views on the development of "Internet + nursing services" in hospitals in Guizhou Province (2 items), as detailed in Supplementary Material 1. This questionnaire was distributed to nursing staff in 55 hospitals.

This self-designed questionnaire was developed using the online platform Questionnaire Star (www.wjx.cn), which is functionally equivalent to Amazon Mechanical Turk. Study participants completed the questionnaire through the Chinese social media platform WeChat. A fully completed questionnaire was considered valid. All questionnaire responses were kept confidential. This study was conducted in accordance with the principles of the Declaration of Helsinki and received approval from the Ethics Committee of Zunyi Medical University Affiliated Hospital (KLL-2022-836).

Research Methods

In this study, the Questionnaire was used to summarize the purpose of the study and to provide the definition of the "Internet + nursing service" in the introduction section of the questionnaire. To ensure the integrity of the data, questionnaires that took less than 30 seconds to fill out and those with contradictory answers or incomplete information were excluded. Of the questionnaires disseminated, 55 were valid and included in the analysis. SPSS 29.0 software was used for statistical analysis. The count data were analyzed by descriptive statistical analysis and were reported in frequency and percentage. In the process of data analysis, the identifiers H1 ~ H55 were used in place of the hospital names.

Results

General Information

Among the surveyed nursing staffs, most were female, between the ages of 35 and 54, supervisor nurses, and head/deputy head of their nursing department. See Table 1 for details.

Development of the "Internet + Nursing Service" in Guizhou Provincial Hospitals

Among the 55 hospitals investigated in this study, 27 were tertiary hospitals and 28 were secondary hospitals. Most of the hospitals had not yet carried out the "Internet + nursing service", but most of the nursing staff expressed their willingness to participate in the service. Of the 14.55% of the nursing staff who had participated in the "Internet + nursing service" in their hospital, the number of specialist nurses accounted for 50.00%. See Table 2 for details.

Table 1 General Information of the Nursing Staff (N = 55)

Items	Responses	Number of Respondents	Constituent Ratio (%)
Gender	Male	3	5.45
	Female	52	94.55
Age (years)	18–24	2	3.64
	25–34	6	10.91
	35–44	30	54.55
	45–54	14	25.45
	> 54	3	5.45
Professional Title	Nurse	1	1.82
	Nurse Practitioner	2	3.64
	Nurse-in-Charge	22	40.00
	Associate Professor of Nursing	18	32.73
	Professor of Nursing	12	21.82
Duty	Head nurse in the ward	16	29.09
	District head nurse	3	5.45
	Functional department chief or deputy chief of nursing	1	1.82
	Director or deputy director of the nursing department	28	50.91
	President/Vice President of the hospital	1	1.82
	No position	6	10.91
Hospital Grade	Tertiary Grade A Hospital	10	18.18
	Tertiary Grade B Hospital	6	10.91
	Tertiary General Hospital	11	20.00
	Secondary Grade A Hospital	27	49.09
	Secondary Grade B Hospital	1	1.82

Table 2 Nurses' Understanding of the "Internet + Nursing Service"

Items	Responses	Number of Respondents	Constituent Ratio (%)
Hospital's participation in the "Internet + nursing service"	Has been carried out	47	85.45
	Has not been carried out yet	8	14.55
Willingness to participate in the "Internet + nursing service"	Willing	46	97.87
	Unwilling	1	2.13
Reasons for unwilling to participate in the "Internet + nursing service"	Unwilling to undertake extra out-of-hospital work	0	0.00
	Burden of family care is heavy/ no extra time	0	0.00
	Unsatisfied with the benefits of providing the service	0	0.00
	Other reasons	1	100.00
Personal participation in the "Internet + nursing service"	Yes	8	14.55
	No	47	85.45
Are you a specialist nurse?	No	4	50.00
	Yes	4	50.00

Discussion

Current Situation of the "Internet + Nursing Service" in Guizhou Province and Its Development in Provincial Hospitals

The development of the "Internet + nursing service" in Guizhou Province has yet to be promoted. The survey results showed that the service development rate in the 55 hospitals that participated was less than 20.00%, and most of those that were in the process of developing the service were tertiary hospitals. Low-level and county-level hospitals had a nursing staff participation rate of 14.55%. However, many hospitals had carried out initial planning, and some hospitals had already selected partners for the "Internet + nursing service" platform to promote the construction of their service projects.

Of the hospitals that had begun to carry out the "Internet + nursing service", the overall service project categories were relatively concentrated in special groups, such as maternal and infant patients and discharged patients, and the services lacked comprehensive and diversified nursing content. The service items with a large demand for online consultation included maternal and child healthcare guidance, diabetes healthcare guidance, and chronic respiratory disease healthcare guidance; for example, H24 solved the problem of wound swelling and neonatal care for puerperal women. Various types of pipeline care (eg, gastric tubes, urinary catheter replacement, tracheotomy care, etc.) and wound stoma care were items with more orders under offline services. The target population was mostly discharged patients with tubes. For instance, H22 carried out on-site nursing services, while the wound stoma specialist nurse in the hospital implemented sacrococcygeal wound care for an elderly man who was paralyzed and restricted to his bed due to stroke and offered professional care for one month to achieve basic healing. Some hospitals, including H30 and H41, set up online medical procedures such as "Internet + hospital" and "palm hospital", aiming to provide more convenient medical care services for the majority of the population. However, due to factors such as region, grade, and qualifications of the nursing staff, various hospitals had different charging standards for the same service.

Nurses' Willingness to Participate in the "Internet + Nursing Service"

This study found that some hospitals did not pay enough attention to establishing the "Internet + nursing service", which led to inconsistent knowledge of its development among the nursing staff. According to the survey results, 85.45% of the hospitals had not yet carried out the "Internet + nursing service", but 97.87% of the nursing staff expressed their willingness to participate in the service, which was consistent with the research results of Gao Xiuhua.[12] The online and offline nursing modes of the "Internet + nursing service" have changed the nursing environment by increasing the flexibility of nursing work,[13] introducing new work experiences to the nursing staff, increasing personal economic benefits, and improving professional accomplishments.[14,15] At the same time, the "Internet + nursing service" also requires a higher professional level.

Homecare safety hazards and the division of responsibility were the main concerns of the nursing staff. Of those willing to participate, they were mostly between 35 and 44 years old. This age group had rich clinical nursing experience, was more sensitive to nursing risks and patient emergencies, more accurately and quickly identified emergencies, and calmly responded to ensure the personal safety of patients.[16] Younger nurses were less willing to participate in the "Internet + nursing service", fearing that their lack of nursing experience would lead to adverse nursing events. Although the current survey found that the nursing staff had a higher emotional willingness to participate in the "Internet + nursing service", their actual behavioral willingness requires further research.[17] It is worth mentioning that according to the research data, the coverage rate of specialist nurses was only 50.00% of the total number of nurses who had participated in the "Internet + nursing service", indicating that specialist nurses in the province were relatively scarce,[18] making it difficult to meet the needs of a wide range of patients.

Analysis of the Strategy of the "Internet + Nursing Service" in Guizhou Province

Strengthen Policy Guidance and Promote the Development of the "Internet + Nursing Service" as a Whole

Guizhou Province should introduce a more detailed "Internet + nursing service" as soon as possible to carry out a series of related policies, establish a unified, homogeneous, and standardized service process for medical institutions at all

levels in the province, and clarify relevant charging standards,[19] which will help to establish trust in service providers in this new nursing service model. The province should also establish relevant service development rules and regulations to standardize the operational mechanism of the "Internet + nursing service", as well as ensure the safety of on-site nursing services and the homogeneity of service quality. The establishment of a special fund would provide financial support to promote the implementation of the "Internet + nursing service", which would be used for technology research and development, equipment procurement, and personnel training to ensure its smooth development. It is also suggested that cooperation between various medical institutions, nursing associations, and relevant departments be fully coordinated to accelerate the development of the "Internet + nursing service". On the basis of strengthening county medical facilities and networking equipment, the province should take the lead in carrying out the "Internet + nursing service" for better development. The government's multiple initiatives, such as policy support, funding, regulations, and coordination and cooperation, would provide a strong guarantee for the implementation of the "Internet + nursing service".

All Medical Institutions Should Respond Positively and Embrace the Practice of the "Internet + Nursing Service"

Under the guidance of the "Internet + nursing service" policy, hospitals and medical institutions at all levels should respond positively, strictly abide by relevant policies and regulations, and implement policy measures. Hospitals should also strengthen the construction of the Internet network infrastructure, increase investment in network facilities, information systems, and data storage, provide better information tools and platforms, and improve the efficiency of nursing work. It is also suggested that hospital management focus on formulating a nursing talent training plan,[20] carry out the construction of specialist nurse talent teams, increase the nursing staff resources reserve, establish a quality management system led by a multidisciplinary cooperation team and specialist nursing team,[21] and gradually improve the service operation process. In addition, hospitals should develop an "Internet + nursing service" pre-job theory and unified assessment and certification, as well as provide training on skills operation, professional quality, early warning risks, and emergency treatment,[22] which will improve the nursing staffs' post-competency, professional level, and service abilities to meet the needs of off-site patients through the "Internet + nursing service". Moreover, hospitals should provide appropriate financial support through various incentives, such as performance and subsidies,[23] to stimulate nursing staffs' enthusiasm and effectively promote the development of the industry. At the same time, it is suggested that the quality assessment and supervision of on-site nurses be enhanced by regularly collecting feedback on the service's effects and improving and optimizing service processes to ensure nursing staffs' on-site service ability and service quality. Finally, hospitals should enrich the content of the "Internet + nursing service" project, add service categories, refine service content, improve service quality, and improve service satisfaction.

Expand Publicity and Learning Efforts to Enhance the Influence of the "Internet + Nursing Service"

This study found that there were differences in the experience of nursing staffs regarding the "Internet + nursing service". Therefore, it is necessary to strengthen publicity work and deepen the knowledge level of nursing staffs regarding specialty services. It is also suggested that government departments cooperate with hospitals at all levels and relevant organizational departments to actively promote the "Internet + nursing service" through diversified channels, such as official channels and media, regularly issuing news releases, holding special interviews, giving expert lectures, and making promotional videos. Hospitals should regularly learn and promote relevant policy information on the "Internet + nursing service" and publicize its functions and advantages to enhance the willingness of their nursing staff and more service providers to participate in the service. Hospitals should also regularly evaluate the learning effects of the "Internet + nursing service" on the nursing staff, and then adjust and optimize training strategies to meet nurses' understanding of the service at a professional level. It is also suggested that professional service awareness and feedback regarding the development of the "Internet + nursing service" be cultivated to improve its quality.

Limitations and Implications

This study has some limitations. As the focus of this research is on nurses in hospitals in Guizhou Province and the sample size is relatively small, the sample may not be representative of other regions. Future research should attempt to

explore the diverse needs of a larger sample of nurses regarding personal subsidies, group collaboration, education, and training in the implementation of services.

Conclusion

Our research found that nearly 85% of hospitals in Guizhou Province have not implemented "Internet + nursing services", with a participation rate of 14.55% among nursing staff in lower-level and county-level hospitals, and varying levels of understanding of service positioning among nursing personnel. The "Internet + nursing service" in Guizhou Province is still in its infancy, facing many obstacles to implementation, such as a lack of relevant policies, imperfect infrastructure, and a shortage of nursing professionals. To accelerate the development of "Internet + nursing services" in the province, hospitals should learn from the successful experiences and favorable policy conditions of pilot provinces in China regarding this service. The government should focus on promoting policy guidance, coordinate the allocation of medical and nursing resources, increase financial support to improve infrastructure and network platform construction, train and retain nursing professionals, mobilize their enthusiasm, and address the shortage of nurses. The provincial capital and its well-developed prefecture-level hospitals should take the lead in implementing "Internet + nursing services". Hospitals in Guizhou Province must ensure the stable and high-speed operation of "Internet + nursing services" to provide high-quality home care services for those with health needs and to accelerate the development of nursing health and health undertakings in the province, thereby elevating the overall level of hospitals and nursing staff.

Data Sharing Statement

The data in our study are available for academic use. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Statement

This study was conducted in accordance with the principles of the Declaration of Helsinki and received approval from the Ethics Committee of Zunyi Medical University Affiliated Hospital (KLL-2022-836). All study participants provided informed consent, and their information was kept confidential throughout the research process.

Acknowledgments

First, we would like to thank the Affiliated Hospital of Zunyi Medical University for the approval and support of this study. Second, we thank the nursing colleagues in the 55 selected hospitals for their support and help in the data collection process, and thank the nurses who participated in the survey for their valuable time. Finally, we are pleased to thank all the research members for their contributions to the improvement of this study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

Disclosure

The authors have no conflicts of interest to declare that are relevant to the content of this article. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

References

1. Xiang M, Feng X, Chen J, et al. Survey of nursing service in pilot medical institutions of "Internet + nursing service" in Guangdong Province. *J Nurs*. 2023;38(3):54–58.
2. General Office of the National Health Commission of the People's Republic of China. Notice on launching the pilot work of "Internet + nursing service". 2019.
3. Yu B, Hong M. Construction and practice of the "Internet + nursing service" model with the hospital as the main body. *J Chin Med Manag*. 2021;29 (20):216–218.
4. Li Q, Hu M, Xu P, et al. Qualitative research on the experience of "Internet + nursing service" by family members of patients. *Shanghai Med*. 2022;43(12):18–21.
5. Jin X, Qin X, Xu X, et al. Construction and practice of regionalized 1 + X + n Internet plus nursing service system dominated by county hospitals. *Modern Med*. 2023;51(S1):46–49.
6. Zhang N, Li S, Xu Z. "Internet plus nursing" demand survey—taking Tianjin as an example. *Heilongjiang Sci*. 2023;14(23):40–43.
7. Tian H, Gu X, Hu L, et al. Application status of "Internet + nursing service" model in chronic disease management. *Nurs Pract Res*. 2023;20 (15):2253–2258.
8. Zhao Y, Qian W, Zhao Q. A mixed study on nurses' practice safety and coping strategies under the background of "Internet + nursing service". *Nurs Refresher J*. 2023;38(07):607–611.
9. Ma G, Zhang J, Shi Z, et al. Investigation and analysis of the needs of disabled and semi-disabled elderly families for "Internet + nursing service. *China Nurs Manag*. 2022;22(03):386–390.
10. Hu B, Yang D. Practice and discussion of "Internet + nursing service" in Zhejiang. *Nurs Rehabilitation*. 2021;20(04):1–4.
11. Zuo X, Lu J. From poverty alleviation to common prosperity: research on the path of digital technology empowering poverty governance—an example of "big data assistance" in Guizhou Province. *Modern Econ Discuss*. 2023;(08):96–107,132.
12. Gao X, Tan H, Ye X, et al. Study on the willingness and influencing factors of online nurses to participate in "Internet + nursing service". *Guangdong Med*. 2023;44(01):112–117.
13. Liu J, Duan X, Wang Y, et al. Survey on the status and needs of job training for online nurses. *J Nurs*. 2022;37(11):92–94.
14. Gao Y, Zhao H, Li X, et al. Meta integration of qualitative research on the "Internet + nursing service" experience of nurses in China. *J Nurs*. 2022;37(11):87–91.
15. Fang T, Liu L, Chen J, et al. Nurses' service experience in the initial stage of "Internet + nursing service". *China Nurs Manag*. 2022;22 (08):1253–1257.
16. Tan W, Zhang R, Zhang L, et al. Construction of the objectives and contents of emergency response ability training for nurses in "Internet plus nursing service". *China J Nurs Educ*. 2023;20(10):1205–1211.
17. Zhao B, Wang W, Yi M, et al. Nurses' perceptions of engaging in internet-based nursing services: a qualitative study based on three hospitals in China. *Nurs Open*. 2023;10(10):6856–6865. doi:10.1002/nop2.1934
18. Tian F, Xi Z, Ai L, et al. Investigation on nurses' willingness to "Internet + nursing service" and analysis of influencing factors. *J Multidiscip Healthc*. 2023;16:251–260. doi:10.2147/JMDH.S396826
19. Jiang F, Fang Z, Li H. Construction and application of the "Internet + nursing service" model in tertiary general hospitals. *Chongqing Med*. 2023;52 (10):1593–1597.
20. Xu B, Zhang Y, Wu S, et al. Survey on the training needs of core knowledge and skills of "Internet + nursing service" for nurses in tertiary hospitals. *J Nurs*. 2020;35(12):90–93.
21. Hu L, Jin L, Chen Y, et al. The practice and effect of "Internet + nursing service" led by the specialist group. *J Nurs*. 2023;38(24):60–64.
22. Li M, Dong L, Zhao W, et al. Qualitative research on the restrictive factors of "Internet + nursing service" was carried out by stoma wound incontinence specialist nurses. *Shanghai Nurs*. 2024;24(01):16–20.
23. Wang M, Wu S. Qualitative research on nurses' participation in the needs of "Internet + nursing service". *Jiangsu Health Manage*. 2023;34 (11):1573–1576.