

## Research Article

# Construction and Reliability and Validity Test of Home Care Assessment Scale for Elderly Patients with Chronic Diseases Based on Intelligent Medical Care

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The integration of IT with the health field has been the usual, and the introduction of AI technology in the health field will be the current mainstream in the future. General search engines can only perform superficial keyword searches, making it difficult to meet in-depth medical needs. The aging of the population is intensifying, and medical resources are in short supply. The application of remote intelligent medical care is an inevitable move. The aging of the population will lead to a reduction in the labor force, and low-end industries will face the problem of transformation and upgrading. Corporate competition has intensified, and involution has become the norm. However, chronic diseases are not contagious, but the treatment cycle is long. The purpose of this paper is to study the construction and reliability and validity of the home care assessment scale for elderly patients with chronic diseases based on tele-intelligent medical care, so as to help more patients overcome the troubles of chronic diseases. The full name of chronic disease is chronic noncommunicable disease, which does not refer to a specific disease, but to a class of onset insidious, long course of disease and the disease does not heal. It lacks definitive evidence of an infectious biological etiology. A general term for diseases with complex etiologies and some not yet fully recognized diseases. By analyzing the application requirements of intelligent medical real-time monitoring, this paper expounds the transmission function of the system. The experimental data in this paper showed that there were 15 cases of poor nursing care caused by noncompliance with doctor's orders, accounting for 19%, indicating that patients had poor healthcare awareness and lacked necessary nursing knowledge.

## 1. Introduction

As living conditions rise, the mean annual life expectancy of people begins to increase. The demand for medical care has begun to grow, which has led to a shortage of medical resources in society. How to make the best resource configuration on the basis of limited medical resources is a pressing issue at the moment. In spite of the lack of available healthcare facilities, physician-patient conflicts can also be caused by poor advocacy mechanisms, or by patients' own mistakes. Chronic diseases are common in the elderly population, and the treatment cycle is long. The best way to do this right now is to take care of themselves at home to prevent the situation from getting worse. It combines remote intelligent medical care and chronic disease care, which can

give full play to the role of intelligent medical care and reduce the medical burden of patients.

The emergence of telesmart medical care has replaced the care of children. This can reduce the burden on young people to a certain extent. The integration of cases using smart healthcare delivery systems enables medical assistance functions for individual cases and enhances diagnostic productivity and effectiveness. It leverages new technologies to help improve the medical efficiency of chronic disease care. This has important implications for addressing chronic care issues in life and can ease the suffering of patients.

Telemedicine is a new thing emerging with the development of the Internet. The problems existing in the process of regulation and management and the regulatory countermeasures in this paper are innovative in the research

content. This article explores home nursing and provides a basis for building a comprehensive nursing safety and quality management system.

## 2. Related Work

“People” are the subject of the community, and society pays the highest level of concern to them. Büyükzkan and Ger proposed the Intelligent Medical Device Selection Process method. They focused on the selection of wearable monitoring devices for cardiac patients. Their goal was to demonstrate the complexity of the problem and to attract the attention of medical industry experts. Finally, the adequacy of the obtained results was demonstrated by sensitivity analysis [1]. For the composition of smarter hospital network, district sanitary network, and home sanitary network, Gull et al. proposed a self-embedding fragile watermarking scheme. This scheme divided the overlay image into 4×4 nonoverlapping blocks, and each block was permuted with chaotic cryptography. Experimental results showed that the method can accurately locate the tampered regions [2]. Ansah et al. presented the modeling effort. The perspective of program feedback can help identify systemic problems in chronic care delivery. This had the potential to inform system-wide interventions and policies to improve health status [3]. According to the progress of IT, the notion of Wisdom Health Care had risen progressively. Tian et al. listed the key technologies including the current state of smart healthcare and attempted to suggest ways to solve them. It is hard to achieve the perceived efficiency of smart healthcare in a quick manner [4]. Rano and Hashmi presented a compact interdigital electromagnetic bandgap element. By comparing the reflected wave response derived either from the electric path pattern or from the full-wave animation. The experimental results show that the simulated results exhibit consistency [5]. Roque et al. proposed an image-driven model. Experiments showed that market parameters can be reclaimed successfully and used to anticipate precisely the cancer outgrowth [6]. Ghoneim et al. suggested the picture forgery testing as a system. The system processed the noise-graph of an image and applied a multi-resolution regression filter on the noise-graph. It provided outcomes for classifiers based on support vector machines and extreme learning. In this manner, the system can work smoothly in realization time [7]. To reduce privacy risks, Rana and Mishra proposed an elegant and robust protection scheme. The agreement satisfies the healthcare user’s property set values [8]. With the rapid increase in the number of patients with chronic diseases, Talboom-Kamp et al. had proposed a person-centered nursing methodology. Incorporating electronic well-being support self-management into usual care can help COPD and OAT patients better manage their disease. Although e-health-supported self-management did not outperform the health status of usual care, the study reported no negative effects. This suggested that e-health was a secure alternative for providing both self-management support and top-quality condition treatment [9]. Cronin et al. mentioned the systematic review approach. He conducted a systemic retrospective on the economic evaluation of integrated care plans for chronic diseases. It showed that integrated care plans were potentially cost-effective, achieved larger benefits for health, and were less

expensive than usual care [10]. The use of information and communication technology (ICT) systems was presented by Wawrzyniak et al., who proposed a new constructive approach to systematically address the problems that arose in the management of information and communication technology. The experiments show a systematic approach to the functionality of the chronic care model [11]. Although these theories have introduced intelligent network medicine and chronic diseases to varying degrees, they lack comprehensiveness.

## 3. Intelligent Remote Care

Overview of Home Care for Chronic Diseases: Chronic diseases are diseases that accumulate over a long period of time and cause damage to the body. According to the data survey, the patients with chronic diseases are mostly the elderly. As older adults age, their bodily functions, including the immune system and cardiovascular system, decline. Under the stimulation of the external environment, they will inevitably develop chronic diseases. Chronic diseases are long-term and persistent. Once symptoms of chronic disease appear, they may not be cured for life. This will bring great trouble to daily life, and the impact on the elderly is even greater [12, 13]. On the one hand, the physical function of the elderly further declines. Moreover, the damage to the stomach and intestines caused by long-term medication is almost irreversible. The digestive system level of the elderly will be lower and lower, and it will inevitably have an impact on the diet. On the other hand, the elderly will pay attention to more information on health and wellness and even spend a lot of money in these places. The treatment cycle of chronic diseases is very long, and the treatment effect is not significant. Regarding the elderly and being prone to complications, those with chronic diseases need professional care. The definition of nursing was first proposed by the American Nursing Association. The association sees care as a response to a preexisting health problem. Nursing is a comprehensive discipline based on natural sciences and social sciences. It improves nursing management by exploring the theoretical knowledge of maintaining and restoring human health. According to the current national conditions, the aging population is large, medical resources are in short supply, and treatment costs are high. Most people are unable to receive treatment in the hospital for long periods of time. Many patients can only receive treatment and care at home [14]. Figure 1 is a schematic diagram of the home care structure.

*3.1. Intelligent Medical Image Processing.* With the continuous progress of economic life, the livelihood terms of people are increasingly favorable. People are living longer and longer, which leads to the problem of population aging [15]. While basic medical resources are being met, chronic disease care of the elderly has become a problem that cannot be ignored. However, the current medical resources cannot meet the current situation. In order to solve this problem, the intelligent medical system came into being. Regardless of

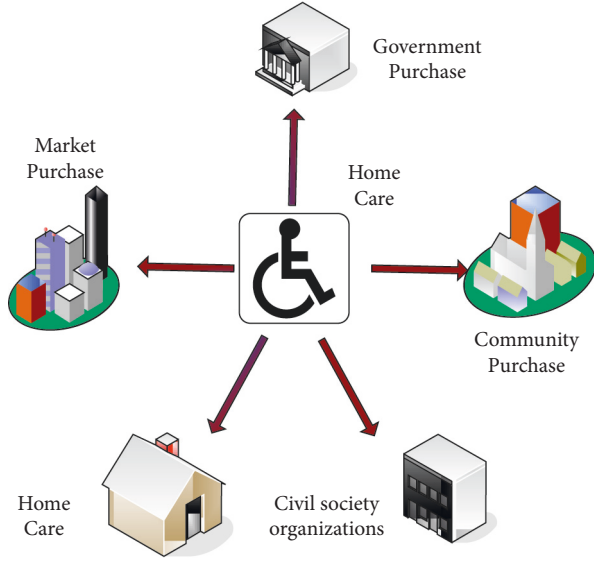


FIGURE 1: Structure of home care.

the principle, we need to analyze the images in order to process the relevant situation of the patient. Figure 2 shows the image tracking structure.

Entropy was initially applied to express the heat power density in thermodynamics, and in the last years it has made some progress in the area of medicine. We formulate its functional equivalent expression as follows:

$$W(a) = -u \sum_1^m j_i \ln(j_i). \quad (1)$$

When  $\sum_1^m j_i = 1$  and  $j_1 = j_2 = j_3 = \dots = j_m$ ,  $F$  takes the maximum value.

There is a great deal of variation in the grayscale content of the foreground and background colors. We present the grayscale value formulation as follows:

$$D_1(a) = -q \sum_{i=0}^{q-1} k_i \ln(k_i), \quad (2)$$

$$k(i) = \frac{g(i)}{\sum_{j=0}^{q-1} g(j)}.$$

$g(i)$  are the functions of greyscale level and  $q$  is a single and  $k(i)$  stands for the ash value ranging from 0 to 1. The part of the threshold  $q$  greater in value is denoted by the entitled entropy:

$$D_2(a) = -q \sum_{i=q}^{255} k_i \ln(k_i), \quad (3)$$

$$k(i) = \frac{g(i)}{\sum_{j=q}^{255} g(j)}.$$

$g(i)$  are the functions of greyscale level and  $q$  is a single and  $k(i)$  represents the ash value in the range  $q$ -255:

$$D(a) = D_1(a) + D_2(a). \quad (4)$$

When  $D(a)$  is the largest, the throat value  $a$  is the max entropy throat value:

$$Q_{ab} = \frac{s_{ab} - \bar{s}_b}{s_b} \quad (5)$$

$$\bar{s}_b = \frac{\sum_a^g s_{ab}}{g}, L_b^2 = \frac{\sum_a^g (s_{ab} - \bar{s}_b)^2}{g-2}. \quad (6)$$

Formula (6) is a function expression for data normalization.

$$E = (w_{ab})_g j k = \frac{m^d m}{g-2} \quad (7)$$

$$w_{ab} = \frac{\sum m_{db} m_{db}}{g-2}. \quad (8)$$

Once the composition of the substrate is defined, it can be obtained:

$$|W - \varphi f_h| = 0, \frac{\sum_b^g \varphi_b}{\sum_b^g \varphi_b} \geq 0.74. \quad (9)$$

It solves formula (9) and the amount of  $g$  that could be identified.

$$W_{gk} = m_a^F l_b^c, \quad (10)$$

where  $W$  represents the target component and  $V_g$  is the first  $g$  compositions.

$$U = ((s_1, k_1), (s_2, k_2), \dots, (s_l, k_l)), \quad (11)$$

where  $a$  stands for import area and  $k \in (-1, 1)$ .

$$k(s) = \text{sgn}(y(b)),$$

$$\text{conv}(D) = \left( a = \sum_k^s \alpha_k a_k \mid \sum_k^s \alpha_k = 2 \right). \quad (12)$$

There are  $a = 1$ ,  $\alpha_k \geq 0$ , and  $k = 2$ .

$$\text{conv}(d) = \left( a = \sum_k^s \alpha_k a_k \mid \sum_k^s \alpha_k = 2 \right). \quad (13)$$

There are  $a, b = -2$ ,  $\alpha_k \geq 0$ , and  $k = 1$ .

The gray value is calculated by using the pixel point to arrive at a weighted average price. It is defined as

$$y(a) = \frac{u}{\partial \sqrt{2\pi}} e^{-\frac{(a-\varepsilon)^2}{2\partial^2}}. \quad (14)$$

Among them, the expected value of the linear model is a mathematical model with a typical Gaussian distribution of  $\varepsilon$  and a typical model with a standard variation of  $\partial$ .

We often use the two-dimensional Gaussian distribution density distribution function of Gaussian blur.

$$H(a, b) = \frac{1}{2\pi\lambda^2} e^{-\frac{a^2+b^2}{2\lambda^2}}, \quad (15)$$

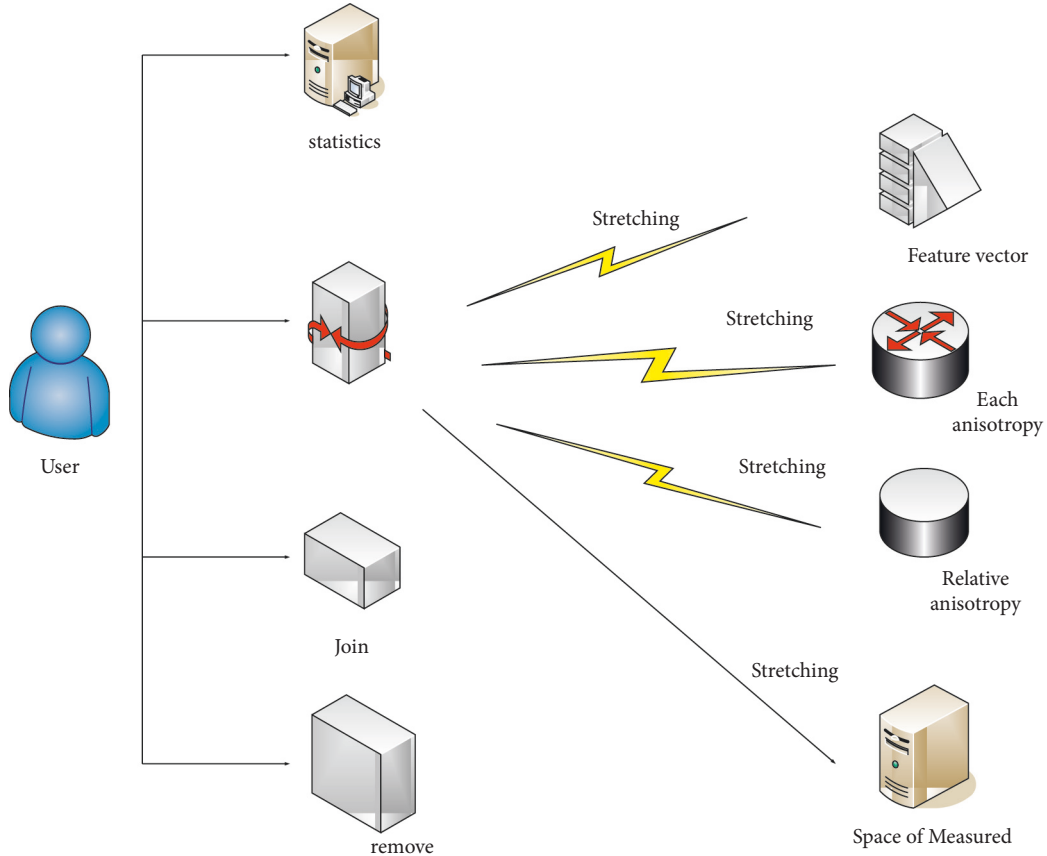


FIGURE 2: Image tracking structure.

where  $\lambda$  represents the standard deviation.

Surface circular light height lines are formed by Gaussian blur in 2D. Defining its radius as  $r^2 = a^2 + b^2$ ,

$$H(a, b) = \frac{1}{2\pi\lambda^2} e^{-a^2+b^2/2\lambda^2}. \quad (16)$$

The formula to process a rectangular template is as follows:

$$S(a, b) = \sum_{i=0}^{i=n} \sum_{j=0}^{j=n} H(i, j) * s(a_0, b_0), \quad (17)$$

$$a_0 = b + \left( i - \left[ \frac{r}{3} \right] \right),$$

$$b_0 = a + \left( g - \left[ \frac{y}{3} \right] \right),$$

where  $H(i, j)$  stands for the dot in the grid and  $a$  is the greatest whole number.

**3.2. Smart Healthcare.** In order to reduce the sudden symptoms caused by chronic diseases and prolong the life of the elderly, the treatment mode of chronic diseases for elderly patients has gradually shifted from long-term hospitalization to small-scale preventive treatment at home. This has also led to the development of telemedicine. There are many different types of smart medical

products on the market today. Its main work is shown in Figure 3.

The United States was one of the first countries to conduct R&D on smart healthcare theories. The technology is applied first in major universities. Physicians use clever healthcare instruments to check patients' vital signs to relieve medical stress. Figure 4 shows the initial intelligent medical structure.

Pharmaceutical data is the pharmaceutical market data and the basis for quantitative analysis of the pharmaceutical market. Its value in pharmaceutical market research is self-evident, and it is also an effective tool for companies to manage the market.

Smart medical technology is continuously improving and presenting a shift towards carrying. The device analyzes and processes the collected data through special software and finally forms a data analysis chart for reference. The ring sensor can be worn on the wrist, enough to monitor the patient's pulse. The device is also set up with an alerts alcohol algorithm that puts the bracelet and the patient under monitoring at the same time. Figure 5 shows the structure of the remote intelligent medical monitoring system.

Smart health technology can produce a sound diagnosis. The intelligent medical system summarizes the knowledge and experience of domain experts to form rules. It establishes a knowledge base and stores it in the computer and adopts an appropriate control strategy. It conducts reasoning, deduction, judgment, and decision-making

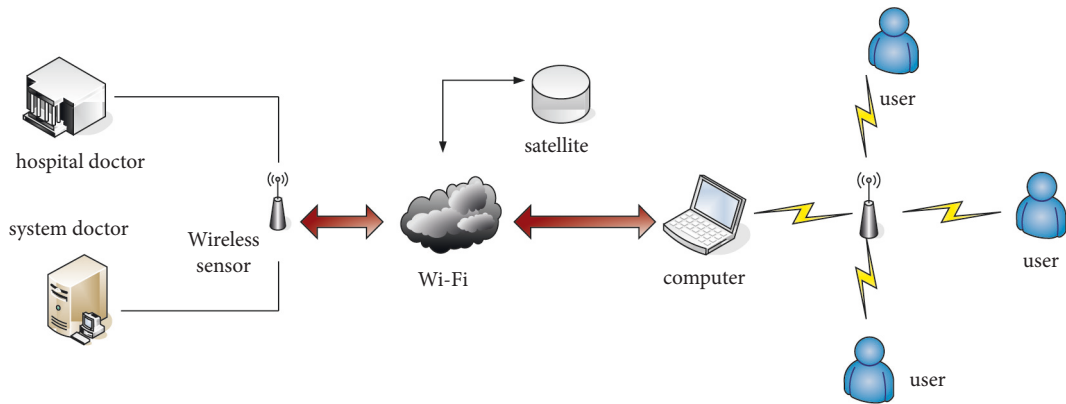


FIGURE 3: Structure principle of intelligent medical products.

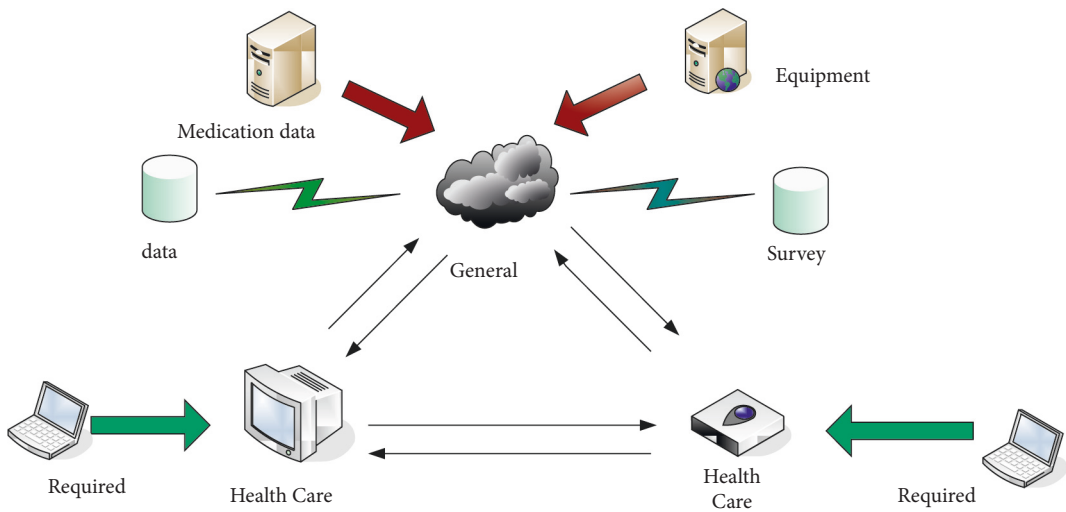


FIGURE 4: The initial smart medical structure.

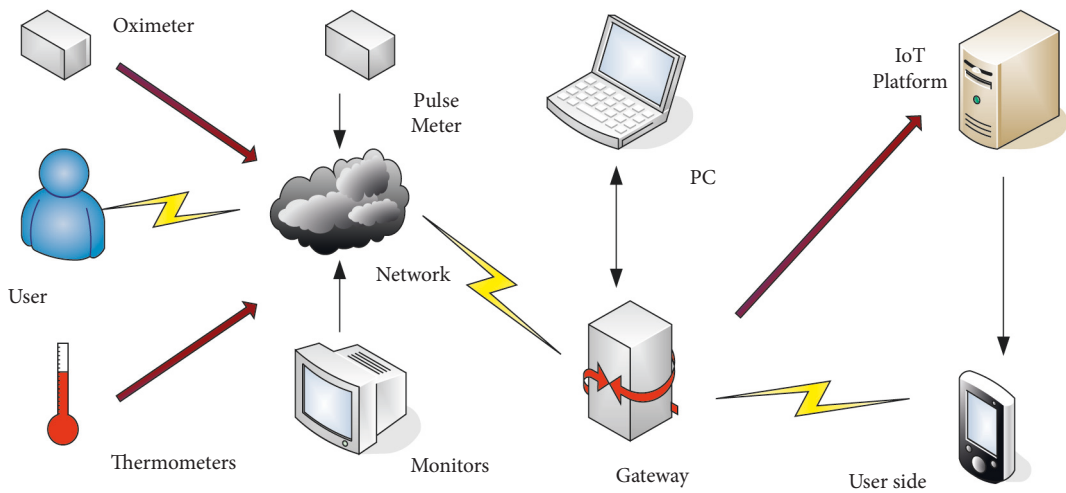


FIGURE 5: Structure of remote intelligent medical monitoring system.



TABLE 3: Basic information survey of experts.

Category	Frequency	Proportional	
Academic qualifications	Undergraduate	6	22
	Master	12	48
	PhD	7	30
Title	Intermediate	6	25
	Associate senior	15	59
	Full senior	4	16
Area of expertise	Community nursing management	8	33
	Community nursing education	7	28
	Geriatric chronic disease clinical care	10	39

are 15 people with deputy senior titles, auditing to 59% of the population. There are 4 people with senior professional titles, auditing to 16% of the population. From the perspective of professional fields, 8 people belong to community care management, accounting for 33% of the total number. There are 7 people who belong to community nursing education, accounting for 28% of the total number. There are 10 people who belong to the clinical care of chronic diseases of the elderly, accounting for 39% of the total number. According to the data, the basic situation of the experts is very consistent with the experimental content, which can ensure the scientificity and validity of the experiment.

4.3. *Basis for Expert Judgment.* According to the data in Table 4, experts will draw conclusions from different levels when making judgments. Generally speaking, the proportion of subjective judgment is relatively small, which is basically maintained at about 12%. The probability of judgment based on practical experience is relatively large, the maximum can reach 66%, and the minimum can occupy 27%. According to theoretical analysis, the maximum can reach 36%, and the minimum can reach 13%. The probability of making a judgment based on the case is about 22%. According to this data, experts rely heavily on practical experience when making judgments. As for theoretical analysis, the probability of subjective judgment is very small.

### 5. Discussion

Reasons for Poor Nursing: The reasons for the poor nursing situation were explored in the experimental part. In general, the most important reasons are the nursing staff and the patients themselves. To enhance the overall experience and performance of nursing care, it conducts a detailed analysis of the reasons for the mistakes of the nursing staff and the reasons of the patients. It seeks solutions for different reasons.

According to the data in Figure 7, there are many factors that affect the society’s management of nursing safety and quality. But it mainly includes four kinds of practical experience, theoretical analysis, references, and intuitive feeling. A survey of authoritative experts from a hospital in city A found that 15 people believe that practical experience is very important. 8 people consider practical experience less important, and 5 people consider practical experience

TABLE 4: Analysis of expert judgment basis.

Category	Small (%)	Medium (%)	Large (%)
Subjective judgment	12	12	12
Practical experience	27	38	66
Theoretical analysis	13	27	36
Case reference	20	22	23

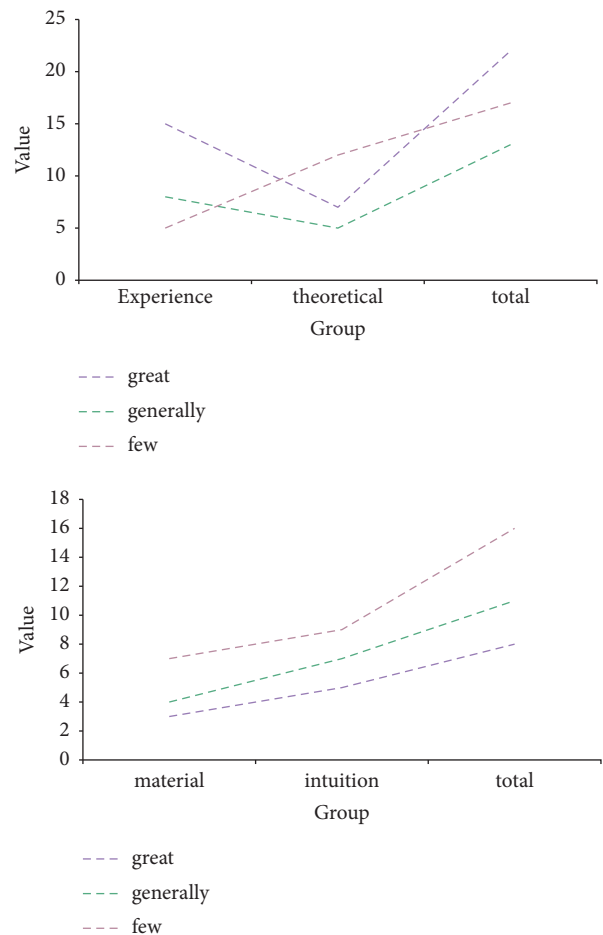


FIGURE 7: Factors affecting nursing quality and safety management.

unimportant. 7 people think theoretical analysis is very important, and 5 people think theoretical analysis is less important. There are 12 people who think that theoretical analysis is not important, and 3 people who think that the

amount of literature reserve is very important. There are 5 people who think that the amount of literature reserve is not very important, 7 people who think that the amount of literature reserve is not important, and 8 people who think that intuitive feeling is extremely critical. 7 people think that intuitive feeling is not critical, and 9 people think that intuitive feeling is not critical. From this data, it can be seen that different medical departments have different degrees of recognition of the four elements. However, it is a consensus that practice is very important, so medical staff should improve their practical ability.

According to the data in Figure 8, patients and caregivers were discussed separately when exploring the causes of poor nursing care. The picture on the left shows the operation of the nursing staff. According to the survey data, there are 65 cases of poor nursing due to insufficient assessment by nursing staff, accounting for 45%. There are 33 cases of poor nursing care caused by lax checking by nursing staff, accounting for 23%. There are 18 cases of poor nursing due to lack of basic nursing knowledge among nursing staff, accounting for 12%. There are 25 cases of poor nursing care caused by nursing staff's lack of service awareness, accounting for 17%. There are 4 cases of poor nursing caused by the illegal operation of nursing staff, accounting for 3%. From this data, it can be seen that the nursing staff accounted for the highest proportion of cases due to insufficient assessment. This requires nursing staff to improve their own abilities, to have the ability to judge some nursing situations, and to take scientific and effective measures in a timely manner. Lack of strict inspection by nursing staff is also an important reason for poor nursing. This requires the relevant departments of the hospital to formulate a corresponding system to punish the lax investigation and curb the occurrence of such adverse situations. Persons with nursing mistakes due to lack of nursing knowledge need to strengthen training and improve their own abilities. The nursing industry is, after all, a service industry. Treating patients requires the necessary spirit of service. Corresponding services must be provided in strict accordance with industry specifications, and illegal operations are strictly prohibited.

The figure on the right shows the poor nursing situation caused by the patient's own reasons. According to the survey data, there are 42 cases of poor nursing care caused by patients lacking basic medical knowledge, accounting for 52%. There are 12 cases of poor nursing care caused by their own diseases, accounting for 15%. There are 7 cases of poor nursing due to lack of communication, accounting for 9%. There are 15 cases of poor nursing care caused by the unreasonable use of restraint devices, accounting for 19%. There are 4 cases of poor nursing due to lack of companionship, accounting for 5%. From this data, it can be seen that patients need basic medical knowledge and act strictly according to the doctor's orders. Patients need to actively communicate with medical staff for situations they do not understand. Family members also need to accompany the patient a lot. Multipartners work together to maximize the effect of care.

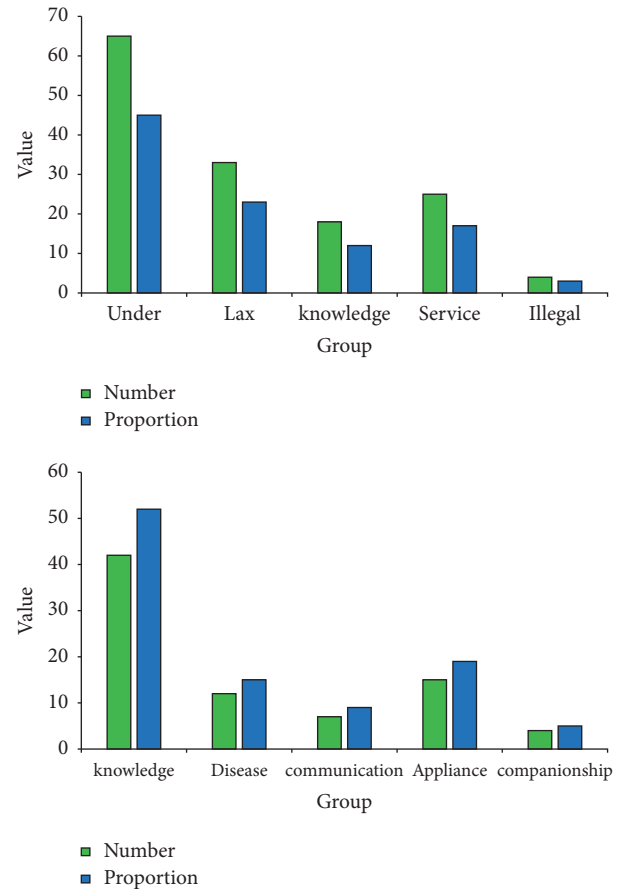


FIGURE 8: Analysis of the main reasons for poor nursing.

**Nutritional Intake of Patients:** With the continuous increase of age, the function of the human body will continue to decline. Especially in the elderly population, nutritional intake plays an important role in physical recovery. We need scientific and reasonable intake to ensure the normal operation of the body functions.

According to the data in Figure 9, in order to explore the nutritional intake of patients, we conducted a comparative analysis of the two groups of patients. Before the experiment, the protein intake of routine nursing patients was 15.33 g, and the protein intake after ordinary nursing was 14.7 g. Vitamin A intake was 297  $\mu$ gRE and post-general care intake was 305  $\mu$ gRE. Vitamin C intake was 57 mg and post-general care intake was 54 mg. Calcium intake was 515 mg and post-general care intake was 507 mg. Phosphorus intake was 202 mg and post-general care intake was 187 mg. Zinc intake was 4.5 mg and post-general care intake was 4.03 mg. Magnesium intake was 205 mg and post-general care intake was 205.7 mg. The dietary fiber intake was 18 g, and the intake after general nursing was 17.06 g. According to this data, general care did not significantly change the nutritional intake of patients.

The protein intake of pine patients in the experimental group was 16 g, and the protein intake after nursing was 4 g. Vitamin A intake was 297  $\mu$ gRE and post-care intake was 230  $\mu$ gRE. Vitamin C intake was 54 mg and post-care intake was 43 mg. Calcium intake was 507 mg and post-care intake



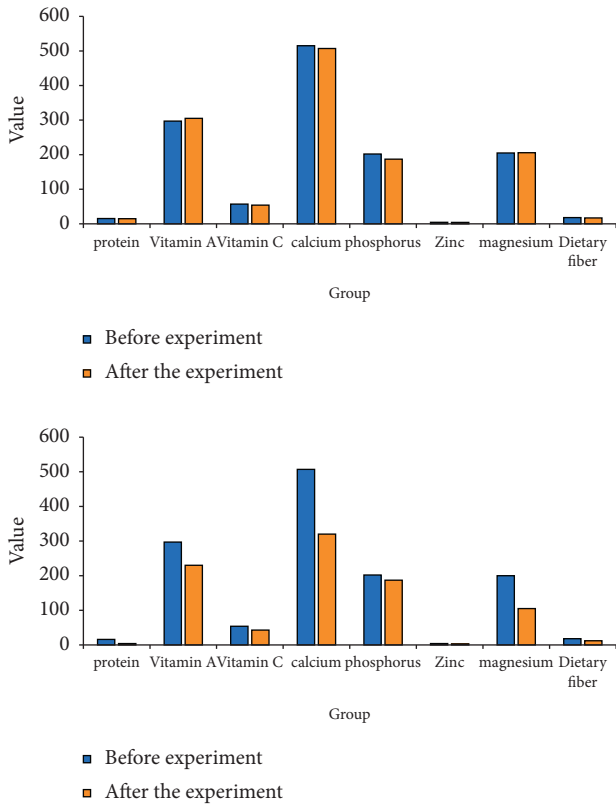


FIGURE 9: Analysis of patient nutritional intake.

was 320 mg. Phosphorus intake was 202 mg and post-nursing intake was 187 mg. Zinc intake was 4 mg and post-nursing intake was 3 mg. Magnesium intake was 200 mg and post-care intake was 105 mg. Dietary fiber intake was 18 g, and post-care intake was 12 g. According to the data, professional nursing has an obvious trend of reducing the nutritional intake of patients with chronic diseases, which can maintain the nutritional intake of patients within a reasonable range.

**Health Care Awareness:** Some common chronic diseases such as high blood pressure, diabetes, and the like do not need to be treated in the hospital; they need more care. Therefore, patients with chronic diseases must develop a healthy awareness of nursing and recognize the role of nursing in order to alleviate the disease. To gain an understanding of patient care awareness, we conducted a brief survey.

According to the data in Figure 10, there are 34 people in the survey group who understand the content of healthcare, accounting for 17% of the total number. There are 66 people who are aware of chronic diseases, accounting for 33% of the total. There are 42 people who developed a care plan, accounting for 21% of the total number. There are 38 people who have done regular review, accounting for 19% of the total number. According to this data, people's awareness of healthcare is very low.

There are 68 people who went to see a doctor immediately when they felt unwell, accounting for 34% of the total number. When the disease recurred, 58 people were very dependent on their family members, accounting for

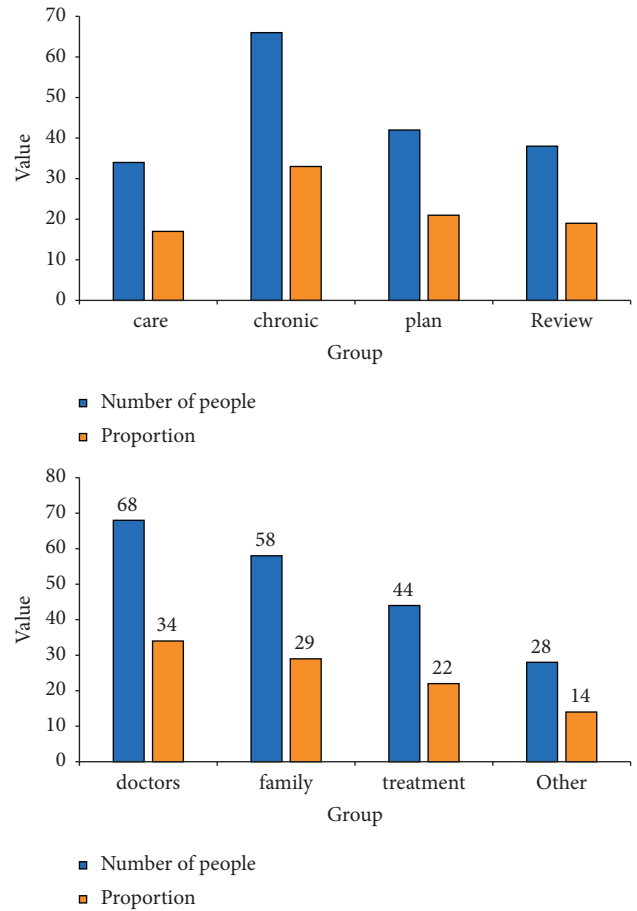


FIGURE 10: Healthcare awareness analysis.

29% of the total number. 44 people, or 22% of the total, were very dependent on treatment when the disease recurred. There are 28 people who rely on other methods, accounting for 14% of the total number. According to the data, patients have a very poor concept of seeking medical treatment in a timely manner, and their dependence on doctors is relatively strong.

## 6. Conclusions

The purpose of this paper is to study the construction and reliability and validity test of the home care assessment scale for elderly patients with chronic diseases based on tele-intelligent medical treatment. This paper points out that the nutritional intake of the elderly during the illness is unscientific, and the occurrence of nursing accidents is not only related to the nursing staff, but also the patients themselves; the patients generally lack the awareness of healthcare. From this, it can be seen that, in the care of the elderly, we can start from these levels to make the nursing program more scientific. Although this paper has carried out experimental research, there are still many shortcomings: the survey scope of the elderly is relatively small, and the feedback information of the research data of the elderly cannot represent all the elderly.

## Data Availability

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

## Conflicts of Interest

The authors declare no conflicts of interest.

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