Research Paper

Demand analysis of an intelligent medication administration system for older adults with chronic diseases based on the Kano model

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ABSTRACT

Objectives: Gerontechnology has great potential in promoting older adults' well-being. With the accelerated aging process, gerontechnology has a promising market prospect. However, most technological developers and healthcare professionals attached importance to products' effectiveness, and ignored older adults' demands and user experience, which reduced older adults' adoption intention of gerontechnology use. The inclusion of older adults in the design process of technologies is essential to maximize the effect. This study explored older adults' demands for a self-developed intelligent medication administration system and proposed optimization schemes, thus providing reference to developing geriatric-friendly technologies and products.
Methods: A cross-sectional survey was conducted to explore older adults' technological demands for the self-developed intelligent medication administration system, and data were analyzed based on the Kano model. A self-made questionnaire was administered from July 2020 to October 2020 after participants used this system for two weeks. The study was registered with the Chinese Clinical Trial Registry (ChiCTR2000040644).
Results: A total of 354 older adults participated in the survey. Four items, namely larger font size, simpler operation process, scheduled medication reminders and reliable hardware, were classified as must-be attributes; three items, namely searching drug instructions through WeChat, more sensitive system and longer battery life, as attractive attributes; one item, viewing disease-related information through WeChat, as the one-dimensional attribute; and the rest were indifferent attributes, including simple and beautiful displays, blocking advertisements automatically, providing user privacy protection protocol, viewing personal medical information only by logged-in users, recording all the medications, ordering medications through WeChat. The satisfaction values were between 0.24 and 0.69, and dissatisfaction values were between 0.06 and 0.94.
Conclusion: This study suggested that older adults had personalized technology demands. Including their technological demands and desire may assist in decreasing the digital divide and promoting the satisfaction of e-health and/or m-health. Based on older adults' demands, our study proposed optimization schemes of the intelligent medication administration system, which may help developers design geriatric-friendly intelligent products and nurses to perform older adults-centered and efficient medication management.

What is known?

- Older adults often develop multiple chronic noncommunicable diseases requiring long-term and complex medication regimens. Nonadherence may result in decreased therapeutic

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benefits, severe complications, frequent hospital and physician visits, leading to a significant care burden.
- Information and communication technology has been widely used in medication management.
- Most technicians and developers attached importance to products' effectiveness and ignored older adults' demands and use experience. Studies have suggested that many factors can promote older adults' acceptance of gerontechnology, such as compatibility of needs and support.
- The Kano model is a useful method to understand target users' demands when planning a product, thus helping improve usability and accessibility of products and customer satisfaction.

What is new?

- Based on the Kano model, our study explored older adults' personal demands on the intelligent medication administration system and proposed the optimization schemes, which will improve older adults' experience while facilitating their use of this intelligent system.
- This study will remind researchers of the importance and necessity of analyzing and satisfying target users' specific demands, enhancing the practicability and usability of intelligent products, and satisfaction of nursing care through older adults' technology use habits.
- This study will provide technicians with reference to developing geriatric-friendly products, which is helpful to decrease the digital divide and promote the satisfaction of e-health and/or m-health.

1. Introduction

Older adults often develop multiple chronic noncommunicable diseases (CNCDs) requiring long-term and complex medication regimens [1]. Physical and mental changes caused by aging, such as impaired hearing, lower self-rated health, and cognitive function, lead to some barriers to medication adherence. It, therefore, may present with a higher risk of non-adherence to medications compared to the younger population [2,3]. Medication adherence is defined as the degree to which patients' medication-taking behaviors are consistent with their physicians' recommendations [4]. Nonadherence may result in decreased therapeutic benefits, severe complications, frequent hospital and physician visits, and a significant financial medical burden [5].

In recent years, information and communications technology (ICT) has promoted convenient and feasible innovations to improve medication adherence [6], such as electronic monitoring devices, electronic medication packaging devices and blister packs [7–10]. Common features of these devices include recording and storing dosing events, audio reminders, real-time monitoring. However, these devices generally used mobile apps for near-end configuration, which could not deliver drug plans by the cloud platform. Importantly, most devices could not synchronize and share older adults' medicines data among their caregivers and healthcare providers (HCPs), which is important in transitions of care.

We developed an intelligent medication administration system based on interactive design theory. The overall architecture is shown in Fig. 1, including a terminal named "electronic medicine device," the Web interface, and a WeChat Program named "Smart Drug Box." Functions of the electronic medicine device can be grouped into three broad classes of utility: monitoring, reminding and recording. It monitors nurses to dispense the correct drugs by Radio Frequency Identification (RFID) chips that are stuck on the

bottom of drug cups. It reminds patients to take medications with audible alarms, repeated three times at 10 min intervals. It also records older adults' medication-taken to keep track of past action and synchronizes to the Web interface and WeChat Program. This system constructed a cloud-based health record; HCPs can view patients' real-time medication-taken conditions on the Web interface, contributing them to addressing adverse drug events in a timely manner. Furthermore, HCPs will push brief articles and/or short videos about medication and disease guidance to the WeChat Program in order that patients and their caregivers can view at any time; it may save the time of repeated health education. Family members and/or caregivers can bound accounts with the WeChat Program, which will provide them with older adults' adherence performance feedback (*medication alerts will be sent in the form of short messages to bound users when preprogrammed drug-use schedules are missed*). Screenshots of this system are shown in Appendix A.

We had conducted a randomized controlled trial in two nursing homes in Chongqing, China [11]. Results suggested that older adults in the intervention group had significantly higher medication adherence than the control group, and nurses stated that the health education through the WeChat program not only reduced the time cost, but also made positive effectiveness. However, older adults reported that there were some differences between this system and their technological demands, making it difficult to use for a long time. Studies have shown the limited effects due to some gap between technologies developed for older adults and their personal demands [12], and the design process of intelligent products should be "older adults-centered" [13]. Therefore, it is essential for us to optimize this intelligent system based on older adults' actual demands and desires.

It is critical to understand target users' demands when planning a product. The theory we used here is the Kano model, which is a useful method to determine the attributes of customers' demands [14]. According to the relationship between the subjective feelings of customers and the objective performance of products, Professor Kano proposed that demand attributes can be divided into must-be attributes (M), one-dimensional attributes (O), attractive attributes (A), indifferent attributes (I) and reverse attributes (R) [15]. Recently, this model has been applied in different fields to improve customer satisfaction, as in pharmaceutical logistics and burns units [16,17].

In order to increase the usability and accessibility of the intelligent medication administration system, we must advance the inclusion and engagement of older adults during the optimization process. This study aimed to explore older adults' technological demands of the intelligent medication administration system using the Kano model and provide reference to developing intelligent products that are more suitable and useable for older adults.

2. Methods

2.1. Study design

Firstly, empirical user testing was conducted. Older adults who met the eligibility were required to use the intelligent medication administration system for two weeks. Then, a cross-sectional study was conducted to assess their demands. Finally, data were analyzed based on the Kano model.

2.2. Participants

Convenience sampling was carried out in two hospitals in Chongqing. Participants were eligible if they were aged over 60 years, diagnosed with at least one chronic disease, prescribed at
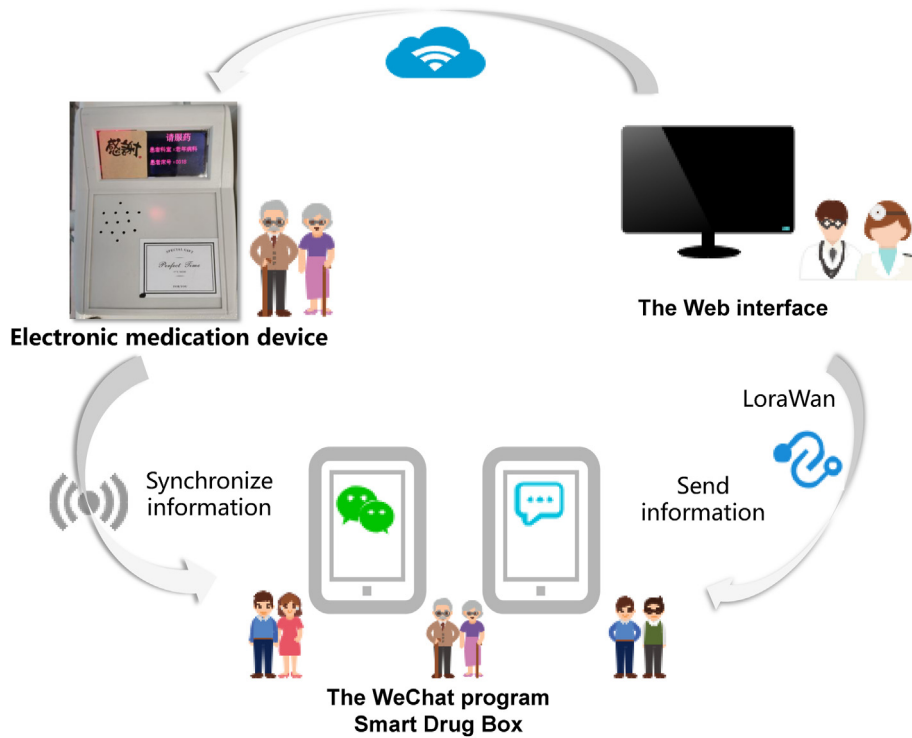
Fig. 1. The architecture of the intelligent medication administration system.

least two medications, and volunteered for this study. Participants were excluded if they were with obvious cognitive impairment (a Mini-Mental State Examination score<27) [18], with decreased hearing inadequate for conversation, with decreased vision inadequate to read text at a font size of 22 pt, and had critical or end-stage diseases.

2.3. Research tools

We designed a questionnaire that comprised of two sections: 1) General information, including sociodemographic characters, chronic diseases and medication use condition; 2) Demand survey of the intelligent medication administration system, designed based on the Kano estimation questionnaire. The concrete items of the demand questionnaire are shown in Table 1. Four experts, three of whom are in the field of geriatric nursing and chronic disease care and one who specializes in communication technology, were invited to evaluate the demand questionnaire based on the

Table 1
Demand questionnaire of the intelligent medication administration system.

Number	Customer demands
1	Simple and beautiful displays
2	Larger font size
3	Simpler operation process
4	Block advertisements automatically
5	Provide user privacy protection protocol
6	View personal medical information only by logged-in users
7	Scheduled medication reminders
8	Search drug instructions through WeChat
9	Record all the medications
10	Order medications through WeChat
11	View disease-related information through WeChat
12	Reliable hardware
13	More sensitive system
14	Longer battery life

relevance of each question using a Likert scale. The item-level content validity index (CVI) of the demand questionnaire was between 0.75 and 1.0, and the scale-level CVI was 0.96. The reliability was assessed using Cronbach's α, which was 0.932; the internal consistency was assessed using test-retest coefficient, which was 0.986. The above indicated that the content validity and reliability of the demand questionnaire were acceptable.

2.4. The Kano model

2.4.1. Demand attributes

Kano divided demand attributes into five categories, and the implications are shown in Table 2. Notably, for reverse attributes, customer satisfaction decreases after the feature is provided, and the degree of provision is inversely proportional to satisfaction. Thus, it is necessary to ask for reasons why participants chose reverse attributes [19]. Demand attributes could be classified through the Kano estimation questionnaire. As shown in Table 3, each demand includes two opposite questions, for example, "1A. If the remote health counseling is provided, how do you feel? (functional question)" and "1B. If the remote health counseling is not provided, how do you feel? (dysfunctional question)". For each question, the participants can choose an answer from "I like it that way," "It must be that way," "I am neutral," "I can live with it that way," and "I dislike it that way." There are 5*5 possible results, and each of which corresponds to a Kano attribute [20].

2.4.2. Importance coefficients

In order to compare the importance of different demands, which are classified into the same attribute, the importance coefficients, namely, customer satisfaction and dissatisfaction values, were proposed by DuMouchel [21]. Each customer demand can be represented as a pair of satisfaction and dissatisfaction values. The satisfaction value was calculated as $(A + O)/(A + O + M + I)$, and the dissatisfaction value was calculated as $(O + M)/(A + O + M + I)$,

Table 2
Definitions of demand attributes.

Demand attribute	Definition
Must-be attribute (M)	Customers are more dissatisfied when the product is less functional, but the customer's satisfaction never rises above neutral no matter how functional the product becomes.
One-dimensional attribute (O)	More functionality leads to more customers' satisfaction.
Attractive attribute (A)	Customers are more satisfied when the product is more functional, but they are not dissatisfied when the product is less functional.
Indifferent attribute (I)	Customers are neither satisfied nor dissatisfied whether the product is dysfunctional or fully functional.
Reverse attribute (R)	Customers' satisfaction will decrease when the product is functional, and the degree of provision is inversely proportional to satisfaction.

Table 3
Kano estimation table.

Functional question (e.g, If remote health counseling is provided, how do you feel?)	Dysfunctional question (e.g, If remote health counseling is not provided, how do you feel?)				
	I like it that way	It must-be that way	I am neutral	I can live with it that way	I dislike it that way
I like it that way	Q	A	A	A	O
It must-be that way	R	I	I	I	M
I am neutral	R	I	I	I	M
I can live with it that way	R	I	I	I	M
I dislike it that way	R	R	R	R	Q

Note: Q = questionable results, means this questionnaire is invalid. A = attractive attribute. O = one-dimensional attribute. R = reverse attribute. I = indifferent attribute. M = must-be attribute.

where A, O, M, and I are the number of the attribute categories, respectively. The satisfaction and dissatisfaction values are between 0 and 1; a satisfaction value closer to 1 indicates that satisfaction can be improved by providing such an attribute, and a dissatisfaction value closer to 1 indicates that providing such an attribute will prevent dissatisfaction [22].

2.5. Data collection and analysis

Recruitment advertisements were delivered in geriatric department, cardiology department, respiratory department, neurology department and nephrology department. Clinical nurses were trained and familiarized with the study protocol, then invited to assess the eligibility of participants. A total of 391 older adults were recruited, of whom 360 agreed to participate in our study. As investigators, three nursing postgraduates were trained by the developer of the intelligent medication administration system about operation methods to ensure that they were proficient in all functions. Two researchers inputted and organized the data to guarantee the accuracy, and data were analyzed by IBM SPSS statistical software package version 23.0.

2.6. Ethical approvals

This study was approved by the hospital research ethics committee (No. 2019-089) and performed in line with the principles of the Declaration of Helsinki and its later amendments or comparable ethical standards. Before participating in this study, all participants signed informed consent form; and we followed the principle of voluntary withdrawal and no harm.

3. Results

From July to October 2020, 360 questionnaires were sent out, and six older adults did not complete all the questions because of privacy concerns. Ultimately, 354 valid questionnaires were collected with an efficient rate of 98.33%.

3.1. General information

Males accounted for 51.69% of participants. Participants' average age was 72.35 ± 8.06, 146 were between 60 and 69 years (41.24%), 126 were between 70 and 79 years (35.59%), and 82 were over 80 years (23.17%). A total of 151 older adults were users of smartphones. The number of CNCDs ranged from 1 to 5, and the mean value was 2.24 ± 0.88; the number of medications was between 2 and 15, the mean value was 4.60 ± 2.26. A total of 145 participants suffered from adverse drug reactions (ADRs) diagnosed by physicians, including gastrointestinal disorders ($n = 99$), sleep disorders ($n = 34$), skin rash ($n = 1$), hypoglycemia ($n = 4$), acute hypertension ($n = 3$), hemorrhage caused by warfarin ($n = 1$), diabetic ketoacidosis ($n = 2$) and etimicin allergy ($n = 1$). The ADRs reported were mainly related to patients' stopping and/or changing medications without their physicians' permission, as determined by their pharmacists or physicians. More information is shown in Table 4.

3.2. Demands analysis

3.2.1. Demand attributes

As shown in Table 5, from the final Kano attribute, we can determine that six options were classified as indifferent attributes: simple and beautiful displays, blocking advertisements automatically, providing user privacy protection protocol, viewing personal medical information only by logged-in users, recording all the medications, and ordering medications through WeChat; four options as must-be attributes: larger font size, simpler operation process, scheduled medication reminders and reliable hardware; three options as attractive attributes: searching drug instructions through WeChat, more sensitive system and longer battery life; and one option as a one-dimensional attribute: viewing disease-related information through WeChat. Notably, for the tenth item (Order medications through WeChat), nine older adults classified it as a reverse attribute. Through semistructured interviews, we found the main reasons were as follows: as explained by an older adult, "It was better to consult pharmacists according to the diseases state each time, because the illness condition was always changing; " the

Table 4
General information of aged users of the intelligent medication administration system ($n = 354$).

Characteristic	n (%)
Gender	
Male	183 (51.7)
Female	171 (48.3)
Age (years, Mean ± SD)	72.35 ± 8.06
Highest level of education	
Primary education or below	166 (46.9)
Secondary education	164 (46.3)
Higher education	24 (6.8)
User or non-user of smartphones or other smart devices	
User	151 (42.7)
Non-user	203 (57.3)
Number of chronic diseases	
1—2	219 (61.9)
3—4	134 (37.8)
5	1 (0.3)
Number of medications	
2—5	251 (70.9)
6—9	91 (25.7)
10—15	12 (3.4)
Time of medication-taking (years)	
≤1	12 (3.4)
2—5	82 (23.2)
6—9	79 (22.3)
>9	181 (51.1)
Adverse drug reactions	
Occurred	145 (41.0)
Un-occurred	209 (59.0)
Adverse drug events	
Missed daily medication	78 (22.0)
Late daily medication	127 (35.9)
Wrong dose	51 (14.4)
None	98 (27.7)

other participants stated, "I did worry about the quality of medications purchased online." As for the eleventh item (View disease-related information through WeChat), three participants classified it as a reverse attribute. They explained, "I was unwilling to read many written materials due to my poor eyesight." However, they also said this service is positive if it is provided in the form of audio and/or videos.

3.2.2. Importance coefficients

As shown in Fig. 2, the nature of customer demands can be delineated by the quadrant into which that point falls. It was clear to discern the final Kano attributes and importance of all demands from the diagram. For must-be attributes (the fourth quadrant), the

satisfaction value of CD3 was the highest, which suggested that the maximized satisfaction would be realized by simplifying the operation process; the dissatisfaction value of CD7 was higher than others, illustrating that the function of medication reminders must be provided to prevent satisfaction decreasing. For attractive attributes (the second quadrant), the satisfaction value of CD14 was the highest, suggesting that the intelligent medication administration system will attract more older adults to use if we reinforce the battery life; the dissatisfaction value of CD13 was the highest, it reminds that the higher sensitivity of this system, the more older adults are willing to use it.

4. Discussion

At present, the adoption of ICT among older adults is on the rise [23], and more and more studies suggest that many factors can promote the use of ICT, such as compatibility of needs, proficiency in use and support [24]. However, researchers and HCPs universally focus on technology improvements and clinical effects, and might ignore older adults' personal demands. Our study explored older adults' demands; the discussion will further elaborate on the demand attributes evaluated by older adults and on the optimization schemes in accordance with their specific needs.

4.1. Indifferent attributes

Older adults classified "simple and beautiful displays" as an indifferent attribute, suggesting that they paid more attention to the practicality than the appearance of the system, which is consistent with the research of Parette et al. [25]. Furthermore, they thought these demands—blocking advertisements automatically, providing user privacy protection protocol, viewing personal medical information only by logged-in users, recording all the medications, and ordering medications through WeChat — would not increase their satisfaction with this intelligent system. Through semistructured interviews, the main reasons were as follows. 1) Older adults hoped to receive more information regarding diseases and medications, even though medical advertisements, suggesting that older adults were more likely to perform the disease prevention-related self-care behaviors nowadays [26]; 2) Older adults rarely paid attention to their privacy, which was consistent with the finding of Demiris et al.: privacy and confidentiality are often overlooked by older adults when relating to a service using ICT [27]. However, older adults with higher education levels attached importance to their individual information, consistent with the results found by Karlsen and colleagues [28].

Table 5
Demands survey results of the intelligent medication administration system.

| Customer demand number	Frequency Distribution					Final Attribute	Satisfaction value	Dissatisfaction value
	M	O	A	I	R			
1	23	20	123	188	0	I	0.40	0.12
2	229	78	22	25	0	M	0.28	0.87
3	118	86	79	71	0	M	0.47	0.58
4	70	67	72	145	0	I	0.39	0.39
5	50	72	84	148	0	I	0.44	0.34
6	30	74	100	150	0	I	0.49	0.29
7	261	71	15	7	0	M	0.24	0.94
8	36	65	156	97	0	A	0.62	0.29
9	15	18	156	165	0	I	0.49	0.09
10	3	18	139	185	9	I	0.46	0.06
11	43	137	106	65	3	O	0.69	0.51
12	257	71	15	11	0	M	0.24	0.93
13	79	63	144	68	0	A	0.58	0.40
14	44	58	167	85	0	A	0.64	0.29
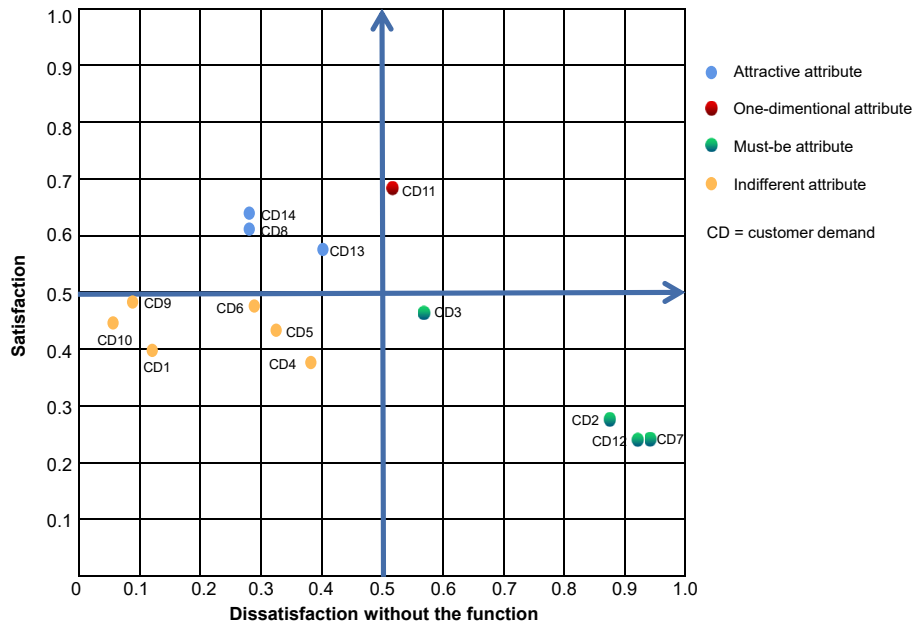
Fig. 2. Satisfaction-Dissatisfaction quadrant diagram.

In the context of the current explosion of big data, this fear of harming one's privacy is pronounced because the benefits of ICT in terms of older adults' well-being can often overshadow rights to privacy [29]. It is imperative that we increase the focus on privacy protection from a user perspective to enhance security. We will strengthen the gateway data docking process of the intelligent medication administration system to ensure that older adults' personal information is protected during the network layer interconnection. Overall, indifferent attributes will be considered only after satisfying other more urgent demands given the time and economic costs.

4.2. Must-be attributes

Older adults in our study thought reliable hardware, simpler operation process and larger font size should be must-be attributes, which was related to aging. These results were consistent with the findings of Roberts and Allen: age-related changes such as eyesight and the ability to learn new things may decrease older adults' acceptance of ICT [30]. Taking that into account during the design process of intelligent products, age-related changes in performance can be minimized [12]. According to the Kano model, demands that are classified as must-be attributes are considered the most basic and indispensable, and it is necessary to satisfy these demands first.

To enhance stability, we will upgrade the thermal components to prevent the frequency of RFID chips from decreasing. Face or fingerprint recognition as the identification step is being considered to simplify the operation process of the electronic medicine device. Finally, technicians will rewrite the code to increase the sound volume of medication reminders to make older adults hear more clearly.

4.3. Attractive attributes

In this study, older adults classified "search drug instructions through WeChat" as an attractive attribute, which will attract them to use this system. According to a report [31], daily use of WeChat of older adults was only 0.49 h less than that of young people, and WeChat is more and more popular among the geriatric group.

Through semistructured interviews, we found the main reasons were as follows. 1) Older adults often forget to read drug instruction books when they take new medications; however, they almost use the WeChat app every day, which will remind them to read drug instructions; 2) The electronic drug instructions are convenient to read at any time. That reminds physicians, pharmacists and nurses to reinforce health education to improve older adults' awareness of the importance of drug instruction books to enhance their adherence, especially in the transition of care. Additionally, older adults thought "more sensitive system" and "longer battery life" would be attractive for them, which conformed to the theory of the Technology Acceptance Model: perceived usefulness will promote the use of technologies [32].

In the future development process, the instructions of common drugs for CNCDs will be added to the WeChat database, which is convenient for older adults to read at any time; and USB constant power supplies will replace batteries, simplifying the recharging step. In terms of wireless transmission and engineering operations, we will optimize the accessibility of signal transmission and the system architecture to improve deployment efficiency.

4.4. One-dimensional attributes

In our study, viewing disease-related information through WeChat was considered as a one-dimensional attribute, which means that providing this service will improve satisfaction directly according to the Kano model. It also reminds us of an innovative method for health education of older adults with CNCDs. Although there are multiple modalities to conduct health education, the effectiveness among older adults is mixed [33]. ICT can intensify memory and help with the retention of information through visual, auditory and tactile stimuli [34], and it is critically important to consider older adults' individual demands to prompt changes in their behavior. Therefore, we will customize the health education content in the form of videos according to older adults' different educational backgrounds, cultural differences and illness conditions to maximize the effect.

To promote older adults' satisfaction, we should consider the demands of must-be attributes first. Besides, costs of economic and

time are also important factors in the development process of intelligent products. Therefore, the service that was the highest satisfaction values - simplifying the operation process - should be provided first; then, the service - medication reminders - must be provided to prevent dissatisfaction due to its highest dissatisfaction values.

Older adults' attitudes toward ICT, such as more perceived usefulness, self-efficacy and increased interest, will be improved through designing geriatric-friendly intelligent products [35]. Our study explored older adults' technological demands and the priority of demands and also promoted some optimization schemes of this intelligent system. We hope this study will remind researchers of the importance and necessity to analyze and satisfy target users' specific demands and provide reference to designing and optimizing; besides, nurses should take older adults' technology use habits into account to conduct personalized care.

4.5. Limitations

There are some limitations in our study. Firstly, due to COVID-19, we only included older adults who were in hospitals. In the future, we will extend this system to other scenarios to investigate its usability. Secondly, gender, different family attention and education level may make some differences in older adults' personal needs, desires and preferences, which is worth further analysis and discussion in the future study. Finally, this study aimed at the intelligent medication administration system, a large sample investigation on other intelligent products will be needed in the future.

5. Conclusions

While ICT is exponentially developing, the challenge of acceptance will probably continue to persist; and studies have shown that the digital divide might even widen in the future [36]. Including what older adults want and need, in our opinion, may become a shortcut to reducing the digital divide. Our study found older adults' specific demands and pointed out that researchers should attach more importance to improving older adults' experience while facilitating their use of the intelligent medication administration system. Demand attributes have a certain life cycle and customers' demands also change over time. It is vital to continue to explore what kinds of services older adults with different peculiarities will require with the continuous promotion of the system. Moreover, increased focus on the feelings of HCPs and older adults' caregivers should become a direction of research in e-health and/or m-health.

6. Implications

ICT can assist nurses in managing complex medication regimens effectively; however, many older adults do not seem ready to embrace them when it comes to technologies. The needs analyzed herein may provide some reference for researchers when conducting gerontechnology services, which will be helpful to enhance the practicability and usability of intelligent products and satisfaction of nursing care through consisting with older adults' technology use habits.

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Ethical approvals

This study was approved by the ethics committee of The First Affiliated Hospital of Chongqing Medical University (No. 2019-089) and performed in line with the principles of the Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent was obtained from all participants included in this study.

Data availability statement

Authors declare the absence of shared data in the present study.

Credit authorship contribution statement

Jiayi Mao: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Project administration. **Liling Xie**: Conceptualization, Methodology, Validation, Funding acquisition, Resources, Data curation, Writing - review & editing, Supervision, Project administration. **Qinghua Zhao:** Methodology, Validation, Formal analysis, Resources, Writing - review & editing. **Mingzhao Xiao:** Conceptualization, Methodology, Validation, Resources, Writing - review & editing. **Shuting Tu:** Methodology, Validation, Formal analysis, Investigation, Resources, Writing - review & editing. **Wenjing Sun:** Conceptualization, Methodology, Validation, Formal analysis, Writing - review & editing. **Tingting Zhou:** Methodology, Data curation, Formal analysis, Writing - review & editing.

Declaration of competing interest

The authors have declared no conflict of interest.

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Appendices. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2021.12.012.

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