

Construction of a Full-Process Nursing Service Platform for Day Surgery Patients Based on Kano Model

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Abstract. This study was based on the Kano model and rely on the Internet hospital to build a day surgery patient full-process nursing service platform. Based on the Internet hospital's HIS system, nursing Yuanzhuo system, patient mobile terminal (WeChat) and other information systems. The platform was designed by following the WHO's conceptual framework for developing a scaling-up strategy. It was tested and refined by a pilot in a hospital in China. The full-process care platform for day surgery patients realizes information interconnection and interoperability of patient surgical consultation, surgical inquiries, and postoperative follow-up. It consists of a WeChat applet (client) and an online website (server). Pre-experiment results show that patients are more likely to recommend the hospital's day surgery to others. The mHealth-based perioperative full-process nursing service platform for day surgery patients can initially meet the health education needs, surgical consultation needs and follow-up needs of day surgery patients.

Keywords. Day surgery; Kano model; full-process care; intervention platform development; m-health

1. Introduction

Day surgery refers to a surgery in which the patient is admitted, operated and discharged within 1 working day. Day surgery provides a better solution to shorten the average length of stay, speed up bed turnover, and solve the above problems. With the continuous improvement, the demand for medical services for day surgery patients is also constantly escalating [1, 2]. The "Healthy China 2030" Planning Outline [3] points out that we must continue to expand services, improve service quality, and give full play to the leading and supporting role of scientific and technological innovation and informatization, so that all people can enjoy needed, high-quality, and affordable services. Prevention, treatment, rehabilitation, health promotion and other health services. Day surgery patients have a short hospital stay and little understanding of disease knowledge, postoperative care, etc., and the problem that their medical service needs cannot be effectively met is becoming increasingly prominent [4].

Many researchers have also addressed this issue by using pre-admission "quasi-collective" education [5], video and telephone intervention, monitoring and follow-up [6], and paper health education materials combined with telephone follow-up [7] and other methods try to meet the surgical knowledge needs and follow-up needs of day surgery patients, but currently there are still some challenges and problems in day surgery services. For example, 1. During the admission process of day surgery, patients need to

travel to and from the hospital multiple times. In multiple departments such as wards, outpatient clinics, and day surgery centers, process issues have become a “pain point” for patient; 2. The traditional model is difficult to provide full-process nursing services for day surgery patients, and related processes and content are fragmented, and 3. Patients are unclear about the surgical schedule and have common problems such as preoperative anxiety. The emergence of M-health provides a direction to solve the above problems.

Only by clarifying the different levels of needs of day surgery patients can we provide targeted medical services [8]. As a technology that can qualitatively identify the degree of customer demand for services, the Kano model has been widely used in the medical industry in recent years to clarify patient needs and improve the quality of medical services [9, 10]. The Kano model [11] demand is divided into desired attributes, necessary attributes, and attractive attributes, indifference attributes and reverse attributes.

Patient satisfaction is a multifaceted concept, evident across various aspects. Previous studies have shown that providing adequate perioperative health education to day surgery patients significantly impacts patient satisfaction [8]. As far as we know, the current construction of electronic care platforms for day surgery patients focuses on a single health education system or a single follow-up system [12, 13]. There is still a lack of full-process electronic care services for day surgery patients based on a suitable model platform. Therefore, this study will use the Kano model as the theoretical framework, based on the core needs of the full-process care of day surgery patients investigated by the research team in the early stage, and through docking with information systems such as HIS system, Nursing Yuanzhuo system, and patient mobile terminals. Realize the information interconnection and interoperability of surgical consultation, surgical inquiry, and postoperative follow-up for day surgery patients, and design a full-process nursing service platform for day surgery patients with full coverage of nursing services and full care quality.

2. Methods

This study was a two-arm implementation study. The full-process nursing service platform was developed and updated in 4 steps: 1. determining the overall framework (Figure 1), 2. setting the modules and functions of the online platform, 3. developing educational materials and online systems, and 4. pre-experimentation. The development process follows a four-stage implementation model covering preparation, piloting, scale-up and sustainment [14]. In the preparation stage, we used the Kano model questionnaire to investigate the full-process nursing service needs of day surgery patients [15], built a full-process nursing service platform for day anorectal surgery patients and conducted a pilot, and then expanded the platform to include cataracts, For 25 common ambulatory surgery types and diseases such as macular edema and hysteroscopy, the content of the full-process care service platform for ambulatory surgery patients with different diseases will be continuously maintained and updated in the maintenance phase based on the development of evidence-based evidence.

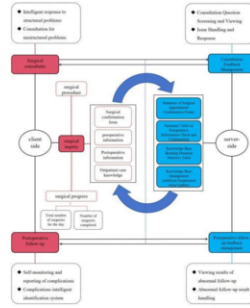


Figure 1. Overall framework of whole-process nursing service platform for day surgery patients

2.1 Client requirement design

1. **Surgery confirmation:** It supports pushing the surgery confirmation form to patients at 7AM on the day before surgery and on the day of surgery, and supports patients to choose the reasons why they cannot be admitted to the hospital for surgery.
2. **Surgical consultation:** It supports structured question answering and unstructured question asking. A group meeting was used to determine structured answers to common questions asked by day surgery patients. Unstructured questions are stored in the database to generate unique records for patients. The platform will feed back the records to the nurse PC management terminal, where professionals will respond online.
3. **Surgery inquiry:** Supports query of surgical procedures for day surgery patients, query of preoperative health knowledge and postoperative horizontal and vertical knowledge base, query of operation time and number of patients during surgery, etc. The preoperative health knowledge and postoperative horizontal and vertical health knowledge query functions of day surgery patients are implemented based on the patient's ICD disease diagnosis code and the name of the knowledge base.
4. **Postoperative follow-up:** Postoperative follow-up includes push of postoperative complications form, handling of abnormal results and self-monitoring of symptoms. The platform will push it to the patient's WeChat account on the first day after the patient is discharged, and the patient can open it at any time. The system will judge the follow-up results as abnormal and abnormal. The results are pushed to the nurse PC management terminal and processed by professionals.

2.2 Server requirements

According to the client's needs, corresponding server modules and functions are developed.

3. Results

After 13 expert group meetings and multiple systematic literature searches, the final result is an intelligent and personalized full-process service platform for day surgery patients, consisting of a WeChat applet (client) and an online website (service end) composition. Patients can search for the "Beijing Tiantan Hospital Affiliated to Capital Medical University" service account in the WeChat mini program and bind their identity information to use the platform. Administrators can log in through their PC account and password to maintain the platform. The full-process nursing service platform semi-automatically provides surgical consultation, surgical inquiry and postoperative follow-up services for day surgery patients, and automatically provides perioperative health education knowledge.

At present, the health education path for 25 common types of day surgery has been completed, integrating the content of the knowledge base with patient disease information, diagnosis and treatment information, and nursing information to achieve regular push of smart health education for day surgery patients throughout the process. 55 patient consultation questions have been received and responded to; day surgery patients were hospitalized and the total time spent reading various knowledge exceeded 200 hours.

The patient satisfaction score in the intervention group was 48.35 ± 3.39 points, and that in the control group was 47.13 ± 6.2 points. The difference was not statistically significant. The difference between the two groups of patients on the item "Whether they would recommend this hospital to others" was statistically significant ($P=0.038$).

4. Discussion

Adequate health education and a complete follow-up system can alleviate patient anxiety [4], reduce the delayed discharge rate of day surgery patients [16]. The full-process care platform for day surgery patients based on the Kano model is an innovative, comprehensive health education, consultation and follow-up system that provides all-round pre-operative care for day surgery patients through modules such as surgical consultation, surgical inquiry and postoperative follow-up. knowledge, intraoperative information and postoperative precautions to meet the diverse health education needs of day surgery patients. In accordance with the promotion strategy and theoretical framework developed by the World Health Organization, the platform will be continuously improved based on pilot use and promotion results, as well as evidence development and updates [17]. Pre-experimental results suggest that the patients are more willing to recommend the hospital's day surgery to others. Compared with other ambulatory surgery health education platforms, including those based on APPs, websites, etc. [12, 13], the health education system built in this study is more compatible, scientific, and supportive.

(1) The full-process nursing service system for day surgery patients based on the Kano model is developed based on WeChat, which is the most popular social platform in China. The widespread use of WeChat has freed researchers from issues such as compatibility issues with mobile health tools and frequent APP downloads and updates [18].

(2) All surgical procedures and health education materials are developed based on evidence-based evidence and expert experience, and health education materials will continue to be updated based on the development of evidence.

(3) This platform has built a communication platform for nurses and patients. Patients can click on structured questions to consult on unstructured questions, so that the problems that patients have incurred during the short day surgery can be further effectively solved.

For nurses, the health education content provided by this platform is comprehensive, which reduces the need to repeatedly educate patients due to their different memory and academic levels. In addition, follow-up forms are automatically pushed to patients through the platform, reducing the workload of nurses in making follow-up calls, thereby reducing the workload of clinical nurses, and the standardized health education path also improves the homogeneity level of nursing, which is similar to the research results of Wongkietkachorn, Apinut, etc. [8]. Patient satisfaction is a complex concept that can be reflected from many aspects, but studies have found that providing adequate perioperative health education knowledge to day surgery patients is an important factor affecting patient satisfaction [19]. Therefore, this study is based on the results of previous studies [20], focusing on the disease-related knowledge, treatment, disease-inducing factors, high-risk factors, protective factors, preoperative precautions, surgical introduction, preoperative preparation materials, Intraoperative cooperation, postoperative observation time and key points, postoperative transverse knowledge (medication, complications/symptom management, exercise, diet, excretion), postoperative longitudinal knowledge (notes on the 1st day, 3rd day, 7th day after the operation and the recovery period). Carry out adequate health education to meet the knowledge needs of day surgery patients. At the same time, patients are followed up online, allowing patients to enjoy convenient nursing consultation and services at home. Patients are satisfied with the way health education is provided, and are more willing to recommend the hospital's day surgery to others.

5. Conclusions

The full-process care platform for day surgery patients based on the Kano model is an expanded and innovative health education system built on the Internet. It is based on appropriate frameworks and comprehensive existing resources for patients with different surgical types to designed. Current research progress shows that the platform can meet most of the information needs of day surgery patients, reduce the workload of nurses, and patients are more willing to recommend the hospital to others.

References

- [1] Patel KT, Lewis TL, Gill P, Chatterton M. The patient perspective, experience and satisfaction of day case unicompartmental knee arthroplasty: A short-term mixed-methods study. *KNEE* 2021 Dec;33: 378-385,doi:10.1016/j.knee.2021.10.022.
- [2] Curfman KR, Blair GE, Pille SA, Kosnik CL, Rashidi L. The patient perspective of same day discharge colectomy: one hundred patients surveyed on their experience following colon surgery. *Surgical Endoscopy* 2023 Jul; 37(1): 134-139,doi:10.1007/s00464-022-09446-w.
- [3] CPC Central Committee SC. "Healthy China 2030 "plan outline. 2016 2023 2023-12-14] https://www.gov.cn/zhengce/2016-10/25/content_5124174.htm

- [4] Alacadag M, Cilingir D. Presurgery Anxiety and Day Surgery Patients' Need for Information. *J PERIANESTH NURS* 2018 Oct;33(5): 658-668,doi:10.1016/j.jopan.2017.06.125.
- [5] Zhang L, Ying Y, Yin J, Li N, Cheng Y, Yu R. Effect of pre-admission "quasi-collective" education on health education for patients with ophthalmic day surgery. *TECHNOL HEALTH CARE* 2023 Oct;1-8, doi:10.3233/THC-230877.
- [6] Mora C, Sampedro I, Rodríguez-Caballero A, Martín-Láez R, Ortega-Roldán M, Venkatraghavan L, Fernández-Miera M, Varea M, Pajaron-Guerrero M, Esteban J, Moreno B, Manzano A, Ruiz I, Martino J, Zadeh G, Bernstein M, Velásquez C. Barriers and facilitators in the implementation of a telemedicine-based outpatient brain tumor surgery program. *NEUROSURG FOCUS* 2022 Jun;52(6): E8, doi:10.3171/2022.3.FOCUS2242.
- [7] Gülşen M, Akansel N. Effects of Discharge Education and Telephone Follow-up on Cataract Patients' Activities According to the Model of Living. *J PERIANESTH NURS* 2020 Feb;35(1): 67-74, doi: 10.1016/j.jopan.2019.04.010.
- [8] Wongkietkachorn A, Wongkietkachorn N, Rhunsiri P. Preoperative Needs-Based Education to Reduce Anxiety, Increase Satisfaction, and Decrease Time Spent in Day Surgery: A Randomized Controlled Trial. *WORLD J SURG* 2018 Mar;42(3): 666-674, doi:10.1007/s00268-017-4207-0.
- [9] Materla T, Cudney EA, Hopen D. Evaluating factors affecting patient satisfaction using the Kano model. *INT J HEALTH CARE Q* 2019 Feb;32(1): 137-151, doi:10.1108/IJHCQA-02-2018-0056.
- [10] Müller SD, Tsirozidis G, Mathiasen M, Nordenhof L, Jakobsen D, Mahler B. Eliciting Information Needs of Child Patients: Adapting the Kano Model to the Design of mHealth Applications. *METHOD INFORM MED* 2022 Sep;61(3-04): 123-138, doi:10.1055/s-0042-1749359.
- [11] Malcolm E. Home. Kano Model; 2017. Available from: [https:// www.kanomodel.com/](https://www.kanomodel.com/). [Last accessed on 2017 Oct 29].
- [12] Highland KB, Tran J, Edwards H, Bedocs P, Suen J, Buckenmaier CC. Feasibility of App-Based Postsurgical Assessment of Pain, Pain Impact, and Regional Anesthesia Effects: A Pilot Randomized Controlled Trial. *American Academy of Pain Medicine* 2019 Aug;20(8): 1592-1599, doi:10.1093/pm/pny288.
- [13] Li C, Huang S, Su X, Zhang T, Jiang K. Monitoring of home recovery using the 317-nursing mobile application following day-case surgery in children. *MEDICINE* 2019 Aug;98(31): e16639, doi:10.1097/MD.00000000000016639.
- [14] Aarons GA, Hurlburt M, Horwitz SM. Advancing a Conceptual Model of Evidence-Based Practice Implementation in Public Service Sectors. *ADM POLICY MENT HLTH* 2011 Jan;38(1): 4-23, doi:10.1007/s10488-010-0327-7.
- [15] Weige S, Ran Z, Jie L, DU Yue, Weixin C. Survey of needs of the whole process management service in day surgery patients based on the Kano model. *Chinese Nursing Management* 2023 Jul;23(7): 994-998, doi:10.3969/j.issn.1672-1756.2023.07.009.
- [16] Mateshaytis J, Brawner M, Steed H, Pin S. Improving the Rate of Same-day Discharge in Gynecologic Oncology Patients with Endometrial Cancer undergoing Minimally Invasive Robotic Surgery: A Quality Improvement Initiative. *J MINIM INVAS GYN* 2022 Oct;29(10): 1184-1193, doi:10.1016/j.jmig.2022.07.006.
- [17] World Health Organization. Nine steps for developing a scaling-up strategy (2010). Available at: <https://apps.who.int/iris/handle/10665/44432>. Accessed April 1, 2021.
- [18] Liu J, Zheng X, Zhang X, Feng Z, Song M, Lopez V. The Evidence and Future Potential of WeChat in Providing Support for Chinese Parents of Pediatric Patients Undergoing Herniorrhaphy. *J TRANSCULT NURS* 2020 Mar;31(2): 114-120, doi:10.1177/1043659619841672.
- [19] Jaensson M, Dahlberg K, Nilsson U. Factors influencing day surgery patients' quality of postoperative recovery and satisfaction with recovery: a narrative review. *PERIOPER MED-LONDON* 2019 May;8: 3, doi:10.1186/s13741-019-0115-1.
- [20] Cukierman DS, Cata JP, Gan TJ. Enhanced recovery protocols for ambulatory surgery. *Best Practice & Research Clinical Anaesthesiology* 2023 Sep;37(3): 285-303, doi:10.1016/j.bpa.2023.04.007.