

Development and Application of PICC Patients Management System Based on WeChat Public Platform

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Abstract-In this paper, we describe the structure design, function modules design and clinical application of PICC patients management system base on public platform. The research results show that the incidence of related complications of PICC patients in the experimental group are significantly lower than those of the control group and the difference is statistically significant ($P < 0.01$). Satisfaction of patients in the experimental group is significantly higher than that of the control group and also the difference is statistically significant ($P < 0.05$). Therefore, the system which can effectively serve for continuation of nursing care, with significant social and economic benefits, has a broad range of application prospects.

Key Words-PICC, WeChat, Public Platform, Patient, Management System.

Peripherally Inserted Central Catheter (PICC) is widely used in the long-term chemotherapy of cancer patients who need to bring catheter outside hospital in intermittent period after treatment. If the management is not properly, it will easy results in complications which directly affect the catheter indwelling time and the follow-up treatment of patients, so it is particularly important to take continuous care of patients with catheter^[1]. At present, continuation of care is usually by telephone, e-mail, letters, visits and other traditional ways. The study shows that refusal to visit, telephone does not match and low effective rate of follow-up exist by using above information tools^[2]. Therefore, it is necessary to explore a

convenient, fast, economical and effective mode to carry out the continuation of nursing work. With rapid development of information technology, WeChat is currently one of the most popular way of network information communication. WeChat public platform with collection of pictures, texts, audios, videos and other medias which accepted by almost people, is a important medium of realizing maximum of coverage and effect of news and interactive feature^[3]. The system explores a new type of continuous nursing mode based on WeChat public platform, so as to guide patients to do a good job in PICC maintenance, to reduce the incidence of catheter related complications and to improve patients' satisfaction, according to the demands of patients about development and extension of its function.

I. SYSTEM DESIGN

A. System Structure Design

This system is developed and deployed based on WeChat public platform, through software engineering methods, using database technology, HTML5 technology, JAVA technology and cloud computing service mode. Features of system design are as follows:

(1) This system sets up data storage center by using Saas mode, so hospital accessed in this system only have to pay less rent and no need to invest a lot of money to build system service platform. System provides a common data dictionary service which helps those hospitals without too much energy to maintain basic data directly use the system default data services. At the same time, the system also provides a private data

dictionary service to achieve personalized service. Hospitals accessed in the system maintain single value tables, questionnaires, multimedia resources and other private data and extend report statistics through WEB application or client system.

(2) System provides interface and WEB API of hospital information system to provide a guarantee for connection. Those hospitals accessed

B. System Module Design

The structure of system function modules is shown in figure 1.



Fig. 1 Structure of System Function Module

1) **Health Education Module:** This module uses web crawler technology to automatically get the most popular medical news daily from internet, and according to the patient's interests and hobbies to push news personally. Medical staffs can also manually add excellent health education knowledge to help patients improve medical knowledge and understand the latest medical trends.

2) **Nurse Patient Communication Module:** This module realizes online private chat between patients and nurses, and supports a variety of multimedia formats such as texts, pictures, etc.. Patients can upload pictures of affected area so that helps accurately describe the disease to solve the patient's "secret sorrow". At the same time, nurses can also establish a patients group to realize the

in, under the premise of having authority, get the data of patients generated by platform.

(3) System is developed based on WeChat public platform open services, so patients enjoy the service without downloading any software. Patients can enjoy the services provided by different hospitals only need to associate with different hospitals.

nurse patient group chat. For patients, this module solves the barriers of communication between patients and medical staffs, rapidly improve the quality of patient's medical treatment. For medical staffs, this module can take full advantage of the time, enhance communication with patients, and then help understand patient's conditions in the first time, finally help gain patient's trust. The module can also give the corresponding answer to the problem of patients by natural language processing. If the patient is not satisfied with the outcome of the response, system will provides a quick link channel, convenient for patients and medical staffs to communicate directly. The module can answer common, common sense related questions to avoid medical staff to answer the same questions again,

save the time of medical staffs, and then solve the problem of shortage of medical resources. At the same time, it is convenient for patients to get the relevant reply in the shortest time. Meanwhile, system realizes reminder of unread messages to prevent missing communicate information or delaying the patient's conditions of illness.

3) **Precise Appointment Module:** This module implements the full open and precise appointment of reservation numbers and division of appointment time in hours so that helps patients make an appointment by demand, changes traditional reservation mode, avoids the peak period of outpatient and finally largely reduces waiting time of patients. Description of conditions of disease in WeChat appointment is convenient for the nurses to understand the general conditions of patients before medical treatment, and improve communication efficiency and quality of medical treatment process. In the process of appointment, system supports patient discussing questions with nurses in directly communication mode by texts, pictures, voices, and other communication methods to help easily communicate between nurses and patients. In addition, this module also provides a query of history of appointment and reservation records.

4) **Questionnaire Module:** This module implements the questionnaire of custom visual editing, questionnaire, statistics, analysis and mining. Medical staffs can directly import questionnaires or edit questionnaires by visual editing interface. Patients select relevant questionnaire in WeChat Client and submit results of the answer according to the demand to timely feedback of the current conditions of illness or

medical experiences. The system will automatically notify medical staffs, If patient's questionnaire results in a tendency of worse of the disease conditions, so that it can help control the disease in the first time. The system will provide hospital with personalized questionnaire statistical analysis report if the hospital proposes statistical strategies of a questionnaires.

II.SYSTEM APPLICATION

A.Personnel Training

Heart cards with QR code and function profile printed on both sides are distributed to the experimental group. Nurses help and confirm patients or family members scan QR code with mobile phone, and follow and confirm the platform of “Second Hospital of Cangnan”. Then the experimental group of patients or their families are trained about related knowledge of WeChat public platform functions and are distributed and educated with operation manual of the platform to ensure that patients or their families to master using of WeChat public platform.

B. Clinical Applications

We select 200 cases from September 2015 to January 2016, including patients with PICC in our hospital or malignant tumor patients from other hospital undergoing chemotherapy and maintain PICC in our hospital outpatient for the first time. Inclusion criteria: ①Patients with malignant tumor by clinical and pathological diagnosis need for chemotherapy; ②Patients with PICC catheter first time in our hospital and need for outpatient maintain or patients with PICC catheter from other hospital and first time come for outpatient maintain. ③Patients or their families have ability to use mobile phone and to communicate through WeChat software. Exclusion criteria: ①Patients or families who lack the ability of information communication using mobile phone. ②Patients with PICC maintenance period is less than 3 months. ③Patients sign out because deteriorated or out of contact. Through random number, patients are

divided into two groups. 100 cases are divided into experimental group, other 100 cases are divided into control group. Control group follows with the traditional mode of outpatient maintenance and routine oral education. Besides the traditional mode, experimental group pays attention to the PICC patient management system which provides network health education, multidimensional nurse patient communication, precise outpatient appointment and other new types of extended care mode.

III. EFFECT EVALUATION

Evaluation and analysis of incidence of PICC related complications and satisfaction of two groups of patients 3 months before and after the implementation are carried out by two nurses.

A. Evaluation Index

(1) Incidence of PICC related complications: During the study period, incidence of catheter related complications of patients is judged and recorded by 2 PICC specialist nurses in the way of

returning to hospital examination, including: phlebitis, hemorrhage or infection, catheter blockage, catheter displacement, catheter prolapse completely, thrombosis and so on.

(2) Patient satisfaction: By researchers set on its own scale contains 10 items, each item alternative answers as "satisfaction, basic satisfaction, not satisfied" three levels and assign respectively 10 points, 5 points and 0 points, the score is more than or equal to 90 points as in satisfaction.

B. Statistical Methods

Measurement data is expressed as average±standard deviation($\bar{x} \pm s$), and is checked by *t* by analysis of SPSS 17.0 software. Count data is expressed as percentage, is checked by χ^2 , and have statistical significance when $P < 0.05$ as difference.

IV. RESULTS

A. Comparison Of Incidence Of PICC Related Complications In Two Groups

As table 1 shows, results which have statistical significance ($P < 0.01$) are that incidence of PICC related complications in experimental group is significantly lower than that in control group.

Table 1 Comparison of incidence of PICC related complications in two groups(case)

group	number of cases	Mechanical phlebitis	Blood and seepage	Catheter displacement	Catheter blockage	Thrombosis	Count
Experience	100	5	3	3	6	0	17
control	100	14	5	3	15	2	39
χ^2 value		4.71	0.13	0.17	4.31	0.51	25.17
P value		$P < 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P < 0.01$

B. Comparison Of Satisfaction Evaluation Results Of PICC Patients With Catheter In Two Groups

The difference of result, satisfaction of patients in experimental group is 98% and in control group is 90%, is statistically significant ($P < 0.05$).

This system has changed the traditional PICC continued nursing mode, to provide network of health education and multidimensional nursing patient communication, precise outpatient appointment and service, and to explore a kind of convenient, fast, economical and effective model of continued nursing mode. The results of this study

V. CONCLUSION

shows that this model which is more effective than traditional maintenance guidance in guiding patients to carry out correct maintenance outside hospital leads to decrease of complications, and which is more convenient for instructing the patient to carry on the reasonable maintenance treatment in time, to avoid or reduce frequency of returning to the hospital for treatment contributes to increase of satisfaction. This model which can replace the extended care model based on telephones, has significant social and economic benefits and a broad prospect in application.

This mode has limitations of scope of popularization and needs further improvement and perfection, because WeChat belonged to new method of communication based on network information which required network knowledge

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and ability of operating intelligent mobile phone, results in patients of old age or lower level of education are difficult to master and demand for help from participation of family members.

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