Application of FOCUS-PDCA in Reproductive Clinic Procedure and Study on Patient Satisfaction

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In order to study the application of FOCUS-PDCA in a reproductive clinic process and the satisfaction of patients, in this study, patients in a reproductive clinic were taken as the research subjects. Based on FOCUS-PDCA program, the outpatient flow was optimized and a patient satisfaction management mechanism was established. Through questionnaires and on-site interviews with medical staff and patients, the data of satisfaction survey were collected and the waiting time of patients in the 4 links of registration, payment, waiting for injection was counted, so as to evaluate the effect of outpatient process optimization. The results showed that in the four links of registration, payment, waiting for medical treatment and waiting for injection, the waiting time of patients after the optimization of outpatient process is significantly shorter than that before the optimization of outpatient process and the difference was statistically significant (p<0.05). Before the optimization of outpatient procedure, the total average waiting time of patients in each link was 177.89 min. After the optimization of outpatient procedure, the average queuing waiting time of patients in each link was 49.06 min, which was shortened by 128.83 min and the efficiency of medical treatment was effectively improved. The evaluation was made from 7 items, which were guidance sign, equipment

layout, outpatient information, assistant material placement, workload, working environment and safety. After the optimization of outpatient process, the satisfaction score of medical staff was higher than that before the optimization of outpatient process, and the difference was statistically significant (p<0.05). Before the optimization of outpatient process, the average score of medical staff satisfaction with 7 items was only 66.73, while after the optimization of outpatient process, the average score of medical staff satisfaction with 7 items reached 90.44, which increased by 23.71 points. When the evaluation was made from 5 items, which were guidance service, guidance sign, waiting time, medical staff efficiency and queuing time. After the optimization of outpatient process, patients' satisfaction score was higher than that before the optimization of outpatient process, and the difference was statistically significant (p<0.05). Before the optimization of outpatient procedure, the average score of patients' satisfactions with 5 items was only 66.57, while after the optimization of outpatient procedure, the average score of patient satisfactions with 5 items reached 90.64, which increased by 24.07 points. Based on FOCUS-PDCA procedure, the reproductive clinic process was optimized to shorten the waiting time of patients in the process of consultation, reduce the pressure of medical staff and improve patient satisfaction. There are still some shortcomings in the research process, but the research results still would provide some reference and guidance for exploring more precise mechanism in the future, so this study is a significant research topic.

Key words: FOCUS-PDCA procedure, reproductive clinic, medical satisfaction, continuous quality improvement, assisted reproduction

Continuous quality improvement (CQI) is one of the important contents of quality management. It improves the quality of products, processes or systems by applying effective measures to meet the quality requirements, so as to raise the quality to a new level and height[1]. FOCUS-PDCA is an effective method of quality management, which is first created by American hospital organizations and used for CQI. It has been applied in hospital grade evaluation[2,3]. FOCUS includes find, organize, clarify, understand and select[4]. Find refers to the discovery of problems that need improvement, organize refers to the organization of a team responsible for quality improvement, clarify refers to the clarification of existing processes and related norms, understand refers to the analysis of the root causes of problems and select refers to the selection of process improvement programs and the use of PDCA work mode to achieve continuous improvement of quality[5-7]. PDCA cycle, also known as Dai Minghuan, is the ideological basis and methodological basis of total quality management[8]. The PDCA cycle divides quality management into 4 stages, which are plan, do, check and act[9]. Plan includes defining guidelines and objectives and formulating activity plans, do is to design specific methods, plans and layout based on existing information, and then operate to achieve the contents of the plan, check is to summarize the results of the implementation plan and identify problems and act is to deal with the results, affirm and standardize the successful experience, and summarize the lessons

of failure, so as to raise attention. These 4 stages do not end at one run, but go round and round. At the end of a cycle, some problems are solved, while unsolved problems are solved in the next cycle[10-12].

Assisted reproductive technology (ART) refers to the technology of pregnancy of infertile couples through medical assistance, including artificial insemination (AI) and *in vitro* fertilization and embryo transfer (IVF-ET) and their derivatives. IVF-ET[13,14] is the method of *in vitro* fertilization. The reproductive clinic mainly treats infertility and has a high success rate in human-ART. In addition, it also includes the treatment of reproductive system diseases[15]. Male reproductive system diseases include abnormal urination, pyuria, abnormal urinary secretion, pain, mass, sexual dysfunction and male infertility[16]. Female reproductive system diseases are vulvar diseases, vaginal diseases, uterine diseases, fallopian tube diseases and ovarian diseases[17]. Due to the high requirement of privacy and other particularities of reproductive clinic, the unreasonable setting of outpatient procedure leads to unclear process and disorder of consultation, which increase the pressure of medical staff, and lead to low patient satisfaction and more complaints[18]. Therefore, it is necessary to optimize the process of reproductive clinic, so as to improve patient satisfaction and maintain good doctor-patient relationship[19]. In summary, in order to further improve the order and experience of reproductive outpatient visits, in this study,

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reproductive clinic patients were recruited as research subjects, so as to explore the application of FOCUS-PDCA program in reproductive outpatient procedure and patient satisfaction and to provide reference for the optimization of clinical visiting procedure.

Five hundred patients were collected from the reproductive clinic of Sir Run Run Shaw Hospital (SRRSH) from August 2017 to July 2018. Informed written consent was provided by patients, and the study was approved by the Ethics Committee of SRRSH.

The assisted reproductive outpatient procedure was appointment, registration, waiting at the consulting desk, doctor's visit, examination, drug injection or next visit, and leaving the hospital. Before the reform, 400 to 500 people were injected daily with drugs related to assisted reproduction, such as ovulation-stimulating injection and drugs promoting uterine microcirculation. However, there are only 2 injection nurses, so the workload of nurses is heavy and patients wait for injection for a long time. In order to meet the increasing demand of patient flow and improve the quality of outpatient service, the outpatient process was optimized based on FOCUS-PDCA program. The number of injecting nurses increased to 6 to shorten the waiting time for injections.

Information facilities such as self-service registry machine and outpatient service inquiry system machine have been established. In addition to telephone booking, on-site booking, and online booking, patients can also use Alipay mobile phone and WeChat to complete appointment, registration, payment, inspection results and interaction with medical staff. After the first visit, the attending doctor suggests the time of re-visit and completes the appointment to simplify the appointment process. In the registration hall, the video of the hospital outpatient treatment process is rolled out. In the waiting area of the lobby, nurses should remind patients to pay attention to the information on the display screen and prepare for visit. The hospital logo was optimized and the service of each guidance desk was strengthened to provide better and timely guidance for patients. According to the different types of treatment programs, the call queues of assisted reproduction in IT centers and outpatient offices are subdivided into three items: assisted reproduction 1, assisted reproduction 2 and assisted reproduction 3.

On the patient's reexamination card, nurses post entries of different colors to facilitate patient identification and registration. According to the items on the reexamination card, the labeling registration was carried out to solve the problem of patients' calling in different stages of assisted reproduction in the same clinic room. In the expert outpatient call system, the expert pre-check call sequence was increased. Patients will automatically enter the expert call sequence after the end of the pre-examination, and doctors can call again in order, so as to solve the call problem of the same expert in different clinics. The order at the door of the clinic needs to be maintained to avoid congestion and queue jumping caused by heavy traffic. In another clinic, additional numbers, registration, certificate verification, chromosome detection and surgical reservations are set up to avoid interfering with patients' visits and save time for each patient.

Patients can pay by mobile phone Alipay or WeChat. According to the request information sent by hospital information system and patient payment information, laboratory departments send relevant information such as test items, physical requirements, location and so on to patients. After payment, the patients are sampled and examined immediately. After the inspection report is issued, the hospital information system sends it to the attending doctor and the patient himself. At the same time, the patient is arranged in the call system and informed for a second diagnosis and treatment. After the treatment, the doctor updates the patient's electronic medical record, makes prescriptions on the hospital information system and sends them to the pharmacy. The pharmacy is equipped with drugs in advance. At the same time, the patient receives the payment information and goes to the pharmacy to collect the medicine after the payment is completed. After patients leave hospital, online guidance services are arranged, patients' recovery is tracked, and targeted advice is provided according to patients' feedback.

Before the reform, the outpatient department is responsible for the investigation and management of the patient's satisfaction in reproductive clinic. The management level is low, the effect is not obvious, and the patient's satisfaction is poor. Therefore, an independent CQI team should be established to comprehensively lead and organize the management of patients' satisfaction with medical treatment. Attention should be paid to patients' satisfaction. According to FOCUS-PDCA procedure, the working mechanism of each medical staff is determined, the tasks and objectives are clear and the working process is straightened out. Patients' satisfaction with medical treatment is assessed, so as to find problems in time,

and carry out timely rectification in view of the actual problems. Every month, the satisfaction of patients is announced in the outpatient clinic. If the patient's satisfaction is not high, the quality will be improved according to FOCUS-PDCA procedure. Through the implementation of the above measures, reproductive clinic staff is guided to continuously improve the quality of service, so as to improve patient satisfaction.

The patient satisfaction management team publicizes the related issues of process optimization and mobilizes the enthusiasm of each medical staff. In the process of outpatient process optimization, questionnaire survey and on-site interviews were conducted among medical staff and patients to collect survey data on their satisfaction. Through the outpatient information system, the waiting time of patients in the four links of registration, payment, waiting, examination results and waiting for injection were collected and counted. Comparing the data before and after the optimization of outpatient clinics, the successful optimization scheme was analyzed, criteria were formulated according to the successful experience, and the unsuccessful scheme was further optimized. The opinions and suggestions of medical staff and patients collected in the field interviews were summarized in time, and the optimized scheme was improved to provide better service experience for patients.

In this study, SPSS22.0 software was used for statistical analysis of data. All quantitative data were tested for normal distribution and homogeneity of variance, which were expressed as mean±standard deviation. Single factor analysis of variance was used for comparison among groups. LSD test was used for normal distribution and homogeneous variance, and SNK-q test was used for variance. Pearson correlation analysis was used to analyze the correlation between the two parameters, and the difference was significant when $p<0.05$.

The proportion of first visit before and after optimization of outpatient procedure is shown in fig. 1. Before the optimization of outpatient procedure, 19.75 % of the patients visited the hospital for the first time and 80.25 % of the patients not visited the hospital for the first time. After the optimization of outpatient procedure, the proportion of patients who first came to hospital was 12.53, and 87.47 % who were not first came to hospital.

The queuing time of patients before and after optimization of outpatient procedure was compared as

shown in Table 1. It can be seen that in the registration link, the queuing waiting time of the patients before the optimization of the outpatient process was 15.54± 1.34 min, while after the optimization of the outpatient process, the queuing waiting time of the patients was 3.14±0.35 min, and the average waiting time was shortened by 12.40 min. In the payment link, the waiting time of the patients before the optimization of the outpatient process was 22.43±2.07 min, while the waiting time of the patients after the optimization of the outpatient process was 4.06±0.59 min, the average waiting time was shortened by 18.37 min. In the waiting stage, the waiting time of the patients before the optimization of the outpatient process was 33.45± 2.36 min, while the waiting time of the patients after the optimization of the outpatient process was 11.43± 1.07 min, the average waiting time was shortened by 22.02 min. In the waiting injection stage, the waiting time of the patients before the optimization of the outpatient procedure was 106.47±9.93 min, while after the optimization of the outpatient procedure, the waiting time of the patients was 30.45±4.65 min, which the average waiting time was shortened by 76.02 min. These results showed that the waiting time of patients after the optimization of outpatient process was significantly shorter than that before the optimization of outpatient process, and the difference was statistically significant ($p<0.05$). Before the optimization of
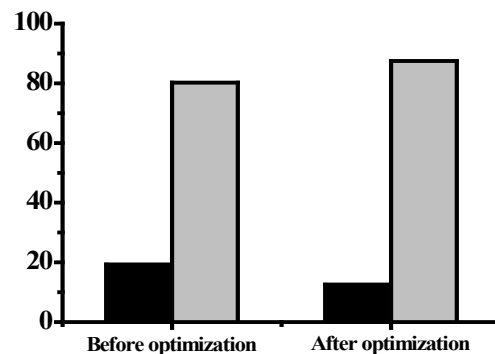

Fig. 1: The proportion of first visit before and after optimization of outpatient procedure
(■) Visiting hospital for the first time, (■) not for the first time

TABLE 1: COMPARISON OF QUEUING WAITING TIME OF PATIENTS BEFORE AND AFTER OPTIMIZATION OF OUTPATIENT PROCEDURE

Waiting time (min)	Before optimizing outpatient procedure	After optimizing outpatient procedure
Registration	15.54±1.34	3.14±0.35
Payment	22.43±2.07	4.06±0.59
Waiting for diagnosis	33.45±2.36	11.43±1.07
Waiting for injection	106.47±9.93	30.45±4.65

outpatient procedure, the average queuing waiting time of patients in each link was 177.89 min. After the optimization of outpatient procedure, the average queuing waiting time of patients in each link was 49.06 min, which was shortened by 128.83 min before and after the optimization.

The comparative results of questionnaires on satisfaction of medical staff before and after optimization of outpatient procedure are shown in Table 2. From the evaluation of seven items, which are guidance sign, equipment layout, outpatient informatization, assistant material placement, workload, working environment and safety, it can be seen that the satisfaction score of medical staff after outpatient process optimization was higher than that before outpatient process optimization, and the difference was statistically significant ($p<0.05$). Before the optimization of outpatient procedure, the average score of medical staff satisfaction with seven items was only 66.73, while after the optimization of outpatient procedure, the average score of medical staff satisfaction with seven items reaches 90.44, which increases by 23.71.

Questionnaire results of patient satisfaction before and after optimization of outpatient procedure are shown in Table 3. In the guidance service, the patients' satisfaction score before the optimization of outpatient process was 65.42±2.90, and after the optimization of outpatient process, the patients' satisfaction score was 90.53± 5.24, and the average score was increased by 25.11 points. On the guidance signs, the patient satisfaction score before the optimization of the outpatient process was 69.78±3.58, and after the optimization of the outpatient process, the patient satisfaction score was 95.51±5.85, with an average

TABLE 2: COMPARISON OF SATISFACTION QUESTIONNAIRES OF MEDICAL STAFF BEFORE AND AFTER OPTIMIZATION OF OUTPATIENT PROCEDURE

Item score (score)	Before optimizing outpatient procedure	After optimizing outpatient procedure
Guidance sign	60.46±4.73	89.88±7.14
Equipment layout	65.58±5.46	90.43±7.59
Outpatient informatization	71.20±5.87	95.69±8.32
Assistant material placement	72.43±5.90	93.54±7.60
Work load	57.39±3.32	83.24±6.97
Working environment	60.43±4.12	85.72±7.00
Safety	79.65±6.56	94.58±8.04

TABLE 3: QUESTIONNAIRE RESULT OF PATIENT SATISFACTION BEFORE AND AFTER OPTIMIZING OUTPATIENT PROCEDURE

Item score (score)	Before optimizing outpatient procedure	After optimizing outpatient procedure
Guidance service	65.42±2.90	90.53±5.24
Guidance sign	69.78±3.58	95.51±5.85
Queuing waiting time	68.19±3.11	81.30±4.36
Efficiency of medical staff	70.28±4.05	97.50±5.90
Number of queues	59.17±2.57	88.38±4.97

increase of 25.73 points. In terms of waiting time, patient satisfaction score before optimization of outpatient procedure was 68.19±3.11, while patient satisfaction score after optimization of outpatient procedure was 81.30±4.36, with an average increase of 13.11 points. In terms of medical staff's work efficiency, patient satisfaction score before optimization of outpatient procedure was 70.28±4.05, and patient satisfaction score after optimization of outpatient procedure was 97.50±5.90. The average score is increased by 27.22 points. On the number of queues, the satisfaction score of patients before optimization of outpatient procedure was 59.17±2.57 and 88.38±4.97 after optimization of outpatient procedure. The average score was increased by 29.21 points. According to the results, the scores of patient satisfaction after the optimization of outpatient process are higher than those before the optimization of outpatient process, and the differences are statistically significant ($p<0.05$). Before the optimization of outpatient process, the average score of patients satisfactions with five items was only 66.57, while after the optimization of outpatient process, the average score of patient satisfactions with 7 items reached 90.64, an increase by 24.07.

In this study, the application of FOCUS-PDCA in reproductive outpatient procedure and patient satisfaction were studied. In this study, the patients in reproductive clinic were taken as the research object. Based on FOCUS-PDCA program, the outpatient flow was optimized and the patient satisfaction management mechanism was established. Through questionnaires and on-site interviews with medical staff and patients, the data of satisfaction survey were collected, and the waiting time of patients in the four links of registration, payment, waiting for treatment and waiting for injection was counted, so as to evaluate the effect of outpatient process optimization. The results showed that in the four links of registration, payment, waiting

for treatment and waiting for injection, the waiting time of patients after optimization of outpatient procedure was significantly shorter than that before optimization of outpatient procedure, and the difference was statistically significant ($p < 0.05$).

Before the optimization of outpatient procedure, the total average waiting time of patients in each link was 177.89 min. After the optimization of outpatient procedure, the average queuing waiting time of patients in each link was 49.06 min, which was shortened by 128.83 min, and the efficiency of medical treatment was effectively improved. When the evaluation is made from 7 items, which were, guidance sign, equipment layout, outpatient information, assistant material placement, workload, working environment and safety. After the optimization of outpatient process, the satisfaction score of medical staff was higher than that before the optimization of outpatient process, and the difference was statistically significant ($p < 0.05$). Before the optimization of outpatient process, the average score of medical staff satisfaction with 7 items was only 66.73, while after the optimization of outpatient process, the average score of medical staff satisfaction with 7 items reached 90.44, an increase by 23.71 points. When the evaluation was made from 5 items, guidance service, guidance sign, waiting time in queue, efficiency of medical staff and queuing times. After the optimization of outpatient process, patient satisfaction score was higher than that before the optimization of outpatient process, and the difference was statistically significant ($p < 0.05$). Before the optimization of outpatient process, the average score of patient satisfaction with 5 items was only 66.57, while after the optimization of outpatient process, the average score of patient satisfaction with five items reached 90.64, an increase of 24.07 points.

In this study, the application of FOCUS-PDCA in reproductive outpatient procedure and patient satisfaction were studied. Based on FOCUS-PDCA procedure, the reproductive outpatient service process in hospital was optimized to shorten the waiting time of patients in the process of consultation, reduce the working pressure of medical staff, and improve the patient satisfaction. However, there are also some shortcomings in the process of this study, such as the small amount of data collected from the samples, which leads to a certain degree of deviation of the results. Therefore, in the later research process, the data capacity will be further increased to make the results more valuable.

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