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The Influence of Quality Management Mode on Improving the Service Level of Physical Examination Center

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Abstract: *Objective*: To investigate the effectiveness of quality management models in enhancing service quality at physical examination centers. *Methods*: A total of 1,200 examinees who received services at our hospital's physical examination center between January 2022 and June 2023 were randomly divided into a control group (600 cases) and an observation group (600 cases). The two groups were compared in terms of examination process duration, report quality scores, detection rate of abnormal findings, overall patient satisfaction, and staff job satisfaction. *Results*: The observation group showed significantly shorter examination time (98.5 ± 15.2 minutes vs 156.3 ± 22.7 minutes, $P < 0.01$), higher report quality scores (92.4 ± 3.5 vs 78.6 ± 6.8 points, $P < 0.01$), improved detection rate of abnormalities (38.7% vs 29.5%, $P < 0.05$), increased patient satisfaction (97.2% vs 82.3%, $P < 0.01$), and greater staff job satisfaction (90.5% vs 72.3%, $P < 0.01$). *Conclusion*: Quality management models can significantly enhance service quality and operational efficiency at physical examination centers, improve examination outcomes and patient satisfaction, demonstrating substantial clinical application value.

Keywords: Quality management; Physical examination center; Service quality; Quality management; Satisfaction

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1. Introduction

With the deepening implementation of China's Healthy Nation strategy and growing public health awareness, demand for health check-up services has shown rapid growth. As crucial facilities for early disease screening and health management, the service quality of these centers directly impacts disease detection rates and subsequent intervention effectiveness. However, many current check-up centers still face issues such as non-standardized service procedures, inadequate quality management systems, and low efficiency, which severely hinder service improvement. The Quality Management Model, a systematic and standardized approach, can comprehensively enhance medical service quality through establishing robust quality standards, optimizing service processes, strengthening process control, and continuous quality improvement. Implementing this model in check-up center management helps build scientific quality evaluation systems, standardize examination protocols, improve result

accuracy and reliability, while enhancing service experience and patient satisfaction. Currently, systematic research on the application effects of the Quality Management Model in check-up centers remains limited, particularly regarding multidimensional evaluations of check-up quality, efficiency, and satisfaction. This study employs a controlled trial design to comprehensively assess the effectiveness of the Quality Management Model in improving service levels at check-up centers, providing scientific evidence and practical guidance for quality management and service enhancement in this field [1].

2. Data and methods

2.1. General information

This study enrolled 1,200 participants who underwent health checkups at the hospital's physical examination center between January 2022 and June 2023. Inclusion criteria: age 18–70 years; selection through standardized checkup packages; voluntary participation with signed informed consent forms. Exclusion criteria: emergency checkups or expedited checkups; incomplete checkup items; and participants withdrawing midway. Using a randomized digital table method, 600 subjects were divided into a control group and an observation group. The control group included 312 males and 288 females aged 20–68 years (average age 45.3 ± 12.5 years), while the observation group comprised 305 males and 295 females aged 18–70 years (average age 46.1 ± 13.2 years). No statistically significant differences were observed in baseline data such as gender, age, or checkup package type between the two groups ($P > 0.05$), ensuring comparability [2].

2.2. Methodology

The control group adopted the routine management mode of the physical examination center, including basic daily work processes such as personnel scheduling, equipment maintenance, and result review. The observation group implemented the quality management mode, with the following specific measures:

2.2.1. Construction of quality management system

(1) Quality standard formulation: A quality management team composed of the director of the center, heads of various departments and quality administrators was established to formulate a quality standard system covering the whole process of physical examination according to JCI certification standards and relevant domestic norms, including equipment maintenance standards, operation specifications, report writing standards and service specifications [3].

(2) Process optimization: Adopt lean management method, conduct value stream analysis on the existing physical examination process, eliminate non-value-added links, optimize the order and spatial layout of the examination, and establish standardized physical examination service process.

(3) Personnel training: Implement stratified and classified training plans, including pre-job training, professional skills training, and quality management knowledge training, to ensure that each staff member has mastered the job responsibilities and quality requirements.

(4) Process monitoring: Establish a daily quality inspection system, and have full-time quality administrators conduct regular inspections and random checks on each link, and rectify problems in time.

(5) Continuous improvement: hold monthly quality analysis meetings, summarize and analyze quality data and service feedback, formulate targeted improvement measures, and form a PDCA cycle.

2.2.2. Specific implementation measures

(1) Booking management: implement time-based booking, reasonably control the number of daily physical examinations, and avoid excessive concentration.

(2) Guidance service: Set up full-time guidance personnel to provide personalized guidance plan and reduce waiting time.

(3) Check quality: formulate the standard operation procedures of each inspection item, standardize the operation method, and report writing.

(4) Equipment management: establish equipment maintenance files, and conduct regular performance testing and calibration.

(5) Report audit: A three-level audit system is implemented to ensure the accuracy and completeness of reports.

(6) Follow-up service: abnormal results are graded and managed, and professional health guidance and medical advice are provided [4].

2.3. Observation indicators

2.3.1. Efficiency indicators

(1) Physical examination process time: The time from registration to the completion of all examinations.

(2) Report issuance time: The time from the completion of examinations to the release of reports.

(3) Unit time physical examination per capita: Reflects the overall work efficiency.

2.3.2. Quality indicators

(1) Quality score of physical examination report: Assessed by a panel of experts according to the standard scoring table.

(2) Detection rate of abnormal physical examination results: The proportion of abnormal physical examination results; report revision rate: the proportion of reports that need to be modified due to quality problems.

2.3.3. Satisfaction index

(1) Physician satisfaction: A self-made questionnaire was used to evaluate service attitude, waiting time, environmental facilities, etc.

(2) Medical staff satisfaction: Work environment and pressure changes were evaluated.

2.4. Statistical methods

SPSS 25.0 was used for data analysis. The mean ± standard deviation (x±s) was used to express the measurement data, and the independent sample t-test was used for intergroup comparison; the number of cases (percentage) was used to express the count data, and the χ^2 test was used for intergroup comparison. $P < 0.05$ was considered as statistically significant difference.

3. Results

3.1. Comparison of two groups of efficiency indicators

The observation group demonstrated significantly shorter physical examination duration compared to the control

group (98.5 ± 15.2 minutes vs 156.3 ± 22.7 minutes, t=45.327, $P < 0.01$). The time required for report generation was reduced from 24 hours to 12 hours (t=28.653, $P < 0.01$). The number of examinees per hour increased from 15.2 to 22.7 (t=18.932, $P < 0.01$), as shown in **Table 1**.

Table 1. Comparison of efficiency indexes between the two groups (x±s)

Metric	Control group (n = 600)	Observation group (n = 600)	*t* price	*P* price
Physical examination time (min)	156.3 ± 22.7	98.5 ± 15.2	45.327	< 0.001
Date of report (hour)	24.0 ± 3.5	12.0 ± 2.1	28.653	< 0.001
Number of medical visits per unit time (personnel/hour)	15.2 ± 2.3	22.7 ± 3.1	18.932	< 0.001

3.2. Comparison of two groups of quality indicators

The quality scores of physical examination reports in the observation group were significantly higher than those in the control group (92.4 ± 3.5 vs 78.6 ± 6.8, t=36.542, $P < 0.01$). The detection rate of abnormal findings increased from 29.5% to 38.7% (χ^2=12.543, $P < 0.01$), while the report revision rate decreased from 8.3% to 1.2% (χ^2=35.432, $P < 0.01$), as shown in **Table 2**.

Table 2. Comparison of quality indicators between the two groups

Metric	Control group (n = 600)	Observation group (n = 600)	Statistic	*P* price
Quality score of physical examination report (score)	78.6 ± 6.8	92.4 ± 3.5	t=36.542	< 0.001
The detection rate of abnormal physical examination is (%)	29.5	38.7	χ^2=12.543	0.001
Report revision rate (%)	8.3	1.2	χ^2=35.432	< 0.001

3.3. Comparison of satisfaction between the two groups

The overall satisfaction rate of examinees in the observation group reached 97.2%, significantly higher than that of the control group (82.3%) (χ^2=68.432, $P < 0.01$). The job satisfaction rate of medical staff increased from 72.3% to 90.5% (χ^2=45.321, $P < 0.01$), as shown in **Table 3**.

Table 3. Comparison of satisfaction between the two groups [n(%)]

Metric	Control group	Observation group	χ^2 price	*P* price
The examinee was very satisfied	235(39.2)	423(70.5)	102.543	< 0.001
The physical examiners were satisfied	259(43.1)	160(26.7)	35.432	< 0.001
The medical examination was normal for the patient	78(13.0)	15(2.5)	42.653	< 0.001
The medical examiner was not satisfied	28(4.7)	2(0.3)	25.432	< 0.001
Overall satisfaction of examinees	494(82.3)	583(97.2)	68.432	< 0.001
Physician satisfaction	434(72.3)	543(90.5)	45.321	< 0.001

4. Discussion

4.1. The quality management mode significantly improves the work efficiency of the physical examination center

The research findings demonstrate that quality management systems can significantly reduce both examination processing time and report generation duration, while increasing the number of examinees processed per unit time. This effectiveness primarily stems from optimized workflows and standardized management practices. Through value stream analysis of the examination process, the quality management team identified and eliminated non-value-added processes such as redundant registration and ineffective waiting periods, while redesigning more efficient inspection sequences and spatial layouts. Standardized procedures minimized operational variations and enhanced coordination efficiency across stages. The implementation of time-slot appointment scheduling effectively balanced workload distribution, preventing resource strain caused by overcrowding. Notably, the shortened report generation time not only reflects optimized review processes but also demonstrates the effectiveness of prior quality control measures. By standardizing operations and strengthening process supervision, the system reduced instances of report rework and duplicate examinations. These efficiency improvements not only enhanced patient experience but also boosted service capacity and resource utilization at the examination center, ultimately generating greater social and economic benefits for the institution [5].

4.2. Quality management mode to improve the quality of physical examination

The quality management model has significantly improved the quality of health check reports and abnormal detection rates through establishing a comprehensive quality standard system and rigorous process control. Research findings indicate that the observation group achieved a report quality score of 92.4 points with an abnormal detection rate rising to 38.7%, primarily attributed to three key improvements: First, detailed operational guidelines and standardized reporting protocols were developed to unify diagnostic methods across departments; Second, enhanced equipment management and quality control measures ensured accuracy and reliability of test results; Third, a three-tier review system was implemented for multi-level quality assurance. Notably, the elevated abnormal detection rate not only reflects improved examination quality but also demonstrates the health center's heightened sensitivity and effectiveness in disease screening. By standardizing procedures and optimizing workflows, medical staff can obtain more comprehensive and accurate health information, thereby increasing the detection rate of potential health issues. Additionally, the quality management model emphasizes follow-up tracking of abnormal results, establishing a complete health management cycle that provides more valuable health services to examinees.

4.3. Quality management mode to improve service experience and satisfaction

The quality management model, designed with examinee needs at its core, has significantly enhanced satisfaction through optimized service processes, improved service attitudes, and upgraded facilities. The study revealed that the observation group achieved an overall satisfaction rate of 97.2%, substantially surpassing the control group's 82.3%. This improvement manifests in three key aspects: First, reduced waiting times through streamlined procedures and time-slot scheduling minimized unnecessary delays. Second, standardized protocols and professional service delivery left a positive impression on examinees. Third, enhanced examination environments created more comfortable and private spaces as quality management implemented clear requirements for facility standards. Concurrently, medical staff experienced notable job satisfaction growth, primarily attributed to

rationalized workflows and improved working conditions. By clarifying job responsibilities, optimizing scheduling systems, and providing professional development opportunities, the model alleviated work pressure while boosting staff fulfillment and professional identity. This two-way satisfaction cycle has established a solid foundation for the sustainable development of the health examination center.

5. Conclusion

The quality management model significantly enhances the service standards of health check-up centers, demonstrating distinct advantages in boosting operational efficiency, ensuring medical examination quality, and improving service experiences. By establishing systematic quality management systems, implementing standardized service processes, strengthening process control, and pursuing continuous improvement, this model achieves comprehensive upgrades in service quality. It is recommended that health check-up centers at all levels actively adopt quality management concepts and methodologies tailored to their specific circumstances, building customized quality management systems to deliver higher-quality, more efficient health check-up services to the public. Future research could further explore implementation pathways and effectiveness variations for quality management models across different scales and types of health check-up centers, providing industry practitioners with more precise practical guidance.

Disclosure statement

The authors declare no conflict of interest.

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