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Exploring Refined Pathways for Medical Record Management Based on Quality Control

Bixia Ye*

Hua Tuo Hospital, Duanzhou District, Zhaoqing City, Guangdong Province, China
yebixia2025@163.com
**Corresponding author*

Abstract: *This study investigated the impact of quality control (QC) on medical record management. We analyzed 300 medical records from January 2023 to August 2024, divided into two groups: a control group (n=150) managed conventionally and an observation group (n=150) where QC measures were implemented. Both groups were managed by 20 medical staff. Our findings indicate that the observation group, utilizing QC, achieved significantly higher scores across various management aspects, including regular inventory checks, location-based management, organization and archiving, disease coding, medical record registration, and content verification (P<0.05). While baseline assessments of assessment systems, information entry, and quality supervision showed no significant differences between groups (P>0.05), post-management scores were significantly higher in the observation group (P<0.05). Furthermore, the observation group demonstrated a markedly lower incidence of adverse events (2.00%) compared to the control group (14.00%) (P<0.05). These results suggest that implementing quality control measures significantly enhances the quality of medical record management and substantially reduces adverse events, highlighting its value for widespread adoption in healthcare settings.*

Keywords: *Quality Control, Medical Record, Management Quality, Risk Prevention*

1. Introduction

With the rapid advancement of medical technology, medical record management has gradually become a key focus of hospital administration. Its quality is closely related to medical service standards, overall hospital management efficiency, and patient treatment safety. Medical records contain textual, imaging, and graphical information generated during diagnosis and treatment, serving as the foundation for hospital operations. They encompass all patient medical information, playing a crucial role in improving healthcare quality, ensuring medical safety, and advancing medical research [1]. Conventional medical record management typically includes storing patient names and classifying records based on diseases. While these methods meet basic management requirements, they face significant challenges such as low efficiency, difficulty in retrieval, and limited information utilization [2]. Additionally, as the volume of medical data continues to grow, the limitations of traditional paper-based record management have become increasingly apparent, making it difficult to meet modern healthcare demands. Quality control, through a series of management measures and strategies, effectively supervises and regulates various stages of medical record management, ensuring compliance with established standards. It enhances the completeness and accuracy of medical record documentation, reduces the occurrence of medical disputes, and standardizes record management processes [3]. Furthermore, quality control provides hospitals with comprehensive and precise information support. Its application significantly improves the utilization of medical record data, fostering the development of medical science.

Based on these considerations, this study aims to analyze the effectiveness of quality control in medical record management.

2. Literature Review

In recent years, the rapid advancement of medical technology and the increasing complexity of healthcare services have made medical record management a critical aspect of hospital administration. The quality of medical record management directly impacts patient safety, the improvement of medical quality, and the overall development of hospitals [4]. With the continuous enhancement of medical

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information systems, medical record management has transitioned from conventional manual processes to intelligent and electronic management. However, this shift has also introduced challenges such as increased management complexity and a growing volume of data. Medical records not only reflect real medical events but also serve as key references for evaluating medical quality, assessing medical incidents, and processing medical insurance claims. Therefore, ensuring the effective management and utilization of medical record resources, as well as improving management efficiency and quality, is a pressing issue for healthcare institutions.

Traditional medical record management primarily involves collecting, organizing, storing, and retrieving records. While these basic functions can support medical activities to some extent, the increasing volume of medical data and the complexity of healthcare environments have made conventional management insufficient [5]. Issues such as incorrect record entries, incomplete records, damaged or lost records significantly impact the improvement of medical record management quality. Furthermore, conventional management often lacks a comprehensive quality control system, making it difficult to monitor the entire management process effectively, which in turn affects accurate evaluations. The application of quality control in medical record management plays a crucial role in addressing these challenges. Quality control establishes clear standards, enforces inspections, and implements targeted preventive and corrective measures to ensure quality compliance at every stage of medical record management. Specifically, quality control enables real-time monitoring of record entry, archiving, coding, and retrieval, allowing early detection and resolution of management issues to ensure the reliability and accuracy of medical record information [6]. Additionally, quality control enhances the overall competency of management personnel by fostering awareness of quality management and responsibility, thereby ensuring efficient medical record management operations. By implementing quality control measures, medical record management not only provides patients with better medical services but also continuously improves healthcare quality and supports further medical research [7].

3. Research Design

3.1 Materials

A total of 150 medical records from our hospital between January 2023 and August 2024 were selected as the control group, while another 150 medical records from the same period were chosen as the observation group. A comparison of the general data between the two groups showed no statistically significant difference ($P>0.05$).

3.2 Research Methods

3.2.1 Control Group

Conventional Management: Medical record management is conducted in accordance with national regulations and hospital-specific procedures. Records are collected, verified, archived, borrowed, and planned accordingly. If any issues are identified, they are promptly reported to higher authorities and addressed through targeted corrective actions. Quality control involves identifying and addressing issues in conventional management while summarizing common problems in medical record management based on past practices. These issues include patients undergoing multiple visits but still relying on initial diagnosis records without timely updates, insufficient documentation of basic patient information, incomplete records that hinder effective follow-up, vague patient descriptions, and inadequate recording of imaging data. The root cause of these issues lies in the lack of a well-developed hospital management system, particularly in detailed record-keeping, which increases the incidence of medical disputes. Therefore, it is essential to establish a quality control model that aligns with the hospital's operational framework.

3.2.2 Observation Group

Developing a comprehensive quality management system requires hospitals to implement structured quality control policies across departments, regulating personnel behavior through institutional guidelines. Medical staff should leverage available resources to precisely define their roles while ensuring efficient medical record collection, binding, verification, archiving, and preservation. Staff members must master surgical classification coding and international disease classification methods, accurately documenting patient records while safeguarding patient privacy. Medical record management should also incorporate security review protocols, record-keeping policies, and archiving procedures,

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with responsibilities assigned down to individual personnel. Any issues detected must undergo verification at various levels, from teams to individual staff. Medical record statistics should be managed by designated personnel following strict regulations, with an incentive and penalty system in place.

Precision quality control in medical record management is critical, as errors in information entry often compromise data authenticity and reliability. To mitigate this risk, meticulous management must be applied. Information technology should be used to standardize medical record writing, data input, scanning, and archiving, ensuring a cohesive and structured system. Additionally, rigorous analysis and supervision during archiving are necessary to uphold the integrity of medical records. Throughout the process, thorough checks should be conducted to identify missing characters or pages, and any discrepancies should be immediately reported to physicians for correction, minimizing potential errors.

Security management is also crucial, as medical records play a pivotal role in improving patient treatment quality, reducing medical disputes, and serving as key references for judicial cases and hospital insurance claims. Strengthening hospital medical record security is imperative, and refined quality control measures emphasize meticulous oversight of record storage. Specialized anti-pest, anti-theft, fire prevention, and mold-proof equipment should be installed in record rooms, supplemented by electronic surveillance. Regular electronic database inspections should be conducted to detect and address vulnerabilities. Additionally, strict supervision of borrowed medical records must be enforced through clear borrowing guidelines. If records are not returned on time, the borrowing party must be contacted and reported, ensuring follow-up tracking to prevent information loss. Before archiving, meticulous verification ensures that data is not altered, confused, or lost.

3.3 Observation Indicators

(1) Management quality score, including indicators such as regular inventory checks, location-based management, organization and archiving, disease coding, medical record registration, and content verification. A higher score indicates better management quality.

(2) Observation of assessment systems, information entry, and quality supervision scores.

(3) Observation of adverse events, including record confusion, formatting errors, lost records, missing pages, and incorrect information.

3.4 Statistical Methods

The data in this study were processed using SPSS 20.0 statistical software. Measurement data were expressed as ($\overline{x} \pm s$), and count data were presented as rates (%). The t-test and chi-square (χ^2) test were used for analysis. A comparison between the two groups showed a significant difference ($P<0.05$).

4. Data Analysis

4.1 Management Quality Score

The management quality score in the observation group was higher than that in the control group, with a significant difference between the two ($P<0.05$), as shown in Table 1.

Table 1 Comparison of Management Quality Scores Between the Two Groups ($\overline{x} \pm s$, points)

Group	Sample Size	Regular Inventory	Location-Based Management	Organization & Archiving	Disease Coding	Medical Record Registration	Content Verification
Control Group	20	91.35±4.25	87.56±5.12	92.41±4.15	90.56±2.34	88.95±5.64	89.15±5.12
t-value	20	94.28±2.16	91.29±6.38	95.28±4.26	93.18±3.05	92.34±4.56	92.67±4.85
t		2.748	2.039	2.158	3.048	2.090	2.232
P		0.009	0.048	0.037	0.004	0.043	0.032

4.2 Assessment System, Information Entry, and Quality Supervision Scores

After management intervention, the observation group had higher scores in assessment system,

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information entry, and quality supervision compared to the control group (P<0.05), as shown in Table 2.

Table 2 Comparison of Assessment System, Information Entry, and Quality Supervision Scores Between the Two Groups ($\bar{x} \pm s$, points)

Group	Sample Size	Assessment System		Information Entry		Quality Supervision	
		Before Management	After Management	Before Management	After Management	Before Management	After Management
Control Group	20	69.53±6.18	88.45±6.25	63.34±8.26	83.14±7.54	71.15±6.37	88.85±6.18
Observation Group	20	69.61±6.23	92.34±3.18	62.98±8.31	90.51±6.69	71.23±6.43	92.35±4.12
t		0.041	2.481	0.137	3.269	0.039	2.107
P		0.968	0.018	0.891	0.002	0.969	0.042

4.3 Occurrence of Adverse Events

The overall incidence of adverse events was lower in the observation group, showing a significant difference compared to the control group (P<0.05), as shown in Table 3..\

Table 3 Comparison of Adverse Event Incidence Between Two Groups [n (%)]

Group	Cases (n)	Case Confusion	Formatting Errors	Case Loss	Missing Pages	Information Errors	Total Incidence Rate (%)
Control Group	150	2	7	3	6	3	21(14.00)
Observation Group	150	0	1	0	1	1	3(2.00)
x^2							14.674
P							0.000

5. Conclusions and Recommendations

5.1 Conclusions

Data analysis indicates that the observation group scored higher than the control group in several aspects, including regular inventory checks, location management, archival organization, disease coding, medical record registration, and content verification. This demonstrates that the implementation of quality control significantly improves medical record management. The improvement in regular inventory check scores further highlights the advantages of establishing a well-structured inventory system and standardized processes, ensuring the validity and completeness of medical record data. This reduces the likelihood of record loss and enhances the utilization rate of medical records. Optimizing location management through scientific record-keeping systems ensures more reasonable placement of medical records, making retrieval more efficient, reducing search time, and significantly improving work efficiency. Regarding archival organization, the observation group adopted standardized and regulated archival procedures, ensuring that each medical record is effectively stored, facilitating future management and retrieval, and notably reducing disorder caused by improper archiving [8]. The improvement in disease coding accuracy is closely related to the observation group's regular training of coding personnel and strict adherence to coding rules, ensuring consistency between diagnoses and codes. This provides accurate data support for clinical statistics and medical reimbursement. Medical record registration has been enhanced, primarily due to the observation group's adoption of digital solutions, such as electronic medical record systems, which enable real-time recording and updating of patient information. This reduces human errors and improves data accuracy and timeliness. Results indicate that the observation group achieved significantly higher scores in post-management evaluation systems, data entry, and quality supervision compared to the control group. This suggests that the application of quality control effectively improves both the accuracy of medical record documentation and the overall quality management level. The reasons are as follows: The observation group established relatively comprehensive assessment indicators that incorporate both the timeliness and completeness of medical records while implementing a continuous quality improvement system to ensure the effectiveness and fairness of evaluations. In contrast, the control group lacked a dynamic adjustment system for evaluations and had insufficient quantifiable standards, making it difficult to accurately assess the real status of medical record management, which in turn affected scoring. Additionally, the observation group utilized structured and standardized electronic medical record systems, combined with regular training, learning

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sessions, and guidance, which significantly improved the accuracy of medical record data entry by medical staff [9]. The system includes mandatory field prompts and proofreading functions, minimizing errors and omissions in data entry to ensure that medical record information is complete and reliable. In contrast, conventional management primarily relies on manual record-keeping, where data entry is highly susceptible to external factors, resulting in higher omission and error rates, which ultimately affect overall assessment scores. Additionally, quality control is implemented through a comprehensive and multi-level supervision system, including specialized inspections, self-assessments, regular sampling audits, and digital monitoring. This ensures timely feedback on supervisory effectiveness at each stage. Such a dynamic oversight model further enhances the traceability and transparency of medical record management, allowing early identification of issues and continuous improvement [10]. In contrast, the control group primarily adopted centralized management, with limited supervision frequency, making it difficult to oversee the entire medical record management process, thereby affecting overall quality control. Results indicate that the observation group had a lower overall incidence rate of adverse events compared to the control group. This demonstrates that the application of quality monitoring can significantly reduce the occurrence of adverse events and ensure effective quality management.

In conclusion, quality control has significant advantages in medical record management. It not only enhances the quality of record management but also reduces the incidence of adverse events, making it a valuable approach for adoption and promotion.

5.2 Recommendations

5.2.1 Continuous Optimization of the Quality Control System

Hospitals should regularly evaluate the effectiveness of their quality control system, gathering feedback from medical staff and patients to promptly revise any deficiencies in the system. For instance, based on newly emerging medical record management issues, hospitals should further refine job responsibilities, optimize reward and penalty mechanisms, and enhance staff motivation. This ensures that the system remains up-to-date, better aligning with hospital development and patient needs.

5.2.2 Continuous Optimization of the Quality Control System

Increase training frequency and diversify content. In addition to fundamental topics such as coding rules and documentation standards, training should also include case studies and simulation exercises to enhance the practical skills of medical staff. Personalized training programs should be tailored for different roles, providing systematic foundational training on medical record management for new employees, while offering advanced management concepts and technical training for experienced personnel, ensuring overall professional development.

5.2.3 Deepen the development and application of informatization

Increase investment in information system construction and introduce more advanced medical record management systems. Utilize artificial intelligence technology to achieve automatic recognition, classification, and error correction of medical record information, improving entry efficiency and accuracy. Establish a data-sharing platform to enable real-time exchange of medical record information among departments, facilitating doctors in reviewing and updating patient data while reducing errors caused by untimely information updates.

5.2.4 Enhance interdepartmental collaboration and communication

Establish a joint working group composed of the medical record management department, clinical departments, and the information department, holding regular meetings to collectively discuss and address issues encountered in medical record management. For example, clinical departments can promptly provide feedback on problems identified during the use of medical records, while the information department can optimize system functions based on needs. Through interdepartmental collaboration, a combined effort is formed to jointly improve the quality of medical record management.

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