

Quality Analysis of 10 954 Inpatient Medical Record Front Pages in a Secondary-level Public Hospital

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Abstract: ***Objective:** To analyze the quality of inpatient medical record front pages from a secondary-level public hospital in Wuhan, Hubei province, so as to provide support for establishing high-quality front-page data. **Methods:** All 10 954 inpatient medical record front pages in 2024 at the hospital were audited. Compliance was evaluated per the Specifications for Data Quality of Inpatient Medical Record Front Pages. **Results:** Among the reviewed records, 2 937 (26.81 %) contained defects, totaling 5770 defects (average: 1.96 defects per front page). The primary issues identified in the defect analysis of medical record front pages are concentrated in the following categories with their respective frequencies: surgical/procedural information defects (27.31 %), discharge diagnosis or coding defects (22.06 %), defects in ethnicity/nationality/gender/age-related fields (17.76 %), and ID/contact information defects (13.07 %). Further analysis reveals a statistically significant correlation between high-frequency defects and specialty groups. The surgical-rehabilitation group is more prone to procedural or operational defects, while the internal-medicine group exhibits higher rates of diagnostic or coding errors, with no notable differences in basic-information defects between the two groups. **Conclusions:** The key issues in the hospital's medical record front page can be resolved through three measures: enhancing training programs, advancing informatization, and improving the quality-control management system.*

Keywords: Medical record front page, Quality analysis, Pareto charts, High-frequency defects, Countermeasures.

1. Introduction

As a vital component of hospital information systems, inpatient medical record front-page data quality directly affects hospital administration, medical quality evaluation, medical insurance payment, and other critical links. Multiple important workstreams, including Diagnosis-Related Group (DRG) payment, public hospital performance appraisal, epidemiological surveillance, hospital accreditation, and key specialty evaluation, all rely on accurate and complete front-page data of inpatient medical records. Nevertheless, numerous defects exist in real-world front-page data, greatly limiting its practical value. This study conducts quality analysis on inpatient medical record front pages from a secondary-level public hospital, so as to deliver empirical evidence for quality improvement.

2. Materials and Methods

2.1 Data Sources

All 10 954 inpatient medical record front pages generated from January 1, 2024 to December 31, 2024 in a secondary-level public hospital in Wuhan, Hubei Province were enrolled. The *advancing informatization* covers all departments of the hospital and is representative.

2.2 Research Methods

Quality-control standards adopted in this study include the Specifications for Data Quality of Inpatient Medical Record Front Pages (Interim) and Quality Management and Control Indicators for Inpatient Medical Record Front-Page Data (2016 Version) [1]. ICD-10 and ICD-9-CM-3 serve as coding references for diagnoses, surgeries and procedures. A special inspection panel for medical-record-front-page review was set

up, consisting of three coders, among whom two are associate-senior-title quality-control specialists; all members have rich experience in medical-record administration and quality surveillance.

The inspection panel divided front-page content into 12 defect items across four dimensions: diagnosis-and-treatment information, basic demographic information, hospitalization-process information and expense information. Manual review and statistical analysis were performed. Considering specialty relevance, degree of inter-department overlap and medical-record volume, hospital departments were classified into two major groups: internal-medicine group and surgical-rehabilitation group, to explore the correlation between specialty grouping and defect patterns.

2.3 Statistical Methods

WPS Office was used to process defective-item data. Indicators including overall defect rate, constituent ratio and frequency of each defect category were calculated; a Pareto chart was plotted. SPSS 19.0 software was adopted for χ^2 test to analyze associations between three major high-frequency defects and specialty groups. The significance level α was set at 0.01. Bonferroni correction was applied for pairwise comparisons, adjusting α to 0.005. $P < \alpha$ indicated statistically significant difference.

3. Results

Among the 10 954 inpatient medical record front pages, 2 937 records contained defects, corresponding to a defect rate of 26.81 %. The total number of defective items reached 5 770, with an average of 1.96 defective items per defective front page. Records with two defective items accounted for the largest subset (1 460 cases, 49.71 %) (Table 1).

Based on defect frequencies in Table 2, the Pareto chart showed that defect distribution followed the Pareto principle ("80/20 rule"). Over 80 % of all defective items fell into four categories within diagnosis-treatment information and basic demographic information (Figure 1). Ranked by frequency from high to low, these categories were: surgical- or procedure-related information defects (27.31 %), discharge diagnosis or coding defects (22.06 %), defects in ethnicity/nationality/gender/age-related fields (17.76 %), and ID-number-and-contact-information defects (13.07 %). Based on the underlying causes, the latter two categories were merged as basic-information defects for statistical purposes. Correlation analysis was performed between three defect categories and specialty groups (Table 3).

Hypothesis H₀: no difference in defect patterns between the

two groups; Hypothesis H₁: defect patterns differ between groups. The χ^2 value was 136.25 with $P < 0.01$. H₀ was rejected and H₁ was supported, demonstrating statistically significant differences in defect patterns between the internal-medicine group and the surgical-rehabilitation group.

Pairwise inter-group comparison of the three defect categories is shown in Table 4. The surgical-rehabilitation group presented higher risks of surgical-or-procedure-related defects, while the internal-medicine group was more susceptible to diagnosis-and-coding defects; both differences were statistically significant. Although the proportion of basic-information defects was slightly higher in the internal-medicine group, no statistical significance was observed ($\chi^2 = 1.04$).

Table 1: Number of defective inpatient medical-record front pages in a secondary-level public hospital

Rank	Number of defective items per front page	Number of medical records	Constituent ratio (%)
1	2 items	1 460	49.71
2	1 item	928	31.60
3	≥ 3 items	549	18.69
Total	—	2 937	100.00

Table 2: Defective-item distribution of inpatient medical-record front pages

Description of defective items	Number of defective records	Percentage of defective records	Defect frequency
Basic-information defects	892	30.37 %	1 779
Ethnicity, nationality, gender, age, date of birth, occupation, marital status, place of birth	604	20.57 %	1 025
ID number, contact information (residential address, telephone, postal code, employer, contact-person information, etc.)	288	9.81 %	754
Hospitalization-process-information defects	705	24.00 %	901
Errors in admission-/discharge-condition documentation	92	3.13 %	213
Errors in discharge-disposition and admission-route entries	101	3.44 %	161
Missing or erroneous drug-allergy history	347	11.81 %	362
Deficiencies in quality-control physician and nurse information	63	2.15 %	63
Incorrect autopsy checkbox for deceased patients	102	3.47 %	102
Diagnosis-and-treatment-information defects	1 390	47.33 %	3 052
Defects in discharge diagnoses and coding (principal diagnosis, other secondary diagnoses)	712	24.24 %	1 273
Surgical-or-procedure defects (mismatch between surgery/procedure and principal diagnosis; omission, misentry and incorrect priority of surgeries/procedures; errors in surgical incision and healing-grade documentation; wrong anesthesia-method entries)	475	16.17 %	1 576
Pathological-diagnosis defects	92	3.13 %	92
Defects in external-cause-of-injury-and-poisoning coding	111	3.78 %	111
Expense-information defects	38	1.29 %	38

Table 3: Comparison of defect frequencies between the internal-medicine group and the surgical-rehabilitation group

Group	Defect Type			Total
	Surgical-or-procedure-related defects (items)	Diagnosis-or-coding defects (items)	Basic-information defects (items)	
Internal-medicine group	649	803	934	2 386
Surgical-rehabilitation group	927	470	845	2 242
Total	1 576	1 273	1 779	4 628

Table 4: Correlation between specialty groups and defect categories

Group	Defect Type		
	Surgical-or-procedure-related defects	Diagnosis-or-coding defects	Basic-information defects
	Present / Absent	Present / Absent	Present / Absent
Internal-medicine group	649 / 1 737	803 / 1 583	934 / 1 452
Surgical-rehabilitation group	927 / 1 315	470 / 1 772	845 / 1 397
χ^2 value	103.01	93.37	1.04
P value	< 0.005	< 0.005	0.309

Note: α was adjusted to 0.005 by Bonferroni correction.

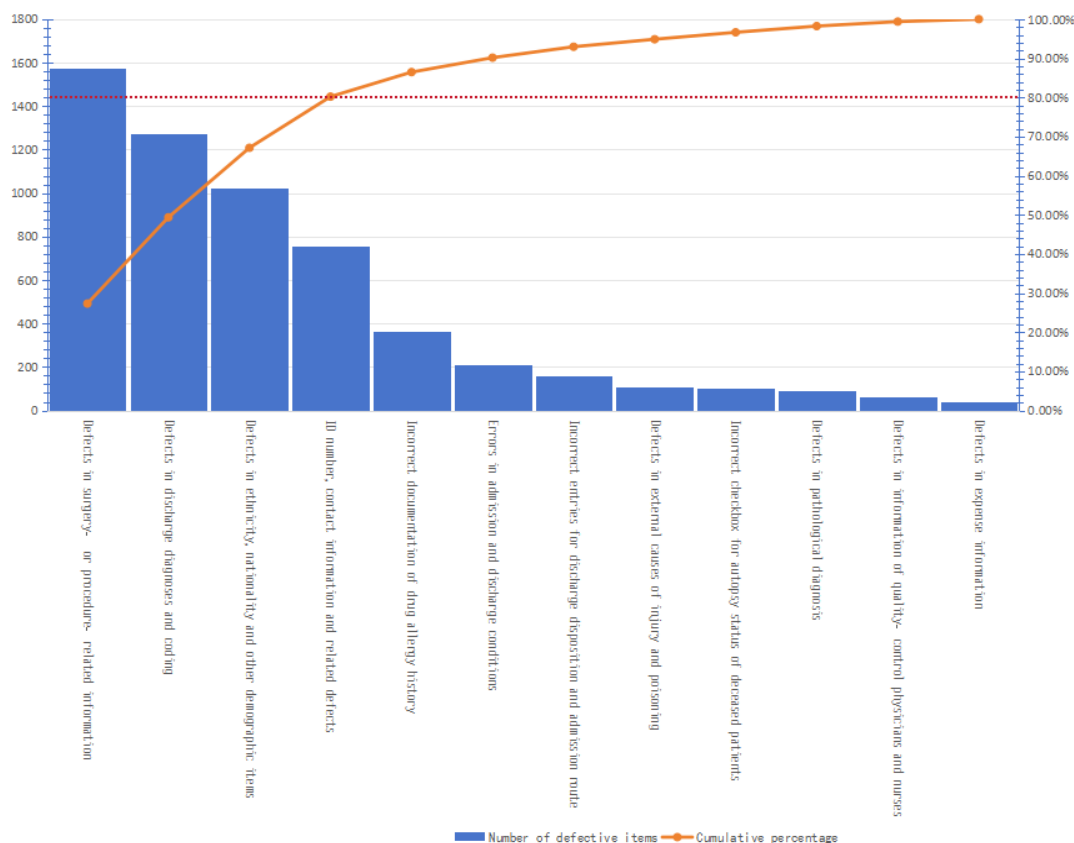


Figure 1: Pareto Chart of Defect Frequencies for Inpatient Medical Record Front Pages in a Secondary-Level Public Hospital

4. Discussion

4.1 Root-cause Analysis of Front-page Defects

4.1.1 Insufficient professional awareness and sense of responsibility among medical staff

Table 1 shows that 68.40 % of defective front pages contained two or more defective items. Clinicians lack adequate attention and a sense of responsibility when completing medical-record front pages. In recent years, the hospital has expanded rapidly with a sharp increase in hospital admissions while staffing levels cannot keep pace, which overburdens physicians and impairs documentation quality [2].

Discharge-diagnosis-or-coding-defect records were the most numerous, while surgical-or-procedure-related defects exhibited the highest frequency (Table 2). The high prevalence of diagnosis-treatment-related defects reflects clinicians' inadequate understanding of the "three-most" principle, weak awareness of diagnostic documentation standards, and insufficient professional competency.

4.1.2 Close correlation between high-frequency defects and clinical specialties

Table 4 validates this correlation. Internal-medicine patients usually carry multiple diagnoses and complex comorbidities (e.g., hypertension complicated by cardiac and renal failure). Surgical diagnoses tend to be relatively straightforward. Although rehabilitation patients also have multiple comorbidities, their principal diagnoses are more fixed and standardized, leading to lower diagnostic complexity compared with internal-medicine cases. Hence,

surgical-rehabilitation-group defects center on surgical-procedure entries.

For instance, surgeons tend to use simplified operative names, creating obstacles for coders to match ICD-9-CM-3 detailed codes. Many therapeutic rehabilitation procedures, such as joint mobility training and gait training, are frequently omitted because clinicians misconstrue them as "non-surgical" interventions. Notably, the hospital is undergoing transformation from a secondary-level general hospital toward a tertiary-level rehabilitation-specialized hospital. Multiple rounds of departmental and personnel restructuring were implemented in 2024. Some surgical services are being integrated with rehabilitation practice, so surgical procedures appear in rehabilitation-department medical records. Clinicians cannot clearly distinguish surgical operations versus therapeutic procedures, and even misclassify procedures as surgeries.

4.1.3 Inadequate informatization infrastructure

Basic-information defects rank second among all defect categories, with no statistically significant inter-group difference (Table 4), indicating a hospital-wide systemic problem. This phenomenon reveals that information-technology-enabled quality control has long been neglected, resulting in low efficiency and frequent information-entry defects. The hospital information system lacks automatic logical-error alerts for illogical entries. Data cannot be shared and synchronized across different subsystems, forcing heavy reliance on manual data entry. System-level bugs further exacerbate basic-information defects.

4.1.4 Deficient quality-control mechanisms

From a macro-management perspective, the hospital's existing front-page quality-control workflow has obvious shortcomings. The medical-record department is a secondary department affiliated with the Medical Affairs Division, receiving insufficient managerial focus and resource allocation. It has three staff members with coder qualifications, yet each employee undertakes mixed core and non-core assignments without clear role demarcation. Heavy miscellaneous workloads prevent high-quality coding and front-page surveillance. Coders are not provided with regular professional training, hindering competency improvement. Although a four-tier medical-record quality-control framework exists, special workflows and focused oversight targeting medical-record-front-page quality are absent.

4.2 Improvement Countermeasures for Front-page Quality

4.2.1 Targeted training for clinicians and coders

Targeted training improves professional awareness. Specialty-oriented training should be delivered for clinicians: internal-medicine clinicians shall focus on principal-diagnosis selection criteria; surgeons and rehabilitation physicians shall emphasize standardized documentation of surgeries and procedures. Case-based teaching is more effective than abstract conceptual lectures. Workloads for coders shall be reasonably optimized; additional staffing shall be arranged when necessary to guarantee regular professional training for coding personnel.

4.2.2 Upgrade hospital informatization

A big-data platform with embedded quality-control analysis modules shall be constructed. Predefined quality-control rules shall be deployed to realize full-process quality surveillance for medical-record-front-page data [3]. Logical-verification controls shall eliminate certain basic-information entry mistakes. Real-time monitoring shall be introduced to replace traditional post-hoc final-stage quality review, which suffers from time-consuming rework and difficult data revision. Shift from retrospective manual quality control toward real-time computer-aided concurrent quality control [4]. A standardized coding validation module shall be embedded to automatically check coding standardization and mitigate coding errors [5].

4.2.3 Optimize the medical-record-front-page quality-control management system

A robust management system serves as the cornerstone for front-page quality improvement. Quality-control nodes shall be moved forward into clinical departments; concurrent-quality-control assessment mechanisms shall be established to regularly evaluate departmental quality-control representatives [6]. Drawing on the model of clinical multidisciplinary collaboration teams, a special working group for medical-record-front-page administration shall be formed [7]. Through top-down linkage and cross-department collaboration, communication barriers between functional divisions can be broken down, significantly enhancing front-page completeness and standardization [8]. The PDCA cycle management tool shall be adopted to realize spiral

refined improvement of medical-record-front-page coding quality [9]. Routine inspections and quality-analysis meetings shall be held. Medical-record-front-page quality indicators shall be incorporated into clinical-department performance appraisal to raise clinical teams' awareness.

5. Summary

In summary, this study analyzes overall defect conditions, high-frequency defect patterns, and specialty-related differences of medical-record front pages in the investigated hospital. Targeted quality-improvement interventions can be formulated based on these findings. The three strategies of intensive training, informatization upgrade, and quality-control-system optimization can resolve predominant front-page defects and provide a reference for peer institutions.

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