Risk Management and Healthcare Policy

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ORIGINAL RESEARCH

A Real-World Study on Medical Resource Consumption in Multidrug-Resistant Organism Infections Under the DRG Payment Model

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Purpose: Diagnosis-Related Groups (DRG) has become the predominant approach in China, while infections with multidrug-resistant organisms (MDRO) increase patient length of stay (LOS) and costs. Quantifying the impact of MDRO infections on medical resource consumption, providing a basis for hospitals' precise prevention and cost management.

Patients and Methods: A retrospective analysis was conducted on discharge patient data from a Grade A tertiary general hospital in China, from January 2023 to December 2024. Resource consumption was compared between MDRO-infected (by different sources and types) and non-infected groups. There were 953 patients in the MDRO-infected group and 210,608 in the non-MDRO-infected group. Differences in median LOS and hospitalization costs were further analyzed through DRGs stratification.

Results: The overall incidence of MDRO infections was 0.571‰. The MDRO-infected (by different sources and types) had higher Time Consumption Index (TCI) and Cost Consumption Index (CCI) than the non-infected group ($P < 0.05$). Both indices use a benchmark of 1, with values exceeding 1 indicating prolonged hospitalization and cost overruns, respectively. *Carbapenem-resistant Gram-negative bacilli* (CR-GNB) had higher resource consumption, while *methicillin-resistant Staphylococcus aureus* (MRSA) had relatively lower. In ten high-infection-rate DRG, nine groups of infected patients had longer median LOS and higher median hospitalization costs ($P<0.05$). The infection group had a higher proportion of non-medical discharge and mortality. Non-medical discharge refers to voluntary departure against clinical recommendations for continued inpatient care.

Conclusion: MDRO infections substantially increase medical resource consumption. Strengthening the control of high-incidence MDRO DRG is necessary to help hospitals adapt to the DRG payment model.

Keywords: diagnosis-related groups, multidrug-resistant organism, hospitalization costs, length of stay, time consumption index, cost consumption index

Introduction

Multidrug-resistant organism (MDRO) infections represent a major global public health concern, posing significant challenges to hospital management and contributing to increased healthcare expenditures and prolonged hospital stays.[1,2] According to data from the World Health Organization,[3] approximately 25,000 deaths occur annually in Europe due to MDRO infections, with an associated socioeconomic burden of around €1.5 billion. In the United States, approximately 23,000 deaths and $3.4 billion in direct economic losses are attributed to MDRO infections each year. Among the most concerning MDROs are *Acinetobacter baumannii resistant to carbapenems* (CRAB), *carbapenem-resistant Enterobacteriaceae* (CRE), *vancomycin-resistant Enterococcus faecium* (VRE), *carbapenem-resistant Pseudomonas aeruginosa* (CRPA), and *methicillin-resistant Staphylococcus aureus* (MRSA), which have been designated as critical or high-priority drug-resistant bacteria by the World Health Organization.[4] These organisms exemplify the growing threat of antimicrobial resistance, which not only imposes substantial economic burdens but also undermines the foundation of

https://doi.org/10.2147/RMHP.S570297
Received: 20 October 2025
Accepted: 10 January 2026
Published: 21 January 2026

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modern medical care. Without timely and globally coordinated interventions, the world may enter a post-antibiotic era in which common infections become life-threatening once again.[5]

Diagnosis-Related Groups (DRGs) constitute a classification system that categorizes hospitalized patients into groups based on disease severity, treatment complexity, and similarity in resource consumption.[6] In recent years, as part of healthcare reform initiatives in China, the DRG-based payment model has been adopted to standardize clinical practices and enhance the efficiency of medical insurance fund utilization. This model has become the dominant form of insurance reimbursement, aiming to improve healthcare efficiency and assess the quality of care delivery.[7] In 2021, China's National Healthcare Security Administration released the Three-Year Action Plan for DRG/DIP Payment Reform, stipulating that DRG/DIP payment systems will be fully implemented across all administrative regions by the end of 2025.[8] With this transition, medical institutions are under increasing pressure to control costs. Patients with MDRO infections incur substantially higher medical cost burdens than those with non-drug-resistant bacterial infections, and the current fixed DRG reimbursement standards fail to fully cover their actual medical expenses—with merely 19.12% of these infected patients having their hospitalization costs covered by the DRG reimbursement standards, a figure significantly lower than that for non-infected patients.[9] Although DRG-based estimates of the economic burden of MDRO infections may not fully capture all losses, such analyses are of urgent practical relevance as the healthcare payment system evolves.

Comparing MDRO-infected and non-infected patients within the same DRG—where diagnosis, disease severity, and treatment modalities are largely consistent—can clarify the specific impact of MDRO infections on medical costs and LOS. Therefore, quantifying the economic burden of MDRO infections within the DRG framework is of great importance in minimizing financial losses and optimizing hospital management strategies. Tang et al reported that the detection rate of MDRO in Sichuan, China remained relatively high between 2019 and 2023, with CRE and MRSA showing an annual upward trend.[10] As a major regional healthcare provider in central Sichuan, Suining Central Hospital undertakes extensive diagnostic and treatment responsibilities and faces significant challenges related to MDRO infection control and resource consumption. A detailed investigation of the association between MDRO infections and medical resource Consumption under the DRG payment model in this hospital is critical for optimizing operational management and safeguarding patient outcomes.

This study utilizes medical records of discharged patients from a Grade A tertiary general hospital in China, from Jan. 1st, 2023, to Dec. 31th, 2024. By integrating DRG classifications and associated indicators, it compares resource consumption between MDRO-infected and non-infected patients. The aim is to elucidate the impact of MDRO infections on medical resources, provide evidence to guide infection prevention and control strategies, and support hospitals in achieving operational efficiency and sustainable development under the DRG payment model.

Subjects and Methods

Study Population

All patients discharged from Suining Central Hospital, Sichuan Province, China, from Jan. 1st, 2023, to Dec. 31th, 2024 were included as the study population. There were 953 patients in the MDRO-infected group and 210,608 in the non-MDRO-infected group. Due to the retrospective nature of this study, Suining Central Hospital Ethics Committee waived the ethical approval and patient informed consent procedures (KYLLMC20250017).

Data Sources

DRG-related indicators were extracted from the "Sichuan Provincial Health and Family Planning Data Analysis and Decision Support Cloud Platform." Data on MDRO infections were obtained from the "Blue Dragonfly Healthcare-associated Infections (HAIs) Real-time Monitoring and Management Platform." The infection types in patients with identified MDROs were determined and verified by full-time hospital infection control personnel.

Criteria for MDRO Classification

MDROs detected on the first or second calendar day following hospital admission were classified as community-acquired, whereas those detected from the third calendar day onward were considered hospital-acquired.[11] In cases of

repeated (≥ 3) isolation of the same MDRO from the same site without clinical symptoms, the condition was classified as colonization. If an MDRO was detected, but subsequent re-examination within 48 hours revealed strain or resistance profile changes, or if the findings were clearly inconsistent with other diagnostic indicators, the condition was classified as contamination.[12]

Types of MDROs

The MDROs evaluated in this study included CRAB, *carbapenem-resistant Klebsiella pneumoniae* (CRKP), VRE, CRPA, MRSA, and other CRE.

Inclusion and Exclusion Criteria

Inclusion criteria: All discharged patients from January 1, 2023 to December 31, 2024. Exclusion criteria: (1) Patients not classified into DRGs; (2) Patients with a length of stay (LOS) < 2 calendar days; (3) Patients with MDRO colonization or contamination. This study was approved by the institutional ethics committee. Given its retrospective nature and lack of interference with patients' routine clinical management, the requirement for informed consent was waived.

Study Design

A retrospective analysis was conducted to compare DRG indicators, LOS, hospitalization costs, Consumption Index (TCI), Cost Consumption Index (CCI), and discharge outcomes between the MDRO infection group (hereinafter referred to as the "infection group") and the non-MDRO infection group ("non-infection group"). Additionally, TCI and CCI were analyzed among patients with community-acquired MDROs, hospital-acquired MDROs, and various MDRO types. A stratified analysis was also performed on the median LOS and hospitalization costs for each DRG classification. The calculation formulas for TCI, CCI, and MDRO infection rate were as follows:[13,14]

TCI=∑[(ALOS of a Specific DRG ÷ ALOS of Stay for its DRG) × Case Count per DRG] ÷ Overall Case Volume.

CCI=∑[(Cost per Hospitalization of a Specific DRG ÷ Cost per Hospitalization of Stay for its DRG) × Case Count per DRG] ÷ Overall Case Volume.

MDRO Infection Rate = (MDRO Infection Patients During a Specified Period ÷ Total Hospitalization Days of Discharged Patients in the Same Period) × 1000‰.

DRG Grouping Rules

All included patients in this study were grouped into DRG in strict adherence to the Grouping Scheme for Diagnosis-Related Groups (DRG) Payment (Version 2.0).[15] Grouping was determined solely based on the patients' primary diagnosis, without regarding MDRO infections as Major Comorbidity/Complication (MCC) or Comorbidity/Complication (CC) to adjust grouping levels or severity weights. Per the definition of this scheme, MCC/CC refers to a specific list of diseases identified through large-data analysis and clinical expert validation, with its core function to reflect the severity of the underlying condition. In contrast, diagnostic codes corresponding to MDRO infections (eg, CRE, MRSA) are classified under the category of "Infections and Parasitic Diseases" and are not included in the MCC/CC list, thus not triggering grouping adjustments.

Definition of Indicators

The Discharge Methods of included medical discharge, medical transfer, non-medical discharge, and in-hospital mortality. Specifically, non-medical discharge refers to the circumstance in which the treating clinician determines that continued inpatient management is clinically indicated based on the patient's current disease status, yet the patient voluntarily departs the hospital and discontinues treatment due to personal considerations. The TCI is a core efficiency metric for DRGs, defined as the ratio of an institution's actual average LOS to the region-level average LOS for the same DRG; it uses a benchmark value of 1.0. Values > 1.0 indicate prolonged LOS requiring additional treatment or monitoring, which may be linked to HAIs. Conversely, values < 1.0 reflect efficient care delivery with minimal HAI-related delays. The CCI is a key cost metric for DRGs, defined as the ratio of an institution's actual average inpatient cost to the region-level average cost for the same DRG, also with a benchmark value of 1.0. Values > 1.0 signify cost

overruns, potentially driven by HAI-related expenditures. Values < 1.0 indicate effective cost control with reduced HAI-related resource waste.

Calculation of Hospitalization Costs

Hospitalization cost data were obtained from the medical records of patients in both the infection and non-infection groups. All costs were converted to US dollars using the exchange rate of 1 USD = 7.19 CNY as of December 31, 2024.

Statistical Analysis

Data collation was performed using Excel 2019, while statistical analyses were conducted using *SPSS* version 25.0 and Python 3.1. For normally distributed continuous variables, results were expressed as *mean* ± *standard deviation* (±s), and comparisons were made using the independent samples *t*-test. For non-normally distributed data, results were presented as M [P_{25}, P_{75}], and the *Wilcoxon* signed-rank test was applied. Categorical variables were expressed as proportions or percentages, and comparisons were conducted using the *Pearson chi-square* test. A $P < 0.05$ was considered statistically significant.

Results

Patient Enrollment

Between Jan. 1st, 2023, and Dec. 31th, 2024, a total of 236,288 patients were discharged. Among them, 3159 patients were not assigned to DRGs, 21,509 patients had LOS < 2, and 59 patients were diagnosed with MDRO colonization or contamination. Ultimately, 953 patients with MDRO infections and 210,608 patients without MDRO infections were included in the final analysis (Figure S1).

Baseline Information

A total of 211,561 patients were grouped into DRGs during the study period, among whom 953 were diagnosed with MDRO infections, yielding a total of 1029 MDRO isolates. The cumulative number of hospital days among discharged patients was 1,668,723, resulting in an overall MDRO infection rate of 0.571‰ (953/1,668,723).

Resource Consumption

The 953 patients with MDRO infections were distributed across 195 DRGs, whereas the 210,608 non-infected patients were distributed across 688 DRGs. The TCI and CCI of the infection group were 2.01 times and 1.99 times higher, respectively, than those of the non-infection group (Table 1). Patients with community-acquired and hospital-acquired MDRO infections exhibited significantly higher TCI and CCI values than the non-infection group ($P < 0.05$), as illustrated in Figure 1A. Furthermore, patients infected with various types of MDROs also demonstrated significantly elevated TCI and CCI values compared to the non-infection group ($P < 0.05$), as shown in Figure 1B.

Table 1 Comparison of Resource Consumption Across Different Infection Types

Infection Type	Cases (n)	DRGs (N)	TCI	CCI
Non-infection group	210,608	688	0.93	1.09
Infection group	953	195	1.87	2.17
CAI	344	127	1.30	1.49
HAI	609	136	2.19	2.55
MRSA	349	141	1.43	1.57
CRKP	249	57	2.16	2.60
CRAB	181	54	2.15	2.55
CRPA	187	59	2.37	2.77
Other CRE	63	40	2.32	2.70

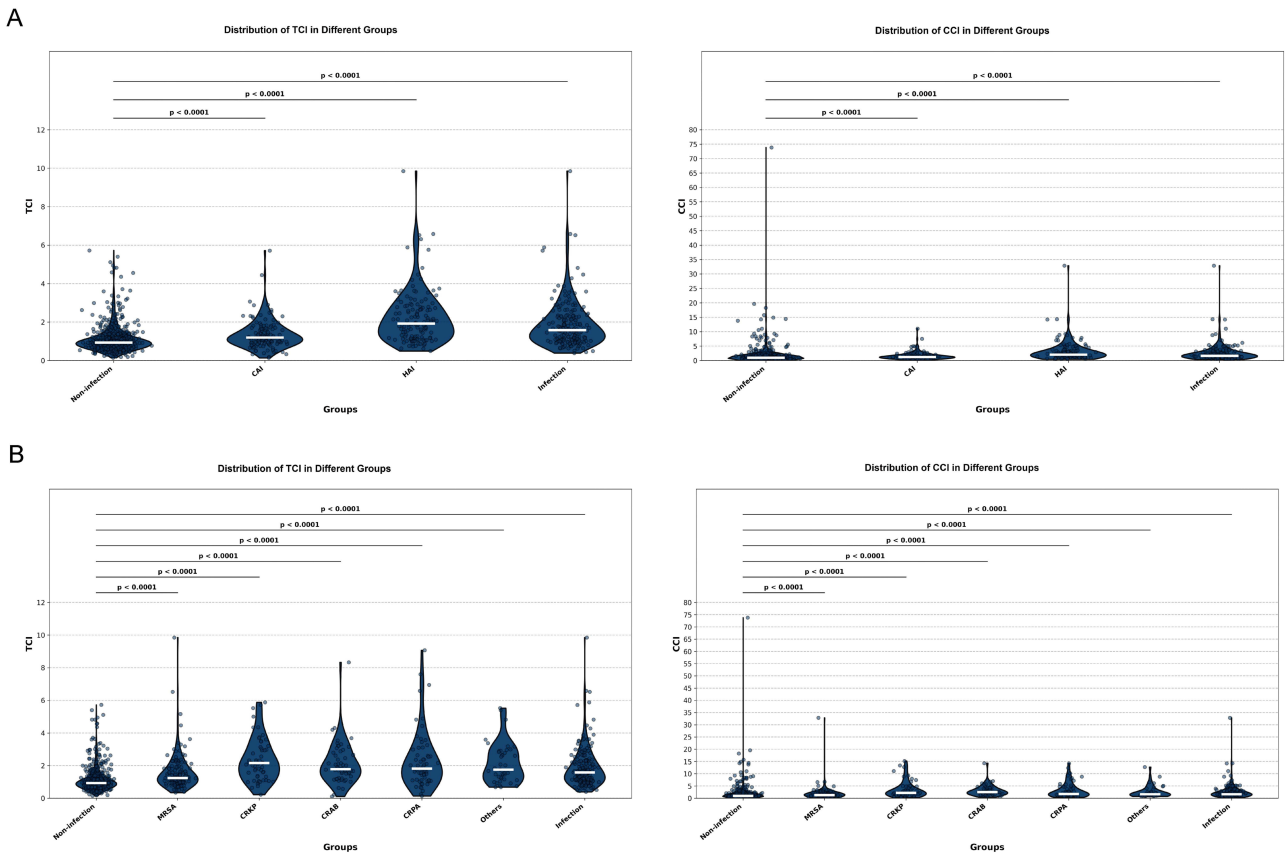

Figure 1 (**A**) TCI and CCI Differences by MDRO Infection Source; (**B**) TCI and CCI Differences Among Various MDRO Types.

Median LOS and Median Hospitalization Costs in Key DRGs

In the infection group, 23 DRGs categories included more than 10 patients with infections. Among these, 10 DRGs categories exhibited a MDRO infection rate exceeding 2‰. These categories were primarily concentrated in DRGs associated with tracheotomy and mechanical ventilation for over 96 hours, intracranial or craniotomy procedures with MCC, and cellulitis without MCC. Notably, the DRG coded as 870 (sepsis or severe sepsis with mechanical ventilation for ≥96 hours) had the highest MDRO infection rate, reaching 9.867‰. Elevated MDRO infection rates, all exceeding 5.000‰, were also observed in the following DRG categories: 4 (tracheotomy with mechanical ventilation ≥96 hours, excluding primary diagnoses of the head, face, and neck [DRG011–013], without major operating room procedures), 603 (cellulitis without MCC), 207 (respiratory system diagnoses requiring ventilator support for >96 hours), and 3 (extracorporeal membrane oxygenation [ECMO] or tracheotomy with mechanical ventilation ≥96 hours, excluding primary diagnoses of the head, face, and neck [DRG011–013], with major operating room procedures), as shown in Table 2.

An analysis of these 10 key DRGs revealed that, in DRG 603, there was no statistically significant difference in either the median LOS or median hospitalization costs between the infection and non-infection groups ($P > 0.05$). In contrast, the differences observed in the remaining groups were statistically significant ($P < 0.05$), as presented in Table 3.

Patient Discharge Methods

A statistically significant difference was observed in discharge methods between the infection and non-infection groups ($P < 0.05$). The proportions of patients non-medical discharge and in-hospital mortality were notably higher in the infection group—4.34 times and 20.00 times higher, respectively, than those in the non-infection group. Table 4

https://doi.org/10.2147/RMHP.S570297

Table 2 DRGs with More Than 10 Infected Patients and an MDRO Infection Rate Greater Than 2‰

DRG Code	Name	MDRO Cases (n)	LOS (d)	MDRO Infection Rate (‰)
870	Sepsis/severe sepsis with mechanical ventilation for ≥96 consecutive hours	37	3750	9.867
4	Excluding cases with principal diagnoses of head/face/neck disorders (MS-DRG 011–013) who underwent tracheostomy with ≥96 hours of mechanical ventilation but without major operating room procedures	61	6604	9.237
603	Cellulitis without MCC	32	4021	7.958
207	Respiratory diagnoses requiring >96 hours of mechanical ventilation	32	5058	6.327
3	ECMO or excluding cases with principal diagnoses of head/face/neck disorders (MS-DRG 011–013) who underwent tracheostomy with ≥96 hours of mechanical ventilation and with major operating room procedures	62	10,060	6.163
23	Craniotomy with major device implantation OR acute complex central nervous system diagnosis with MCC or chemotherapeutic agent infusion	41	10,068	4.072
20	Principal diagnosis: Intracranial vascular surgery with postoperative hemorrhage with MCC	14	3529	3.967
91	Other nervous system disorders with MCC	34	10,237	3.321
25	Craniotomy or Intracranial Endovascular Procedures with MCC	34	10,360	3.282
955	Craniotomy for Multiple Severe Trauma	11	3675	3.008

Table 3 Comparison of Median LOS and Median Hospitalization Costs in Key DRG [M (P_{25}, P_{75})]

DRG Code	Median LOS(d)		*Z*	*P*	Median Hospitalization Costs ($)		*Z*	*P*
	Infection	Non-Infection			Infection	Non-Infection		
870	23.00 (14.00, 38.00)	17.00 (12.00, 26.00)	−2.531	0.011	13548.20 (9407.60, 22569.46)	10898.08 (7560.45, 15326.73)	−2.419	0.013
4	38.00 (24.50, 75.00)	26.00 (19.00, 37.00)	−4.251	0.000	19594.05 (13194.48, 28514.94)	12092.44 (8529.92, 17113.34)	−4.596	0.000
603	7.00 (5.00, 9.00)	7.00 (5.00, 10.00)	−0.784	0.433	519.18 (422.94, 754.25)	594.80 (399.95, 845.30)	−0.632	0.527
207	24.00 (15.25, 35.75)	16.00 (11.00, 23.00)	−3.510	0.000	10785.56 8363.26, 17308.57)	6831.57 (5359.72, 10050.17)	−4.607	0.000
3	49.50 (34.00, 74.00)	30.00 (22.00, 42.00)	−6.103	0.000	23449.64 (16051.96, 36173.51)	14356.34 (11165.83, 20346.66)	−6.016	0.000
23	33.00 (24.50, 59.00)	15.00 (7.00, 25.00)	−6.754	0.000	18848.21 (13484.45, 26633.50)	10134.24 (6847.67, 14103.57)	−6.619	0.000
20	42.00 (29.75, 47.75)	16.00 (11.00, 23.00)	−4.826	0.000	26651.59 (20285.00, 31441.92)	9886.97 (8108.14, 16213.01)	−5.118	0.000
91	25.00 (22.50, 27.25)	22.00 (10.00, 28.00)	−1.968	0.049	5150.46 (2997.08, 5620.05)	2289.46 (1399.02, 3587.76)	−5.736	0.000
25	49.00 (19.00, 80.25)	17.00 (11.00, 25.00)	−5.678	0.000	20233.12 (9058.81, 33579.26)	7399.11 (4180.36, 10865.43)	−6.043	0.000
955	75.00 (43.00, 169.00)	18.00 (11.50, 38.50)	−4.167	0.000	25758.99 (18622.39, 62219.49)	8260.57 (5216.89, 13576.33)	−4.403	0.000

Table 4 Comparison of Discharge Methods Between the Infection and Non-Infection Groups

Discharge Method	Infection Group (n=953)	Non-Infection Group (n=210,608)	χ^2	*P*
Medical discharge	610 (64.01%)	168,811 (80.15%)	663.574	0.000
Medical transfer	215 (22.56%)	36,124 (17.15%)		
Non-medical discharge	107 (11.23%)	5440 (2.59%)		
Death	21 (2.20%)	233 (0.11%)		

Discussion

In the context of enhancing the supplemental mechanisms supporting public hospital operations, promoting tiered healthcare delivery, and achieving a mutually beneficial outcome for the tripartite stakeholders—healthcare providers, medical insurance systems, and patients—the DRG payment system serves as a key strategy to control the irrational increase in medical expenditures. The successful implementation of this model depends on standardized and scientifically

sound DRG groupings.[8] This classification system integrates variables such as disease diagnosis, surgical procedures, comorbidities and complications, and patient age, thereby grouping patients with similar clinical trajectories and resource consumption profiles into standardized categories. As a result, it facilitates more refined hospital management, optimizes resource allocation, and reduces patients' financial burdens.[16,17]

However, under the DRG-based prospective payment system, fixed reimbursements are assigned per DRG category. Consequently, any increased disease burden stemming from HAIs, including those caused by MDROs, must be borne entirely by the healthcare institution. As a critical factor in HAIs, MDROs not only inflict clinical and economic harm on patients but also lead to a substantial increase in diagnostic and treatment expenditures, potentially resulting in financial losses. When the cost of treatment surpasses the reimbursement limit defined for a DRG category, the hospital must absorb the excess expenses.[18] Previous studies have shown[19] that even when patients with HAIs are assigned to DRG accounting for complications, the additional insurance reimbursements are insufficient to offset the costs associated with managing infections. The financial burden is thus shifted to healthcare institutions, exacerbating their economic stress.

Under the DRG payment model, analyzing the consumption of hospital resources attributable to MDRO infections is essential. Such analysis can enhance clinical awareness, strengthen infection control measures, and ultimately reduce the incidence of MDRO infections.

Previous health economic studies on MDRO infections were predominantly based on matched case-control designs.[20] However, such studies are susceptible to selection bias, particularly due to inaccuracies in researchers' assessment of disease severity. In contrast, the present study employs DRG classification to control for variables such as disease type and illness severity, uses real-world data, and adopts stratified statistical approaches to more scientifically and objectively evaluate the impact of MDRO infections on resource Consumption for comparable disease categories. Noteworthy, DRG grouping strictly follows the Grouping Scheme for DRG Payment (Version 2.0), and MDRO infection was not included in MCC/CC for grouping adjustments. This avoids masking MDRO's true resource burden, classifying MDRO as a complication would assign patients to higher-resource DRG groups, confounding baseline differences. Instead, grouping solely by primary diagnosis ensures consistent baseline resource benchmarks within each DRG, so elevations in TCI or CCI can be directly attributed to MDRO-related interventions, validating TCI or CCI as "overconsumption" indicators. By leveraging DRG grouping, direct comparisons of median hospitalization costs and LOS can be made between infected and non-infected patients within the same DRG. For analyses involving multiple DRG categories, comparisons of the TCI and CCI between infection and non-infection groups offer a more objective reflection of intergroup differences. Notably, directly comparing median costs or LOS across all cases without controlling for DRG classification would be analogous to conducting an unmatched analysis, thus amplifying bias. In this context, a TCI or CCI value of 1 represents the regional average, values <1 indicate performance better than the average, and values >1 indicate worse performance, thereby offering a precise metric for assessing the impact of MDRO infections on healthcare resource consumption.[21]

This study demonstrates that both the TCI and CCI of the infected group are higher than those of the non-infected group, with values exceeding 1. This finding indicates that, under the DRG payment system, the LOS for patients with MDRO infections is 1.87 times the provincial median, and the hospitalization cost is 2.17 times the median. Consequently, hospitals are likely to incur financial losses when treating such patients. In contrast, the TCI and CCI of non-infected patients are both below 1, suggesting shorter hospital stays and lower medical expenses, thus allowing hospitals to generate higher revenue from these cases. Furthermore, the TCI and CCI values for non-infected patients are relatively concentrated and have low medians. In comparison, the distributions of TCI and CCI for patients with hospital-acquired and community-acquired MDRO infections, as well as those infected with different types of MDROs, are more dispersed, and their medians are significantly higher than those of the non-infected group. These results suggest that MDRO infection is associated with increased TCI and CCI values and greater variability in these indices. Notably, hospital-acquired cases exhibit higher TCI and CCI values than community-acquired cases, possibly due to the more complex clinical conditions and interventions required for treating hospital-acquired MDRO infections.[22,23]

Patients infected with *carbapenem-resistant Gram-negative bacilli* (CR-GNB) show particularly elevated TCI and CCI values and generally have a poor prognosis, with a higher incidence of discharge against medical advise and mortality. This may be attributable to CR-GNB's resistance not only to carbapenems but also to most β-lactam antibiotics, thereby limiting therapeutic options. Such infections often necessitate the administration of high doses of

broad-spectrum antibiotics such as tigecycline or newly developed antimicrobial agents, substantially increasing treatment costs. In addition, the high rate of treatment failure among these patients often requires frequent adjustments to therapeutic regimens, thereby prolonging the course of treatment and LOS.[24,25] Among these, as an important type of CR-GNB, CRAB exhibits drug resistance mainly mediated by the blaOXA-23 gene, with a prevalence rate as high as 92.62%. The high prevalence of this gene is prone to triggering clonal outbreaks in intensive care units (ICUs), further amplifying the complexity of treatment and the consumption of medical resources.[26] In contrast, MRSA infections are associated with relatively lower TCI and CCI values, likely due to the existence of well-established treatment protocols and the typically mild nature of MRSA infections, which result in comparatively lower resource consumption.

Among the 953 infected patients, 195 DRG were represented, with 10 groups exhibiting infection rates exceeding 2‰. Most of these high-incidence groups were related to tracheotomy with mechanical ventilation for 96 hours, intracranial or craniotomy procedures with MCC, and cellulitis without MCC. Except for DRG 603, the median LOS and hospitalization costs for infected patients in the remaining groups were significantly higher than those for non-infected patients. Reducing the median LOS is critical to enhancing the efficiency of medical resource utilization and controlling healthcare expenditures.[27] However, as LOS is influenced by a variety of factors—including social conditions, clinical factors, and healthcare management models[28]—further exploration is necessary to identify optimization strategies that could mitigate the cost increases associated with MDRO infections.

Analysis of the patients' primary diagnoses revealed that the DRG categories related to tracheostomy with mechanical ventilation for 96 hours were primarily associated with severe pneumonia, sepsis, intracerebral hemorrhage, and closed traumatic brain injury. These patients also required ventilatory support and were predominantly admitted to the intensive care unit [ICU]. Previous studies have indicated[29] that critically ill patients on ventilator support are at high risk for hospital-associated pulmonary infections. For this patient population, enhanced nursing care and early infection prevention strategies are essential. Therefore, when guiding clinical departments in implementing HAIs prevention and control measures, particular emphasis should be placed on preventing ventilator-associated pneumonia and MDRO infections. If necessary, protective isolation measures should be implemented at the time of admission to prevent MDRO colonization and infection.

DRGs involving intracranial or craniotomy procedures with MCC primarily included patients undergoing intracranial interventions or craniotomies. These patients often have severe underlying conditions and significant neurological impairment. MDRO infections can exacerbate brain tissue damage and facilitate the spread of infection, necessitating intensified anti-infective therapies, vigilant neurological monitoring, and, in some cases, additional surgical interventions. These factors collectively contribute to prolonged hospitalization and increased medical costs.

The cellulitis without MCC group primarily involved patients with pre-existing skin or soft tissue infections at the time of admission. These individuals typically presented with mild underlying conditions and localized infections that could be effectively managed through surgical debridement. In addition, low-cost antibiotics such as vancomycin were commonly used, with relatively short treatment courses. As a result, no statistically significant differences were observed in the median LOS and hospitalization costs between this group and the non-infected group.

In hospital management practice, although research on DRG-based payment models has become increasingly advanced, exploration into their application in MDRO infection management remains at an early stage. Real-world data are urgently needed to inform evidence-based strategies. Under the current DRG system, the prolonged LOS and increased medical expenses associated with MDRO infections have become key concerns for both hospital administrators and clinical departments. Accordingly, both clinical teams and full-time infection control personnel must implement targeted interventions. Medical staff should shift away from a passive approach to infection control and instead strengthen the implementation of preventive measures against MDRO infections. Improving the timeliness and accuracy of risk identification and early intervention is essential to reducing the overall incidence of these infections. Full-time infection control personnel should enhance the scope and depth of targeted MDRO surveillance, conduct detailed analyses of DRGs with high MDRO incidence, and implement precise risk-based interventions to effectively curb the growing trend of MDRO infections.

Conclusion

Nevertheless, this study has several limitations. Although DRG stratification helps control the confounding effects of disease types and severity, this study does not employ multivariate regression analysis and lacks further adjustment for detailed comorbidities, which may affect the precision of assessing the independent effect of MDRO infection on medical resource consumption. Future studies can address this gap by integrating multivariable regression models to refine the quantification of MDRO's specific impact. Additionally, It analyzed data solely from discharged patients in a single hospital, which may introduce selection bias. Future research should aim to expand the sample size and incorporate data from multiple hospitals and regions to enhance the generalizability of the findings. Moreover, further in-depth analysis of patient-specific characteristics within each DRG is warranted to better understand the risk factors for MDRO infection across various patient categories. In summary, MDRO infection poses a significant impact on medical resource consumption under the DRG payment model. Targeted MDRO prevention and control for high-prevalence DRG groups can provide critical evidence-based support for hospital cost optimization and dynamic adjustments to medical insurance payment standards, thereby facilitating the coordinated improvement of medical quality and operational efficiency.

Data Sharing Statement

All data generated or analysed during this study are included in this published article.

Ethics Approval and Informed Consent

Due to the retrospective nature of this study, Suining Central Hospital Ethics Committee waived the ethical approval and patient informed consent procedures (KYLLMC20250017). This work has been carried out in accordance with the Declaration of Helsinki (2000) of the World Medical Association. I confirm that all methods were performed in accordance with the relevant guidelines. All data accessed in this study have been anonymized to comply with relevant data protection and privacy regulations.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

Sichuan Provincial Preventive Medicine Association Hospital Infection Prevention and Control Project (SCGK202112); Sichuan Provincial Preventive Medicine Association Scientific Research Project (SYYXHPT202428).

Disclosure

The authors declare that they have no competing interests in this work.

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