

Decision Tree-Driven DRGs in Ovarian Cancer: Cost Control Insights in China

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Introduction

To explore the diagnosis-related groups (DRGs) scheme and cost standards for patients with ovarian cancer, aiming to optimize the disease-specific grouping framework and enhance hospital refined management.

Methods

We collected the medical record data of 1,585 discharged patients with a primary diagnosis of ovarian cancer from West China Second University Hospital, Sichuan University, between January 1, 2019, and September 30, 2023. Univariate analysis and multiple linear regression were used to identify factors influencing hospitalization costs. A decision tree model was employed to establish and validate a case-mix grouping scheme for ovarian cancer, followed by an analysis of cost overruns.

Results

(1) Multiple linear regression revealed that age, length of stay (LOS), number of comorbidities/complications, surgery grade, use of rescue measures, blood transfusion, and lymph node metastasis were significant predictors of hospitalization costs ($P < 0.05$). (2) The decision tree model stratified the 1,585 cases into 11 DRG groups (DRG1–DRG11). The primary classification node was LOS, followed by blood transfusion status, number of comorbidities/complications, and lymph node metastasis ($P < 0.001$). Kruskal-Wallis H tests demonstrated strong intergroup heterogeneity ($P < 0.001$) and acceptable intragroup homogeneity [coefficient of variation (CV): 0.15–0.30]. (3) Cost overruns occurred in 174 cases (10.98%), with DRG7 (LOS 6–9 days, no transfusion, ≥ 5 comorbidities/complications) exhibiting the highest overrun rate (15.11%). The average costs across all billing categories were higher in the overrun group, while its medical service revenue proportion was 4.82% lower than the non-overrun group.

DRGs	Hospitalization costs (CNY)	n(%)	CV	Weighting factor	Upper limit	Over limit n (%)
Group1 (LOS ≤ 5 d)	21667 $\pm$ 6431	101(6.37)	0.30	0.55	32768	8(7.92)
Group2 (LOS 6 ~ 9d, with blood transfusion)	43367 $\pm$ 9009	95(6.99)	0.21	1.11	55696	8(8.42)
Group3 (LOS ≥ 16 d, without blood transfusion)	49355 $\pm$ 9483	84(5.30)	0.19	1.26	61911	11(13.10)
Group4 (LOS ≥ 16 d, with blood transfusion)	54895 $\pm$ 7857	54(3.41)	0.14	1.40	66561	2(3.70)
Group5 (LOS 6 ~ 9d, ≤ 2 comorbidities/complications without blood transfusion)	27667 $\pm$ 7596	102(6.44)	0.27	0.71	44217	0
Group6 (LOS 6 ~ 9d, 3 ~ 4 comorbidities/complications, without blood transfusion)	33336 $\pm$ 7820	246(15.52)	0.23	0.85	41586	23(9.35)
Group7 (LOS 6 ~ 9d, ≥ 5 comorbidities/complications, without blood transfusion)	35768 $\pm$ 7360	225(14.20)	0.21	0.91	41837	34(15.11)
Group8 (LOS 10 ~ 15d, without blood transfusion, without lymph node metastasis)	39296 $\pm$ 9887	242(15.27)	0.25	1.00	51626	27(1.16)
Group9 (LOS 10 ~ 15d, without blood transfusion, with lymph node metastasis)	42082 $\pm$ 7236	206(13.00)	0.17	1.08	49504	29(14.08)
Group10 (LOS 10 ~ 15d, with blood transfusion, without lymph node metastasis)	50197 $\pm$ 9664	142(8.96)	0.19	1.28	63117	19(13.38)
Group11 (LOS 10 ~ 15d, with blood transfusion, with lymph node metastasis)	47841 $\pm$ 7115	88(5.55)	0.15	1.22	55377	13(14.77)

Conclusions

The decision tree model demonstrates rationality and scientific validity for DRG-based hospitalization cost grouping in ovarian cancer. Hospitals should prioritize LOS-driven cost control strategies for refined management, while administrative authorities may utilize this scheme’s influencing factors to refine DRG policies.



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