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Structural Inequalities in Post-Acute Rehabilitation: An Analysis of Regional Completeness and Involuntary Medical Migration

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Objectives

- For post-acute rehabilitation, establishing a locally integrated healthcare system is critical for patient prognosis. Overcoming the limitations of traditional fragmented claims data, this study investigates regional rehabilitation accessibility and patient utilization trajectories from multiple angles.
- We evaluate spatial inequalities in rehabilitation supply and how regional disparities shape varying patient pathways using a novel "Transfer Block" algorithm and Geographic Information System (GIS) spatial statistics.

Methods

- We analyzed nationwide claims data from the Health Insurance Review and Assessment Service (Jan 2022 - Nov 2024) for patients utilizing tertiary or general hospitals. We reconstructed continuous treatment pathways into 'Transfer Blocks' by linking acute (gap ≤ 1 day) and subacute (gap ≤ 7 days) episodes.
- Regional accessibility was standardized as rehabilitation provision time per 100,000 population across 250 districts.
- Hotspot analysis (Getis-Ord Gi*, K=8) was applied to statistically verify spatial clustering and deprivation of rehabilitation resources.

Results

- Spatial analysis revealed severe structural inequalities (Figure 1). Significant hotspots (99% confidence) were consistently clustered in the capital area (Seoul/Gyeonggi), while coldspots persisted in inland mountainous areas. Alarmingly, 15 districts (acute) and 16 districts (subacute) remained absolute 'blind spots' with zero rehabilitation provision in 2024.
- Furthermore, analyzing Transfer Block trajectories highlighted distinct regional disparities (Table 1, Table 2): (1) The Capital area exhibited robust regional completeness, short-term intra-regional circulation, and the shortest average subacute length of stay (57.9 days). (2) Non-capital Metropolitan areas demonstrated extra-regional fixation, the longest intensive rehab time (33.6 mins), and a unique 'cost inversion' where subacute expenses (10.26M KRW) exceeded acute expenses (9.95M KRW). (3) Non-capital Provincial areas suffered structurally vulnerable pathways, marked by a 'double outflow' to distant regions and the highest reverse-transfer rate back to acute care (5.7%).

Conclusions

- Regional rehabilitation accessibility is strictly hierarchized, forcing provincial patients into involuntary distant medical migration.
- By integrating a micro-level trajectory model with macro-level spatial statistics, this study demonstrates the multifaceted structural failures of the current regional delivery system.
- These findings underscore the critical need for locally tailored policies and reformed reimbursement systems to mitigate regional disparities.

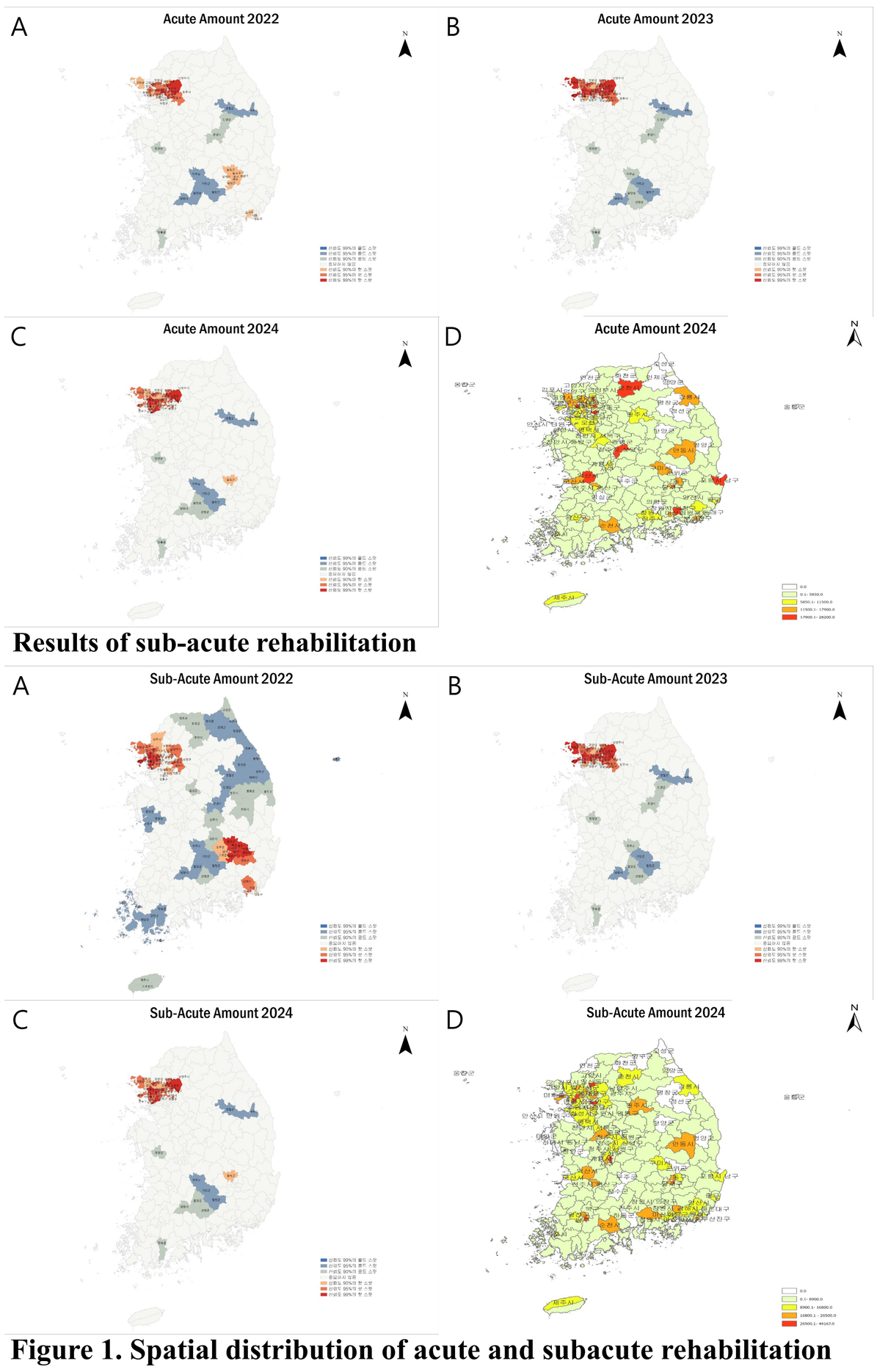

Figure 1. Spatial distribution of acute and subacute rehabilitation supply across administrative districts in South Korea (2022–2024). A-C panels: Getis-Ord Gi* hotspot analysis; red areas indicate statistically significant hotspots (99% confidence, $p < 0.01$) concentrated in Seoul/Gyeonggi, and blue areas represent coldspots in inland mountainous regions. D panels: Choropleth maps of rehabilitation provision time per 100,000 population in 2024, illustrating absolute supply levels by district; white districts indicate zero rehabilitation provision (acute, n = 15; subacute, n = 16).

Table 1. Summary of Subacute Length of Stay and Transfer Characteristics by Region (All-Cause Transfer Blocks).

Region	Subacute LOS (days)	Reverse-Transfer Rate (%)	Subacute Rehabilitation Rate (%) (Total / Recovery / Non-recovery)	Main Trajectory Characteristics
Capital Area	57.9	3.5	18.2 / 5/0 / 17.2	Self-sufficient, short-term intra-regional circulation
Metropolitan	61.2	5.1	16.5 / 6.0 / 15.1	Extra-regional fixation & higher rehabilitation inten sity
Provincial	58.3	57	14.9 / 4.5 / 13.9	Medical migration, double outflow to distant regions

Table 2. Multifaceted Analysis: Cost Inversion Phenomenon by Region (Average for All Patient Groups.

Region	Acute Care Cost (KRW)	Subacute Care Cost (KRW)	Cost Accumulation Pattern
Capital Area	11.38 Million	10.69 Million	Acute > Subacute (standard)
Metropolitan	9.95 Million	10.26 Million	Acute < Subacute (Inversion)
Provincial	9.88 Million	9.47 Million	Acute > Subacute (standard)