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Adverse Risk Selection in the Russian Health Insurance Model: Evidence from Cardiovascular Surgery

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1. BACKGROUND & OBJECTIVE

Introduction

- Adverse selection is usually associated with voluntary insurance markets.
- In Russia's Mandatory Health Insurance (MHI) system, selection incentives are shifted from insurers to providers.
- Cardiovascular surgery (CVS) represents a high-cost and high-risk environment where these incentives become visible.

Objective

To identify mechanisms of provider-driven adverse selection in Russian mandatory health insurance and high-tech medical care (HTMC) financing.

Russian MHI Architecture

Federal MHI System
↓
Territorial MHI Funds
↓
Insurance Medical Organizations (IMOs)
↓
Healthcare Providers (Hospitals)

Financial Incentive Problem

- Capitation payments (primary care)
- DRG/CSG payments (inpatient care)
- Fixed tariffs for HTMC

↓

Undercompensation of high-risk patients creates incentives to avoid complex cases

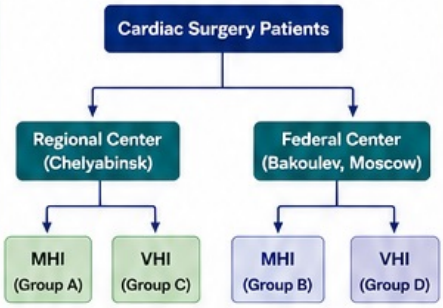
Payment Mechanisms in Russian MHI

Payment model	Risk adjustment	Selection incentive
Capitation (primary care)	Low	High
DRG/CSG (inpatient care)	Moderate	Moderate
HTMC fixed tariff	Very low	Very high

2. METHODS

Study Design

Quasi-experimental comparison



Four groups by insurance type and level of care

Data Sources

- Russian MHI regulations
- Territorial MHI Fund reports
- HTMC payment rules
- Clinical data from cardiac surgery centers
- Risk assessment using EuroSCORE II

Statistical Analysis

- Risk stratification: EuroSCORE II
- Group comparisons using Mann–Whitney U test
- Non-parametric analysis
- Significance level: $p < 0.05$

3. EuroSCORE II Indicators by Group

Group	Mean ± SD (%)	Median (IQR)	Mann–Whitney U, p (vs)
A (MHI, regional)	12.7 ± 6.3	11.2 (7.5–16.4)	–
B (MHI, federal)	3.4 ± 2.1	2.8 (1.8–4.5)	$p < 0.001$ (A vs B)
C (VHI, regional)	4.5 ± 2.9	3.9 (2.4–5.8)	$p < 0.001$ (A vs C); $p = 0.12$ (C vs D)
D (VHI, federal)	2.9 ± 1.8	2.5 (1.5–3.9)	$p < 0.001$ (B vs D)

Key takeaway: Group A (MHI, regional) has 3.7 times higher median EuroSCORE II than Group B (MHI, federal), proving that federal centers decline high-risk MHI patients and shift them to regional hospitals.

3. RESULTS & DISCUSSION

Key Findings

- Fixed HTMC tariffs do not adequately account for age, frailty, and comorbidity.
- High-risk patients face:
  - formal refusals;
  - administrative barriers;
  - excessive preoperative requirements.
- Complex cases are concentrated in a limited number of "unavoidable" referral hospitals.
- Regional inequalities encourage transfer of severe patients to federal centers.
- Federal centers may also select lower-risk patients to preserve outcome indicators and institutional ratings.

Mechanism of Adverse Selection

Flat Reimbursement
↓
Financial Risk
↓
Provider Selection
↓
Referral of High-Risk Cases
↓
Concentration of Severe Patients
↓
Distorted Outcomes
↓
Reduced Access to Care

4. Distribution of Patients by EuroSCORE II Risk Category (%)

Risk Category (EuroSCORE II)	A (MHI, regional)	B (MHI, federal)	C (VHI, regional)	D (VHI, federal)
Low (< 2%)	5%	52%	38%	61%
Medium (2–5.9%)	18%	36%	42%	33%
High (6–9.9%)	27%	8%	14%	5%
Very High (≥ 10%)	50%	4%	6%	1%

Interpretation: In regional MHI, 50% of patients have EuroSCORE II ≥ 10% (expected mortality > 10%). In federal MHI — only 4%.

5. CONCLUSIONS

- Adverse selection in the Russian healthcare system is predominantly provider-driven rather than insurer-driven.
- Current reimbursement mechanisms inadequately account for patient risk in capitation, DRG/CSG payments, and fixed HTMC tariffs.
- Risk-adjusted financing is necessary to align financial and clinical incentives and improve access to care for high-risk cardiovascular patients.
- Transition to value-based healthcare (VBHC) with bundled payments, risk adjustment, and outcomes measurement is essential.