Analysis of Tariff Mapping Errors and Revenue Leakage

A Case Study of a Healthcare Billing System

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Background & Problem Context

The Revenue Leakage Problem

• Hospital billing appears automatic, but gaps form silently between clinical services and financial records

• Charges get forgotten, codes applied incorrectly, tariffs revised without CDM updates

• This isn't fraud! it's process drift that accumulates unnoticed

• Industry estimates: 4–5% of hospital revenue lost to leakage globally

Indian Healthcare Context

• Payer complexity has exploded: TPA cashless, PM-JAY, corporate empanelment, private insurance, cash

• PM-JAY operates on package-based payment, wrong package = claim rejected entirely

• Case: 150-bed hospital losing Rs. 15–18 lakh monthly to unmeasured billing issues

• Root cause: HIS-CDM integration gaps + reactive governance

Research Objectives & Questions

Study Objectives

1. Recognize and classify the most frequent tariff mapping error types

2. Measure financial impact of errors using actual audit data and leakage reports

3. Explore distribution of leakage by department, payer, and service code

4. Examine incident detection channels and resolution timeframes

5. Suggest effective control framework to address mapping errors and minimize leakage

Research Questions

RQ1. What are the most frequent tariff mapping error types according to audits and incident logs?

RQ2. What percentage of total leakage is caused by each error type?

RQ3. In which departments, payer types, and procedure codes do revenue leaks concentrate?

RQ4. What process/system factors contribute to errors, considering detection and correction workflows?

RQ5. What control measures should be implemented to recover lost revenue?

Methodology: Research Design & Setting

Research Design

Single-Case Embedded Study
Secondary data analysis only. Seven tariff mapping error types examined as embedded units.

Study Setting

Case/Sample Hospital
150-bed private trust-operated hospital in Tier-2 Indian city. 12 clinical departments. Mixed payer.

Data Period

12 months
April 2025 – May 2026. Long enough to capture seasonality; HIS and CDM remained stable.

Secondary Data Sources

Tariff master (30 service lines), Revenue leakage report (150 claims), Incident log (45 entries), Billing audit summary (5 quarters). Total population sampling.

Primary Data

Survey (n=32 illustrative)
Respondents: Billing, Medical Coding, RCM/Audit, HIS/IT Support
Sections: Profile, error frequency, root causes, organizational response

Analysis Methods

Descriptive statistics, Pareto analysis, Cross-tabulation, Service-code drill-down, Incident log analysis & triangulation

Key Findings: Leakage Concentration & Detection

Rs. 22.26 L
Total identified leakage (12 months)

88.8%
caused by 3 error types

56%
from just 3 service codes

46 days
avg resolution time (top errors)

Top 3 Error Categories

1. Unmapped Services: 66% of leakage (no CDM code exists)

2. Incorrect Payer-Tariff: 11.5% of leakage (wrong rate card)

3. Outdated Tariff: 11.3% of leakage (>12 mo. old)

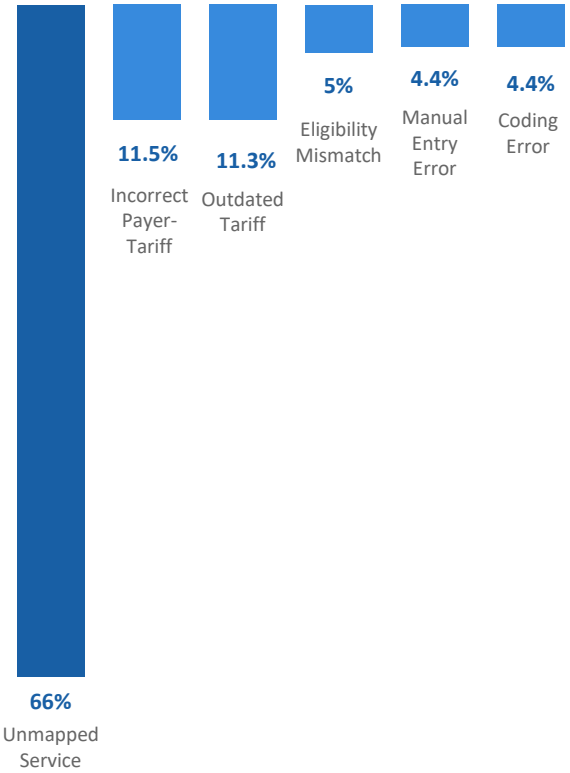
Top 3 Service Codes

HbA1c Test: Rs. 4.75 L

Tab. Atorvastatin: Rs. 4.54 L

Inj. Ceftriaxone: Rs. 3.11 L

Pareto Analysis: Revenue Leakage by Error Type



Key Insight: The 80/20 Principle

Just 3 error types account for 88.8% of all leakage | Remaining 4 types contribute only 11.2% combined

Strategic implication: Focus corrective efforts on Unmapped Services, Payer-Tariff Linkage, and Outdated Tariff corrections. These three targeted interventions will recover the vast majority of leakage without overhauling the entire billing process.

Leakage Distribution: Departments & Payers

By Department

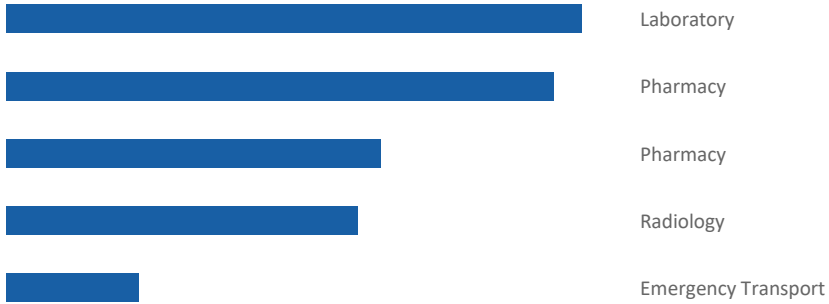
By Payer Category

Pharmacy + Lab = 58.5% of total leakage
Why? High transaction volume, rapidly changing catalogs, limited CDM governance capacity

TPA: Multiple rate cards amplify errors | Self-Pay: No external detection—highest risk

Top 5 Service Codes by Revenue Leakage

HbA1c Test	**Rs. 4,75,278**	Laboratory
Tab. Atorvastatin 20mg	**Rs. 4,53,768**	Pharmacy
Inj. Ceftriaxone 1g	**Rs. 3,10,924**	Pharmacy
X-Ray Knee (2 views)	**Rs. 2,89,000**	Radiology
Ambulance (Intra-city)	**Rs. 1,07,000**	Emergency Transport



Strategic Insight

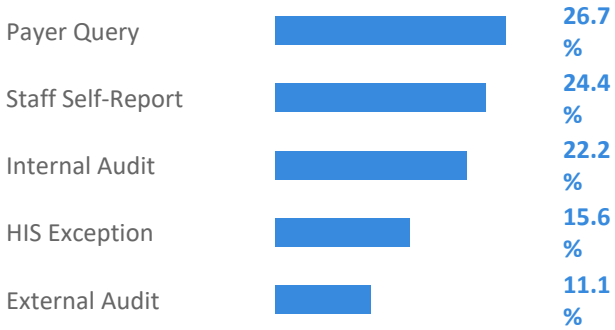
Top 3 codes = Rs. 12.4 L (56% of total leakage)

Why they leak: High frequency + low unit cost + routine nature = overlooked in CDM reviews

Strategic action: Quarterly targeted audit of these 3 codes alone would recover ~Rs. 56L annually—more cost-effective than broad CDM audits

Incident Detection & Resolution: The Hidden Risk

Detection Method (n=45 incidents)



Resolution Time by Error Category

Critical insight: Only 15.6% caught by automated HIS exception reports. 51% caught reactively (payer query or staff notice), not proactively. This means problems are reactive Band-Aids, not preventive systems.

The compounding effect: Top error categories take longest to resolve AND cause most leakage. 46+ days × high-frequency codes = massive cumulative revenue loss.

Triangulation: Secondary Data vs. Staff Perceptions

🔍 The Invisibility Problem: Why Staff Underestimate the Real Crisis

Coding errors and manual-entry errors 'announce themselves' through denials and reconciliation flags. Staff notice them, report them, and audit processes catch them. But unmapped services generate nothing—no claim, no denial, no feedback. The charge is simply never created.

This structural invisibility explains why staff weight Coding Errors highest for frequency while audit data shows they cause less than 9% of leakage.

KEY FINDING: The hospital can have an excellent denial rate and still be hemorrhaging revenue from invisible unmapped-service leakage.

Root Cause Analysis: Structural vs. Human Error

Why Unmapped Services Happen

NOT due to staff negligence — Unmapped services do not occur because a billing executive is careless. They occur because the HIS-CDM connection has no configuration for that service.

DUE to structural HIS-CDM disconnect — When a new pharmacy item is added to the formulary or new lab test added to catalog, the clinical system records it, but billing system has no corresponding entry.

Example: Ceftriaxone injection procured, dispensed, and tracked in clinical system. But if Billing CDM lacks a code, hundreds of vials administered go unbilled—not laziness, process gap.

Traditional vs. Correct Diagnosis

❌ WRONG DIAGNOSIS:
Billing staff lack training | Need better oversight | Solution: Training + discipline (WON'T WORK)

✓ CORRECT DIAGNOSIS:
HIS-CDM integration is weak | No workflow to trigger CDM review when new services launch | Solution: HIS interface fix + process automation (WILL WORK)

Five Prioritized Recommendations

1. Quarterly Targeted CDM Coverage Audit

Focus on top 20 high-volume service lines per department. Align with payer contract renewal cycles and PM-JAY revision schedules.

2. HIS-CDM Interface Review & Remediation

Focus on Pharmacy and Laboratory ancillary system interfaces. Ensure new items trigger CDM mapping workflow BEFORE clinical use.

3. Establish Dedicated CDM Governance Role

Create CDM Coordinator/Tariff Governance Analyst: update CDM within 5 days of payer rate changes, monthly reconciliation, quarterly audit reporting.

4. Reclassify Duplicate CDM Entries as Compliance Risk

Treat duplicate CDM entries as clawback risk factor in audit reports. Conduct quarterly duplicate-CDM sweep before payer audit cycles.

5. Introduce Charge Capture Reconciliation as Monthly KPI

Compare services recorded in clinical/HIS systems against charges created in billing system—monthly. Flag variance >2% for automatic CDM audit.

Strategic Insight: These 5 recommendations address the 3 dominant leakage categories (88.8% of losses). Recommendation 5 is most transformational—it converts the 'invisibility problem' into a measurable KPI, making unmapped-service leakage detectable through routine monthly reconciliation.

Study Limitations: Scope & Boundaries

1. Single-Case Design

Findings apply to Case Hospital only. Specific HIS setup, payer mix, and CDM governance maturity influence results in ways that may not apply to other hospitals.

2. Secondary Data Quality

Rs. 22.26 lakh is a LOWER-BOUND estimate only. Undetected or non-formalized errors are not recorded. Any errors fixed without being logged are invisible.

3. Survey Data is Illustrative

n=32 uses SIMULATED responses to demonstrate methodology. When actual staff responses collected, mean scores may differ, but structural claims based on secondary data remain valid.

4. Self-Reporting Bias

Survey respondents may underestimate their own errors or over-report organizational challenges. Staff perception data must be interpreted with caution alongside objective audits.

5. One-Year Timeframe

May be too short. Study period (June 2025–May 2026) captures snapshot. Multi-year changes in payer mix, HIS maturity, and CDM governance require longer observation.

6. Scope Exclusions

Does NOT cover: patient satisfaction with billing, documentation quality before coding, fraud or intentional underbilling, or billing system modifications outside research period.

Conclusions: Three Critical Findings

1 **Revenue Leakage is Highly Structured, Not Systemic**

Three error types = 88.8% | Three service codes = 56% | This is a FOCUSED ISSUE with focused solutions, not wholesale overhaul.

2 **The Most Critical Errors are Structurally Invisible**

Unmapped services generate NO claim, NO denial, NO feedback | Coding errors 'announce themselves' | This asymmetry creates organizational BLIND SPOTS.

3 **HIS-CDM Integration is the Structural Root Cause**

Tariff mapping = GOVERNANCE problem, not human error | No training fixes structural configuration gaps | Solution: HIS interface + CDM governance + process automation.

The Opportunity Ahead

Revenue leakage is not inevitable—it is resolvable.

Unlike Human Errors

Gaps can be recognized, ranked, and resolved with structured interventions

Concentration = Leverage

Leakage concentrates in 3 error types and 3 codes = disproportionate gains

Strategic Win

Hospitals addressing HIS-CDM gain competitive advantage in PM-JAY era

The gaps in CDM, process management, and HIS integration are NOT organizational failures—they are opportunities.

Questions & Discussion

Thank you for your attention

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