

FRD – Medical Claim Denial Analysis System

1. Purpose

This FRD defines the functional requirements for the Medical Claim Denial Analysis solution, including data model, transformation rules, metrics, and dashboard behavior. The system enables proactive reduction of preventable denials (especially Coding & Eligibility issues) through data-driven insights.

2. Data Model

The solution uses a star-schema model:

FACT Tables:

- Claims: Claim-level data (status, payer, amount, date)
- Denials: Denial events linked to Claims

DIMENSION Tables:

- Payers: Payer information
- DenialReasons: Categorization of denial codes

Primary Keys (PK), Foreign Keys (FK):

- Claims.Claim_ID (PK)
 - Denials.Claim_ID (FK → Claims.Claim_ID)
 - Claims.Payer_ID (FK → Payers.Payer_ID)
 - Denials.Denial_Code (FK → DenialReasons.Denial_Code)
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3. Business Rules

BR-01: Only claims with Claim_Status = 'Denied' contribute to denial metrics.

BR-02: Denial category is determined by mapping via DenialReasons table.

BR-03: Preventable denials are defined as:

Category IN ('Coding', 'Eligibility')

BR-04: Claim_Date is used for reporting and filtering timelines.

BR-05: Each Claim_ID may have zero or multiple denials.

4. Calculated Measures (Functional Description)

- Total Claims
Count of all claim records
 - Total Denied Claims
Count of Claims where Claim_Status = 'Denied'
 - Total Claim Amount
Sum of Claim_Amount from Claims
 - Total Denied Amount
Sum of Denial_Amount from Denials
 - Denial Rate %
 $\text{Total Denied Claims} / \text{Total Claims}$
 - Denied Amount %
 $\text{Total Denied Amount} / \text{Total Claim Amount}$
 - Preventable Denied Amount
Sum of Denial_Amount where Category IN ('Coding', 'Eligibility')
 - Preventable Denied %
 $\text{Preventable Denied Amount} / \text{Total Denied Amount}$
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5. Dashboard Functional Requirements

Page 1: Executive Overview

- KPI Cards: Total Claims, Total Denied Claims, Denial Rate %, Denied Amount %, Preventable Denied %
- Bar Chart: Denied Amount by Category
- Bar Chart: Denied Amount by Payer
- Line Chart: Denial Rate over time
- Filter support: Date, Payer, Department, Denial Category

Page 2: Denial Deep Dive

- Matrix: Denied Amount by Payer × Category
 - Table: Claim-level detail (Claim ID, Date, Dept, Payer, Category, Amount)
 - Slicers: Category, Payer, Department
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6. Non-Functional Requirements

- Usability: Insights must be easily understood by non-technical users.
 - Performance: Standard dashboard load < 5 seconds on typical dataset.
 - Security: Role-based access control recommended for real deployment.
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7. Acceptance Criteria

- AC-01: All KPIs reflect correct totals and filtered context.
- AC-02: Drilldown to claim-level data must function correctly.
- AC-03: Filtering must impact all visuals consistently.
- AC-04: Preventable denial categories must be clearly highlighted.
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