Surface level Summary

1. basic_drugs_formulary

This table defines **tier levels** directly for each drug product (RXCUI, NDC) within each formulary.

- **Tier-level influencers:** tier_level_value, prior_authorization_yn, step_therapy_yn, quantity_limit_yn
    - A lower tier usually correlates with fewer restrictions and higher coverage favorability.
    - Step therapy, prior authorization, or quantity limits often push a drug into higher (less favorable) tiers.
- **Optimization use:** Identify drugs with strong utilization or outcomes but unfavorable restrictions to prioritize for tier negotiation or clinical evidence updates.

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2. beneficiary_cost

This represents **patient out-of-pocket costs** per tier and per plan, differentiating by **preferred, non-preferred, and mail-order** pharmacies.

- **Tier-related indicators:** tier, cost_amt_pref, cost_amt_nonpref, cost_amt_mail_pref
- **Pricing levers:** This data helps estimate patient affordability and shows how much cost difference exists between tiers.
- **Optimization use:** Use these cost metrics to simulate pricing adjustments or evaluate how lowering a drug's tier impacts affordability across plans.

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3. prescribers_by_geography_drug

This links **prescribing patterns** with geographical and demographic attributes.

- **Reach and sales metrics:** tot_prscrbrs, tot_clms, tot_drug_cst, tot_benes
- **Targeting insights:** With these, you can identify where drug utilization is high but access may be restricted due to higher tiers or prior authorization.

- **Optimization use:** Correlate prescribing volume with tier levels from basic_drugs_formulary to measure the elasticity between coverage placement and prescribing.

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4. plan_info

Gives **contextual plan-level details** including premiums, deductibles, region codes, and formulary linkage.

- **Market segmentation:** premium, deductible, ma_region_code, pdp_region_code, state, county_code
- **Optimization use:** Helps assess plan generosity in benefit design and regional pricing environments. Regions with lower premiums but stricter formularies may represent opportunities for improved formulary negotiation.

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5. excluded_drugs_formulary

Lists **drugs excluded** from certain plans or formularies.

- **Influence:** Exclusion from a plan effectively means no tier assignment, hurting reach and sales.
- **Optimization use:** Identify exclusion causes (e.g., duplicative therapies, high cost) and propose data-driven arguments for inclusion.

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6. indication_based_coverage_formulary

Specifies coverage by **indication (disease)**.

- **Clinical effectiveness factor:** Drugs covered for broader indications tend to have stronger formulary placement.
- **Optimization use:** Expand coverage by demonstrating outcomes across additional diseases or patient populations.

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7. geographic_locator

Maps county-level regions to **MA and PDP regions**.

- **Reach analysis:** Useful for aligning prescribing patterns and formulary benefits geographically.

- **Optimization use:** Merge with plan_info and prescribers_by_geography_drug to model regional variability in access and affordability.

Detailed Column Explanations and Action Plans

1. basic_drugs_formulary

- **formulary_id, formulary_version, contract_year**: Identifies the specific formulary and version; use these to join with plan/info tables and analyze changes over time.
- **rxcui**: RxNorm identifier — standardized way to refer to a drug, crucial for merging/utilization analyses.
- **ndc**: National Drug Code; specific product ID — can connect to cost, prescriber, and coverage data.
- **tier_level_value**: The tier assigned to the drug. Lower numbers typically mean preferred tiers (less out-of-pocket for patients). Critical target for upgrade/candidate analysis.
- **quantity_limit_yn, quantity_limit_amount, quantity_limit_days**: Flags/values for limiting how much medicine can be prescribed, which can restrict patient access, especially for chronic use.
- **prior_authorization_yn**: Requires doctor/plan approval before dispensing. Drugs needing prior auth are less likely to be prescribed, and often put in higher tiers.
- **step_therapy_yn**: Mandates trying cheaper alternatives first before approving this drug. Again, step therapy can move drugs into higher (costlier) tiers.

Action:

- Rank drugs by tier_level_value.
- Flag those with restrictions (step therapy, prior auth, quantity limits).
- Identify drugs in non-preferred tiers that are widely used or essential, for potential upgrade advocacy.

Check-in:

Which restriction do you think most impacts patient access: prior authorization, step therapy, or quantity limits?

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2. beneficiary_cost

- **contract_id, plan_id, segment_id**: Identifies the insurance plan/segment, essential for joining to plan info and formulary.
- **coverage_level, tier**: Indicates insurance coverage and formulary tier for cost comparison.
- **days_supply**: Typical prescription length; use to adjust affordability analysis if costs differ for 30- vs 90-day supplies.
- **cost_type_pref, cost_amt_pref, cost_type_nonpref, cost_amt_nonpref**: Shows copay or coinsurance types and actual amounts in preferred/non-preferred pharmacy settings.
- **cost_type_mail_pref, cost_amt_mail_pref, ...**: Similar data for mail-order pharmacies.
- **tier_specialty_yn**: Flags specialty drugs, which are often costlier due to their tier assignment.
- **ded_applies_yn**: True if deductible applies, influencing real patient costs at point-of-sale.

Action:

- Compare cost_amt_pref between tiers for most-used drugs.
- Model impact of a tier downgrade — how much patient cost could decrease?
- Find drugs where moving from tier 3/4 to tier 2 gives the largest cost drop.

Check-in:

What do you think motivates a plan to put certain drugs in higher cost tiers?

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3. prescribers_by_geography_drug

- **year**: Data is time-stamped — compare before/after coverage changes.
- **prscrbr_geo_lvl, prscrbr_geo_cd, prscrbr_geo_desc**: Geographical info (e.g., state, county, region) — enables regional reach analyses.
- **brnd_name, gnrc_name, opioid_drug_flag, antbtc_drug_flag, ...**: Flags brand/generic and therapeutic class — analyze tier and sales by type or category.

- **tot_prscrbrs, tot_clms, tot_30day_fills, tot_drug_cst, tot_benes**: Core usage numbers — let you measure sales/reach per drug, by area, and compare with tier and cost data for elasticity analysis.
- **ge65_sprsn_flag, ge65_tot_clms, ge65_tot_30day_fills, ge65_tot_drug_cst, ge65_tot_benes**: Flags/use stats for patients 65+, relevant for Medicare analysis.
- **lis_bene_cst_shr, nonlis_bene_cst_shr**: Share of drug cost paid by patients qualifying/not qualifying for low income subsidy (LIS).

Action:

- Identify drugs with high claim volume but sitting in higher tiers; these may be good candidates for formulary tier improvement.
- Analyze if a region has higher out-of-pocket costs or utilization, and crosswalk to restrictions in formulary or plan info.

Check-in:

How would you spot a "missed opportunity" for improving sales through tier upgrades using these data points?

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4. plan_info

- **contract_id, plan_id, segment_id**: Unique plan identifiers; use for joins.
- **contract_name, plan_name**: Useful for reporting and targeting negotiations.
- **formulary_id**: Links to drug-tier mapping for plan.
- **premium, deductible**: Shows plan cost structure; contextualizes how much total cost a patient bears, beyond drug-tier copays.
- **ma_region_code, pdp_region_code, state, county_code**: Maps plan info to geographic reach (essential for measuring market impact).
- **snp, plan_suppressed_yn**: Special needs plans or suppressed plans, which may have different tier/restriction patterns.

Action:

- Target plans with higher premiums but stricter formularies for negotiation (they deliver high spending power but limited drug access — potential leverage).
- Segment the market by region to prioritize tier improvement where impact is highest.

Check-in:

If a plan has a low premium but many drugs in high tiers, what messaging would persuade it to improve tiering for a drug?

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5. excluded_drugs_formulary

- **contract_id, plan_id, rxcui, tier**: Tells you which drugs are not available in specific plans — no matter their clinical/market value.
- **quantity_limit_yn, quantity_limit_amount, quantity_limit_days**: Even for excluded drugs, sometimes limitations are the reason for exclusion.
- **prior_auth_yn, step_therapy_yn, capped_benefit_yn**: Flags for other restrictions, revealing exclusion rationale.

Action:

- Identify medicines commonly excluded despite good utilization elsewhere; research why.
- Prepare evidence or economic impact stories to advocate for plan inclusion and tier assignment.

Check-in:

What might be the main argument for a plan to re-include an excluded drug?

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6. indication_based_coverage_formulary

- **contract_id, plan_id, rxcui**: Pinpoints which medicine is covered for which condition in each plan.
- **disease**: Shows the specific indication; broader indications may help push for better tiering.

Action:

- Find drugs with limited indications that could expand with new evidence, supporting a tier downgrade and broader coverage.
- Use success stories in one indication to lobby for expansion in others.

Check-in:

Do you think clinical trial evidence or real-world outcomes matter more for expanding coverage indications?

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7. geographic_locator

- **county_code, statename, county**: Maps regions for granular analysis of coverage/access.
- **ma_region_code, ma_region, pdp_region_code, pdp_region**: Links counties to the MA/PDP coverage areas.

Action:

- Enable cross-table joins so you can analyze utilization, tier level, and cost by precise geography — finding regions where upgrade impact would be greatest.

Check-in:

Why might it be important to know drug access by individual county or region?

Workflow to Identify and Prioritize Tier Upgrade Candidates

Main Goal

Strategically select drugs in unfavorable tiers that could deliver the greatest impact—improved affordability, increased utilization, and boosted sales—if upgraded to a better tier.

Step 1: Data Preparation and Integration

- **Clean and standardize datasets.** Ensure consistent identifiers (rxcui, ndc, formulary_id, plan_id, contract_id).
- **Join tables for complete drug-plan-tier mapping:**
    - Link basic_drugs_formulary ↔ plan_info (by formulary_id)
    - Join prescribers_by_geography_drug on rxcui, regional codes (from geographic_locator)
    - Integrate beneficiary_cost by plan_id, tier, and rxcui
    - Bring in exclusions from excluded_drugs_formulary
    - Add indication info from indication_based_coverage_formulary

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Step 2: Candidate Drug Identification

- **Filter for drugs in high/unfavorable tiers:** Use tier_level_value (e.g., 3, 4, or 5).
- **Flag drugs with restrictions:** prior_authorization_yn, step_therapy_yn, quantity_limit_yn = 'Y'.
- **Exclude already excluded drugs:** Remove drugs found in excluded_drugs_formulary.

Step 3: Impact and Feasibility Scoring

- **Clinical importance and usage:**
    - Aggregate tot_clms, tot_prscrbrs, tot_benes from prescribers_by_geography_drug.
    - Bonus: Focus on high-use or guideline-recommended drugs.
- **Patient financial burden:**

    - Extract cost_amt_pref, cost_amt_nonpref from beneficiary_cost.
    - Flag drugs where the cost difference between current and next better tier is substantial.
- **Regional disparities:**
    - Use geographic_locator + plan region codes to highlight areas with high need but restrictive coverage.
- **Indication breadth:**
    - Pull from indication_based_coverage_formulary—drugs with coverage for more indications rank higher.
- **Calculate composite score per drug:**
    - Example formula:

$$\text{Score} = \text{Usage Factor} \times \text{Cost Impact} \times \text{Regional Need} \times \text{Indication Breadth}$$

        - **Usage Factor:** Total claims/prescribers in the last year
        - **Cost Impact:** Reduction in patient out-of-pocket if tier is upgraded
        - **Regional Need:** Number of regions with high usage but high tiers
        - **Indication Breadth:** Number of covered indications

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Step 4: Prioritization

- **Rank drugs by composite score.**
- Highlight those with:
    - Highest predicted patient savings
    - Largest potential boost in prescription rates (driven by lowered restrictions, improved coverage)
    - Broadest indications or highest sales impact

Step 5: Validation and Strategy

- For top candidates:
    - Check historic formulary changes—did tier downgrades elsewhere improve utilization/sales?

- Review clinical/literature support for better placement (real-world evidence, comparative safety/outcomes).
- Prepare documentation making the business and clinical case for negotiation with payers/reimbursement authorities.

Step 6: Reporting & Advocacy

- Build summary dashboards:
    - List top tier upgrade candidates, their impact metrics, suggested tier goal, territories for advocacy, and evidence references.
- Develop targeted outreach programs to payer decision-makers, supported by data analytics and economic modelling.