

ARKA-TCOC Baseline Variation Ledger

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Tenant: public-demo
Period: 2008-01 -> 2010-12
Engine version: tcoc-1.0.0
Measure-set: imaging-eleven-85e27803de98
Generated: 2026-08-23T03:38:58.246Z
Turnaround: ten business days from receipt.
If the number isn't there, we'll tell you, and we'll stop.
Method: /evidence/methodology#tcoc-attribution-method
Source Register: /sources

WATERMARK: Synthetic data. Structure is realistic; clinical associations are not. Used to validate the pipeline, not to make claims.

Small-cell rule: strata with n < 11 render as "suppressed (n<11)" ? never blank.

SECTION 0 ? DATA READINESS

Readiness verdict: degraded [measured]
Ordering NPI present: 99.6%
Tier mix: direct 33.3% / inferred 33.3% / unattributed 33.3%
Of 3 advanced imaging studies in the 24-month window, 1 (33.3%) carried an ordering clinician on the professional claim and were attributed directly. A further 1 (33.3%) were attributed to a clinician who saw the member within 30 days for a related condition; these are labelled inferred throughout. The remaining 1 (33.3%) could not be attributed to an ordering clinician and are counted in the population totals but excluded from every clinician-level figure in this report.
Accepted lines: 12,713,077; members: 99,191

SECTION 1 ? TOTAL LOW-VALUE ADVANCED IMAGING SPEND

Narrow (strict): \$500.00 [modeled]
Broad (permissive): \$500.00 [modeled]
Measures:
Ivi-headache-imaging [public-academic] Head imaging for uncomplicated headache ? Schwartz AL, Landon BE, Elshaug AG, Chernew ME, McWilliams JM. Measuring Low-Value Care in Medicare. JAMA Intern Med. 2014;174(7):1067-76. ICD-10 carry-forward: Updating a Claims-Based Measure of Low-Value Services Applicable to Medicare Fee-for-Service Beneficiaries. J Gen Intern Med. 2022. (modeled)

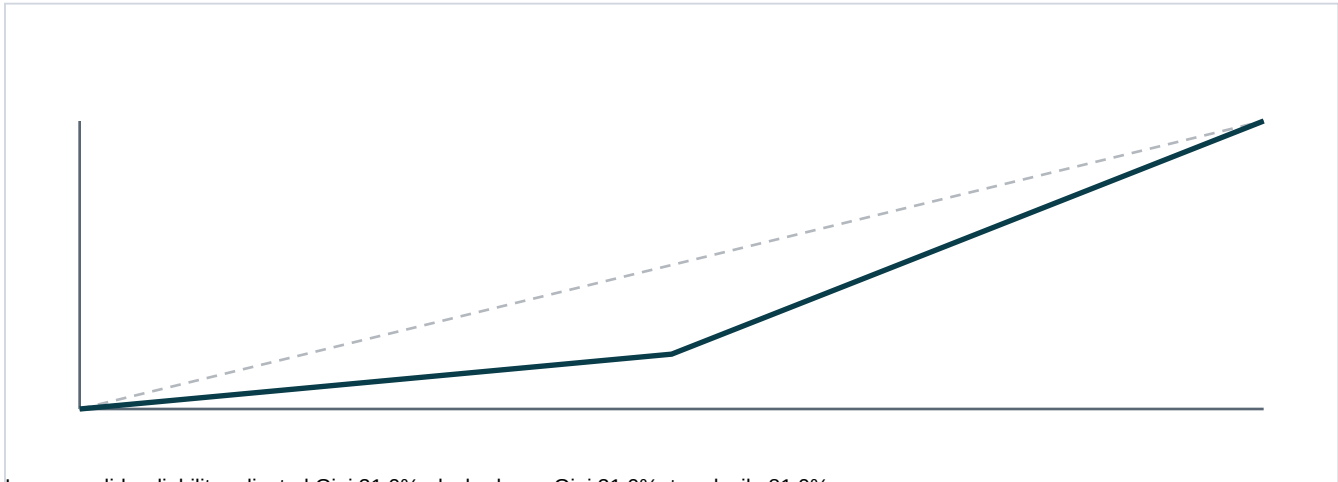
COMBINED IMAGING + NON-IMAGING OPPORTUNITY

Modeled per 100,000 attributed lives. Overlap computed from item-28 grouper. [modeled]
Imaging gross: \$4,200,000.00
Non-imaging gross: \$5,040,000.00
Overlap subtracted: \$0.00
Net (after overlap): \$9,240,000.00
Method: docs/nonimaging-measure-spec.json#overlap-method

DUPLICATE IMAGING ? NAMED METRIC

Named and measured. Small cells (n < 11) render as "suppressed (n<11)". [measured]
Strict (specific) ? leads ? sensitivity strict [measured]
Rate: 100.0% n=42 / 42
Wilson 95%: 91.6?100.0%
Spec 1.1.0 sha256:caa14b090d51ea92b7610736ff5e055d97b9021a4d6dc412c1f51b48f0739bb8
Avoided spend \$18,900.00 = measured \$18,900.00 [measured] + modeled \$0.00 [modeled]
Permissive (sensitive) ? sensitivity permissive [measured]
Rate: 100.0% n=54 / 54
Wilson 95%: 93.4?100.0%
Spec 1.1.0 sha256:caa14b090d51ea92b7610736ff5e055d97b9021a4d6dc412c1f51b48f0739bb8
Avoided spend \$24,300.00 = measured \$24,300.00 [measured] + modeled \$0.00 [modeled]

Share of counted duplicate spend across ordering clinicians. A duplicate is usually a systems failure ? this curve is the organisation conversation, not a personal ranking.



(Modality, region) cells ? strict:

ct / head_brain: n=42/42 100.0% Wilson 91.6% 100.0% [strict]

DUPLICATE EXCLUSION CASCADE

Every candidate pair is counted or excluded by exactly one named reason. [measured]

WHY MOST CANDIDATE PAIRS ARE NOT COUNTED

Candidate pairs 42

- Planned interval follow-up 0
- Change in clinical question 0
- Change in clinical status 0
- Clinical status indeterminate 0
- Contrast/non-contrast protocol 0
- Intervening procedure or admission 0
- Anatomic non-overlap 0
- Transfer of care 0
- Insufficient look-back 0

= COUNTED DUPLICATES 42

Planned interval follow-up: An oncologic or surveillance diagnosis on either claim is planned interval follow-up, not a duplicate.

Change in clinical question: The two studies carry different qualifying diagnosis groups (AHRQ CCSR); they answer different questions.

Change in clinical status: Claims show a new qualifying diagnosis, hospitalization, procedure, or medication change between the studies.

Clinical status indeterminate: Claims cannot distinguish whether clinical status changed; the pair is not flagged (never-auto-deny).

Contrast/non-contrast protocol: A contrast and non-contrast pair in the same CPT family within one day is a protocol sequence, not a repeat.

Intervening procedure or admission: A procedure or inpatient admission between the two studies justifies re-imaging.

Anatomic non-overlap: The two CPTs map to body regions that do not overlap, despite category similarity.

Transfer of care: The second study occurs after a documented transfer of care (facility change or transfer diagnosis).

Insufficient look-back: The earlier study sits inside the category window of the extract start, so prior history cannot be seen.

AVOIDED-DUPLICATE SPEND

The second study of each counted pair is priced, never the first. Pricing the subsequent study is the conservative choice.

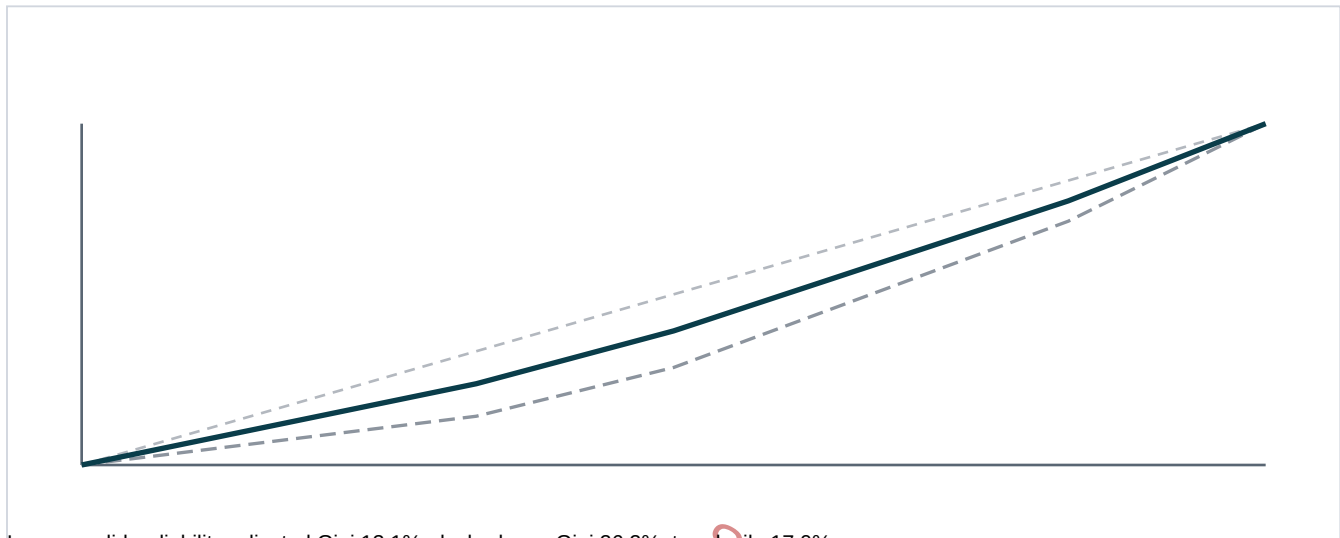
Avoided spend is what the duplicate cost. A counterfactual reduction requires a locked

SYNTHETIC DATA ? NOT FOR SALE

pre-period and a control group.
Measured (buyer allowed): \$18,900.00 [measured]
Modeled (published reference): \$0.00 [modeled]
Combined (split shown): \$18,900.00 = measured \$18,900.00 + modeled \$0.00
Retained value omitted ? buyer did not supply a contracted share.
Not annualised (factor 1). Window not supplied.

SECTION 2 ? DISTRIBUTION & CONCENTRATION

No ranked clinician list (invariant I3).
Adjusted Gini: 13.1% Raw Gini: 26.2% [modeled]
Top-decile spend share: 17.0%
Below display threshold: 0



Lorenz: solid=reliability-adjusted Gini 13.1%; dashed=raw Gini 26.2%; top-decile 17.0%

SECTION 3 ? RISK-ADJUSTED RATES

Model: cms-hcc-v28+elixhauser-nb [modeled]
Reportable clinicians: suppressed (n<11)
Population crude (per 1k/yr): 0.00 [modeled]
Spec hash: 44136fa355b3678a1146ad16f7e8649e94fb4fc21fe77e8310c060f61caaff8a
Covariates: age, sex, dual, institutional, raf, elixhauser, panel_acuity, specialty, u_clinician

APPROPRIATENESS ? FOUR DIMENSIONS

Appropriateness is a four-component record, not a single scalar. Each column has its own denominator and provenance chip. Shared decision and patient understanding stay not_measured until those instruments are fielded ? an honestly empty column names the next thing to measure.

Indication supported: met ? 2/3 (66.7%) ? measured
Evidence adequate: not met ? 181/1536 (11.8%) ? measured
Shared decision occurred: not_measured ? illustrative
Patient understanding: not_measured ? three questions, at the end of the encounter, on whatever survey the site already runs

SECTION 4 ? MODELLED SHARED-SAVINGS VALUE

Shared-savings opportunity: \$62.50 [modeled]
Sensitivity band: \$104.17 ? \$145.83
Sliders:
addressableFraction=1 (default 1) ? Share of measured low-value imaging spend judged in-scope for ARKA measures [modeled]
attributedLives=100000 (default 100000) ? Buyer attribution roster / MSSP assigned

beneficiary count [measured]
 contractedRateMultiplier=1 (default 1) ? Buyer commercial-to-Medicare allowed ratio; 1.0 = Medicare fee schedule [modeled]
 expectedReductionRate=0.06 (default 0.06) ? Meeker et al. JAMA 2016
 difference-in-differences (5?7 pp); never the raw within-arm drop ? Vol III ?5.1 [modeled]
 rampMonths=12 (default 12) ? Linear ramp to full effect over N months within the contract year [modeled]
 sharedSavingsRetentionRate=0.5 (default 0.5) ? MSSP BASIC Level E 50% shared-savings retention (Enhanced 75%) ? Vol III ?9.2 [modeled]
 Two-route derivation:
 Route A ? bottom-up from imaging utilisation (Vol III ?9.1) [modeled]
 events_per_100k ? avg_allowed ? (lives/100000) ? lvc_share ? capture_25pct
 Route B ? top-down from Medicare low-value-service literature (Vol III ?9.1) [modeled]
 imaging_subset_lvc_per_100k[\$4.0M?\$5.0M] ? (lives/100000) ? capture_25pct
 Product model ? measured LVC ? addressable [modeled]
 measuredLowValueSpendCents ? addressableFraction
 Product model ? DiD ? relative pool reduction [modeled]
 expectedReductionRate / DID_BASELINE_INAPPROPRIATE_RATE (0.06/0.24 = 0.25 at defaults)
 Product model ? modeled avoided spend [modeled]
 addressableSpendCents ? relativePoolReduction ? contractedRateMultiplier ? rampFactor
 Product model ? retained by buyer [modeled]
 modeledAvoidedSpendCents ? sharedSavingsRetentionRate

SECTION 5 ? THE FIXED PRE-PERIOD

Delivered even to prospects who never buy. The pre-period is a non-renewable resource.
 Pre-period: 2008-01 -> 2010-12 [illustrative]
 Locked: no ? disclosed, not sealed
 Method: Controlled interrupted time series (controlled segmented regression) ? disclosed, not yet locked
 Control group: Matched non-participating clinicians in the same organisation (Vol III ?17 Study 2), enumerated and fixed before any peer packet is sent (Part A.8 / Wagner 12/12).
 Analysis-plan hash: 1cefcaabc6b6a69d92d129f2f072710436a25737fca6af15f278700d0992214

APPENDIX A ? METHODS

Appendix A ? Methods

Model id: cms-hcc-v28+elixhauser-nb
 Equation:

$$\text{low_value_events} \sim \text{NegBin}(\mu, \theta)$$

$$\log(\mu) = b_0 + b_{\text{age}} + b_{\text{sex}} + b_{\text{dual}} + b_{\text{institutional}} + b_{\text{raf}} + b_{\text{elixhauser}} + b_{\text{panel_acuity}} + b_{\text{specialty}} + u_{\text{clinician}} + \text{offset}(\log(\text{attributed_member_months}))$$

$$u_{\text{clinician}} \sim N(0, \sigma_u^2)$$

Covariates: age, sex, dual, institutional, raf, elixhauser, panel_acuity, specialty, u_clinician
 Offset: attributed_member_months
 Distribution: negative-binomial
 Spec URL: /evidence/methodology#risk-adjustment-specification
 Spec hash: 44136fa355b3678a1146ad16f7e8649e94fb4fc21fe77e8310c060f61caaff8a
 Software versions: (none recorded)
 Seeds: (none ? deterministic fit with fixed solver settings)

APPENDIX B ? MEASURE SPECIFICATIONS

Appendix B ? Measure specifications

Each imaging measure is evaluated at both narrow (strict) and broad (permissive) sensitivity, per Schwartz et al. JAMA Intern Med 2014.

IVI-headache-imaging ? Head imaging for uncomplicated headache. Schwartz AL, Landon BE, Elshaug AG, Chernew ME, McWilliams JM. Measuring Low-Value Care in Medicare. JAMA Intern Med. 2014;174(7):1067-76. ICD-10 carry-forward: Updating a Claims-Based Measure of Low-Value Services Applicable to Medicare Fee-for-Service Beneficiaries. J Gen Intern Med. 2022. [licence: public-academic; provenance: modeled]

APPENDIX C ? LIMITATIONS

Appendix C ? Limitations

This section is written to be read. A report that buries its limitations invites the reader to discover them the hard way.

Readiness verdict: degraded.

Ordering/referring NPI present rate (all lines): 99.6%.

Imaging ordering-NPI spend share: 99.6%.

Attribution unattributed share: 33.3% (adapter encounter-proximity @ em-proximity-30d-v1).

Claims-based low-value measures approximate clinical appropriateness; they do not replace chart review. Narrow and broad sensitivities are both shown because the choice of exclusion set moves the dollars.

Risk adjustment uses CMS-HCC V28 and Elixhauser comorbidity counts with a hierarchical negative-binomial clinician random effect. Residual case-mix and coding intensity differences remain.

Reliability adjustment shrinks small panels toward the peer mean. Clinicians below the display threshold are counted, not ranked, and cells with $n < 11$ render as "suppressed ($n < 11$)".

Section 4 dollars are modelled at the organisation / cohort grain using published difference-in-differences effect sizes ? never a personally attributed clinician dollar (invariant I4).

Section 5 discloses the intended controlled interrupted time series. Until a baseline lock row exists, the pre-period is not sealed and Module 2 peer packets cannot ship (invariant I11).

SYNTHETIC DATA. Structure is realistic; clinical associations are not. Used to validate the pipeline, not to make claims about any real population. Do not use these figures in a sales conversation as if they were the buyer's numbers.

Ingest readiness reasons:

? ordering NPI present on 100% of imaging lines ? clinician-level results will be reported for 100% of imaging spend and the remainder will be shown as unattributed

? allowed amount present on 61% of lines ? spend totals for the missing share will be labeled modeled or omitted

Of 3 advanced imaging studies in the 24-month window, 1 (33.3%) carried an ordering clinician on the professional claim and were attributed directly. A further 1 (33.3%) were attributed to a clinician who saw the member within 30 days for a related condition; these are labelled inferred throughout. The remaining 1 (33.3%) could not be attributed to an ordering clinician and are counted in the population totals but excluded from every clinician-level figure in this report.

APPENDIX D ? SOURCE REGISTER

/sources (seed: docs/arka-tcoc/SOURCE_REGISTER.md)

APPENDIX E ? CONTROL-GROUP MATCHING BALANCE

Appendix E ? Control-group matching balance

No matched control group has been constructed for this report yet. At baseline lock, the balance table is rendered here and hashed into BaselineLock.matchingReport (Prompt 8.2 / Vol III ?17 Study 2).

APPENDIX F ? HOW LONG UNTIL WE KNOW

Appendix F ? How long until we know (CITS power)

Power has not yet been estimated for this population. Run 'npm run tcoc -- power' (Prompt 13.2) against the pre-period series to produce the minimum-detectable-effect table and the buyer sentence. Provenance: illustrative until estimated.

APPENDIX G ? INDEPENDENT REPRODUCTION OF THE PRIMARY ENDPOINT

Appendix G ? Independent reproduction of the primary endpoint

You can run our analysis on our data and get our number. Here is the command.

make reproduce

Package: tools/lowvalue-cits/ (built; public GitHub release pending Prompt Z.8)
Zenodo DOI: assigned on first deposit after Prompt Z.8 clears (see ZENODO.md).
Gate G13: recovered ?7 within 15% of the known injected effect on the golden monthly aggregate series. Analysis-plan template and control-group construction ship beside the fit script so a reader can see the counterfactual method, not just the model.

? end of report ?

SYNTHETIC DATA ? NOT FOR SALE