LONGEVITY RESEARCH · MIMIC-III MORTALITY HARNESS · **BUILD V3.54**

MIMIC-III → Early-Death Oracle Harness

Loads your uploaded MIMIC-III demo CSVs, assembles a per-admission record, routes each free-text admission diagnosis to the matching **early-death (mortality-endpoint) oracle**, computes the maximum achievable risk reduction and life-years saved, and compares against the patient's **observed** in-hospital outcome. Runs entirely in your browser.

⚠ Runs on the 100-patient MIMIC-III DEMO · processing is local (no upload/network) · representative oracle effect sizes

00 The promise, in one number

> *"The fox knows many things, but the hedgehog knows one big thing."* — *Archilochus, fr. 201*

Run across **3,500** patient-records (NHANES, ambulatory) routed to the **5** early-death (mortality-endpoint) oracles, the harness projects a mean gain of **+7.9 life-years per person** from the Bayesian Pareto-optimum set relative to the disease-specific standard-of-care baseline (mean usual-care baseline 20.3 LY → mean Pareto-optimum 28.2 LY; **+27,545 life-years** across the cohort). The effect concentrates where modifiable *post-acute* hazard is largest — Pulmonary (+10.3), Heart Disease (+9.3), Metabolic Disease (+8.9) — and is smallest for Brain (+3.6), whose mortality sits in an acute or age-driven phase no prevention bundle reaches. Every oracle's achievable-risk-reduction frontier is substantial (cross-correlation-corrected joint hazard reduction of 67.2%–75.5%, ρ=0.30); the translated life-years are the disciplined figure.

Discussion. Read as a study, this is a *transportability-and-ceiling* exercise, not a clinical estimate. The mean Δ is an **upper bound** on the incremental gain: the Pareto hazard ratio is applied multiplicatively to the usual-care hazard, so interventions already embedded in standard care (e.g. a statin) are credited a second time. The overlap-free version — the prescribed-vs-Pareto *headroom* in §06 — requires the `PRESCRIPTIONS` table; without it that split reads n/a. Three further bounds on interpretation: (i) the chronic-prevention hazard ratios are transported from ambulatory trials to post-ICU survivors; (ii) the acute first-year mortality m_1 and post-acute hazard h_long are representative literature values, not fit to this cohort; and (iii) where observed actual life-years are absent (a selected-decedent demo with the in-hospital-death flag suppressed), the baseline reflects the disease group's standard-of-care expectation, not the loaded sample. Stated precisely: under transported, literature-calibrated assumptions, the Pareto-optimum set recovers a *modeled* mean gain per person over standard of care — a hypothesis-generating ceiling to validate against cohort-fit baselines and an overlap-free prescribed-vs-Pareto comparison, not a prescribe-tomorrow figure. Not for clinical or policy use.

01 Load the data

Select the CSV files from your `archive.zip` (at minimum `PATIENTS.csv` and `ADMISSIONS.csv`; `structured_medical_records.csv` is optional and used only to read the stated Age). Files are parsed locally in your browser — nothing is uploaded.

NHANES mode (free, no-application data). This harness also reads **NHANES** `.XPT` files directly (SAS-transport, parsed in-browser). Drop a demographics file (`DEMO_*.xpt`, with `SEQN` / `RIDAGEYR` / `RIAGENDR`), a prescriptions file (`RXQ_RX_*.xpt`, `RXDDRUG`), the medical-conditions questionnaire (`MCQ_*.xpt` / `DIQ` / `KIQ` for routing), and a linked-mortality file (`SEQN` + `MORTSTAT` + `PERMTH_EXM`); it auto-detects NHANES, routes by self-reported condition, and runs the same standard-of-care vs Pareto comparison on an **ambulatory** population (general-population survival baseline). You download the files from CDC and drop them here — the tool can't fetch `wwwn.cdc.gov` directly (cross-origin). **NHANES III fixed-width files** (e.g. `adult.dat`) also load: drop the data file together with its **SAS layout** (`adult.sas`) — the tool parses the `INPUT` column positions and `LABEL`s, then routes by condition label. (Bring one fixed-width file + its `.sas` per load; prescriptions/mortality can come from `.XPT` or CSV. Continuous cycles (1999+) are all-`.XPT` and need no layout.)

What this archive does and does not contain. It has demographics (PATIENTS), admissions with a free-text `diagnosis` and death flags (ADMISSIONS), labs, and free-text reports. It does **not** contain `PRESCRIPTIONS`, `DIAGNOSES_ICD`, or `PROCEDURES_ICD`. Consequences: routing uses the free-text admission diagnosis (not ICD codes), and the **doctor-prescribed-protocol risk reduction cannot be computed** (no medication table). The harness therefore reports the oracle's **maximum achievable** risk reduction and life-years, plus the patient's **observed** outcome.

02 Early-death oracles included

Every atlas oracle whose primary endpoint is mortality / early death is included. Population-count analyses (us-mortality, self-caused-harm, rare-disease) and symptom/incidence-endpoint oracles (osteoarthritis, BPH, anxiety, depression, ADHD, dementia-incidence, etc.) are excluded — they do not have a patient-level early-death endpoint.

ORACLE	ENDPOINT	INTERVENTIONS	ROUTED FROM DIAGNOSES CONTAINING…
All-Cause Mortality	All-cause mortality	7	sepsis, infection, UTI, trauma, GI bleed, syncope, fever, failure-to-thrive (default)
Cancer (cause-specific mortality)	Cause-specific 5-yr mortality	6	cancer, carcinoma, malignant, tumour, neoplasm, metastatic, sarcoma, leukemia, glioma
Lymphoma / Waldenström	All-cause mortality in WM	4	lymphoma, waldenström, myeloma
Heart Disease (CVD)	MACE / all-cause mortality	7	heart, cardiac, CHF, congestive, STEMI, NSTEMI, angina, myocardial, coronary, VF arrest, arrhythmia
Kidney Disease (CKD)	ESRD / renal-composite / mortality	6	renal, kidney, ESRD, nephropathy, hyperkalemia, dialysis
Liver Disease	Decompensation / HCC / mortality	6	liver, hepatitis, cirrhosis, varices, hepatic, ESLD, ascites
Pulmonary (COPD/IPF/PAH)	5-yr all-cause mortality	6	pneumonia, COPD, asthma, respiratory, shortness of breath, IPF, pulmonary, bronchitis, dyspnea, tracheal
Metabolic Disease (T2D)	HbA1c / MACE / all-cause mortality	6	diabetes, DKA, hyperglycemia, ketoacidosis, metabolic
Solid-Organ Transplant	5-yr post-transplant all-cause mortality	6	transplant
Brain (tumour / stroke)	All-cause mortality at 24 months	6	stroke, TIA, intracranial, subdural, hemorrhage, seizure, brain, encephalopathy, cranial

03 Per-admission output

SUBJECT/ADM	AGE/SEX	ADMISSION DIAGNOSIS	ORACLE	PRESCRIBED RR	MAX ACHIEVABLE RR	USUAL-CARE BASELINE LY	PARETO-OPTIMUM LY	ACTUAL LY (OBS.)	Δ YEARS ADDED	OBSERVED
11/11	48/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	31.45	41.99	n/a	+10.53	alive at follow-up
49/49	82/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	8.02	14.16	n/a	+6.14	alive at follow-up
63/63	66/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	18.96	27.49	n/a	+8.52	alive at follow-up
67/67	70/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	13.77	23.12	n/a	+9.35	alive at follow-up
74/74	58/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	22.82	33.78	n/a	+10.96	alive at follow-up
78/78	80/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	9.15	15.66	n/a	+6.51	alive at follow-up
96/96	90/M	Brain (tumour / stroke)	Brain (tumour / stroke)	n/a	75.5%	3.35	3.83	n/a	+0.47	alive at follow-up
112/112	21/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	60.14	70.84	n/a	+10.71	alive at follow-up
116/116	84/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	6.07	12.50	n/a	+6.43	alive at follow-up
122/122	69/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	14.45	23.96	n/a	+9.52	alive at follow-up
139/139	72/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	12.44	20.43	n/a	+7.99	alive at follow-up
146/146	78/F	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	10.35	18.30	n/a	+7.95	alive at follow-up

SUBJECT/ADM	AGE/SEX	ADMISSION DIAGNOSIS	ORACLE	PRESCRIBED RR	MAX ACHIEVABLE RR	USUAL-CARE BASELINE LY	PARETO-OPTIMUM LY	ACTUAL LY (OBS.)	Δ YEARS ADDED	OBSERVED
153/153	31/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	47.14	58.43	n/a	+11.30	alive at follow-up
162/162	83/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	7.50	13.44	n/a	+5.94	alive at follow-up
164/164	49/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	33.75	43.49	n/a	+9.74	alive at follow-up
165/165	61/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	20.40	31.03	n/a	+10.63	alive at follow-up
188/188	22/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	59.20	69.87	n/a	+10.67	alive at follow-up
205/205	66/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	18.96	28.49	n/a	+9.53	alive at follow-up
208/208	79/M	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	6.33	7.77	n/a	+1.44	alive at follow-up
217/217	28/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	53.58	65.17	n/a	+11.59	alive at follow-up
230/230	66/F	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	12.61	17.00	n/a	+4.39	alive at follow-up
255/255	33/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	48.86	60.27	n/a	+11.41	alive at follow-up
262/262	83/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	7.50	14.19	n/a	+6.69	alive at follow-up
265/265	17/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	63.86	75.92	n/a	+12.06	alive at follow-up
279/279	52/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	27.91	39.41	n/a	+11.49	alive at follow-up

SUBJECT/ADM	AGE/SEX	ADMISSION DIAGNOSIS	ORACLE	PRESCRIBED RR	MAX ACHIEVABLE RR	USUAL-CARE BASELINE LY	PARETO-OPTIMUM LY	ACTUAL LY (OBS.)	Δ YEARS ADDED	OBSERVED
284/284	59/M	Brain (tumour / stroke)	Brain (tumour / stroke)	n/a	75.5%	14.05	19.64	n/a	+5.59	alive at follow-up
294/294	63/F	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	21.41	31.54	n/a	+10.13	alive at follow-up
315/315	77/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	10.97	18.88	n/a	+7.91	alive at follow-up
343/343	66/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	18.96	28.49	n/a	+9.53	alive at follow-up
357/357	46/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	36.54	47.51	n/a	+10.98	alive at follow-up
359/359	73/M	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	8.42	10.78	n/a	+2.36	alive at follow-up
361/361	46/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	36.54	46.40	n/a	+9.87	alive at follow-up
377/377	24/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	57.33	67.92	n/a	+10.59	alive at follow-up
399/399	61/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	20.40	29.88	n/a	+9.48	alive at follow-up
403/403	58/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	25.67	35.95	n/a	+10.28	alive at follow-up
437/437	32/F	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	30.13	43.62	n/a	+13.50	alive at follow-up
440/440	72/F	Brain (tumour / stroke)	Brain (tumour / stroke)	n/a	75.5%	9.77	13.03	n/a	+3.25	alive at follow-up
450/450	45/F	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	23.15	32.99	n/a	+9.84	alive at follow-up

SUBJECT/ADM	AGE/SEX	ADMISSION DIAGNOSIS	ORACLE	PRESCRIBED RR	MAX ACHIEVABLE RR	USUAL-CARE BASELINE LY	PARETO-OPTIMUM LY	ACTUAL LY (OBS.)	Δ YEARS ADDED	OBSERVED
459/459	70/M	Brain (tumour / stroke)	Brain (tumour / stroke)	n/a	75.5%	9.41	12.49	n/a	+3.08	alive at follow-up
470/470	43/M	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	36.01	48.39	n/a	+12.39	alive at follow-up
488/488	61/F	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	23.09	33.41	n/a	+10.32	alive at follow-up
490/490	83/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	6.49	13.16	n/a	+6.67	alive at follow-up
493/493	81/M	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	5.69	6.88	n/a	+1.19	alive at follow-up
494/494	70/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	13.77	22.07	n/a	+8.31	alive at follow-up
495/495	69/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	14.45	22.91	n/a	+8.46	alive at follow-up
501/501	42/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	40.30	51.43	n/a	+11.12	alive at follow-up
509/509	40/F	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	25.83	37.07	n/a	+11.24	alive at follow-up
542/542	73/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	13.67	21.33	n/a	+7.66	alive at follow-up
552/552	54/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	26.19	36.32	n/a	+10.13	alive at follow-up
557/557	86/M	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	5.29	11.43	n/a	+6.14	alive at follow-up
569/569	58/F	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	25.67	36.24	n/a	+10.57	alive at follow-up

SUBJECT/ADM	AGE/SEX	ADMISSION DIAGNOSIS	ORACLE	PRESCRIBED RR	MAX ACHIEVABLE RR	USUAL-CARE BASELINE LY	PARETO-OPTIMUM LY	ACTUAL LY (OBS.)	Δ YEARS ADDED	OBSERVED
571/571	84/F	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	7.01	13.66	n/a	+6.66	alive at follow-up
593/593	38/M	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	40.66	51.65	n/a	+10.99	alive at follow-up
596/596	73/M	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	11.81	20.90	n/a	+9.09	alive at follow-up
601/601	46/F	Metabolic Disease (T2D)	Metabolic Disease (T2D)	n/a	67.2%	36.54	46.40	n/a	+9.87	alive at follow-up
607/607	40/F	Cancer (cause-specific mortality)	Cancer (cause-specific mortality)	n/a	74.1%	25.83	37.07	n/a	+11.24	alive at follow-up
616/616	79/M	Heart Disease (CVD)	Heart Disease (CVD)	n/a	72.4%	8.38	16.22	n/a	+7.83	alive at follow-up
638/638	58/M	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	22.82	33.78	n/a	+10.96	alive at follow-up
639/639	56/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	27.43	37.85	n/a	+10.43	alive at follow-up
640/640	69/F	Pulmonary (COPD/IPF/PAH)	Pulmonary (COPD/IPF/PAH)	n/a	71.4%	16.62	25.78	n/a	+9.16	alive at follow-up

... 3440 more admissions

04 Aggregate roll-up (cells <6 suppressed, mirroring enclave release rules)

3500
admissions processed

5
early-death oracles exercised

27545
total life-yrs added (Pareto – usual care)

0
observed in-hospital deaths

ORACLE	N	MEAN MAX-ACHIEVABLE RR	MEAN LIFE-YRS ADDED/ADM	TOTAL LIFE-YRS ADDED	OBSERVED IN-HOSP DEATHS
Pulmonary (COPD/IPF/PAH)	835	71.4%	10.25	8562	0
Heart Disease (CVD)	810	72.4%	9.28	7520	0
Metabolic Disease (T2D)	793	67.2%	8.88	7042	0
Cancer (cause-specific mortality)	610	74.1%	4.54	2772	0
Brain (tumour / stroke)	452	75.5%	3.65	1650	0

05 Actual vs usual-care baseline vs Pareto-optimum life-years ("years added")

The **usual-care baseline** is the standard of care: the empirical survival of patients with this disease who received ordinary treatment, including medications taken in the recent past (e.g. a statin they were already on). It is *not* an untreated counterfactual — there is no plausible untreated cohort to estimate it from. The **Bayesian Pareto optimum** is a different, specified set of interventions. So this table compares two regimens — **standard of care** vs the **Pareto-optimum set** — and the **years added** is `Pareto-optimum LE - usual-care baseline LE`. A high disease-specific acute first-year mortality is carried by both regimens; the Pareto set acts on the modifiable post-acute hazard. Observed **actual** life-years (from `dod - admittime`) are shown as the empirical anchor.

0.0
mean actual life-yrs (observed)

20.3
mean usual-care baseline life-yrs (standard of care)

28.2
mean Pareto-optimum life-yrs

+27545
total Δ years added (Pareto − usual care)

ORACLE	N	AVG AGE @ INTERVENTION	AVG AGE @ DEATH	AVG ACTUAL LY (OBS.)	USUAL-CARE BASELINE LY	PARETO-OPTIMUM LY	AVG Δ YEARS ADDED
Pulmonary (COPD/IPF/PAH)	835	53.5	–	*n/a*	29.73	39.99	+10.25
Heart Disease (CVD)	810	67.9	–	*n/a*	17.35	26.63	+9.28
Metabolic Disease (T2D)	793	58.8	–	*n/a*	25.01	33.89	+8.88
Cancer (cause-specific mortality)	610	66.7	–	*n/a*	12.58	17.12	+4.54
Brain (tumour / stroke)	452	71.0	–	*n/a*	10.20	13.85	+3.65

> **What the delta is — and the one caveat that remains.** This compares the standard-of-care regimen to the Pareto-optimum set. The Pareto effect is applied multiplicatively to the usual-care hazard, so where the two regimens **overlap** — e.g. both include a statin — the model still credits that shared intervention, making the headline Δ an **upper bound on the incremental gain**. The clean, overlap-free version is in §06: the prescribed-vs-Pareto **headroom** measures the Pareto optimum relative to what the patient was *actually* given (from `PRESCRIPTIONS`), so it nets out the standard care already in the baseline. Two further notes: the Pareto set acts only on the post-acute hazard (a statin does not avert acute septic death), and observed actual LY runs below the usual-care baseline here because this demo cohort is **selected decedents** — the baseline reflects the disease group's realistic standard-of-care expectation, not this biased sample.

06 Doctor-prescribed vs Pareto-optimum (requires the PRESCRIPTIONS table)

The demo archive you may have loaded omits `PRESCRIPTIONS`. Load it (it ships with the full credentialed MIMIC-III, ~4.16M rows, and with the open 100-patient demo on PhysioNet) and this section activates: each admission's ordered drugs are string-matched (`DRUG` / `DRUG_NAME_GENERIC`) to the routed oracle's interventions, giving the **doctor-prescribed risk reduction**, the **gap to the Pareto optimum**, and a split of life-years into **already secured** by the prescribed protocol vs **remaining headroom**.

ORACLE	N (WITH RX)	MEAN PRESCRIBED RR	MEAN PARETO RR	MEAN GAP (UNREALIZED)	MEAN YRS SECURED	MEAN HEADROOM YRS
No PRESCRIPTIONS table loaded — load PRESCRIPTIONS.csv to activate prescribed-vs-Pareto.						

> **Interpretation caveats.** MIMIC `PRESCRIPTIONS` are *inpatient CPOE orders* during the stay — a mix of acute ICU drugs (pressors, sedatives, antibiotics, which map to no prevention oracle) and continued chronic medications (statins, antihypertensives, etc., which do). So the prescribed RR here is a **lower bound** on the true outpatient regimen and is **not adherence-weighted** (a single inpatient order ≠ chronic use). Lifestyle and procedural interventions (exercise, diet, weight loss, rehab) never appear in a drug table, so part of the "gap to Pareto" is structurally unmeasurable from prescriptions alone.

07 Methods & caveats

- **Routing & priority:** free-text admission `diagnosis` → oracle by keyword, in priority order: **lymphoma** → **cancer** → **transplant** → **sepsis/infection** → **brain** → **heart** → **liver** → **kidney** → **pulmonary** → **metabolic** → **all-cause (default)**. Co-occurring conditions route to the highest-priority match — e.g. `S/P LIVER TRANSPLANT` → transplant, `SEPSIS;PNEUMONIA` → all-cause (sepsis dominates). This priority is a deliberate, editable choice; free-text routing has irreducible ambiguity and a real run would validate it on a labelled sample.
- **Prescribed-protocol RR:** computed when a `PRESCRIPTIONS` table is loaded — drugs are string-matched (`DRUG` / `DRUG_NAME_GENERIC`, the standard MIMIC approach; production uses NDC→RxNorm→ATC) to the routed oracle's interventions. Without that table it shows `n/a`. See §06 for the prescribed-vs-Pareto split.
- **Max-achievable RR:** greedy Pareto over *all* the oracle's decreasing factors, using the atlas rho-corrected joint model `HR=exp(Σln(HRᵢ)·(1-ρ))`, ρ=0.30. This is a counterfactual ceiling, not a prescribe-tomorrow figure.
- **Life-years (usual-care baseline vs Pareto-optimum set):** the **usual-care baseline** is the standard of care — disease-specific survival from literature on real, treated patients, so ordinary treatment (including recently-taken statins etc.) is already embedded; it is not an untreated counterfactual. **Phase 1** (acute, year 1) applies a disease-specific 1-year mortality m_1 (e.g. liver ≈0.50, cancer ≈0.55, sepsis/all-cause ≈0.40, heart ≈0.28) carried by both regimens. **Phase 2** (post-acute) applies a chronic disease hazard `h_long` plus the age/sex background; the Pareto set's joint HR multiplies only `h_long`. Remaining life-expectancy is the area under each survival curve; **years added = Pareto-optimum LE − usual-care baseline LE**.
- **Overlap caveat & the clean version:** because the Pareto HR is applied to the usual-care hazard, interventions common to both regimens (e.g. a statin already in standard care) are credited again — so the §05 Δ is an **upper bound on the incremental gain**. §06's prescribed-vs-Pareto **headroom** nets this out by measuring the Pareto optimum relative to the patient's actual prescribed drugs. Baseline m_1 / `h_long` are representative literature values, not fit to this cohort; `qx` background is a Canadian general-population table.
- **Residual life-years caveats:** (a) the bundle acts only post-acute, so high-acute-mortality groups gain little; (b) the chronic-prevention HRs are transported from ambulatory trials to post-ICU survivors; (c) m_1 / `h_long` are representative literature values, not fit to this cohort — a production version would calibrate them to disease-group survival (e.g. registry or full-MIMIC follow-up).
- **Observed outcome:** from ADMISSIONS `hospital_expire_flag` / PATIENTS `dod` — the only ground-truth mortality available; shown for context against the counterfactual.
- **Effect sizes** are a documented representative subset per oracle (sources listed in §2 on hover), re-expressed in portable JS; full sets live in the atlas dashboards.
- **Demo size & selection:** 100 patients, all with recorded deaths (SSA Death Master File) — not a representative survival cohort. De-identified ages >89 are stored shifted; clamped to 89 here.
- **Not for clinical or policy use.** Pipeline demonstration only.

MIMIC-III Clinical Database (MIT Laboratory for Computational Physiology, Beth Israel Deaconess Medical Center), demo subset. Local processing; representative effect models. Not for clinical or policy use.