HeartLink Health LLC – Algorithm v4.1-CL (ASE 1.3)

Document: Trial Summaries (T1.0–T1.9) | Date: October 2025

# HeartLink v4.1‑CL (ASE 1.3) — Trial Reference Summaries

Each entry outlines the objective, cohort size, method, primary metrics, and acceptance criteria/outcome.

## T1.0 — Baseline Drift Audit

Cohort Size: 10,000 users × 30 days

Method: Assessed EMA stability and baseline normalization during early and steady‑state periods.

Primary Metrics:

• Mean drift ≈ 0.00 ± 0.03

• Stable within ±0.04 normalized score

Outcome: PASS — within tolerance (±0.05).

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## T1.1 — Daily Perturbation Sweep

Cohort Size: 1,000 cases (±1 level jitter)

Method: Evaluated day‑to‑day robustness to random symptom jitter.

Primary Metrics:

• 94.8 % unchanged category

Outcome: PASS — ≥90 % unchanged criterion.

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## T1.2 — Orthopnea Trigger Sensitivity

Cohort Size: 500 mixed‑severity cases

Method: Verified binary orthopnea flag logic when combined with elevated SOB.

Primary Metrics:

• 100 % correct escalation with SOB

Outcome: PASS — 100 % observed.

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## T1.3 — Merged‑Noise Guard Test

Cohort Size: 5,000 dual‑symptom records

Method: Validated guard that caps trivial multi‑delta days.

Primary Metrics:

• False‑alert reduction −42 % vs control

Outcome: PASS — reduction ≥30 % required.

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## T1.4 — Cool‑Down Clamp Validation

Cohort Size: 500 sequences, 20 days

Method: Confirmed delayed return to Green after Orange via de‑escalation clamp.

Primary Metrics:

• Clamp held ≥5 calm days

Outcome: PASS — ≥5 days maintained.

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## T1.5 — Chronic vs Acute Distinction

Cohort Size: 2,000 mixed cases

Method: Tested detection differences between advanced stable baselines and acute rises.

Primary Metrics:

• Accuracy 91.7 %

• AUC ≈ 0.95

Outcome: PASS — ≥90 % accuracy target.

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## T1.6 — False‑Alert Sweep (Cohort B)

Cohort Size: 25,000 simulated days

Method: Measured false‑alert rate under no‑change inputs.

Primary Metrics:

• False‑alert 0.28 %

Outcome: PASS — ≤0.5 % threshold.

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## T1.7 — Ping‑Pong Stability Audit

Cohort Size: 100 trajectories × 60 days

Method: Monitored category reversals across long sequences.

Primary Metrics:

• Ping‑pong rate 0.44 %

Outcome: PASS — ≤1 % target.

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## T1.8 — Cross‑Baseline Stress

Cohort Size: 4,000 cases (variable baselines)

Method: Validated tolerance consistency across low→severe baselines.

Primary Metrics:

• No drift beyond ±0.05 normalized

Outcome: PASS — within spec.

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## T1.9 — Integrated Validation Holdout (Final)

Cohort Size: 4,800 cases (multi‑cohort)

Method: Produced final metrics for v4.1‑CL dossier.

Primary Metrics:

• Accuracy 93.2 %

• Surrogate AUC 0.961

• Balanced confusion profile

Outcome: PASS — all acceptance met.

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