THE ECONOMICS OF PATIENT READINESS

A Financial Framework for Recruitment, Retention, and Clinical Trial Execution

Jumo Health

Whitepaper

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Executive Summary

Clinical development organizations invest progressively more capital in each patient as that patient moves from identification through screening, enrollment, participation, and completion.

Most trial economics measure the cost of individual activities or milestones. Recruitment spend, screening cost, enrollment velocity, site performance, and retention are often tracked separately. What is rarely measured is the amount of sponsor capital already committed to a patient at each stage, the probability that this investment will be lost, and the value preserved when that patient successfully progresses.

This creates a measurable relationship between patient readiness and capital efficiency.

The framework in this paper connects three concepts: Trial Readiness Index, Readiness Gain, and Investment Protected. These measures sit inside a broader economic model spanning Recruitment Economics, Retention Economics, and Study Execution Economics.

The framework also supports a more meaningful denominator for recruitment performance: cost per completed participant. Cost per enrolled patient captures the expense required to reach randomization. Cost per completed participant extends the analysis through the point where the trial receives the intended contribution from that patient.

This creates a more complete measure of the productivity of patient acquisition, screening, enrollment, and retention investment.

Trial Readiness Index → Readiness Gain → Investment Protected

1. The Capital Conversion Problem in Clinical Trials

Clinical trials require a sequence of increasingly expensive investments.

A potential patient may first generate costs associated with identification and outreach. Additional costs are incurred as that patient engages, completes a prescreen, undergoes clinical screening, satisfies medical eligibility, completes informed consent, randomizes, attends visits, and remains in the study.

At every stage, the amount of capital associated with the patient increases.

The economic question therefore extends beyond how many patients enter the recruitment funnel. A more useful question is how efficiently the study converts patient investment into completed participation.

That question matters because patient attrition carries different financial consequences depending on where it occurs. A patient who exits before initial outreach represents limited sunk investment. A patient who exits after clinical screening carries substantially more accumulated cost. A patient who withdraws after randomization may represent recruitment, screening, site, monitoring, intervention, and participation costs.

The financial exposure grows as the patient advances. This accumulated exposure provides the foundation for readiness economics.

2. Why Cost per Enrolled Patient Is an Incomplete Measure

Cost per enrolled patient remains useful. It captures the amount of investment required to produce a randomized participant.

It does not capture the full productivity of that investment.

If two studies randomize 300 patients at the same cost, but one retains 285 through completion while the other retains 240, their underlying economics are materially different.

The recruitment denominator is the same. The value produced by the recruited population is not.

- Cost per identified patient
- Cost per engaged patient

- Cost per screened patient
- Cost per eligible patient
- Cost per consented patient
- Cost per randomized patient
- Cost per completed participant

This sequence makes cumulative economic leakage visible. The further the patient progresses, the more capital is committed. The later the patient exits, the greater the financial consequence.

3. The Readiness Economic Model

The readiness economic model connects patient risk, intervention effectiveness, and financial impact.

> **Medical Eligibility → Trial Readiness Index → Primary Readiness Frictions → Targeted Intervention → Readiness Gain → Improved Progression Probability → Investment Protected → Cost Avoidance → Study Execution Value**

Layer	Primary Question	Measure
Medical Eligibility	Can the patient participate under the protocol?	Eligibility
Readiness	How likely is the patient to progress and persist?	Trial Readiness Index
Intervention	Did readiness improve?	Readiness Gain
Patient Economics	How much committed capital was preserved?	Investment Protected
Operational Economics	What downstream spend was avoided?	Cost Avoidance
Study Economics	What execution risk and delay were reduced?	Execution Value

This structure preserves a clear relationship between clinical qualification, behavioral readiness, operational action, and financial consequence.

4. Trial Readiness Index

The Trial Readiness Index, or TRI, measures the readiness of a patient or patient cohort to progress through the requirements of a specific clinical trial.

TRI reflects the interaction between the patient and the protocol. It incorporates readiness signals across Behavioral, Social, and Protocol-Fit domains. The index is informed by the underlying readiness models and the primary frictions those models reveal.

Examples of frictions include Trust, Comprehension, Cognitive Load, Transport, Cost, Material Hardship, Support System, Caregiving Burden, Digital Access and Skill, Language, Care Continuity, Motivation, Decision Confidence, Emotional and Mood, Protocol Design Fear, Schedule Burden, Execution Pattern, Treatment Fatigue, and Functional Limitation.

These frictions influence different milestones across the trial lifecycle. A patient may demonstrate strong readiness during initial education while carrying significant schedule burden that becomes relevant after randomization. Another patient may demonstrate sufficient logistical capacity while carrying substantial uncertainty about placebo assignment or washout requirements.

TRI provides a structured estimate of these risks before they become operational failures.

5. Readiness Gain

Risk identification creates value when it leads to effective action.

Readiness Gain measures the improvement in patient readiness following targeted intervention.

- Personalized education
- Expectation alignment
- Transportation support
- Caregiver engagement
- Financial navigation
- Decision support
- Procedure preparation
- Scheduling assistance
- Digital support
- Behavioral reinforcement
- Continued education during participation

At the patient level:

> **Readiness Gain = Current TRI - Baseline TRI**

At the cohort or study level, the measure can be aggregated across participants while preserving differences in baseline risk and intervention type. Readiness Gain provides evidence that the intervention changed the patient's readiness profile. The next step is translating that change into progression probability.

6. Cumulative Patient Investment

Every patient carries an accumulating financial investment. This can be expressed as Cumulative Patient Investment, or CPI.

> **CPI(s) = Sum of all attributable investment incurred through stage s**

Stage	Incremental Investment	Cumulative Patient Investment
Identification	$X	$X
Outreach and Navigation	+$X	$XX
Prescreening	+$X	$XXX
Clinical Screening	+$X	$XXXX
Eligibility Confirmation	+$X	$XXXXX
Consent	+$X	$XXXXXX
Randomization	+$X	$XXXXXXX
Study Participation	+$X	Continues to increase

The purpose of CPI is to establish the financial exposure associated with patient loss. It is not necessary for every cost to be perfectly attributable at the individual level. Sponsors can allocate shared costs using consistent methods across cohorts or stages. The value of the measure comes from making the accumulation visible.

7. Investment at Risk

CPI tells the sponsor how much has been committed. The next question is how much of that investment is exposed.

> **Investment at Risk = CPI × Probability of Preventable Attrition**

Example:

Input	Illustrative Value
CPI at current stage	$20,000
Estimated preventable attrition probability	30%
Investment at Risk	$6,000

This converts readiness risk into financial exposure. Patients with similar CPI may have very different risk profiles. Patients with similar readiness may carry very different financial exposure depending on how far they have progressed. The combination of readiness and CPI therefore creates a practical prioritization model.

8. Investment Protected

Investment Protected measures sponsor capital already committed to a patient that is preserved because readiness improvement reduces the probability of preventable attrition.

> **Investment Protected = CPI × Attributable Reduction in Preventable Attrition Probability**

Example:

Input	Illustrative Value
CPI	$20,000
Baseline preventable attrition probability	30%
Post-intervention probability	15%
Attributable reduction	15 percentage points
Investment Protected	$3,000

At the cohort level:

> **Investment Protected = Σ [CPI × Attributable Reduction in Preventable Attrition Probability]**

The attributable reduction should be supported by observed intervention response, a validated model, or an explicit counterfactual assumption. Where causal attribution is uncertain, the value should be reported as modeled Investment Protected with an accompanying confidence level.

9. Recruitment Economics

Recruitment Economics covers the journey from patient identification through randomization.

The key question is how efficiently recruitment investment converts into randomized participants.

- Patients identified
- Patients contacted
- Patients engaged
- Patients prescreened
- Patients clinically screened
- Patients medically eligible
- Patients consented
- Patients randomized
- Conversion rate at each stage

- Cost at each stage
- Cumulative Patient Investment
- Cost per randomized patient

Readiness affects these economics by improving progression at the stages where behavioral, social, and protocol-fit friction can influence patient decisions or execution. These improvements can reduce the number of upstream patients required to achieve the same randomization target. That produces measurable cost avoidance.

10. Recruitment Cost Avoidance

Investment Protected and Cost Avoidance should remain separate. Investment Protected reflects capital already committed. Cost Avoidance reflects future spending that no longer needs to occur.

- Clinical screens that do not need to be performed
- Additional outreach that does not need to be purchased
- Recruitment vendor activity that is no longer required
- Site screening burden that is avoided
- Replacement recruitment that is prevented

> **Cost Avoided = Activity Avoided × Incremental Cost per Activity**

Example: 50 clinical screens avoided × $8,000 per screen = $400,000 of cost avoided. This value should not also be counted as Investment Protected.

11. Retention Economics

Retention Economics begins at randomization and continues through study completion. The relevant denominator becomes completed participants.

- Randomized patients
- Completion rate
- Dropout rate
- Preventable dropout
- Dropouts avoided
- Replacement patients avoided
- Replacement recruitment cost avoided
- Cost per completed participant
- Retention Investment Protected

A patient who leaves after randomization may carry substantial cumulative investment. The cost may include recruitment, clinical screening, site activity, randomization procedures, study visits, investigational product management, monitoring, reimbursement, and data collection.

> **The value of readiness intervention increases as cumulative patient investment increases.**

12. Cost per Completed Participant

Cost per completed participant provides a more comprehensive measure of patient acquisition productivity.

> **Cost per Completed Participant = Total Patient Acquisition and Participation Cost ÷ Completed Participants**

A study with lower cost per randomization can still have worse overall economics if retention performance is poor. Conversely, a study that invests more in readiness before randomization may produce lower cost per completed

participant because fewer patients are lost downstream. This metric connects recruitment and retention performance in a single denominator.

13. Study Execution Economics

Patient readiness also influences study-level risk.

- Rescue recruitment campaigns
- New recruitment vendors
- Additional site activation
- Additional countries
- CRO change orders
- Enrollment extensions
- Additional monitoring
- Operational reforecasting
- Delayed database lock
- Delayed regulatory submission

These costs often sit outside the original recruitment budget. They can materially change total study economics.

> **Expected Execution Exposure = Probability of Event × Financial Consequence**

Illustrative Rescue Example	Value
Probability of rescue	35%
Estimated rescue cost	$3.0M
Expected Rescue Exposure	$1.05M
Post-readiness rescue probability	15%
New Expected Rescue Exposure	$450K
Execution Value Created	$600K

14. Three Forms of Readiness Economic Value

Economic Measure	What It Represents
Investment Protected	Capital already committed to patients that is preserved through improved progression and persistence
Cost Avoidance	Future expenditures that do not have to occur because preventable downstream activity is eliminated
Execution Value	Study-level value generated through reduced rescue, delay, additional sites, change orders, and related execution improvements

> **Total Readiness Economic Impact = Investment Protected ✦ Cost Avoidance ✦ Execution Value**

The categories should continue to be reported separately. The total provides the headline. The individual categories provide financial traceability.

15. Applying the Model Across Disease Complexity

The economic impact of readiness varies substantially by therapeutic and protocol complexity. A useful framework separates studies into Common, Specialty, and Rare disease profiles. The readiness architecture remains consistent across these categories. The economics change.

Disease Profile	Primary Economic Emphasis
Common	Funnel efficiency, screening volume, coordinator burden, cost per randomized patient, cost per completed participant
Specialty	Screening efficiency, consent conversion, behavioral screen failure reduction, retention, cost per completed participant
Rare	Preserving scarce patients, protecting screening investment, avoiding replacement recruitment, preventing delay, reducing rescue risk

The financial value of protecting a single patient can therefore vary significantly across disease contexts.

16. The Readiness Capital Map

The interaction between readiness and financial exposure can be visualized through a Readiness Capital Map.

- X-axis: Trial Readiness or Readiness Gain
- Y-axis: Cumulative Patient Investment
- Bubble size: Investment at Risk

Quadrant	Interpretation
High Readiness, Low CPI	Low immediate financial risk
High Readiness, High CPI	Substantial committed capital with strong progression probability
Low Readiness, Low CPI	Early intervention opportunity with limited existing exposure
Low Readiness, High CPI	Highest financial priority

The map creates a direct connection between patient support decisions and financial prioritization.

17. From Readiness to Capital Efficiency

The broader implication is significant. Patient readiness can be managed as a capital efficiency variable.

Sponsors continually decide where to allocate additional resources. Should another patient enter clinical screening? Should additional recruitment spend be deployed? Should a site receive more support? Should a patient receive a specific intervention? Should rescue begin?

A readiness economic model improves these decisions by adding information about probability of progression, amount of capital already committed, amount of capital at risk, expected effect of intervention, expected downstream cost, and expected execution exposure.

This moves readiness from qualitative patient support into measurable clinical development economics.

18. A Practical Sponsor Scorecard

Category	Recommended Measures
Readiness	TRI; Readiness Gain; highest-risk Primary Frictions; readiness coverage and confidence
Recruitment	Cost per screened; cost per consented; cost per randomized; screens avoided; recruitment cost avoided
Retention	Completion rate; dropouts avoided; replacement patients avoided; cost per completed participant; retention Investment Protected
Capital	CPI; Investment at Risk; Investment Protected
Execution	Rescue probability; Expected Rescue Exposure; additional sites avoided; enrollment months saved; Execution Value Created
Total Financial Impact	Investment Protected + Cost Avoidance + Execution Value

19. Measurement and Validation

The readiness economic model should be treated as an empirical framework that improves as study-level evidence accumulates.

Trial Readiness Index scores should be calibrated against observed progression, randomization, retention, and completion outcomes.

Readiness Gain should be evaluated against pre-intervention and post-intervention readiness measures and linked to subsequent changes in progression probability.

Investment Protected should be estimated using attributable changes in preventable attrition risk and the Cumulative Patient Investment associated with the affected patients or cohorts.

Where direct causal attribution is not yet available, the model should report modeled value, confidence level, assumptions used, observed outcomes, and variance between predicted and actual performance.

Over time, the framework should be recalibrated using:

- Study-specific outcomes
- Therapeutic-area performance
- Site-level performance
- Intervention response
- Cohort-level readiness behavior
- Actual recruitment and retention costs

This creates a continuously improving economic model rather than a static ROI calculator. The objective is to establish a measurable relationship between patient readiness, patient progression, and clinical development economics.

Conclusion

Clinical trials already generate extensive information about medical eligibility, recruitment performance, enrollment, site productivity, and retention.

Readiness adds another dimension: the probability that patients can successfully sustain the demands of participation.

Once readiness is connected to cumulative patient investment, its financial consequences become measurable.

TRI identifies readiness risk. Readiness Gain measures improvement. Investment Protected quantifies the capital preserved. Recruitment Economics measures the efficiency of reaching randomization. Retention Economics measures the efficiency of reaching completion. Study Execution Economics captures the broader financial effects of enrollment stability and reduced disruption.

Together, these measures provide a framework for evaluating patient readiness as a contributor to clinical development capital efficiency.

> **How much capital does a study invest to produce a completed participant, how much of that investment is exposed to preventable readiness failure, and how much can be protected by governing readiness throughout the trial?**

That is the financial value model for patient readiness.

About the Author

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John brings 30 years of experience building categories, products, brands, and growth engines around emerging technology, including executive leadership roles at Medidata, conversationHEALTH, and Swoop. At Jumo Health, he helps define patient readiness as measurable infrastructure for recruitment, retention, completion, capital efficiency, and more credible forecasting.