Kypholift ROI Dashboard User Manual for Radiology Management

Prepared for imaging executives, modality leaders, finance partners, quality, and risk management

Document purpose and boundaries: This manual explains how radiology leadership should use the Kypholift ROI Dashboard to build a defensible capital request, size a deployment, stress-test assumptions, and manage realized benefit after implementation. This manual describes an operations-and-finance model. It does not provide clinical decision support. It does not replace manufacturer Instructions for Use (IFU), MR safety policy, infection prevention policy, safe patient handling procedures, or local governance requirements. When conflicts arise, local policy and the IFU take precedence.

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1. Executive overview: The Kypholift ROI Dashboard helps radiology management quantify the financial and operational value of using a positioning-support device for patients with hyperkyphosis or supine intolerance across MRI, CT, and Nuclear Medicine, PET, as well as oncologic patients. The dashboard focuses on preventable operational failure modes that matter to capacity, quality, and risk. It models how improved positioning tolerance can reduce motion-driven repeats, aborted or incomplete exams, transfer-related fall exposure, time-on-table pressure injury exposure, and sedation escalation due to tolerance problems. The dashboard produces outputs that capital committees expect: annual savings, net benefit after operating cost, payback period, ROI, and an executive brief view that can be printed as a one-page finance summary. It also provides a Monte Carlo module that converts point estimates into distributions so that leadership can answer the CFO's question: What happens if assumptions are wrong?

1.1 What the dashboard predicts: The dashboard predicts annualized operational and financial impact under a defined set of assumptions. It does not predict an individual patient's clinical outcomes. It predicts expected loss without the device versus expected loss with the device, then converts the difference into savings, net benefit, payback, and ROI. In management terms, the dashboard predicts the amount of preventable waste and risk cost you can remove from the imaging pathway by improving positioning tolerance in a targeted cohort.

1.2 Who should use the dashboard

- Imaging executives and directors preparing capital requests and benefit realization plans.
- Modality managers and supervisors calibrating local baseline rates and unit costs.
- Finance partners validating assumptions and reviewing payback, ROI, and sensitivity.
- Quality, patient safety, and risk leaders validating definitions and documentation expectations.

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2. System requirements and access: The Kypholift ROI Dashboard runs client-side in the browser and stores scenarios in localStorage, unless local policy overrides it. No external CDNs are required. The dashboard includes a full-page preview route for troubleshooting and for clean printing of the CFO brief.

2.1 Data governance note: The dashboard stores user-entered assumptions locally in the browser by default. Treat the model as a decision support worksheet. If your organization requires centralized logging, use the export function and store exported JSON scenarios in a controlled location, such as a shared governance drive. Do not store protected health information in the dashboard.

3. Model architecture and concepts

3.1 Cohort definition and eligibility logic: The model targets the subset of imaging volume most likely to benefit from improved positioning support. It estimates eligible exams using a simple chain rule:

Eligible fraction = p(age ≥ 60 | scan) × p(hyperkyphosis | age ≥ 60) × p(supine intolerance | hyperkyphosis).

Eligible exams = Annual exams × Eligible fraction.

You should treat this approach as a pragmatic cohort filter. It is designed to support ROI planning, not epidemiologic inference.

3.2 Expected loss framework: The dashboard quantifies baseline expected loss across operational channels. It then applies an effectiveness factor for Kypholift in each channel to compute expected loss with the device.

The default channels include:
- Repeats due to motion or positioning instability
- Aborted or incomplete exams
- Fall events and associated care and legal exposure
- Pressure injury events and associated care and legal exposure
- Sedation escalation for tolerance issues, including rare severe events
- Downstream claim exposure linked to incomplete imaging and delayed diagnosis risk signals

The dashboard sums expected losses and reports savings, net benefit, and payback.

3.3 Deployment sizing: Management decisions are not only about whether to purchase the device. They also involve how broadly to deploy it. The dashboard models deployment using sites, devices per site, and total devices. The model then applies device costs and annual program operating costs to compute net benefit.

3.4 Modality mix: The dashboard supports MRI-only analysis and expanded modality mixes such as MRI + CT, MRI + CT + Nuclear Medicine, and PET, or a custom mix. Modality mix matters because volumes, baseline repeat rates, and time-on-table profiles differ by modality.

4. Inputs and data sourcing

4.1 Input categories: Inputs fall into five categories:

1) Volumes and cohort eligibility probabilities
2) Baseline event probabilities by modality
3) Unit costs and claim exposure costs
4) Device effectiveness assumptions by channel
5) Program costs and deployment parameters

Start with conservative defaults if local data are not available. Then, calibrate using a 30-90 day baseline measurement period and a short pilot.

4.2 Suggested data sources

- Annual exam volumes: RIS, modality logs, scheduling counts, or billing volumes.
- Repeat sequences or repeats per exam: QC logs, PACS notes, protocol deviation logs, or motion artifact analytics if available.

- Aborted or incomplete exams: exam status codes, scheduling outcomes, and documentation of inability to complete.
- Falls and near-falls: safety reporting system, incident reports, patient safety dashboards.
- Skin and pressure injury events: nursing documentation, safety events, or proxy risk stratification for long exams.
- Sedation escalation: anesthesia scheduling data, sedation medication records, recovery logs.
- Claims and legal exposure: risk management claim history, insurer summaries, or conservative priors when local data are sparse.

4.3 Default assumptions from the model workbook: The dashboard ships with editable defaults based on the Kypholift risk and ROI workbook. Treat these as placeholders until you calibrate to your site.

Assumption	Default value
Scenario selection	Moderate
p(hyperkyphosis | age ≥ 60)	0.3
p(supine intolerance | hyperkyphosis)	0.15
Device cost per room, fully loaded ($)	4500
Annual program ops cost ($)	1500
Number of rooms adopting (total)	3
Discount rate for NPV (optional)	0.08
Effectiveness: reduce repeats	0.2
Effectiveness: reduce aborts	0.2
Effectiveness: reduce falls	0.3
Effectiveness: reduce pressure injury	0.2
Effectiveness: reduce sedation escalation	0.2
Effectiveness: reduce dx-claim probability	0.1

4.4 Modality volume defaults and eligibility example

Modality	Annual exams (N)	p(age≥60|scan)	p(hyperkyphosis|age≥60)	p(supine-intol|hyperkyphosis)	Eligible fraction	Eligible exams
MRI	100000	0.45	0.3	0.15	0.0203	2025
CT	200000	0.35	0.3	0.15	0.0158	3150
PET	20000	0.5	0.3	0.15	0.0225	450

4.5 Baseline event probabilities by modality: Baseline probabilities must be replaced with local values when possible. The defaults are placeholders designed for initial planning.

Modality	p_rep	p_abort	p_fall	p_pressure	p_sed	p_sed_sev
MRI	0.08	0.02	0.0002	0.0001	0.03	0.0005
CT	0.03	0.005	0.0001	0.0001	0.01	0.0004

PET	0.05	0.01	0.0002	0.0001	0.02	0.0005

4.6 Unit costs and claim exposure parameters: Unit costs translate operational events into dollars. Use contribution margin and opportunity cost logic for repeats and aborted slots. For falls and pressure injuries, many organizations start with AHRQ incremental inpatient cost estimates, then adjust with local data. Legal and claim exposure inputs should be set conservatively and reviewed with risk management.

Cost item	Value	Units	Applies to	Editable	Suggested source
c_rep	250	$ per repeat	All modalities	Yes	Set to your contribution margin, or incremental cost
c_abort	150	$ per aborted slot	All modalities	Yes	Opportunity cost includes rescheduled overhead
c_fall_care	6694	$ per fall event	All modalities	Yes	AHRQ additional cost estimate
c_fall_legal	50000	$ per fall event	All modalities	Yes	Local risk mgmt estimate, set conservative
c_pressure_care	12712	$ per pressure injury	All modalities	Yes	AHRQ additional cost estimate
c_pressure_legal	75000	$ per pressure injury	All modalities	Yes	Local risk mgmt estimate, set conservative
c_sed_sev	250000	$ per severe sedation event	All modalities	Yes	Local estimate, tail risk dominates
p_dx_claim_given_abort	0.001	probability	All modalities	Yes	Calibrate with local claims, conservative prior
c_dx_claim	500000	$ per dx-related claim	All modalities	Yes	Radiology claims are fat-tailed; set conservative

4.7 Scenario Lab defaults for effectiveness: The Scenario Lab provides conservative, moderate, and aggressive effectiveness settings. Use these to start, then calibrate to pilot results.

Scenario	p_supine_intol	eff_rep	eff_abort	eff_fall	eff_pressure	eff_sed	eff_dx_claim	Notes
Conservative	0.05	0.15	0.15	0.2	0.1	0.1	0.05	Lower intolerance, modest effectiveness.

								Use when site processes are immature.
Moderate	0.15	0.2	0.2	0.3	0.2	0.2	0.1	Midpoint assumptions for planning; calibrate with pilot data.
Aggressive	0.25	0.3	0.3	0.45	0.3	0.3	0.2	Higher intolerance and stronger impact; use for best-case potential.

5. Step-by-step workflow to build an ROI case

5.1 Recommended build sequence: Radiology leadership should use a consistent sequence to avoid producing an ROI that cannot be reproduced later. Use this sequence every time:

Step 1. Reset to defaults if you are starting a new case.
Step 2. Select deployment sizing: sites adopting, devices per site, total devices.
Step 3. Select the modality mix you want to lead with.
Step 4. Confirm annual volumes for each active modality.
Step 5. Set cohort probabilities for age, hyperkyphosis, and supine intolerance.
Step 6. Enter baseline event probabilities by modality (repeats, aborts, falls, pressure injury, sedation escalation).
Step 7. Enter unit costs for each channel and confirm the logic with finance.
Step 8. Select a Scenario Lab profile for effectiveness, then adjust if needed.
Step 9. Review Results, channel breakdown, and sensitivity.
Step 10. Generate and print the CFO brief, then export the scenario to store in governance records.

5.2 Practical calibration guidance: Start conservative. If your organization does not have measured repeat rates by cohort, do not guess aggressively. Use the conservative scenario to establish a floor, then run the moderate scenario to show the mid-case. Use the aggressive scenario only when you have pilot data or published evidence that supports stronger effectiveness. Treat calibration as a quality improvement cycle. Replace assumptions with measured values over time. The dashboard is designed to support iterative refinement.

6. Understanding outputs and charts

6.1 Core metrics: The dashboard reports a consistent set of core metrics:

Eligible exams: estimated annual count of exams in the target cohort.
EL0: expected annual loss without the device.
EL1: expected annual loss with the device.
Savings: EL0 minus EL1.
Net benefit: Savings minus annual program operating cost.
ROI: Net benefit divided by upfront investment.
Payback: Upfront investment divided by annual net benefit.

Use savings for operational story, use net benefit, and payback for CFO decision framing.

6.2 Reading the channel breakdown: Channel charts show where savings originate. Use them to align the program plan with the dominant drivers at your site. If repeats dominate, then protocol standardization and pre-scan tolerance screening become part of the implementation plan. If falls and pressure injury exposure dominate, then safe patient handling and skin-risk workflows become central to the program plan.

6.3 Interpreting payback and ROI: Payback is the simplest decision metric. It answers how quickly the program returns the initial investment in expected net benefit. ROI expresses net benefit relative to investment. Use ROI to compare Kypholift to alternative investments competing for capital. Be explicit about the time horizon. The dashboard focuses on annualized impact and simple payback. If finance requires NPV over multiple years, use the discount rate input and apply a multi-year horizon in your capital memo.

7. Uncertainty, Monte Carlo simulation, and sensitivity

7.1 Why Monte Carlo matters to CFO review: A point estimate can be misleading when a few assumptions dominate. Monte Carlo simulation converts inputs into distributions. The CFO can then see the probability that the net benefit remains positive and the expected payback range. The default Monte Carlo workbook uses triangular distributions for cohort parameters and median-based variability for program cost parameters. Leadership should update the distributions after collecting local data.

7.2 Example Monte Carlo outputs from the workbook: The following tables illustrate how the uncertainty module summarizes results and highlights key drivers. Treat these as examples, not as your site-specific answer.

Modality	Eligible exams (mean)	Savings median	Savings p05	Savings p95
MRI	2,027.16	28,123.65	13,855.85	59,102.14
CT	3,153.36	21,247.15	10,097.50	48,390.59
PET	450.48	4,639.30	2,254.00	10,100.95
Total	5,630.99	55,126.49	28,231.87	112,446.52

Input	Spearman rho with net benefit
p_supine_intol	0.4609
c_fall_legal	0.4511
p_hyperkyphosis	0.3287
p_dx_claim_given_abort	0.2639
c_pressure_legal	0.2449
c_dx_claim	0.2005
c_rep	0.1261
eff_fall	0.1045
c_sed_sev	0.0987
eff_rep	0.0871

Channel	Median savings	p05	p95
rep	13,289.61	6,625.37	26,016.98
abort	1,727.38	854.89	3,376.39
fall	15,245.50	4,646.39	52,424.95
pressure	8,083.21	2,522.77	28,443.13
sed	2,102.97	457.87	9,617.82
dxclaim	6,395.92	1,009.53	31,179.07

7.3 How to use sensitivity results: Sensitivity answers where to spend your measurement effort. Inputs with the highest correlation to net benefit should be measured first. In the default workbook, cohort intolerance probability and legal exposure assumptions rank high, indicating that leaders should validate cohort size and review risk assumptions with risk management early.

8. CFO brief and capital committee workflow

8.1 What the CFO brief is designed to do: The CFO brief is a one-page print view intended for capital committees. It summarizes the deployment, modality mix, eligible volume, annual savings, annual net benefit, payback, and the dominant savings channels. Use the CFO brief as the primary artifact in capital packets. Attach the full model export and this manual as appendices when committees request deeper justification.

8.2 Recommended talk track for capital review: Radiology leaders typically succeed when they present Kypholift as a capacity, quality, and risk control program rather than as equipment alone. Use a consistent story:

1) Problem statement: a targeted cohort cannot tolerate flat positioning, and drives repeats, incomplete exams, and safety risk.
2) Operational mechanism: Kypholift supports stable positioning and improves tolerance.
3) Financial translation: fewer repeats and aborts yield capacity and margin, fewer adverse events reduce preventable cost.
4) Governance: defined cohort, defined documentation fields, and a monitoring cadence.
5) Confidence: uncertainty analysis shows the result holds across a realistic range.

8.3 Capital packet checklist

- CFO brief (printed).
- Scenario export JSON (archived).
- Implementation plan: training, workflow integration, MR safety, and infection prevention sign-offs.
- Benefit realization plan: baseline measurement, pilot metrics, quarterly review cadence.
- Risk review note: how the program supports safety and reduces preventable failure modes.

9. Post-implementation measurement and benefit realization

9.1 Define success metrics before go-live: Define measurable success criteria before the first device enters service. A simple, high-value KPI set is often enough:

• Completion rate for the targeted cohort
• Repeat sequences per eligible exam
• Aborted or rescheduled exams due to intolerance
• Sedation escalation for tolerance issues
• Transfer-related near-falls and falls in imaging areas
• Skin issues flagged post-exam for long protocols

Use the same definitions in the dashboard and in your operational reporting to avoid disputes later.

9.2 Close the loop with quarterly calibration

Recalibrate the dashboard quarterly using measured data. If the repeats decreased less than expected, adjust the effectiveness assumptions. If cohort size differs from expectation, update p(age ≥ 60 | scan) and p(supine intolerance | hyperkyphosis). Leadership gains credibility when the model evolves with real operational data.

10. Risk, compliance, and guardrails

10.1 Guardrails that prevent misuse

- Do not use the dashboard to estimate patient-specific clinical risk.
- Do not store PHI in the dashboard inputs or scenario names.
- Do not claim that Kypholift eliminates risk. Model it as risk reduction with residual risk.
- Treat legal and claim cost inputs as conservative priors and validate with risk management.
- Follow MR safety labeling and the manufacturer's IFU for any in-room use.

10.2 Documentation discipline: ROI claims become defensible when documentation supports them. Leadership should standardize documentation fields that record why Kypholift was used and what happened. This documentation supports quality improvement and provides evidence when leadership reports the realized benefit.

11. Troubleshooting and FAQ

11.1 Common issues

- Numbers do not change: clear local saved state by using Reset to defaults, or clear browser localStorage for the dashboard instance.
- Model looks too optimistic: switch to conservative scenario, reduce effectiveness, or use p05 results from Monte Carlo.
- Finance disputes unit costs: replace defaults with contribution-margin estimates and opportunity cost logic validated by finance.
- Risk management disputes claim exposure: set legal costs to a conservative prior and present a scenario range, then document rationale.

Appendix A. Data dictionary (selected high-impact inputs)

Input	Definition	Suggested source	Applies to	Editable
Annual exams (N)	Annual completed exams per modality	RIS, billing counts, modality logs	All	Yes
p(age ≥ 60 | scan)	Share of modality volume age 60 and older	Scheduling demographics or EHR reporting	By modality	Yes
p(hyperkyphosis | age ≥ 60)	Share of older cohort with hyperkyphosis	Literature anchored, refined via pilot screening	All	Yes
p(supine intolerance | hyperkyphosis)	Share of the hyperkyphosis cohort unable to tolerate the flat supine position	Pilot screening and prior incomplete exam history	All	Yes
p_rep	Repeat probability for eligible exams	QC logs, protocol deviation logs, and motion analytics	By modality	Yes

p_abort	Abort or incomplete probability for eligible exams	RIS status codes, scheduling outcomes	By modality	Yes
p_fall	Fall event probability for eligible exams	Incident reporting, imaging area safety logs	By modality	Yes
p_pressure	Pressure injury event probability for eligible exams	Nursing documentation, safety events, proxy risk stratification	By modality	Yes
p_sed	Sedation escalation probability for eligible exams	Sedation scheduling, nursing documentation	By modality	Yes
p_sed_sev	Probability of a severe sedation-related event (rare)	Risk was reviewed with anesthesia and risk	By modality	Yes
c_rep	Cost per repeat (margin or opportunity cost)	Finance contribution margin estimate	All	Yes
c_abort	Cost per aborted slot (reschedule overhead)	Scheduling and finance review	All	Yes
c_fall_care	Incremental care cost per fall	AHRQ estimate or local cost accounting	All	Yes
c_pressure_care	Incremental care cost per pressure injury	AHRQ estimate or local cost accounting	All	Yes
c_dx_claim	Claim cost for the dx-related malpractice event	Risk management and insurer history	All	Yes
eff_*	Effectiveness, reduction in each channel with the device	Scenario lab, then pilot calibration	All	Yes
Devices per site	Number of Kypholift devices per adopting site	Deployment plan	All	Yes
Sites adopting	Count of sites adopting	Deployment plan	All	Yes

Appendix B. Formulas and calculations

The following definitions summarize the calculations used in the Kypholift risk and ROI workbook.

Concept	Definition
Eligible fraction	Eligible fraction = p(age ≥ 60 | scan) × p(hyperkyphosis | age ≥ 60) × p(supine-intolerance | hyperkyphosis).
Eligible exams	Eligible exams = Annual exams (N) × Eligible fraction.

Expected loss without the device	EL0 = Eligible exams × [p_rep·c_rep + p_abort·c_abort + p_fall·(c_fall_care+c_fall_legal) + p_pressure·(c_pressure_care+c_pressure_legal) + p_sed·p_sed_sev·c_sed_sev + p_abort·p_dx_claim_given_abort·c_dx_claim].
Expected loss with the device	EL1 uses the same structure but multiplies each event probability by (1 - effectiveness) from the selected scenario.
Savings	Savings = EL0 - EL1.
Simple payback	Payback (years) = Upfront device cost / (Total savings - annual ops cost), if positive.
Calibration advice	Replace baseline probabilities and cost estimates with local quality, safety, and claims data whenever possible. Use scenario ranges first, then refine with a short pilot.

Appendix C. Evidence base and references

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