Implementing AI: A Practical Playbook

Data to Decisions: AI in Healthcare Course

R. Andrew Taylor MD MHS

Objectives and How to Use

- Mental model: idea → safe impact
- Step-by-step implementation playbook
- MLOps = ongoing patient-safety monitoring
- Use on rotations: ask “where, who, how measured?”

Playbook Card

1. Define Problem & Goal
2. Pilot & Validate
3. Integrate Workflow
4. Monitor Safety (MLOps)
5. Scale & Sustain

Questions to Ask:
Where, who, how measured?

Overview

AI in Healthcare: Taxonomy

Predictive

estimate risk or outcomes

Risk score

Generative

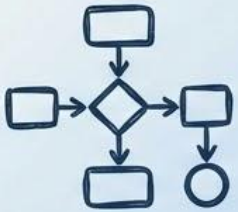
summarize, draft, explain

Note summary

Automation

execute constrained tasks

Protocol automation



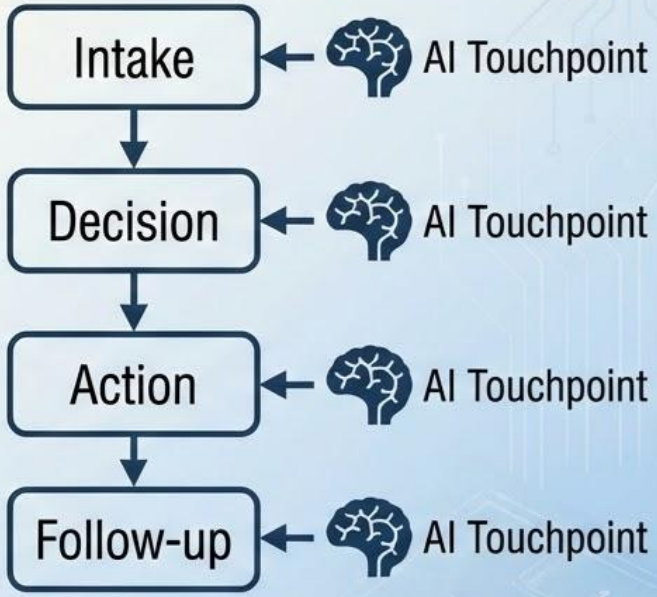
Optimization

allocate resources, schedule flow

Throughput optimizer

Where AI Fits in Workflow

- Workflow map: intake → decision → action → follow-up
- Place AI where it can change actions
- Minimize extra clicks and interruptions



Pause & Think: Choose one touchpoint: intake, decision, action, follow-up—why?

Why Pilots Fail: Top Causes

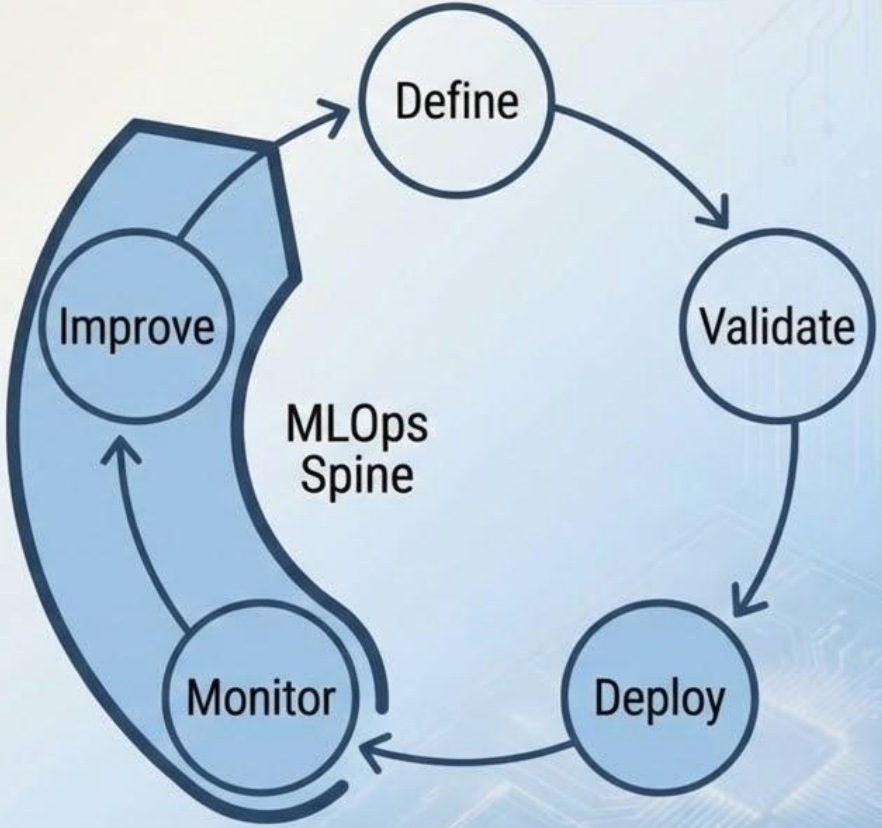
- Workflow mismatch + alert fatigue
- Data issues: missingness, drift, labels
- No ownership or governance
- Weak evaluation + unclear success metrics
- Incentives misaligned with operations

Top 8 failure modes

AI Implementation

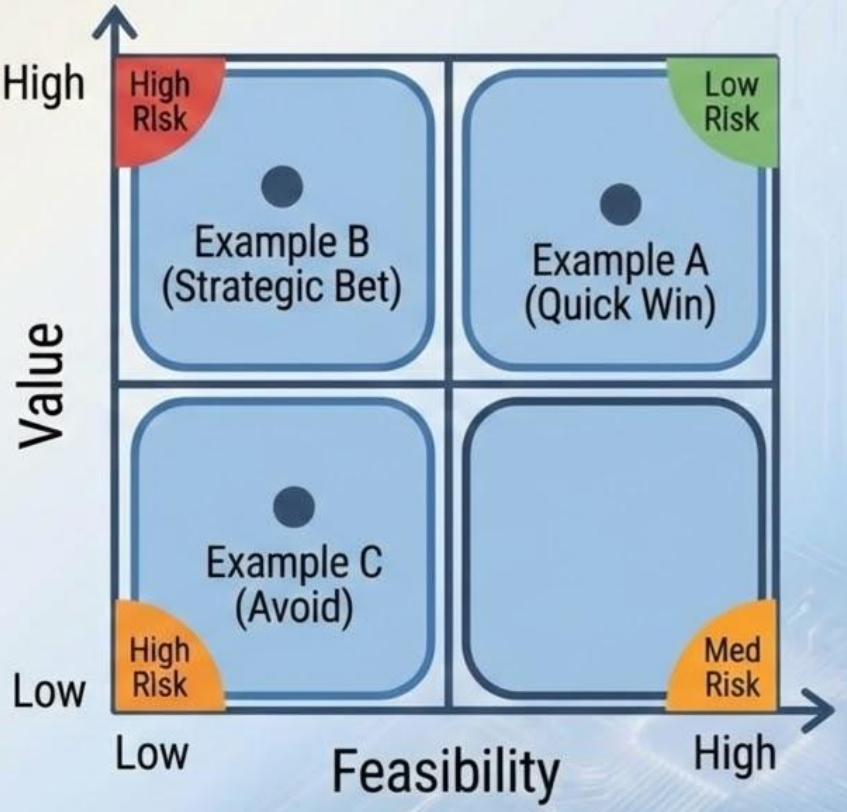
The Implementation Lifecycle Loop

- Define: decision, action, owners, harms
- Validate: technical + clinical performance
- Deploy: workflow + training + controls
- Monitor: drift, safety, equity, usage
- Improve: iterate, retrain, retire



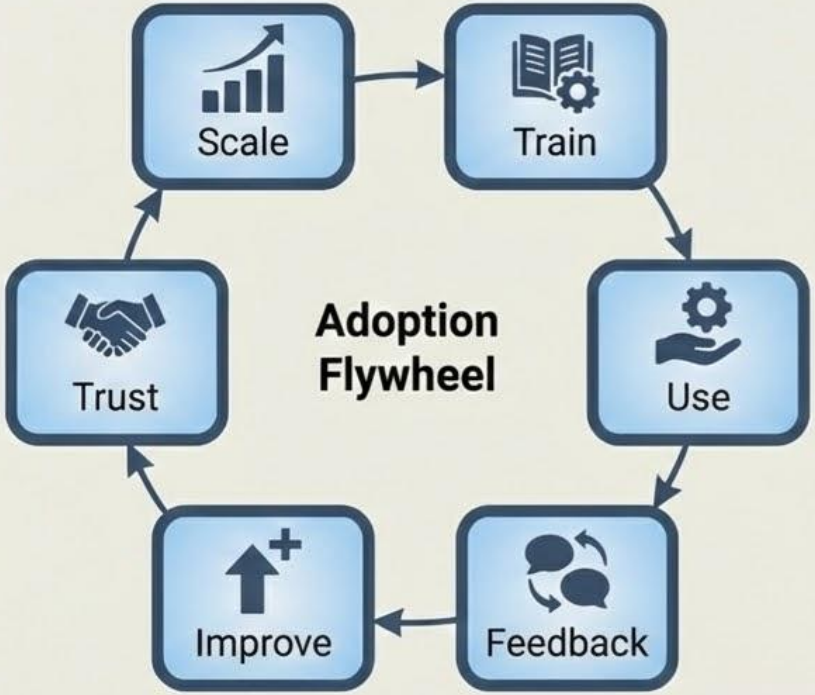
Choosing Use Cases: Value vs Feasibility

- Score: value, feasibility, and risk
- Prefer “high value, low burden” starts
- Define the action pathway before building
- Document why you said “no”



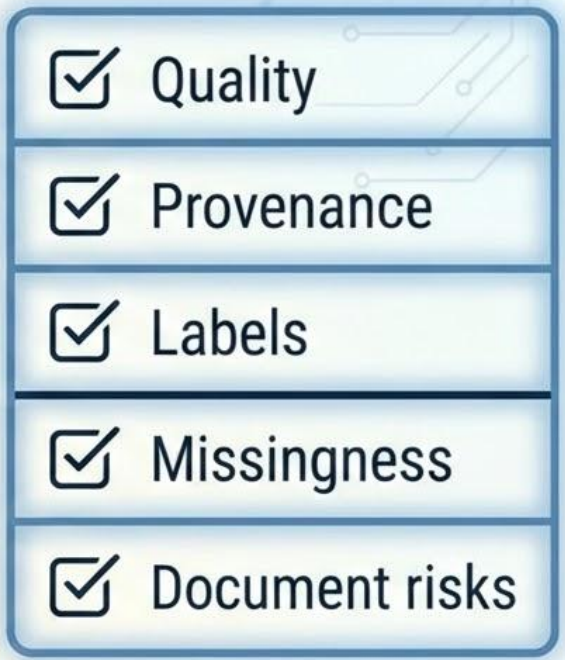
Adoption and Change Management

- Identify champions and accountable owners
- Train for “why,” not just “how”
- Feedback loops: rapid, visible iterations
- Plan de-implementation of failed tools



Data Readiness: The Checklist

- Quality: accuracy, completeness, timeliness
- Provenance: source, transformations, versioning
- Labels: definitions, bias, adjudication
- Missingness patterns can be informative
- Document known bias risks



Governance and Accountability (RACI)

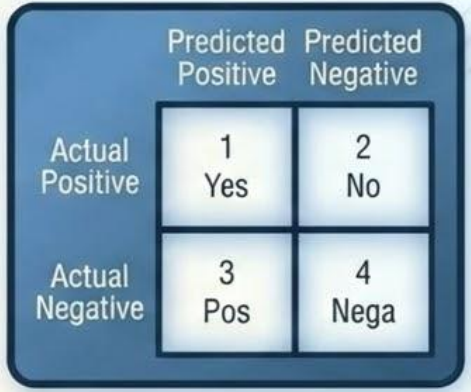
- Assign: clinical owner + accountable leader
- Separate: build, validate, approve, monitor
- Include: IT, compliance, QI, safety, operations
- Decide escalation and rollback authority

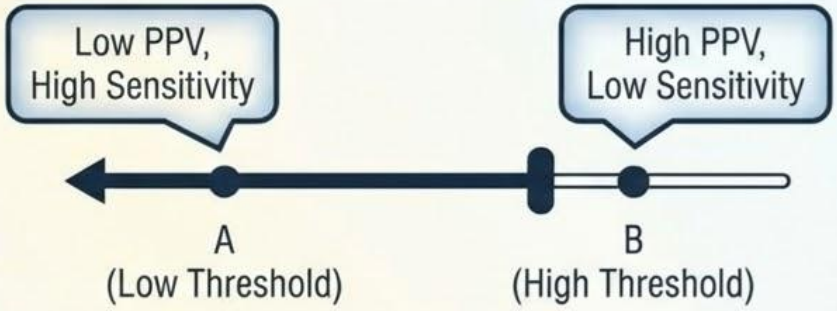
	Clinical Owner	DS/ML	IT	Com-pliance	QI/ Safety
Define	R	C	I	I	C
Validate	A	R	I	C	C
Deploy	C	C	R	I	I
Monitor	A	R	C	C	C
Update	R	A	C	I	C

R: Responsible, A: Accountable, C: Consulted, I: Informed

Clinical Evaluation: Beyond AUROC

- Calibration: predicted risk matches reality
- PPV/NPV at chosen thresholds thresholds
- Decision-curve: net clinical benefit
- Subgroup performance + fairness checks
- Pause & Think: Which threshold?

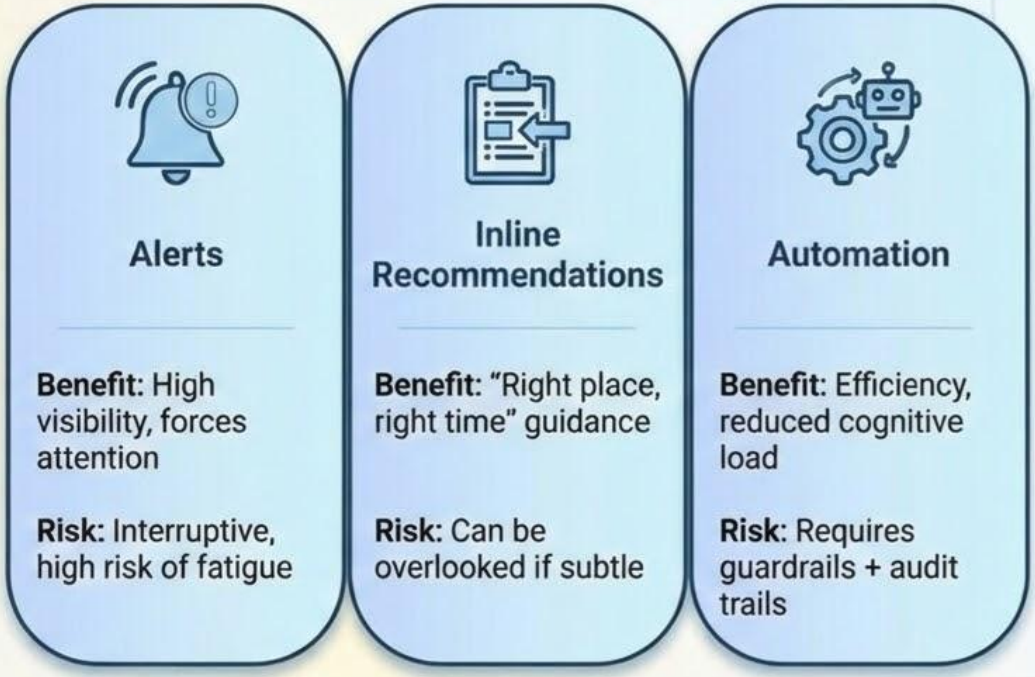




For scarce resources, pick A or B—why?

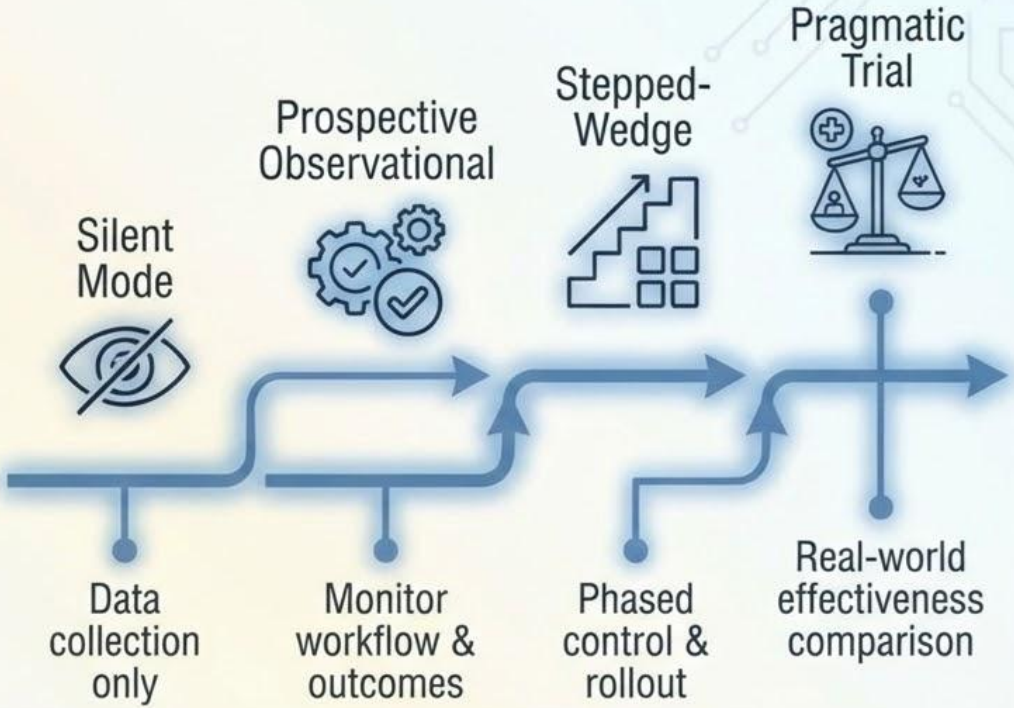
Decision Support Design Choices

- Alerts: interruptive, high risk of fatigue
- Inline recommendations: “right place, right time”
- Automation: only with guardrails + audit trails
- Always include human override + escalation



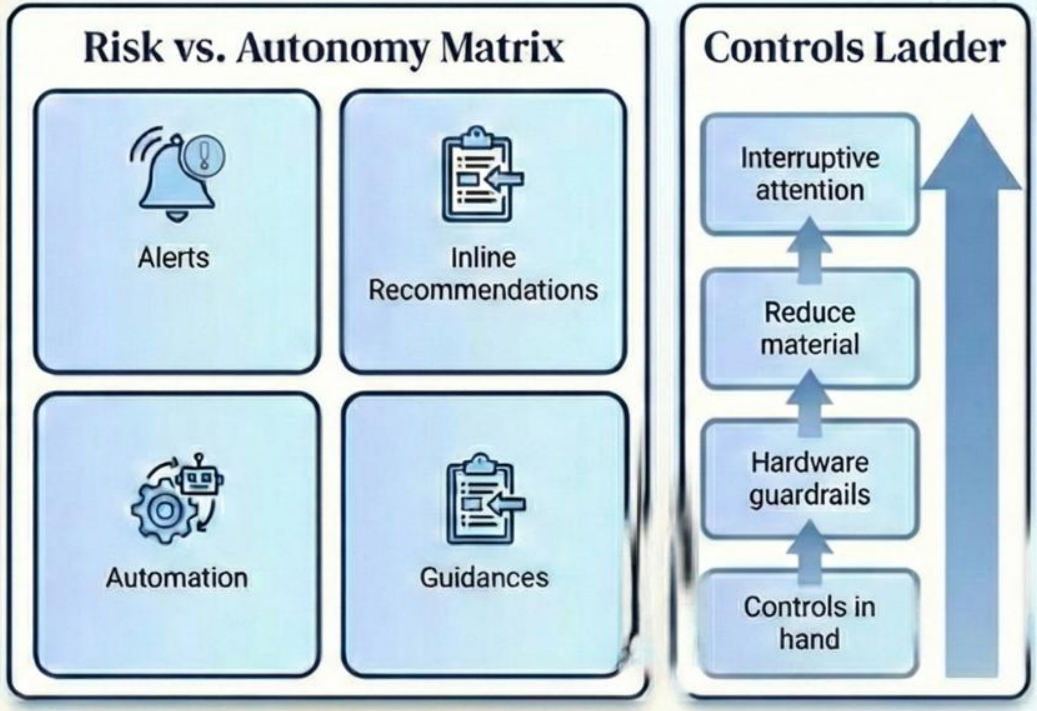
Real-World Evidence: Study Designs

- Silent mode: measure before showing clinicians
- Prospective observational: workflow + outcomes
- Stepped-wedge: phased rollout with controls
- Pragmatic trial: real-world effectiveness



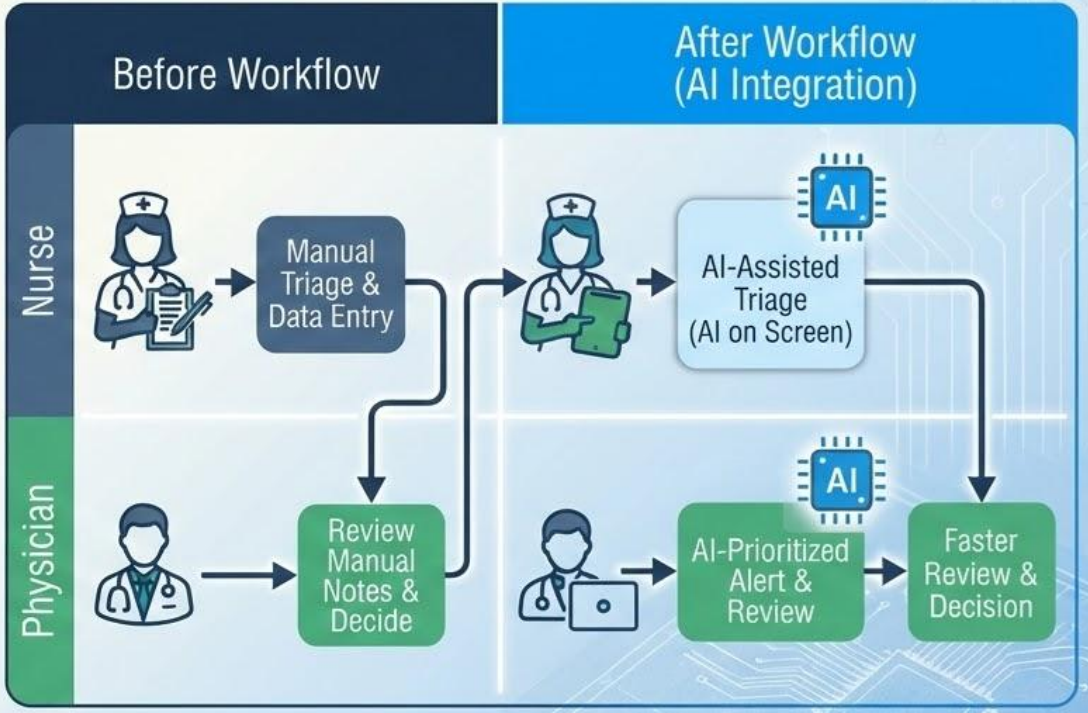
Safety Controls: Risk Ladder

- Alerts: interruptive, high risk of fatigue
- Inline recommendations: “right place, right time”
- Automation: only with guardrails + audit trails
- Always include human override + escalation



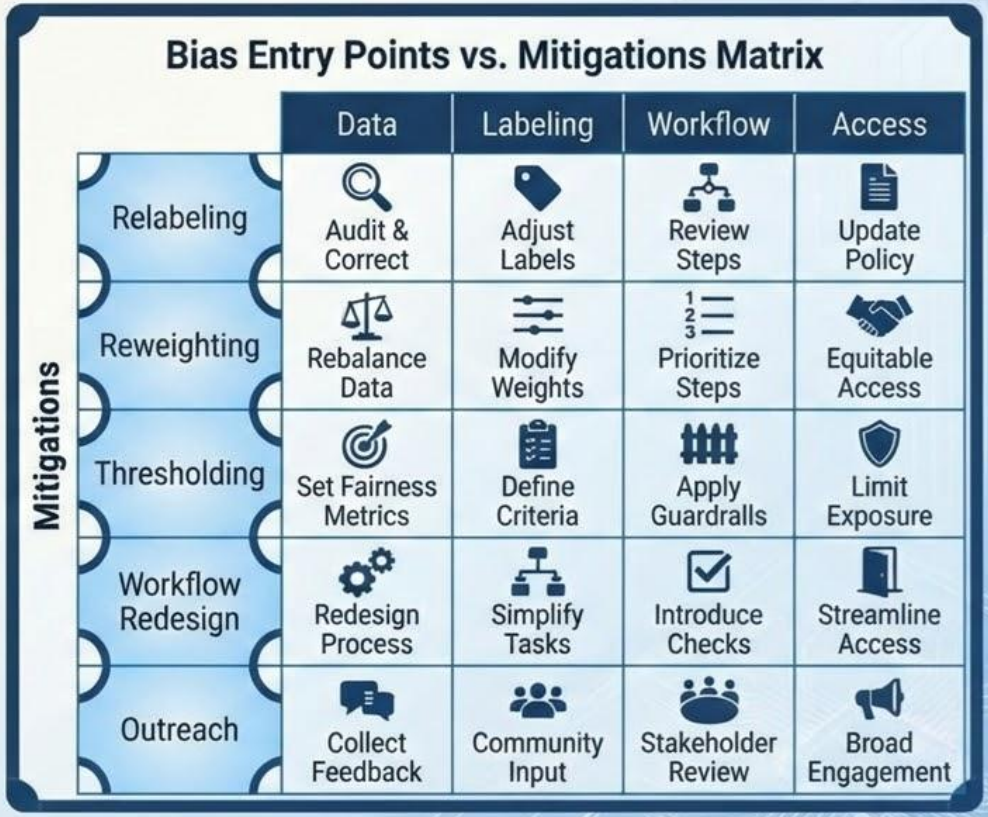
Human Factors: Workflow Integration

- Map “before vs after” workflow
- Minimize cognitive load and interruptions
- Put AI in the clinician’s line-of-sight
- Define override and escalation paths



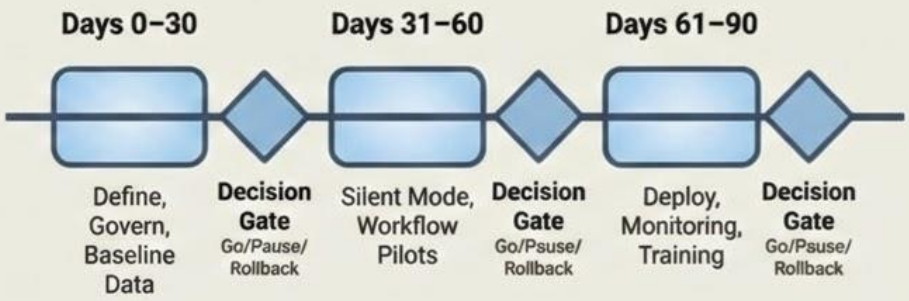
Equity and Bias in Deployment

- Bias enters via data, labels, access, workflows
- Monitor subgroup performance continuously
- Use mitigation playbook (data, thresholds, workflows)
- Engage affected communities early



The 90-Day Implementation Playbook

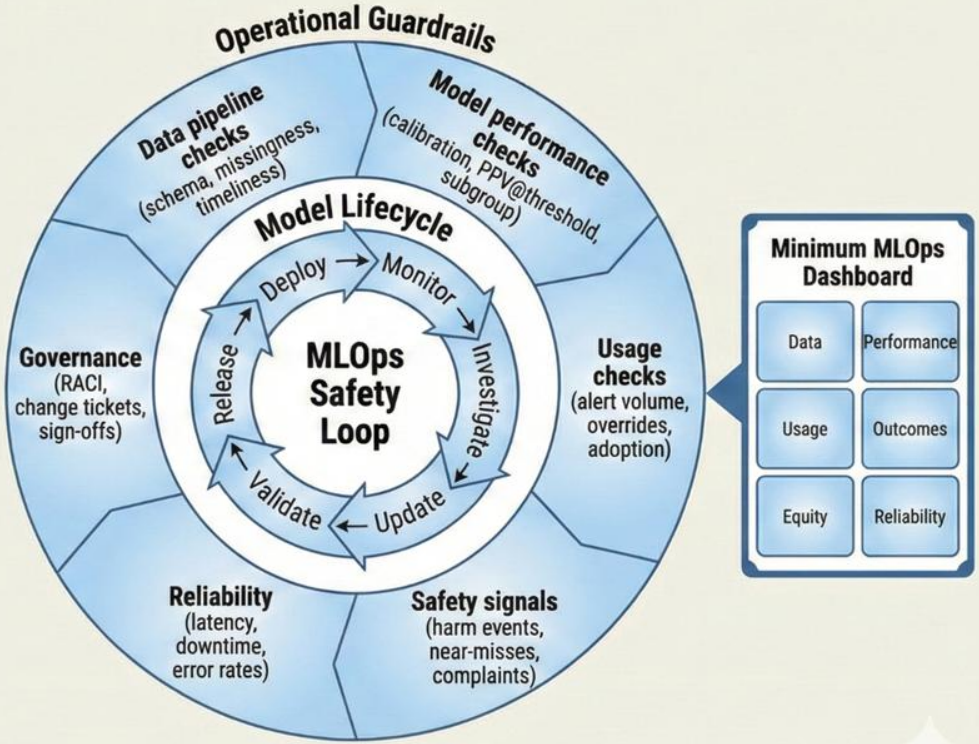
- Days 0–30: define, govern, baseline data
- Days 31–60: silent mode + workflow pilots
- Days 61–90: deploy + monitoring + training
- Decision gates: go/pause/rollback



MLOps

MLOps: Clinical Model Operations for Safety

- MLOps = keep models safe, reliable, and current
- Monitor: data drift, performance, usage, equity
- Control change: versioning, approvals, rollback
- Operate pipelines: uptime, latency, auditability
- Treat updates like clinical changes



Monitoring: What to Watch

- Model: performance drift + calibration shift
- Data: missingness, coding, feature distribution drift
- Use: adoption, overrides, alert burden
- Outcomes: safety signals + equity metrics
- Pause & Think: Drift suspected—now what?

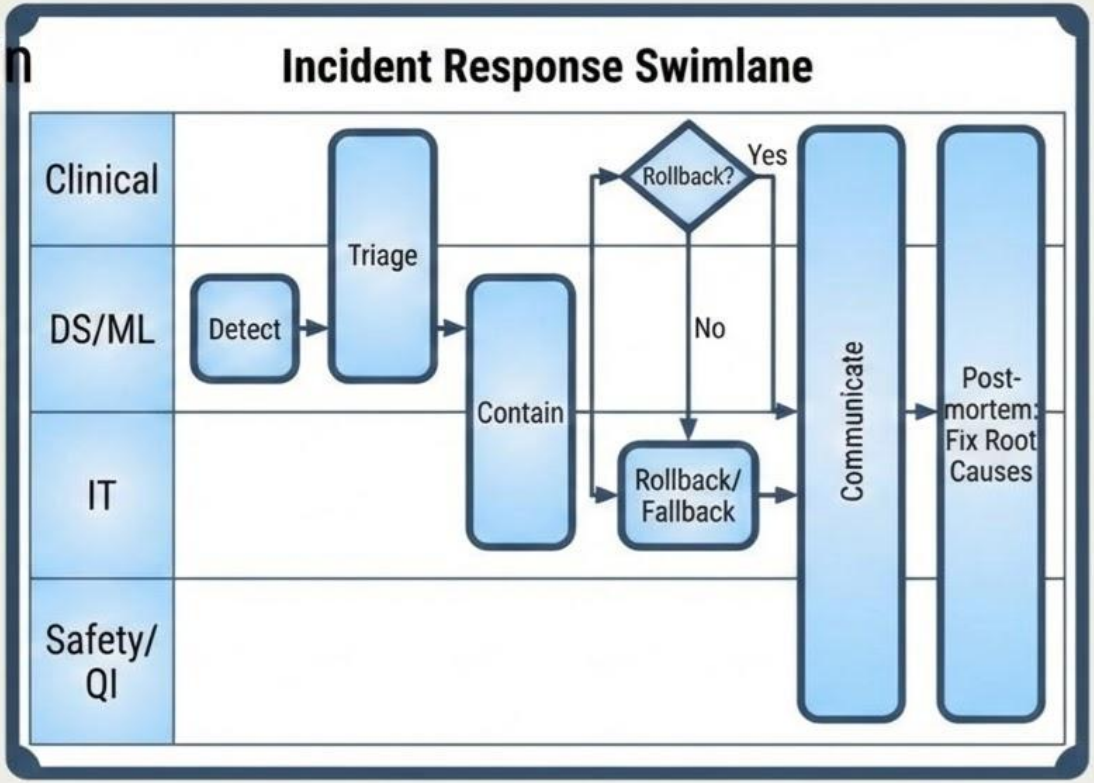
Monitoring Matrix

	Leading indicators	Lagging indicators
Model	Performance drift, Calibration shift	Error Analysis, Subgroup Check
Data	Missingness, Coding, Feature distribution drift	Data Integrity Audit, Source Review
Use	Adoption, Overrides, Alert burden	Workflow Analysis, User Feedback
Outcomes	Near Misses, Process Measures	Safety signals, Equity metrics
Equity	Bias Detection, Fairness Assessment	Disparity Analysis, Long-term Impact

What is your first step?

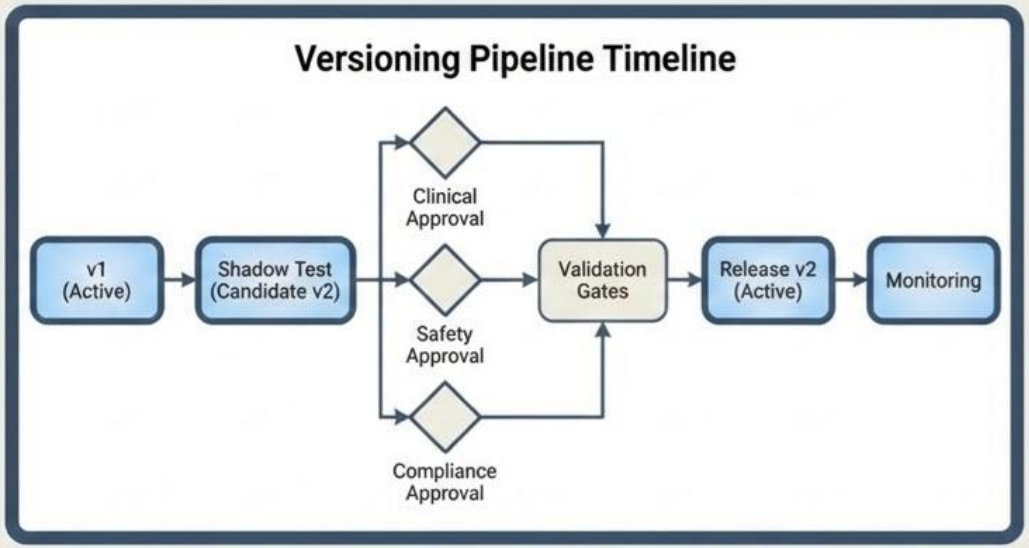
AI Incident Response Playbook

- Detect → triage → contain → communicate
- Rollback and fallback must be practiced
- Document decisions and impact
- Postmortem: fix root causes



Retraining and Versioning With Gates

- Triggers: drift, new data, new workflow
- Validate in shadow mode before release
- Approvals: clinical + safety + compliance
- Maintain version history and changelogs



Measuring Value: The Metric Stack

- Patient outcomes + safety outcomes
- Clinician experience (burden, trust, time)
- Operations (throughput, capacity, delays)
- Cost and unintended consequences
- Leading vs lagging metrics

Your Rotation Rubric + Call to Action

- Rubric: Safe, Useful, Adopted, Maintained
- 3 questions to ask any AI tool
- Spot one workflow opportunity on rotations
- Partner with clinicians, safety, and IT early