

AI in Surgical Decision-Making: When Should Surgeons Trust the Algorithm?

A global surgeon perspective on where AI is entering surgical judgement, why trust remains case-specific, and how clinicians preserve accountability when algorithmic advice conflicts with the patient in front of them.

Context → Signal → Judgement → Action

120

complete responses

6

countries represented

52.0%

clinical judgement first in conflict

54.1%

over-reliance is the greater risk

WHY THIS REPORT

The real adoption question is not use. It is authority.

AI is already present across surgical work, from imaging and risk estimation to literature review and pre-operative planning. But a high-stakes decision cannot be reduced to model performance alone. The surgeon must still interpret whether the input data fits the patient, whether the output is actionable, and whether the recommendation remains inside a validated clinical boundary.

This report follows the decision pathway from exposure to trust, conflict, actionability, institutional pressure, and long-term risk.

Survey lens: The report includes 163 survey records, including 120 complete responses, from practising surgeons in the USA, UK, Canada, France, Italy, and Germany. Core question bases range from 122 to 125. Respondents represented multiple surgical disciplines, including general, orthopaedic, oncologic, transplant, bariatric, cardiothoracic, colorectal, vascular, ENT, plastic, urologic, and neurosurgical practice.

EXECUTIVE SUMMARY

The pattern in six findings

FINDING 01

AI is present, but not routinely authoritative
63.2% use AI at least occasionally, while only 26.4% report routine or frequent use.

FINDING 03

Trust is rebuilt for each case

37.1% say trust varies substantially case by case, and 22.6% generally do not trust AI outputs.

FINDING 05

Accuracy and actionability are different

64.7% encounter outputs that seem accurate but are not actionable at least sometimes.

FINDING 02

Complex cases invite the strongest influence

Complex or multimorbidity decisions lead at 27.2%, where context is hardest to standardize.

FINDING 04

Conflict strengthens human review

52.0% rely on clinical judgement, while others seek tests, re-evaluate, or use MDT discussion.

FINDING 06

Automation bias is the dominant long-term concern

54.1% see over-reliance as the greater risk, compared with 11.5% who prioritize under-use.

SECTION 01 - ADOPTION PATTERN

AI has entered the room, but not yet the centre of surgical authority

CONTEXT

Surgical AI is expanding across imaging, planning, risk estimation, literature retrieval, and pathway support. However, each use case carries a different level of consequence and explainability.

WHAT THE DATA SHOWS

AI enters decisions routinely or often for 26.4%, occasionally for 36.8%, and rarely for 24.8%. Only 12.0% report no use.

THE INSIGHT

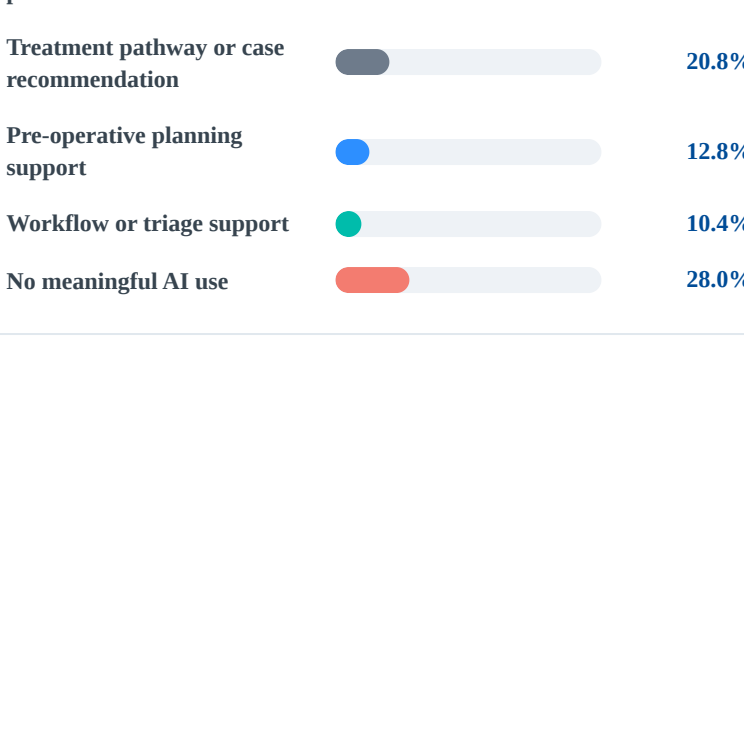
The adoption pattern is selective rather than embedded. Surgeons appear to call on AI when a case creates uncertainty or information burden, not as a default decision-maker.

WHY IT MATTERS

Selective adoption can be clinically sensible, but it produces uneven familiarity and makes institutional oversight harder to standardize.

Frequency of meaningful AI use

How often AI enters surgical decision-making



SECTION 02 - USE CASES

The tool is most attractive where the case is hardest to simplify

CONTEXT

AI outputs range from relatively bounded tasks, such as image interpretation, to broader treatment-pathway recommendations.

WHAT THE DATA SHOWS

Treatment-pathway or case recommendations lead at 20.8%, followed by imaging or diagnostic interpretation at 18.4%. 28.0% do not meaningfully use AI for surgical decisions.

THE INSIGHT

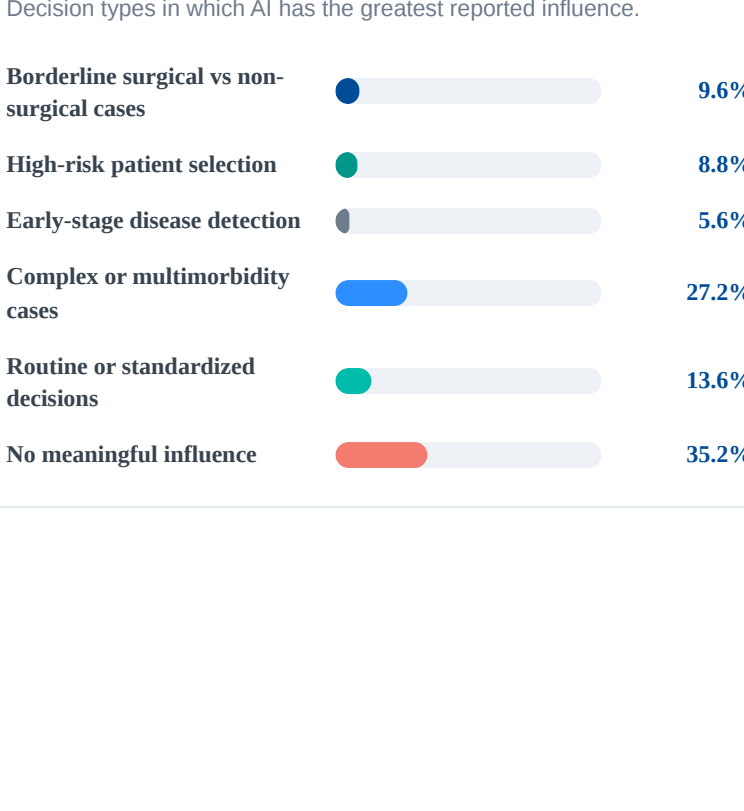
The highest-use category is not the narrowest task. Surgeons are engaging AI at the point where evidence, comorbidity, and multiple options must be synthesized.

WHY IT MATTERS

Broad recommendations can feel useful, but they need stronger transparency and local validation than a tightly defined technical output.

AI outputs used most often

Primary AI outputs engaged with in surgical decision-making



SECTION 03 - INFLUENCE

Complexity pulls AI into judgement before standardization is complete

CONTEXT

Complex cases often lack a single obvious pathway. That makes external synthesis attractive, but also increases the importance of patient-specific context.

WHAT THE DATA SHOWS

Complex or multimorbidity cases are the leading area of influence at 27.2%. 35.2% say AI does not meaningfully influence their decisions.

THE INSIGHT

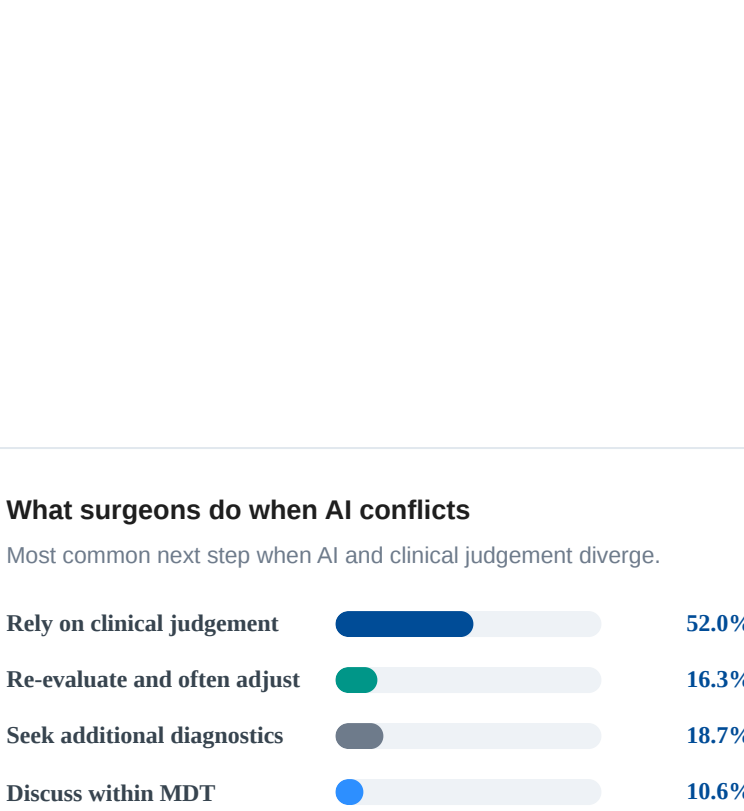
AI is not replacing routine surgical judgement. It is being invited into cases where uncertainty is already high.

WHY IT MATTERS

If AI is used most in complex cases, validation must examine subgroup performance, missing data, and failure modes rather than average accuracy alone.

Where AI most influences judgement

Decision types in which AI has the greatest reported influence.



SECTION 04 - TRUST

Trust resets with the case

CONTEXT

WHO guidance on AI for health emphasizes preserving human autonomy and accountability. These principles become practical when clinicians must decide whether an output is credible in a specific scenario.

WHAT THE DATA SHOWS

Trust varies substantially case by case for 37.1%, while 22.6% generally do not trust AI outputs.

THE INSIGHT

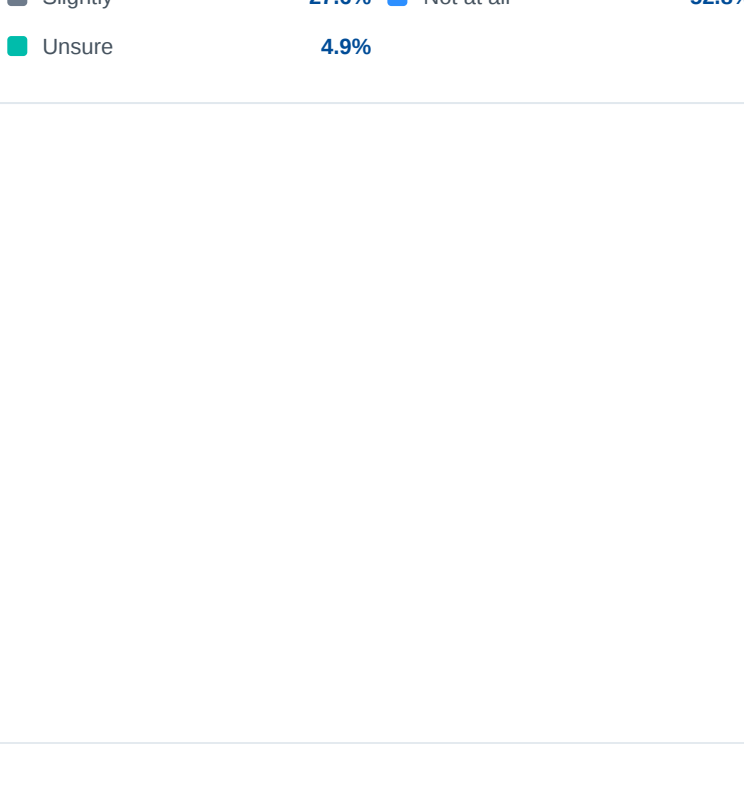
Surgeons are not granting the technology a stable level of authority. They are re-assessing it against context, risk, and their own clinical model of the case.

WHY IT MATTERS

A safe tool must communicate intended use, uncertainty, limitations, and the evidence behind its recommendation at the point of decision.

Trust across clinical scenarios

How trust changes as case type and risk change



SECTION 05 - CONFLICT

Disagreement triggers more human review, not automatic deference

CONTEXT

Conflict between an AI recommendation and a surgeon's judgement is a critical test of the human-AI relationship.

WHAT THE DATA SHOWS

52.0% rely on clinical judgement. Others seek diagnostics, re-evaluate, or use MDT discussion. Only 2.4% follow AI when uncertainty is high.

THE INSIGHT

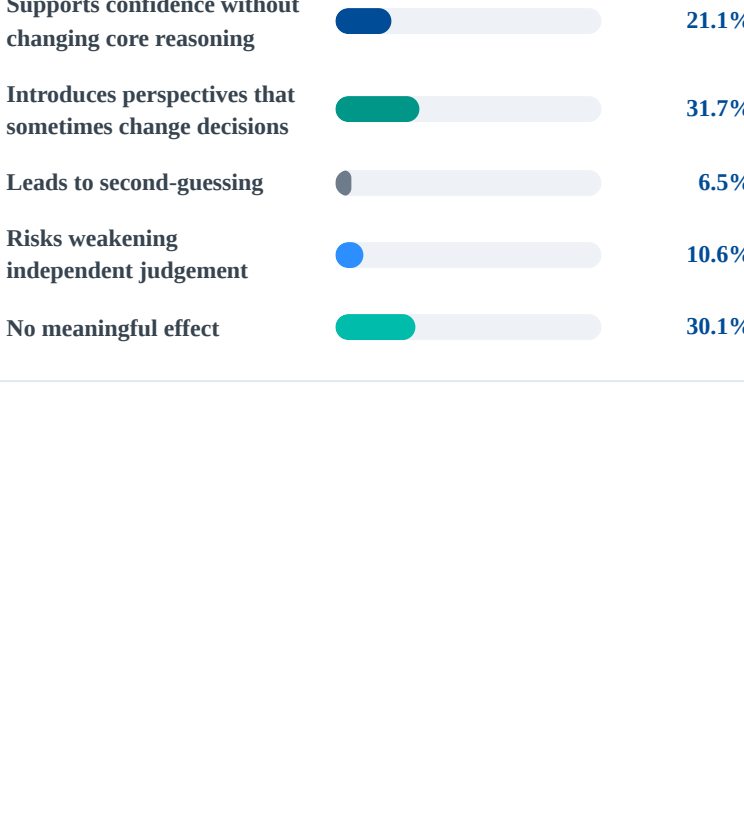
The dominant behaviour is controlled escalation. AI disagreement becomes a reason to inspect the decision more closely.

WHY IT MATTERS

Systems should support second review, additional evidence, and documented overrides rather than treating disagreement as user resistance.

What surgeons do when AI conflicts

Most common next step when AI and clinical judgement diverge.



SECTION 06 - THRESHOLD

AI has not materially moved most borderline surgery thresholds

CONTEXT

A shift in the threshold for surgery can change exposure to operative risk and the balance between intervention and observation.

WHAT THE DATA SHOWS

52.8% report no threshold change and 27.6% report only a slight change.

THE INSIGHT

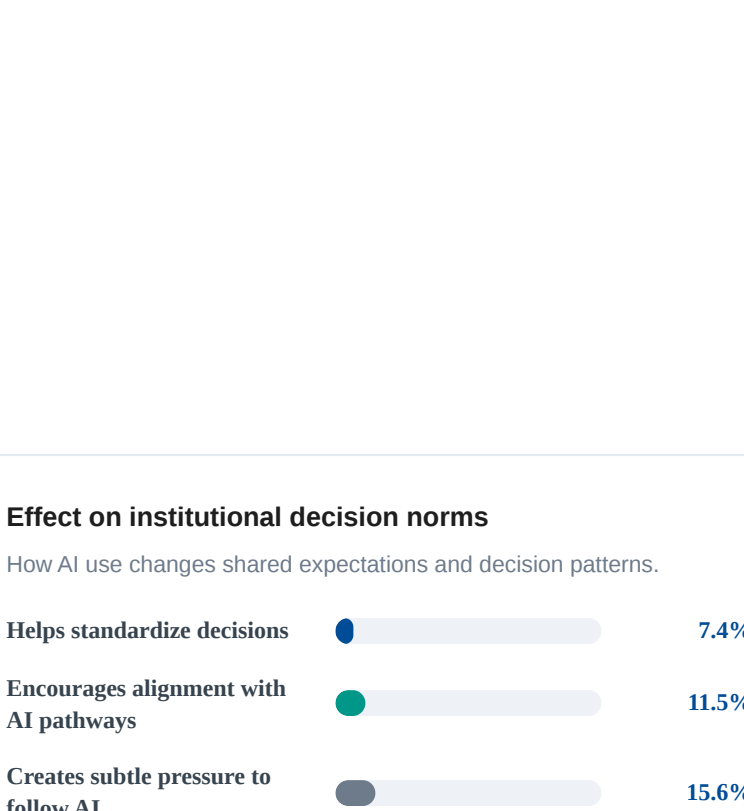
Current AI use appears more supportive than determinative. It may shape confidence or information gathering without changing the final intervention threshold.

WHY IT MATTERS

This stability is reassuring, but it may also reflect limited integration or limited confidence rather than proven safety.

Change in the threshold for borderline surgery

Extent to which AI changes recommendations in borderline cases.



SECTION 07 - DIRECTION

There is no consistent directional fingerprint

CONTEXT

A tool that consistently pushes toward intervention or delay would create a visible pattern.

WHAT THE DATA SHOWS

44.7% see no clear pattern and 40.7% say the direction varies by case.

THE INSIGHT

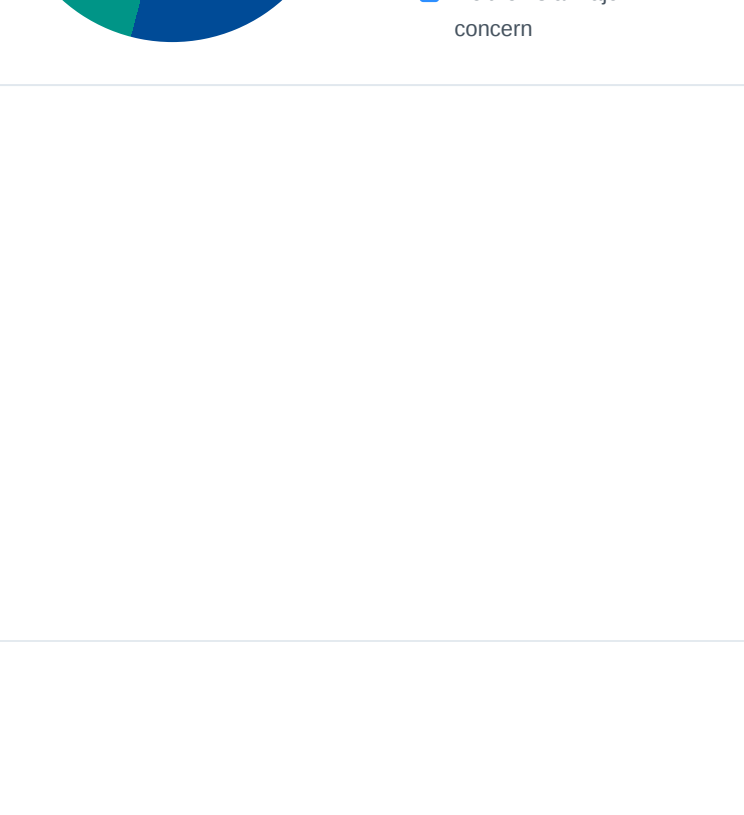
AI is not acting as a simple pro-surgery or conservative force. Its influence is heterogeneous and likely depends on use case, data, and clinician interpretation.

WHY IT MATTERS

Monitoring should focus on case-level decision change and subgroup effects, not only overall use rates.

Direction of decision shift

Whether AI tends to accelerate, delay, or variably affect intervention.



SECTION 08 - REASONING

AI changes the frame more often than it changes the answer

CONTEXT

Support can influence reasoning by adding perspectives, reinforcing confidence, or creating second-guessing.

WHAT THE DATA SHOWS

31.7% say AI introduces perspectives that sometimes change decisions. 21.1% say it supports confidence without changing core reasoning, and 30.1% report no meaningful effect.

THE INSIGHT

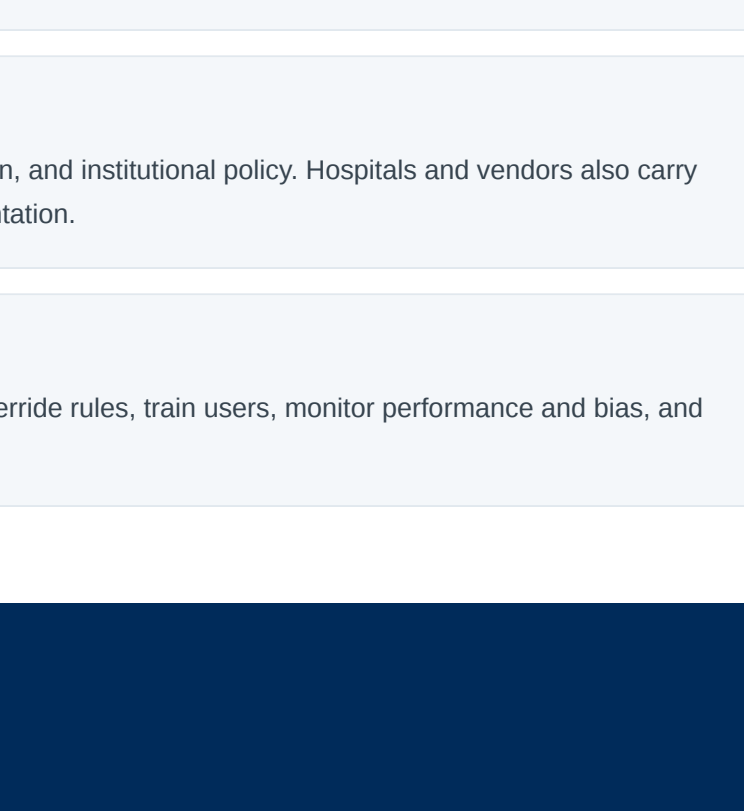
The main influence is cognitive expansion rather than replacement. AI is most useful as a structured prompt to consider evidence or risk that might otherwise be missed.

WHY IT MATTERS

Training should include calibration, confirmation bias, automation bias, and how to distinguish a useful challenge from an unvalidated distraction.

Effect on clinical reasoning

How AI changes the surgeon's reasoning process over time.



SECTION 09 - ACTIONABILITY

An accurate output can still fail the clinical decision

CONTEXT

Accuracy is only one layer of clinical utility. A finding must arrive at the right time, fit the patient, and connect to an actionable pathway.

WHAT THE DATA SHOWS

64.7% encounter outputs that seem accurate but are not actionable at least sometimes.

THE INSIGHT

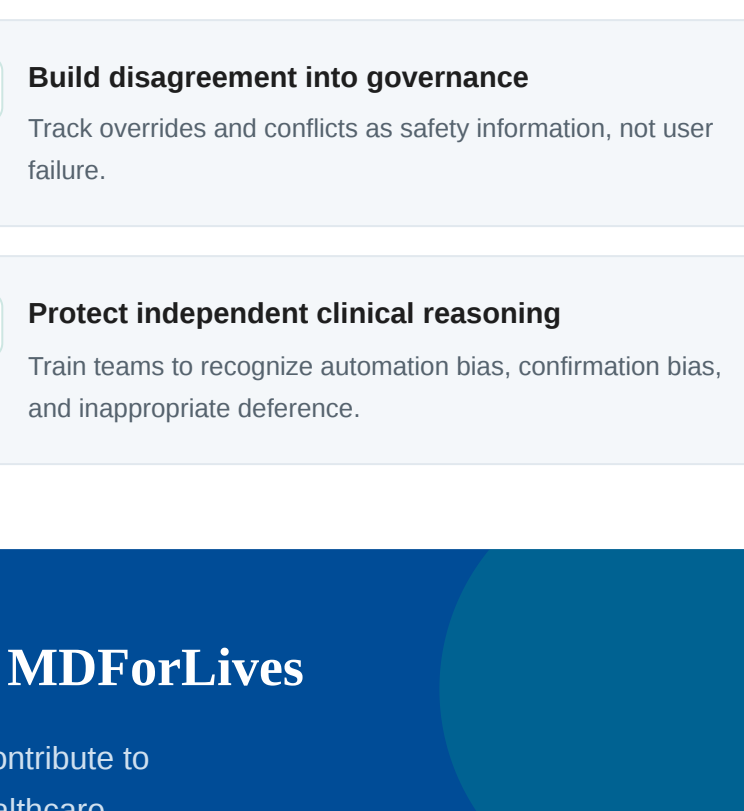
The implementation gap is not merely technical performance. It is the distance between a signal and a defensible next step.

WHY IT MATTERS

Evaluation should include actionability, workflow fit, decision impact, and the burden created by signals that cannot be resolved.

Accurate but not actionable

Frequency of outputs that appear correct but do not support a clear clinical action.



SECTION 10 - INSTITUTION

Institutional norms remain less mature than individual experimentation

CONTEXT

AI can shape norms through pathways, defaults, peer expectations, and subtle pressure to align with machine-recommended recommendations.

WHAT THE DATA SHOWS

39.3% say AI is not integrated enough to affect norms and 26.2% say it has little influence on actual decisions. 15.6% already perceive subtle pressure to follow AI.

THE INSIGHT

Most institutions are early in normalization, but the signal of pressure deserves attention before AI becomes routine.

WHY IT MATTERS

Governance should define advisory status, override rights, documentation, and review of disagreement before pathway dependence develops.

Effect on institutional decision norms

How AI use challenges shared expectations and decision patterns.

SECTION 11 - RISK

The greater fear is not missing AI, but losing independent judgement

CONTEXT

Automation bias can occur when clinicians accept a recommendation without sufficient verification. Under-use can also miss useful insights.

WHAT THE DATA SHOWS

54.1% identify over-reliance as the greater risk, while 27.0% see both over- and under-utilization as equally significant.

THE INSIGHT

The professional concern is balanced adoption, not maximal adoption.

WHY IT MATTERS

The maturity test for surgical AI is whether it strengthens judgement while preserving accountability, not whether it increases usage.

Long-term risk to patient care

Which risks surgeons consider greater

FREQUENTLY ASKED QUESTIONS

Questions professionals ask about AI in surgical decision-making

What is AI used for in surgical decision-making?

AI supports tasks such as imaging interpretation, literature retrieval, risk estimation, pre-operative planning, workflow triage, and treatment-pathway review. Its role should remain proportional to the quality of the input data and the clinical consequences of the decision.

How should surgeons respond when AI conflicts with clinical judgement?

Surgeons should pause, check the data and assumptions behind the output, seek additional diagnostics or multidisciplinary input when needed, and document why the final decision differs from or follows the AI recommendation.

What is automation bias in surgery?

Automation bias is the tendency to give too much weight to a system recommendation because it appears objective or technologically advanced. It can lead clinicians to overlook contradictory findings, context, or patient-specific risk.

How can surgeons decide whether an AI output is clinically actionable?

An output is actionable when it is relevant to the decision, clinically enough to evaluate, supported by validated evidence, and linked to a clear next step. Accurate information without a treatment pathway may still have limited clinical value.