CLINICAL EVIDENCE

The True Cost of a Miscount

A 47-month study of 1,537 intraoperative X-rays at University of Michigan Health

INSTITUTION University of Michigan Health System **STUDY** 47 months | Aug 2021 – Jun 2025 | n = 1,537

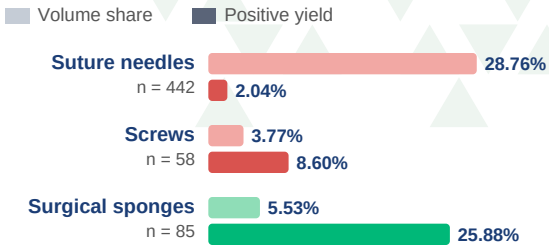
THE STUDY

47 months of intraop X-ray data reveal a gap

Over 47 months, OR teams at University of Michigan Health ordered 1,537 intraoperative X-rays for retained surgical item concerns — averaging 32 per month, with 53% triggered by count discrepancies. A multidisciplinary review of the data exposed a gap between protocol and outcome: X-ray, the current standard adjunct, rarely produced a positive read for needles — and even when negative, could not rule out an RSI.

X-RAY VOLUME vs POSITIVE YIELD

By item: % share of 1,537 X-rays vs. % returning positive



~54% of count-driven X-rays target needles — yet 98% return negative.

WHAT THE DATA SHOWS

1 - 2 x per day
INTRAOPERATIVE X-RAYS
32 per month over 47 months; 53% triggered by count discrepancies.

2.04%
SUTURE NEEDLE YIELD
Of 442 X-rays ordered for needles, only 9 returned a positive read.

~30%
OVERALL X-RAY SENSITIVITY
X-rays are highly specific but poorly sensitive — a negative does not rule out RSI.

$2,720
TRUE COST PER MISCOUNT
X-ray, OR time, anesthesia, staff, and workflow — totaling ~$58K per month.

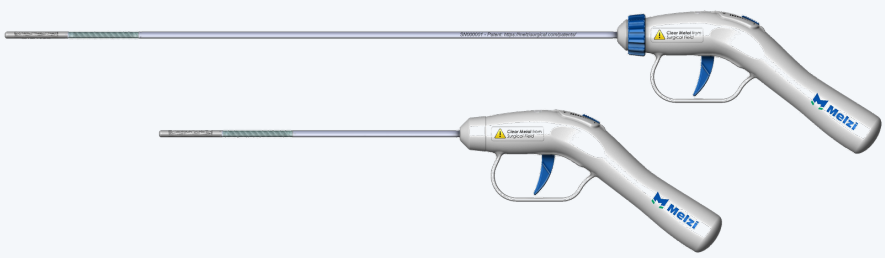
IN THEIR WORDS

> 99% of the time it's not in the patient but a communication error — X-ray feels sloppy and adds infection risk, radiation exposure, and prolonged anesthesia.

SURGEON
Study Participant

> Incorrect counts happen 1–2× per week — amid noise, pressure, and surgeons pushing speed. We must build a culture where everyone feels psychologically safe to speak up.

OR NURSE LEADER
Study Participant



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Source: UMHS Multidisciplinary Analysis of RSI & Miscounts QI Initiative (2021–2025).

PRACTICAL GUIDE

Two Workflows. Two Outcomes.

Unlocking de-escalation and trust when a count is off

TRADITIONAL Intraop X-ray adds ~45 min; erodes trust

MELZI PROTOCOL Rapid sweep; builds trust

RSI WORKFLOW COMPARISON

Same trigger. Different protocols. Different teams.

Traditional: 45-min Penalty
Trust-Action Erosion

- Count discrepancy identified
- **Intraop X-ray ordered**
  - ~2% needle yield • ~45-min delay
  - Negative read does not rule out RSI
- Reduced surgeon willingness to pause
- Reduced nurse psychological safety
- Unresolved discrepancy / RSI risk

REINFORCES MISTRUST

Rapid Resolution
Builds Team Trust

- Count discrepancy identified
- **Rapid in-vivo Melzi sweep**
  - Systematic search in < 5 min
  - Optional X-ray afterwards, if needed
- High surgeon confidence to pause
- High nurse psychological safety
- Resolution before closure

REINFORCES TRUST

THE TRUST DIFFERENCE

Speed isn't only efficiency — it's the foundation for trust.

Rapid in-vivo detection lets the team confirm before closure, replacing the ~45-min X-ray wait with calm escalation — and giving nurses room to speak up.

Same trigger. Different protocol. Different team.

< 5 min
MELZI SWEEP

From discrepancy to resolution — in minutes

Resolves count concerns in minutes — not the ~45 min an X-ray adds — supporting calm escalation and restoring OR team confidence.

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