CASE STUDY

TRANSFORMING SURGICAL LOGISTICS USING AI

2025

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GlobalMed LOGISTIX | SCALPEL

EXECUTIVE SUMMARY

Orthopaedic and spine surgeries rely on a complex supply chain of surgical trays, instruments, and implants. However, the management of non-sterile instrument trays is often outdated and inefficient, largely depending on manual processes that can result in errors, delays, and increased costs.

GlobalMed Logistix (GMLx), a leading healthcare third-party logistics provider specializing in orthopaedic and spine instrument management, partnered with **Scalpel AI** to assess how AI-driven validation and tracking can enhance tray management. Over a three-month period, **GMLx** implemented **Scalpel AI's machine vision system** to analyze more than 10,000 instrument trays utilized in joint reconstruction procedures.

KEY FINDINGS

30–40% Reduction in errors (from 4.3% to 0.2%).

Faster tray validation and assembly. **95%**

25–30% Increase in throughput without adding headcount.

These findings highlight a clear opportunity for OEMs, distributors, and 3PLs: AI-driven logistics can eliminate costly inefficiencies, improve accuracy, and enable scalability while enhancing surgeon and patient confidence in instrument readiness.

🔍 THE CHALLENGE

Inefficiencies in Orthopaedic & Spine Surgical Logistics

Orthopaedic and spine procedures are increasing at **4–6%** annually, driven by an aging population and the rising demand for joint reconstruction and spine interventions. This growth puts increasing pressure on OEMs, distributors, and 3PLs to keep up with instrument tracking, validation, and delivery.

⊕ INDUSTRY CHALLENGES

- **High Error Rates:**

  4–6% of trays leave warehouses or storerooms with missing or mislabeled instruments.

- **Surgeon & Patient Safety Risks:**

  An OR delay can cost up to **$62** per minute, and tray errors can postpone procedures or cause suboptimal patient outcomes.

- **Scalability Limitations:**

  Relying solely on human expertise is unsustainable as procedure volumes rise and labor constraints persist.

  Despite advancements in medical device and surgical technology, many orthopaedic and spine companies depend on outdated inventory and tracking systems that are marginally better than Excel spreadsheets.

Manual validation processes struggle to meet demand, resulting in costly inefficiencies and operational bottlenecks.

💡 THE SOLUTION

Scalpel AI combines advanced camera technology with proprietary AI software to validate orthopaedic and spine trays with near-perfect accuracy. It scans trays in real time, detecting missing or misplaced instruments to ensure completeness before reaching the operating room. Seamlessly integrating into existing workflows, it reduces manual checks and elevates technician accuracy.

CASE STUDY:
HOW SCALPEL AI TRANSFORMED OPERATIONS AT GMLX

GMLx, based in Atlanta, Georgia, services major orthopaedic OEMs, distributors, and healthcare facilities by managing surgical trays across the U.S. In 2024 alone, GMLx processed over 200,000 trays, making accuracy and efficiency mission-critical.

STUDY DESIGN:

🕐 **Duration:**
3 Months

⟦⟧ **Trays Evaluated:**
10,853 joint reconstruction trays

◎ **Focus Areas:**
Accuracy, processing time, throughput, scalability, employee expertise, and employee usability.

RESULTS

BOM

A standard tray inspection involves visually checking surgical trays against a Bill of Materials (BOM). This is essential before shipping to hospitals and upon receipt. Technicians ensure accurate placement, identify missing or misplaced objects, and spot any fractures or deformities. Scalpel AI provides instant tray validation against the BOM and highlights any discrepancy in the tray. We compared a manual process with Scalpel AI-enhanced tray inspection during the evaluation.

Efficiency gains — **40%**

25-30% — **Increase in throughput**

Reduction in errors — **95%**

1. Efficiency Gains

40%
Faster Tray Validation

Scalpel AI reduced validation time from 5.2 minutes per tray to 3.1 minutes per tray.

Minimize Downtime

AI flagged inaccuracies in real time, preventing slowdowns and bottlenecks.

✅ RESULTS

2. Error Reduction

Errors in tray inspection include missing, misplaced, and wrong objects in the surgical trays. **GMLx** is a market leader that has a very low error rate, and they have been optimizing for better accuracy the first time. When things go wrong within a tray, they get caught at another point during the second or third check. With Scalpel, the goal was to find the error in the first inspection itself – improving quality and efficiency.

4.3% >> 0.2%

Pre-implementation error rate: **Post-implementation error rate:**

- **Key takeaway**: AI-assisted validation virtually eliminated errors, ensuring trays were always accurate before dispatch.

3. Increased Throughput

25-30% Increase in trays processed daily - without any additional staff members.

Peak Performance: **Scalpel**-assisted junior staff were able to match senior staff efficiency.

35% By the final month of the pilot, AI-assisted assembly lines outperformed traditional lines by 35% in throughput, with effectively negligible error rates.

This performance gap suggests that extended AI adoption could yield even greater returns over time.

WHAT THIS MEANS FOR OEMS, DISTRIBUTORS, & 3PLS

1. **Cost Savings & Scalability**

- Streamlined processing eliminates operational bottlenecks, improving workflow efficiency.
- AI allows companies to scale operations without proportional increases in labor costs.
- Fewer misassembled trays reduce costly re-sterilization cycles and last-minute replacements.
- Train everyone to be an expert in tray handling, unlocking additional capacity to device companies.
- **Scalpel AI**-powered workflows ensure your staff is productive from day one.
- Utilize business intelligence to determine how to deploy your most expensive sets.

2. **Improved Instrument Readiness & Reliability**

- Ensures trays reach surgical teams complete and validated, reducing OR disruptions.
- Enhances hospital and ASC confidence in vendor reliability, strengthening long-term contracts.
- Supports higher quality assurance standards and positions companies as leaders in efficiency.

3. **Competitive Advantage in a Growing Market**

AI-driven logistics provides a clear differentiator in a competitive landscape dominated by established Ortho and Spine companies.
- Data-driven decision-making improves inventory forecasting and reduces excess stock.
- Proactive issue resolution lowers the risk of tray-related delays, enhancing customer satisfaction and patient safety.

LOOKING AHEAD: THE FUTURE OF AI IN SURGICAL LOGISTICS

With joint replacements expected to exceed **2.5** million annually by the late 2020s and outpatient cases surpassing **50**% by 2026, traditional logistics can't keep up. More surgical volume is shifting to Ambulatory Surgery Centers (ASCs), which have limited sterile processing and storage capacity.

This shift increases reliance on loaner trays, requiring longer lead times, greater coordination, and more efficient inventory management. OEMs, distributors, and 3PLs must adapt—because as demand rises, outdated logistics models will only create bottlenecks, delays, and higher costs.

AI-driven logistics solutions like **Scalpel** are the key. By enhancing efficiency, reducing errors, and ensuring the right instruments are in the right place at the right time, Scalpel helps the industry stay ahead—supporting surgeons, reducing waste, and meeting the growing demand without scaling inefficiencies.

Actionable Next Steps:

1. Assess your current tray validation and tracking process

Are errors, inefficiencies, and staffing challenges slowing you down and driving up costs?

2. Consider a pilot program.

Scalpel AI offers controlled rollouts to assess impact before full-scale adoption.

3. Leverage data insights.

AI-driven analytics can optimize forecasting, reduce waste, and enhance supply chain efficiency.

About Scalpel AI & GlobalMed Logistix

Scalpel AI is a pioneer in AI-driven surgical logistics, providing advanced machine vision technology to automate tray validation, reduce errors, and enhance throughput. Using high-resolution imaging and intelligent recognition, Scalpel instantly detects missing, misplaced, or incorrect instruments—eliminating the guesswork and manual effort that lead to errors.

But it's more than just image recognition. Scalpel analyzes tray compositions, verifies instrument placement, and guides technicians through inspections—creating a smarter, faster, and more scalable process that reduces errors and increases efficiency without requiring constant hiring and retraining.

GlobalMed Logistix (GMLx) is a trusted 3PL specializing in orthopaedic and spine instrument management, partnering with leading OEMs and healthcare facilities to ensure seamless surgical logistics.

For inquiries or to discuss partnership opportunities, contact _yesh@scalpel.ai_