



## EXECUTIVE INSIGHTS

# The True Value of Last-Mile Logistics in Healthcare

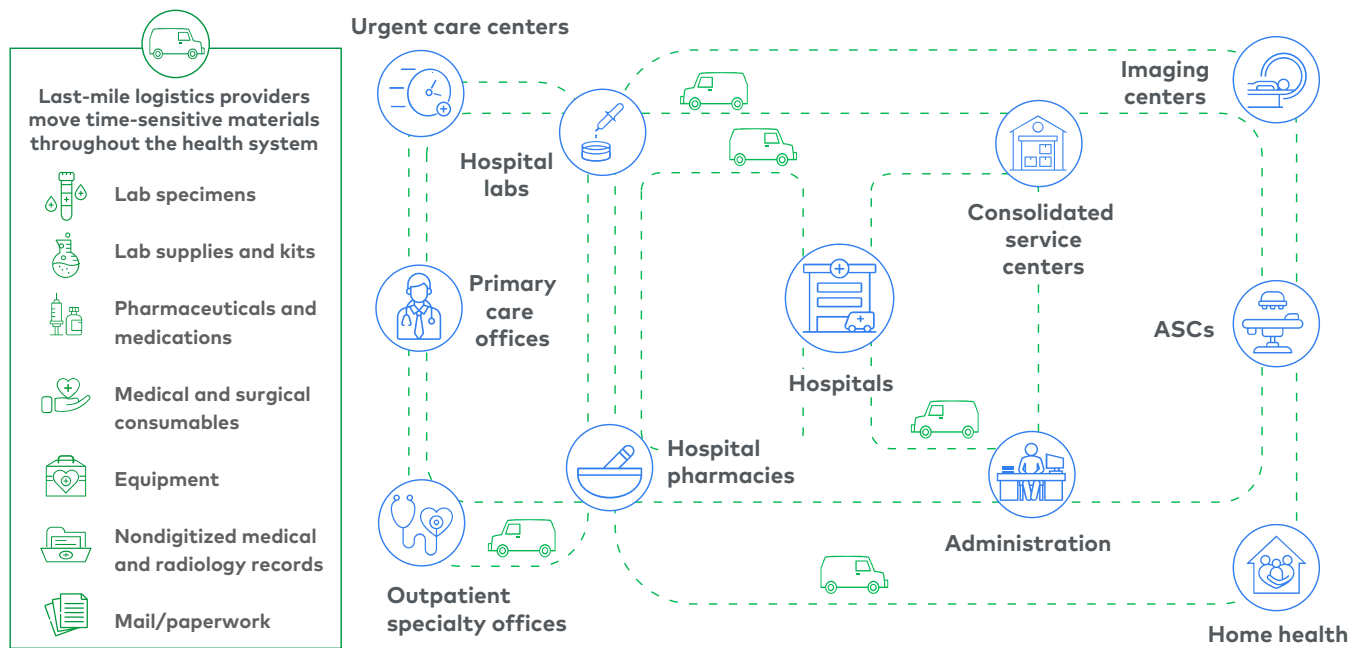
### What role does last-mile logistics play in healthcare delivery?

Health systems and laboratories rely on last-mile logistics providers to transport a variety of materials to and from sites of care. A typical health system delivers care across a broad continuum of sites, often numbering in the hundreds, including hospitals, labs, pharmacies and outpatient centers (e.g., ambulatory surgical centers, primary care offices, specialty offices, urgent care centers). Similarly, laboratories service extensive footprints of specimen collection sites that vary in scale and urgency requirements. Across both health systems and laboratories, sites rely on the timely transport of materials to provide patient care, conduct prompt diagnostics and fulfill administrative requirements (see Figures 1 and 2 for illustrations of common sites and material flows at health systems and independent laboratories).

Providers of last-mile logistics transport both highly sensitive materials — including lab specimens and pharmaceuticals — and less-sensitive items — including consumables and paperwork. Timely and quality-driven shipping is required for lab tests to ensure accurate test results are delivered as soon as possible to inform care decisions. Medical and surgical consumables (e.g., swabs) and essential equipment (e.g., surgical tools) are transported across various sites of care to ensure punctual care delivery. Patient prescriptions and pharmaceuticals are moved between care sites and pharmacies for patient treatments and drug formulation.

Figure 1

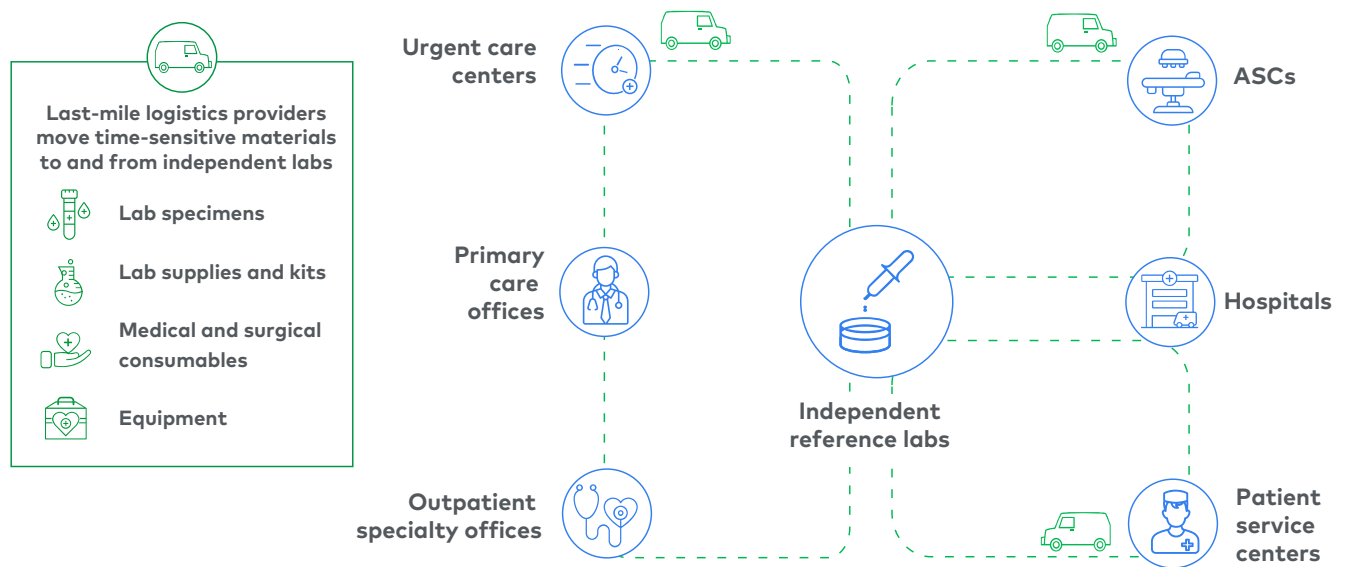
Last-mile logistics providers enable movement of critical materials among health system sites



Note: ASCs=ambulatory surgery centers  
Source: L.E.K. interviews, research and analysis

Figure 2

Last-mile logistics providers enable movement of lab specimens and testing kits across various points of care for independent reference laboratories



Note: ASCs=ambulatory surgery centers  
Source: L.E.K. interviews, research and analysis

How does the quality of a last-mile logistics solution impact clinical care?






Any quality issue with last-mile logistics has the potential to disrupt or delay care. A delayed pharmaceutical delivery can interfere with infusion therapy. A breach in sterilization can delay an orthopedic procedure. A misplaced supply can divert clinician time from patient care.

Specimen mishandling is especially notable as a high volume of specimens are transported, by both health systems and independent laboratories. Specimen handling errors often result from human error such as storing specimens at the wrong temperature, delaying delivery or even losing an item.

The clinical impacts of specimen mishandling range from wasteful repeat lab work to delayed patient treatment or care (e.g., postponed procedures) to even the permanent inability to obtain test results. While the mishandling of routine samples and biopsies can be corrected, patient treatment or care may be delayed because a test result informs the course of action. In the case of more complex samples (e.g., invasive biopsies), specimen mishandling may lead to complications such as idle operating room time or patient mistrust that could prompt them to seek treatment or services elsewhere. And, when it comes to irreplaceable specimens (e.g., operative specimens and stones), the effects of mishandling cannot be reversed, leading to a permanent limitation on care effectiveness (see Table 1 for an overview of specimen types and the impact of mishandling incidents).

Table 1

Mishandling lab specimens may impact patient care, and remedies may lead to direct costs to the health system

Specimen mishandling outcomes			
	Specimen type	Mishandling impact	Potential remedies
 Increasing ease of remedy	 <b>Routine sample</b> (e.g., blood draw, swabs)	<ul style="list-style-type: none"><li>• Repeat lab work</li><li>• Delayed treatment/care</li></ul>	<ul style="list-style-type: none"><li>• Repeat routine sample</li></ul>
	 <b>Simple biopsy</b> (e.g., skin biopsy)	<ul style="list-style-type: none"><li>• Repeat procedure</li><li>• Delayed treatment/care</li></ul>	<ul style="list-style-type: none"><li>• Repeat biopsy, if possible</li></ul>
	 <b>Invasive biopsy</b> (e.g., surgical biopsy, bone marrow biopsy)	<ul style="list-style-type: none"><li>• Repeat procedure</li><li>• Delayed treatment/care</li><li>• Idle OR time</li><li>• Patient goes elsewhere for treatment</li></ul>	<ul style="list-style-type: none"><li>• Repeat invasive biopsy, if possible</li><li>• Reschedule treatment</li></ul>
	 <b>Irreplaceable specimen</b> (e.g., operative specimens, stones, cultures prior to therapy)	<ul style="list-style-type: none"><li>• Permanent inability to obtain test results</li><li>• Delayed treatment/care</li><li>• Idle OR time</li><li>• Patient goes elsewhere for treatment</li></ul>	<ul style="list-style-type: none"><li>• Seek alternative diagnosis strategy, if possible</li><li>• Reschedule treatment</li></ul>

In addition to the direct cost of remedies, health systems and labs risk patient and clinician dissatisfaction and a loss of patient trust, potentially resulting in them seeking care elsewhere for present and future care needs

Note: OR=operating room  
Source: UCLA Health; Mayo Clinic; L.E.K. interviews, research and analysis

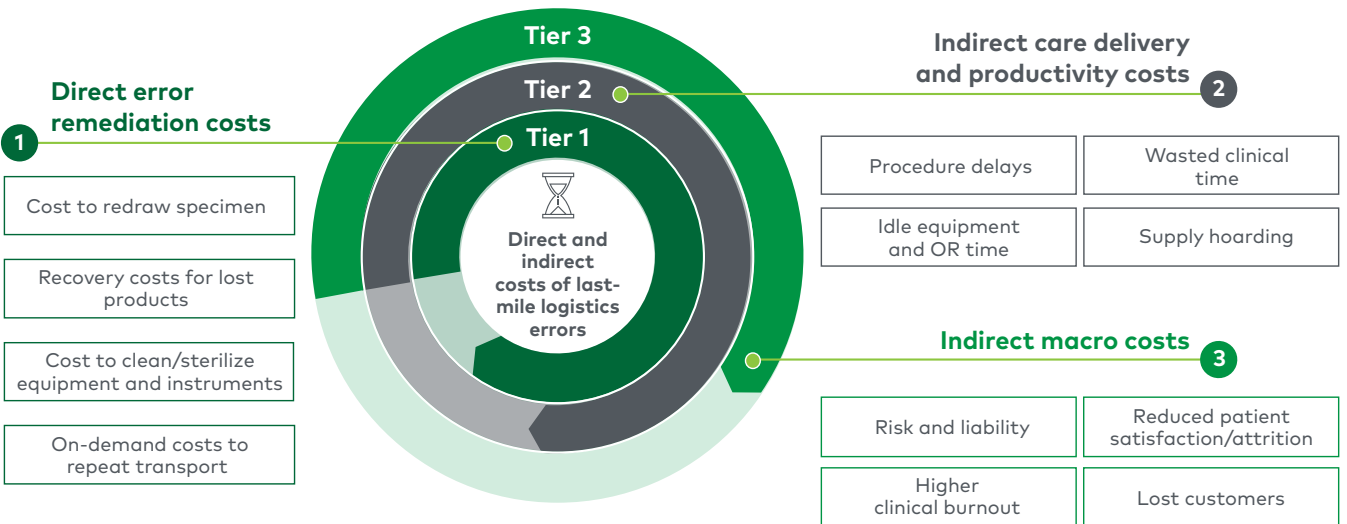
What kinds of costs come from last-mile healthcare logistics errors?

Beyond its clinical impact, mishandling comes at a financial cost that can eat away at the bottom line. There are three tiers of costs (see Figure 3 for an illustration of the framework):

- 1. Direct remediation: When an error occurs, there is often a direct cost to remediate the issue. Examples include the redraw of a specimen, the repurchase of a pharmaceutical and the resterilization of instruments.
- 2. Clinical productivity loss: Last-mile logistics errors can interfere with clinical productivity. Effects vary from idle operating room time to clinical time spent on work-arounds to inefficient lab equipment usage.
- 3. Macro impact: This catchall category applies to impacts that can be infrequent but meaningful, such as a liability event or customer loss.

Figure 3

Direct and indirect costs associated with last-mile logistics errors



Note: OR=operating room  
Source: L.E.K. interviews, research and analysis

What is the magnitude of costs stemming from logistics errors?

At an aggregate level, providers and laboratories spend more on remedying logistics errors than on the cost of last-mile logistics itself. The following page includes estimates of the cost effects of two particularly common forms of remediation.

Specimen recollection

As a Tier 1 cost, specimen recollection is particularly common and includes components such as clinician time and materials costs. Remediation costs can range from \$350 per incident for a routine specimen (e.g., a simple blood draw) to as much as \$5,000 for an invasive biopsy (e.g., a surgical biopsy).

While the mishandling cost per sample may seem small, it can quickly become material when considering the volume of mishandling incidents that typically occur within healthcare. This translates into an average incremental cost across all specimens of approximately \$0.35 for routine specimens, roughly \$1.50 for simple biopsies and about \$5.00 for invasive biopsies. In total, an average three-to-four-hospital system may experience approximately \$1 million in annual specimen mishandling costs for direct remedies to mishandled specimens and biopsies; larger systems could experience far greater costs due to specimen mishandling during transport (see Table 2 for an overview of typical specimen and mishandling volumes within an average-sized health system).

Table 2

The average annual volume of various specimens transported and mishandled within an average three-to-four-hospital health system

Specimen type	Average annual specimen volume per health system	Average annual mishandling volume per health system	"Tier 1" remediation cost per mishandled specimen	Total average "Tier 1" remediation cost per health system
Routine specimen	~2.4 million	~2,400	~\$350	~\$840K
Simple biopsy	~110,000	~110	~\$1,500	~\$165K
Invasive biopsy	~24,000	~24	~\$5,000	~\$120K

Source: AHA; Avalon Lab Insights; health system websites; Journal of Dermatologic Surgery; Medical Laboratory Observer; American Nurse Journal; NIH; Fair Health; L.E.K. interviews, research and analysis

Procedure delay

Specimen mishandling may also cause a procedure to be rescheduled (as can many other forms of last-mile errors, such as equipment mishandling).

"Equipment has to be carefully handled by a knowledgeable team. We've had moments when equipment gets thrown around and is delivered completely damaged or needs to be recalibrated, both of which disrupt workflows and potentially affect patient procedures or outcomes due to time constraints."

— National health system supply chain leader

This Tier 2 effect is alarmingly common. In fact, in 2022 and 2024 surveys conducted by American Nurse Journal, 54% of 661 nurse respondents said that in the past year they had to reschedule at least one patient procedure due to a medical courier error. Each delayed procedure can produce idle operating room time that averages approximately \$4,500 (note: procedure delay is based on an estimated \$50/minute cost and an average procedure length of 90 minutes). With roughly 1.8 million nurses employed at hospital systems (according to the Bureau of Labor Statistics), these inputs imply that the total cost of last-mile-logistics-related procedure delays to healthcare in the United States is truly staggering.

### What are additional costs of quality lapses in last-mile healthcare logistics?

Beyond those elements L.E.K. Consulting has studied, last-mile logistics errors — including mishandled specimens, misdelivered pharmacy products, lost or damaged surgery instruments and other medical shipment errors — produce abundant examples of other impacts to health systems and labs. Tier 3 cost impacts are more indirect and macro in nature but can be significant.

#### The impact on patient experience

Errors in healthcare shipment transport create inconvenience for patients, for example by forcing them to return for specimen recollection. Additionally, if providers perceive mishandling incidents as commonplace, they may become less willing to refer patients into the health system or partner with a lab, posing a substantial reputational and financial risk.

"We don't want patients leaving our health system for another one, and errors in last-mile logistics can lead to that, especially when it's a serious error. The lifetime value of a patient is significant, and there can be further damage if the patient vocalizes the poor experience."

— Academic medical center supply chain leader

#### Exposure to legal liability

While infrequent, legal liability from last-mile logistics errors can be substantial.

"The cost of mishandled specimens can skyrocket with irreplaceable samples, but what costs even more is the intangible reputational cost. In my last health system, an in-house driver lost a surgical specimen and it cost us \$50 million in lawsuits, and we likely lost thousands of patients because of the bad press."

— Regional health system supply chain leader

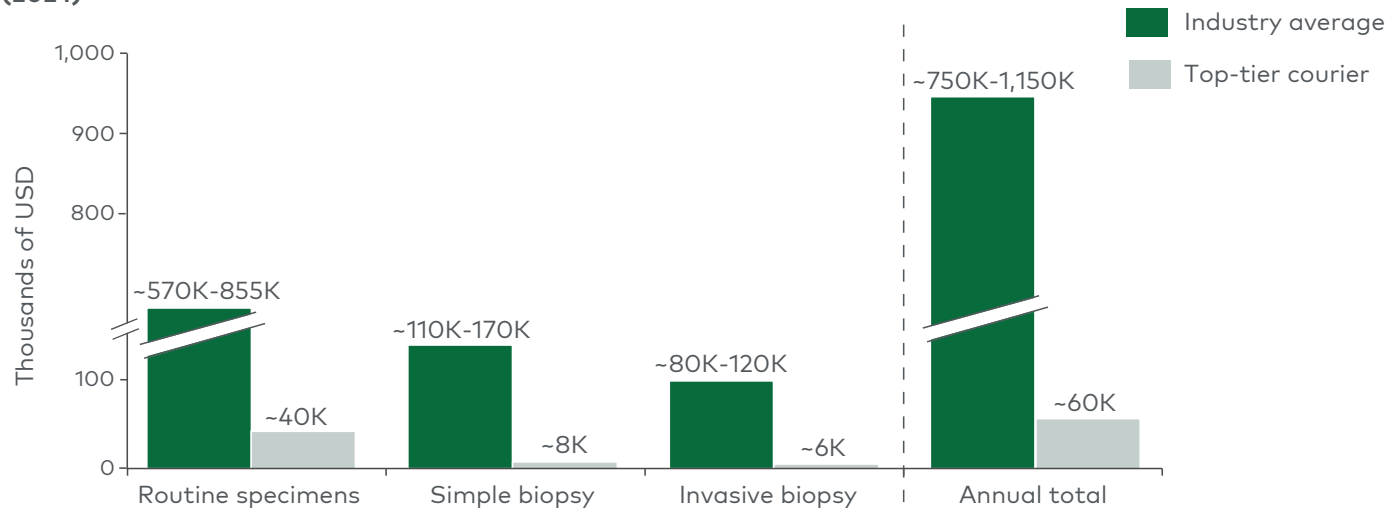
How does a high-quality logistics provider enable healthcare organizations to reduce costs and improve care?

Given last-mile logistics' impact on care and cost, even modest improvements in the quality of this service can make large differences, and variation is often significant. Top-tier logistics providers have meaningfully better results in reducing error rates compared to the industry average (e.g., error rates as low as 1 in 20,000 stops versus industry norms of 1 in 1,000) because of their rigorous protocols that include employed drivers, technology platforms for routing and order tracking, and local 24/7/365 support. Returning to the examination of specimen mishandling costs, lower error rates can save average-sized health systems as much as \$1 million annually by reducing last-mile remediation costs by 95% (see Figure 4 for a comparison of the industry average cost of specimen mishandling and that of a top-tier courier).

Figure 4

Industry average mishandling rates can lead to substantial additional costs for health systems compared to top-tier couriers such as MedSpeed

Estimated annual cost of specimen mishandling remedies per average health system, industry average vs. top-tier courier (2024)



Notes: Average health system size assumes three to four hospitals per health system per CBSA; \$350 per repeat routine specimen draw x ~2.4 million annual routine specimen draws per health system x logistics provider average error rate; \$1,500 per repeat simple biopsy draw x ~110,000 annual simple biopsy tests per health system x logistics provider average error rate; \$5,000 per repeat invasive biopsy draw x ~24,000 annual invasive biopsy collections per health system x logistics provider average error rate  
Source: AHA; American Nurse Journal; Avalon Healthcare Solutions; British Journal of Cancer; Dermatologic Surgery; health system websites; Laboratory Economics; Management Data; Medical Clinics of North America; L.E.K. interviews, research and analysis

## How can providers determine the effectiveness and reliability of a logistics partner?

As health systems and laboratories continue to invest in enhancing their capabilities to deliver high-quality, affordable care, they should consider their approach to last-mile logistics and set higher expectations for their courier partners. To develop a deeper understanding of a courier's quality and capabilities during evaluation, healthcare stakeholders should place a greater emphasis on questions such as:

- What are the courier's service levels and how does it measure and report quality?
- What is the courier's empirical error rate and how does it benchmark to peers?
- What operational (e.g., people, vehicles) and technology investments has the courier made in order to ensure responsiveness and drive quality?
- How does the courier address and remedy errors to minimize costs and clinical/reputational repercussions for the health system?
- How well is the courier able to serve the breadth of needs across the health system and all associated sites?
- How well can it scale as the footprint of the system changes?

## Conclusions

Last-mile logistics providers play a crucial role in healthcare by ensuring the timely and safe transport of critical materials across various care sites. Quality lapses in this process can lead to significant clinical disruptions and financial burdens for health systems and laboratories — a critical issue that is rarely assessed. Too often the focus is on unit pricing, which most often does not translate into lower total cost.

Logistical errors can delay treatments and procedures, force repeated lab work and compromise test results, which not only require high remedy costs but also negatively impact patient care and experience, damage patient trust and erode provider reputations. Investing in high-quality logistics services with stringent protocols can greatly reduce these mishandling incidents, thereby improving operational efficiency, generating cost savings and ensuring patient satisfaction.

This white paper has been co-authored by members of L.E.K. Consulting's Healthcare Supply Chain practice (Ilya Trakhtenberg, Managing Director; Lillian Cham, Principal) and MedSpeed (Jake Crampton, CEO), a leading healthcare logistics provider serving health systems and labs.

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Ilya Trakhtenberg is a Managing Director in L.E.K. Consulting's Chicago office. Ilya has more than 13 years of experience as a management consultant and leads the Healthcare Supply Chain practice at L.E.K. He has led consulting engagements for dozens of clients, focusing on growth strategy, M&A support and commercial excellence in medtech, and healthcare more broadly. Ilya's specific expertise is in medtech and the healthcare value chain.

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Jake Crampton is the founder and CEO of MedSpeed, a leading provider of same-day logistics for the healthcare industry. He launched MedSpeed after developing the concept at the University of Chicago Booth School of Business. Under his leadership, the company has expanded to over 100 operations in 33 states, serving more than a quarter of the top 100 health systems in the U.S. MedSpeed revolutionized healthcare logistics, transforming it from a cost center into a strategic asset. Jake was named EY's Midwest Entrepreneur of the Year in 2017 and received the Chicago Booth Entrepreneurial Award in 2021.

## About L.E.K. Consulting

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