

High Stakes, Higher Standards: Air Cargo and Pharma Integrity

Pharmaceutical logistics has long been recognised as one of the most technically demanding areas of global supply chain management. Precision, credible temperature control and consistent reliability are central to the movement of medicines. In recent years the level of scrutiny and expectation has increased, driven by new therapeutic categories, ongoing geopolitical disruption and more stringent regulatory oversight.

Air cargo plays a vital role in this environment. For medicines that require rapid movement, precise temperature management or intercontinental transit, air transport remains the most dependable means of maintaining the conditions these medicines demand. The advancement of pharmaceutical logistics is shaped by developments across manufacturing, regulation, global trade and cold chain capability. Understanding these dynamics requires looking across the ecosystem, rather than focusing on any single organisation including from the perspective of an airline cargo operator handling temperature sensitive pharmaceuticals.

A Changing Pharmaceutical Landscape

Global pharmaceutical supply chains are in a period of sustained transformation. The volume of temperature-controlled medicines moving through air freight has expanded steadily in recent years, reflecting the growing prominence of biologics, vaccines and other highly sensitive therapies that depend on tightly managed transport conditions. This shift is less about absolute scale than about complexity: more products now require narrower temperature tolerances, greater monitoring and more coordinated handling across international supply chains.

A wider market view reaffirms this trend, with the global healthcare cold chain logistics market value anticipated to rise from about 62.5 billion USD in 2025 to a projected 95.1 billion USD by 2030. Growth on this scale is fuelled by the rising demand for biologics and personalised medicines, which are significantly more temperature sensitive than many traditional pharmaceuticals.

These developments are accompanied by ongoing changes in regulatory expectations. Requirements for real time monitoring, chain of custody transparency and digital traceability have intensified. In parallel, Good Distribution Practice guidelines continue to anchor quality expectations across many regions. Together, these frameworks highlight the sector's move towards continuous visibility and operational accountability.

These developments show that the pharmaceutical industry is deepening its reliance on cold chain systems and that the movement of products will demand increasingly precise handling. This places significant responsibility on logistics operators, infrastructure providers and supply chain partners. The stakes are high and increasing.

Why Air Transport Remains Vital

Air transport plays a distinct role in pharmaceutical logistics, offering the speed and control required for temperature sensitive products. For items with short stability periods or long-distance time constraints, it provides a level of reliability that other modes cannot match. Longer transits increase exposure to

temperature excursions, and each transfer or delay raises the risk of deviation for sensitive products.

The pharmaceutical logistics environment is becoming more demanding, with geopolitical uncertainty, regulatory change and expectations around shipment visibility all increasing operational pressure. In this context, transport solutions must be able to adapt to changing conditions while preserving oversight across the cold chain.

Nearly twenty percent of new drugs under development are cell or gene-based therapies, and these often require narrow temperature ranges and rapid movement between production sites, clinical facilities and distribution centres. Their growing presence strengthens demand for reliable, long-distance, temperature-controlled transport.

Cold Chain Pressures and the Need for Operational Certainty

Cold chain handling has always required careful control, but the growth of specialised medicines has increased expectations across the supply chain. Temperature excursions



remain one of the most significant risks in pharmaceutical logistics, as even a brief deviation can cause irreversible damage. This risk is heightened by the complexity of global supply chains, the number of stakeholders involved and the increasing regulatory focus on documentation and traceability.

The rising share of biologics, mRNA vaccines and cell therapies means that cold chain logistics is now treated as a strategic priority across the pharmaceutical sector. Companies are investing in real time temperature tracking, connected sensor technology and more advanced packaging to minimise exposure to variable conditions during transit. These investments represent an industry-wide recognition that reliance on manual controls or fragmented monitoring is no longer sufficient.

Digital technologies are reshaping expectations across pharmaceutical logistics. In a recent global survey of logistics decision makers, eighty-eight percent of respondents in the pharmaceutical and healthcare sector identified Internet of Things devices as a critical trend, while eighty-six percent emphasised supply chain visibility.⁴ The findings illustrate the value placed on continuous monitoring and the need to understand conditions at every stage of a shipment's journey. As a result, integrated digital systems are becoming essential for both product safety and regulatory compliance.

High performing facilities, trained personnel and reliable temperature-controlled infrastructure are central to maintaining product integrity. As pharmaceutical supply chains become more advanced, logistics providers must ensure their operations reflect the sensitivity of the goods in their care.

Lessons From Operational Experience

To understand how pharmaceutical logistics is meeting these rising demands, it is helpful to look at developments within the air cargo sector. Appropriate handling relies on suitable infrastructure, and recent years have seen greater investment in temperature-controlled facilities to meet rising requirements.

Purpose built facilities have become essential for meeting modern pharmaceutical standards. High specification temperature-controlled buildings, equipped with multi zone storage environments, advanced monitoring systems and streamlined processes, help reduce risks associated with manual handling or unregulated conditions.

Facilities with direct airside access and dedicated cool cell storage offer additional protection by reducing exposure to external temperatures during loading and unloading. These considerations are particularly important for products with narrow stability ranges.

Automation is becoming more prominent in pharmaceutical handling. Material handling systems support consistent cargo flow, regulate dwell times and enable accurate allocation and storage. These technologies reduce the risk of errors associated with manual processes and help maintain the level of predictability required in a high demand cold chain environment.

Another critical element is the development of resilient global networks supported by trained specialists. The complexity of international pharmaceutical movements requires expertise in documentation, regulatory expectations and route planning. Having experienced personnel available across multiple regions, helps ensure that deviations, disruptions, or unexpected events are managed quickly and effectively.

Collectively, these developments signal where pharmaceutical air logistics is moving, with reliability, transparency and resilience supported by modern facilities, technology and skilled personnel.

The Future of Pharmaceutical Air Logistics

The next phase of pharmaceutical logistics will be shaped by several trends already visible across the industry. Digital transformation is one of the most significant and organisations are increasingly turning to automation to support route planning, demand forecasting and predictive maintenance for temperature-controlled assets.

Cold chain excellence will continue to be a central priority and cargo companies will continue to invest more in real time visibility tools, improved insulation technologies and advanced packaging solutions that provide greater stability for sensitive materials. The fact is that product quality is only maintained when the cold chain performs consistently.

Regulation is another constant factor that will continue to influence pharmaceutical logistics. With new traceability requirements and evolving quality standards emerging across multiple jurisdictions, logistics providers and other supply chain operators will need to maintain flexibility in their processes. Integrated digital systems,

audit ready documentation and validated equipment will be essential to support compliance and maintain the confidence of regulators and customers.

Resilience has moved beyond contingency plans. It requires flexible networks, backup routes and strong partnerships to keep products moving during geopolitical, weather or demand driven disruption. Diversifying supply chains is now a key part of managing these risks.

When infrastructure, skills and technology are aligned with product requirements, handling becomes more dependable. Air transport continues to play a central role, offering the speed and temperature control needed for essential medicines.

Safeguarding Medicines, Now and Next

Pharmaceutical logistics is changing, with new therapies, tighter regulation and a more volatile operating environment raising expectations for accuracy, transparency and resilience. Air transport provides the speed and predictability needed to move medicines safely. Across the sector, purpose-built facilities, automation and digital monitoring are strengthening cold chain performance and visibility.

Delivering safely depends on precise operations and effective collaboration. In this environment, being trusted to deliver means consistent control, dependable uplift and proven care for temperature-sensitive products, supported by a network that connects major pharmaceutical markets worldwide.

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