

COLD CHAIN CHALLENGE

Cold chain logistics is a complex area that is becoming increasingly challenging to manage. Vaclav Sulista, Novartis, and Jyrki Syväri, Boehringer Ingelheim, discuss the issues involved and call for a common understanding of the specific requirements in order to realise potential business benefits.

KEY POINTS

- Cold chains are becoming big business.
- Logistics has an increasing part to play.
- The economics of cold chain transportation are complex.

Contributor profiles



Dr Vaclav Sulista is section head, clinical packaging, drug supply management at Novartis. In 1990, he worked as head of QC lab for a contract manufacturing company. After studying galenics of solid dosage forms at the Swiss Federal Institute of Technology, Sulista became production manager in the same company. In 1996, he moved to Basel as head of QA for a clinical trial materials company. He joined Novartis in 2002

At Boehringer Ingelheim, Dr Jyrki Syväri has been responsible for worldwide launches of new products such as Metalyse and Spiriva and is now leading the firm's launch and special supplies group. In this function he is responsible for setting up supply chains for new products and looking at new supply chain paradigms and concepts, including new concepts for temperature-controlled deliveries.

It is unlikely to make headlines in the mainstream media, but the launch in July 2008 of the Indiana Health Study, a landmark longitudinal study of coronary artery disease in the US state, should be of interest not just to locals, but to anyone involved in the transportation of pharmaceutical products. That's because the success or failure of this study will in part revolve around the large-scale collection and storage of biological samples by BioStorage Technologies, an expert in cold chain logistics management.

In an increasingly complex, fast-moving pharmaceutical environment, the management of cold chains is vital. Whether money is being spent on, as in Indiana's case, biological samples or the increasingly sophisticated (and expensive) array of biological and other pharmaceutical products coming on to the market, being able to transport them safely from one place to another is becoming increasingly challenging.

Logistically lucrative

While cold chain management is becoming an evermore important part of a pharmaceutical firm's business capability, it is also, from the logistics point of view, big business. In July 2008, for example, global freight firm DHL announced it was investing in a massive expansion of its Envirotainer network.

These are temperature- and humidity-controlled air cargo containers that allow climate-sensitive products, many of them pharmaceuticals, to be transported safely.

'The key is to bring the product in the right condition for the patient and the challenge is to do it in a time-frame that is often getting shorter,' explains Vaclav Sulista, section head of clinical packaging in drug supply management at Novartis.

This may sound simple, but the economics of cold chain transportation are a complex interplay of product, packaging materials and transportation methods, as well as complying with an evolving regulatory landscape. On top of this, the rising cost of transportation make this a live issue for pharmaceutical firms in financial terms, too. Add growing concerns about environmental responsibility and it is clear there are any number of headaches to be considered.

'Some companies are sending refrigerated trucks with one 10kg package on the road,' explains Sulista. 'Doing this is neither economical nor ecological. Others, though, are trying to solve this at a lower level, not by just throwing money at it. Finding the middle way is the challenge. What you need is a holistic risk-based approach based on the products, their

stability data, cold chain packaging and logistics chain.’

Sensitivity issues

Some vaccines are more sensitive to heat than others. Up to now the most common temperature range for a pharmaceutical cold chain has been transportation between +2°C to +8°C but increasingly we are seeing drugs, particularly some biological products, that require transportation at a much lower temperature, commonly between -15°C and -25°C, something that brings with it a whole new set of transportation challenges.

‘What works best for us is a set of passive containers of different sizes, which are using water at +5°C as inner insulation around the product, vacuum insulation panels around them and then freeze packs at -5°C as outer insulation,’ says Sulista. ‘These maintain the temperature between 2°C and 8°C for up to six days, which is mainly sufficient for our logistics chain. We see another challenge coming up with products that have to be transported between 15°C and 25 °C. Completely new solutions are needed here.’

‘Logistics has become one of the key backbones of the business.’

Yet some vaccines and drugs are also sensitive to being too cold and will lose potency if they are exposed to temperatures below 0°C and become useless. For such vaccines, it is essential to protect them from heat and from freezing. What’s more, all freeze-dried vaccines become much more heat-sensitive after they have been reconstituted, making it even more important at that point that they are not exposed to heat.

Many firms use a combination of active or passive transportation boxes, with passive systems depending on a cold source, such as dry ice or refrigerated gel packs, and an insulated container. Active systems in turn generally use some sort of power source, often an AC or battery, to drive a refrigeration coil.

Logistics partner

According to Sulista, in practical terms, when it comes to effective cold chain management, a reliable partner network is necessary for every transport. ‘Logistics has become one of the key backbones of the business,’ he says. ‘You need people who know everything is correctly declared, that the taxes, import licences have been paid and so on. What you don’t

THE INDIANA HEALTH STUDY IN DETAIL

The Indiana Health Study is a new research study involving the communities of Indiana, US. Sponsored by the Fairbanks Institute for Healthy Communities, the Study will make it possible for researchers to study the population of Indiana in order to learn more about the causes of common diseases such as heart disease, cancer and diabetes. Their findings will lead to new drugs and diagnostics that allow doctors to better manage chronic diseases. The Indiana Health Study is intended to go on for many years and involve thousands of people from Indiana communities.

Participation in the Indiana Health Study is voluntary. Participants will be asked to provide a blood sample and answer questions about their health and the health of their family members. Once a year, they will be contacted to update this information.

The first Indiana Health Study focuses on heart disease, which affects over 340,000 Indiana residents and 15 million people nationwide, and is the leading cause of death for men and women. The Indiana Health Study gives Indiana

communities an opportunity to help decrease these growing numbers.

The Indiana Health Study is enrolling people into the study of heart disease. One group will have a history of coronary artery bypass graft (CABG) surgery or angioplasty and stent placement. Another group will be people who are similar to the first group in age, gender and ethnicity but do not have heart disease. Researchers will compare blood samples and information from the two groups to learn more about the causes and progression of heart disease.

want is for lorries to end up hanging about somewhere because they have not got the right paperwork.’

Getting and maintaining the right partnership is absolutely critical, agrees Jyrki Syväri, head of group launch and special supply at Boehringer Ingelheim. ‘The key challenges to establishing a reliable and manageable cold chain are ensuring the integrity of the cold chain by developing reliable partners, ensuring you have sufficient equipment worldwide, such as trucks, containers and Envirotainers, to transport products under cold chain temperature ranges and to ensure less-than truckload shipments,’ he explains.

It is also imperative to be able to follow the chain through from start to finish. ‘It needs to have a homogenous structure,’ says Sulista. ‘In our company, for example, we transport to about 130 countries around the world so this is quite a difficult challenge, we simply cannot hold the whole supply chain ourselves.’

The most common mistake companies tend to make is either ignoring the issue altogether or, even when they do recognise it, not investing what they should have done, both financially and in terms of focus, thought and effort. But such a head-in-the-sand approach overlooks the fact that this is an issue that is becoming more important as the pace of pharmaceutical innovation speeds up.

‘We are talking about much bigger volumes,’ says Sulista. ‘I think it will grow exponentially. For example, we have 25 drugs in the pipeline that are biologics and most of them have really tough transport conditions, such as needing to be stored upright or not shaken. When you combine this with rising prices for transport it is a growing issue.’

Where pharmaceutical firms most often go wrong when it comes to managing a global cold chain is simply not having robust cold chain standards in place or enough supply chain integrity, argues Syväri. ‘Pharmaceutical companies should invite their partners to discuss the process, to agree on throughput times and to get clarity of roles and responsibilities for everyone involved in the shipment processes,’ he says.

Robust planning concepts, such as equipment pre-booking and ensuring there are realistic time windows to load and unload the cold chain shipments all help.

'The pharmaceutical companies should also align the temperature ranges in order to optimise and consolidate shipments, so reducing transportation costs,' Syväri advises.

Ultimately, to measure the efficiency of the cold chain, the most important factor is to be monitoring cold chain shipments and performance on measures such as supply integrity, reliability and costs.

'The most efficient way to measure is utilising a kind of online monitoring, providing shipment transparency of the distribution partners,' says Syväri. 'The transparency should be based on agreed distribution process throughput times and logistics parameters.'

Rules and understanding

Another ongoing challenge for pharmaceutical firms in this area has been the fact that up to now, cold chain has fallen below the regulatory radar.

'The authorities are starting to become aware of the complexity of regulations,' says Syväri. 'In the past there was no or little discussion around audit or inspection, now it is clearly coming into focus.'

What is needed is a greater common understanding about cold chain and its specific needs from suppliers, freight forwarders and customers. Based on equipment availability and a clear understanding about cold chain requirements, another consideration is time – not only transport time, but also holding times in airports, harbours and at customs – to deliver goods from the supplier to the customer and how to make costs reasonable once the complexities of the cold chain have been taken into consideration.

While there is no general worldwide official guideline on this topic, publications such as *Gold Sheets Vol. 40 No 9* or the work of the Pharmaceutical Cold Chain Discussion Group have proved useful to many firms.

'Sometimes it is not easy to find a common language, to find a common regulation or guideline from the authorities that will make life for everyone easier,' says Sulista. 'The big pharmaceutical companies should get together and work with the authorities so we can have something that is robust and reliable. At the moment there is guidance from so many different regulatory authorities that everything is being done piece by piece. More and more companies are demanding more control over the whole of the chain, not just the cold chain but also the ambient temperature. All the pharmaceutical companies are facing the same issue of having to deal with shortened cycles. It is all about getting rid of insecurity in the product supply chain.' **WPF**

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