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Strategic Design of the Supply Chain: Too Little, Too Late for Pharma?

Supply chains need to be strategicially designed by companies so that the end product specifically meets the needs of patients and consumers.

24 April, 2018 by Hedley Rees, Managing Consultant, PharmaFlow

Across the globe, the pharma supply chain has been under attack from governments, regulators and other key stakeholders for many a year. Issues such as high costs, slow response times, poor quality levels, economic adulteration of materials, shortages, consent decrees, counterfeiting, product diversion and theft consistently rear their ugly heads.

Stakeholders have been moved to try and stem the tide, with legislation passed on either side of the pond calling for safety measures to be applied and all manner of expensive technology adopted to mitigate some of the damage.

But wait, what are those developing and selling medicines doing to play their part, aside from following the dictate of governments and regulators?

This article asserts the answer to the problem is not more "outside help;" it is for pharma to design its supply chains strategically, from inception. Many within the industry balk at such a suggestion, observing that failure rates are so high that redesigning their supply chain would be a waste of time.

Pharma Supply Chain the Neglected Child

I made this bold assertion in my first book:(1)

"Left unattended, supply chains lay around doing the human equivalent of lounging on the sofa, drinking pop (soda), eating sweets (candy), and watching TV. They behave like neglected children. No other sector seems to have neglected its (supply chain) children to the degree that pharmaceuticals have."

I also went on to explain that pharma supply chains just do not perform to anywhere near the level they could or should. Quality levels are repeatedly reported to be at 2.5 – 3 sigma (between 70,000 and 100,000 defects per million opportunities), whereas exemplar sectors come in at around 3.4 defects per million opportunities (6 sigma).

The industry's historic tactical approach to outsourcing, together with low-cost country sourcing, has rendered many a supply chain long, convoluted and almost impossible to contain costs due to sole supplier lock-in.

Lead times are in months, not weeks or days, and inventory holding levels do not stack up well against comparable industries. So how did this all come about?

Evolution of the Pharma Supply Chain

To understand fully, we need to go back to the point where it all starts, to where a molecule is handed over from discovery research and the development team picks up the baton.

The first stage is preclinical development. A project team is formed and populated with a leader and specialists in the essential scientific disciplines of pharmacology/toxicology, chemistry, manufacturing and controls (CMC) and analytical chemistry.

The team is charged with assessing the compound's potential to move forward into testing in humans.

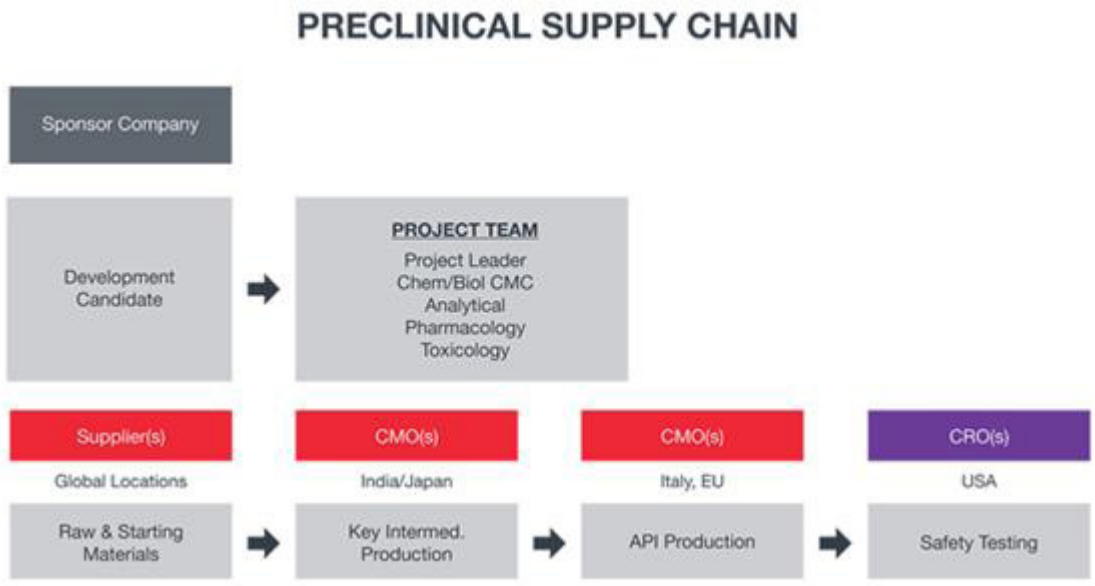

Diagram of a typical preclinical sypply chain for a small molecule compound.

The star symbol represents the company sponsoring the preclinical work (or any future clinical trials). The sponsor company's obligation for the entire supply chain, end-to-end, and the product or materials produced by it, is complete and absolute.

The supply chain depicted has evolved from a chemical route of synthesis devised by the colloquially termed role of "route scout." This defines starting and raw materials, any intermediate stages and the final conversion stage to an active pharmaceutical ingredient (API).

The initial batch is usually 5 to 10 kilos of API. Often this is termed a "dirty batch," as a worst case is required to provide toxicology cover.

This is the point where it starts to get puzzling. With the increasing prevalence of the virtual business model and coincident growth of third-party contractors, there is no shortage of choice; and for some reason (I have never been able to fathom out) contractors are selected from around the globe, with no apparent rhyme or reason to it.

So, please, hold that thought a moment as we move on, assuming the preclinical testing has been successful.

Time to Get It into the Regulatory Filing

Below, we see a diagram of the physical supply chain we have just studied, sitting under the requirements for a regulatory filing to market a product, termed the Common Technical Document (CTD). This is a set of five modules that explain to the regulatory authority everything it needs to know about the development program, clinical, non-clinical and CMC.

The CMC section of the CTD must contain every pertinent detail, including material and product specifications, suppliers, manufacturers, process instructions and a host of other details required for the dossier. Nothing can change after approval unless it is supported by a regulatory compliant review and action plan (either a variation or within an approved design space under a quality by design/ICH Q8(R2) compliant registration).

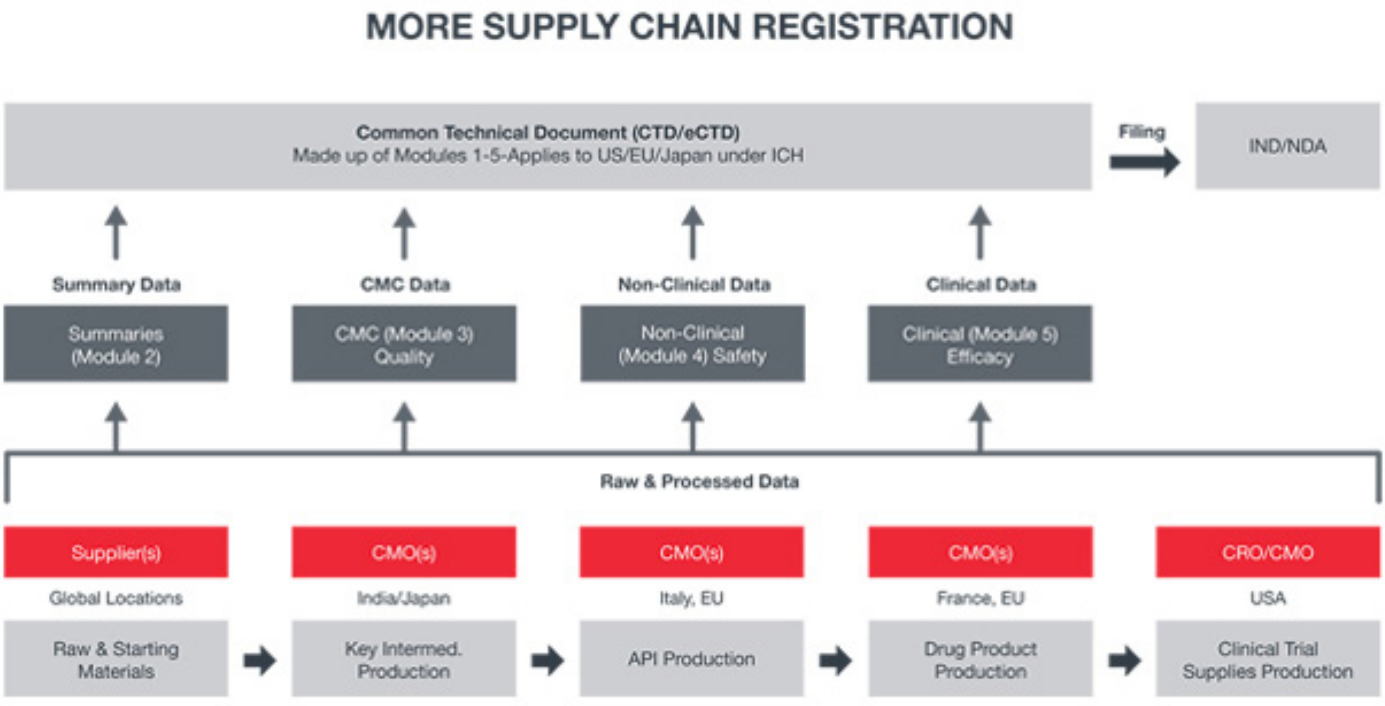

Diagram of a physical supply chain based on the requirements for a Common Technical Document (CTD).

All the data from the preclinical supply chain must be collated and included in the CTD.

Since our study was successful, we move on to the next stage of evolution, a first-in-human study, commonly called a phase I study in healthy volunteers.

We see from the diagram below that new players join the project team. They reflect the requirement to further consider drug absorption/distribution/metabolism/excretion (ADME), produce a dosage form to deliver the API, procure/deliver clinical trial supplies and adopt good working practices (GxP).

There is also a requirement to deliver patient samples to central laboratories for bio-analytical testing.

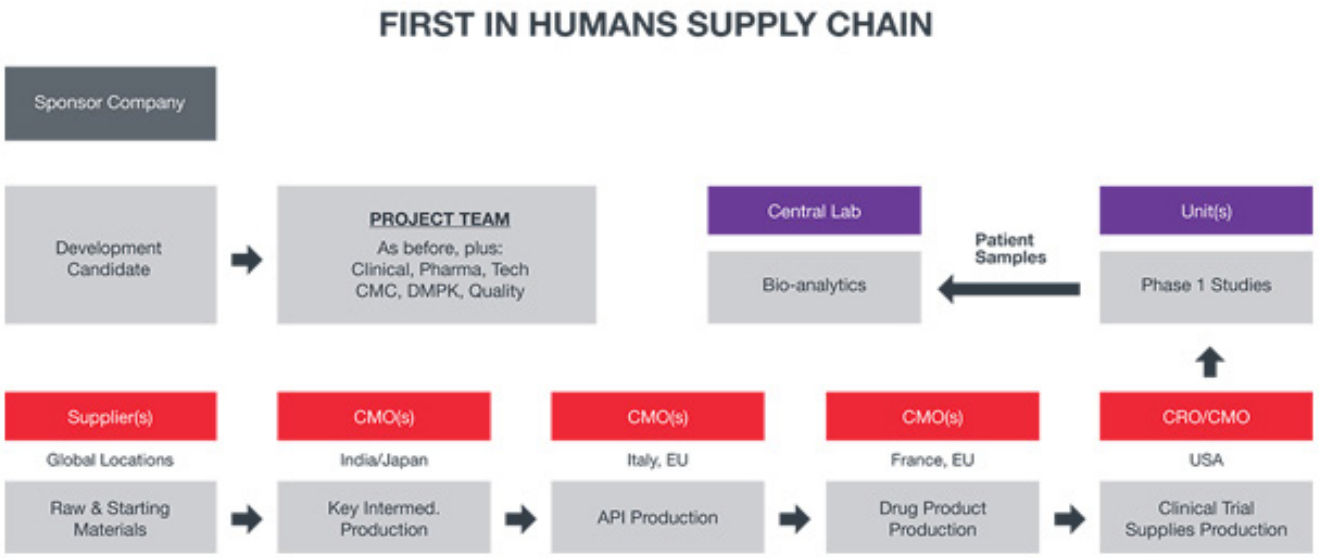

Diagram of a first-in-human study that adds more players to the strategic design of a supply chain.

Who is Thinking about the Supply Chain?

And, so, as each clinical endpoint is reached, the supply chain goes through another phase of evolution, until the one in 250 programs that are reportedly successful gains an approval. At last, the supply chain comes into its own, as without it, patients don't get the product and sales revenues don't come flooding in. So who was thinking about it when all this was going on?

Answer, no one. Instead of supply chain thinking, we had end-point thinking resulting in a multitude of issues that have been locked in there for life, including, but certainly not limited to:

- Scarce/bespoke (custom) materials specified
- Limited material and product sourcing options
- Inappropriate dosage forms
- Contractors with insufficient capacity or capability
- Poor process yields
- Weak compliance with technical agreements
- Inadequate analytical methods
- Shipping/storage conditions not adequately defined
- Incorrect value declarations to customs
- Poor contractor relationships
- Channel management not considered

There is a Better Way

This, of course, is not the way exemplar sectors build their supply chains. They start at the real end point — from the perspective of users consuming their products in the market place and designing to deliver what they want. They don't embark on development programs, unless and until, they have done the necessary predictive work, using prototypes as test beds and working closely from inception with a broad spectrum of experts across the development lifecycle.

I describe the approach in my second book, "Find It, File It, Flog It" and have taken it to a deeper level in my next, "Design It, Deliver It", to be released early summer.(2)

References

1. Rees, Hedley, “Supply Chain Management in the Drug Industry: Delivering Patient Value for Pharmaceuticals and Biologics”, Wiley, February 2011.

2. Rees, Hedley, “Find It File It Flog It”, Wordcatcher Publishing, Dec. 15, 2017

About the Author

Hedley Rees *is an advocate of the regulatory modernization frameworks of the FDA’s 21st century modernization and the International Council for Harmonisation (ICH). He writes and educates extensively on operations and supply chain management in life sciences, leveraging his 30-plus years of experience working with large pharmaceutical companies, emerging biotech, investors, lawyers, other consultancies, facility design and build specialists and third party logistics providers (3PLs).*

Hedley graduated from the University of Wales as a production engineer, holds an executive MBA from Cranfield University School of Management. He also sits on the advisory board of the International Institute for Advanced Purchasing & Supply (IIAPS) and the editorial board of GMP Review.

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