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Tech-Clarity Insight:

Quality Risk Management in Life Sciences

Preventing Failures, Protecting Patient Health

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Executive Overview

It is an undeniable truth that defects are inherent to manufacturing processes. Manufacturing is a risky business, and issues come up that can lead to product failure. In the Life Sciences industry, these failures can put patient health at stake. It is the responsibility of the manufacturers of these products to ensure product quality, and the implications are serious for both corporate executives and for patients. "*Even the most harmless of medical devices can be fatal,*" explains Andy Jobson, GM of Medical Operations for contract manufacturer Moll Industries. "*People can end up in jail.*" Life Sciences executives recognize the importance of quality, and that they are responsible and liable for ensuring safety.

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While patient health is the primary concern for all, product quality also has significant cost implications. Recalls and retrofits can be exceedingly expensive and drastically cut into profits. "*Nobody wants to be responsible for a defect that results in a recall,*" Mr. Jobson explains, "*A device failure can put a lot of smaller companies out of business, one recall can wipe you out.*" Due to the risk to patient and corporate health, manufacturers of all sizes need to be vigilant in preventing defects, but more importantly preventing the *resulting impact* a defect can result in.

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Because of the potential consequences, Life Sciences companies must aggressively pursue quality. The good news is that there are best practices available, including FMEA (Failure Modes and Effects Analysis) and CAPA (Corrective Action and Preventative Action). Many companies, unfortunately, fail to leverage these tools to their fullest extent because they view these practices as compliance "checklists" instead of embracing a more proactive Quality Risk Management (QRM) approach. Wallace Torres is the Global Head of the Integrated Risk Management program for Pharma Technical Operations for global healthcare company F. Hoffmann-La Roche Ltd. Mr. Torres explains the essence of QRM, "*You must start thinking proactively to identify what can go wrong.*" By systematically identifying what can go wrong, manufacturers can prevent issues from occurring in the first place.

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The first place to start for most companies should be leveraging the knowledge they have across their own organization. Most manufacturers can gain a lot of insight simply by "closing the loop" by communicating knowledge in Manufacturing, Quality, and other departments back to Engineering to design quality into products up front. In the same way, the information should be fed to Quality and Manufacturing to develop control plans to prevent issues from occurring in the first place. For this reason, QRM processes require sharing knowledge across the enterprise. Making information easy to search and reuse is critical to prevent defects and repetitive errors.

If you aren't highly focused on risk management, you have no business being in this industry.
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Unfortunately, quality processes are often manual or rely on spreadsheets and are both poor at sharing information across the enterprise and inefficient. Increasing the efficiency of quality processes through an enterprise QRM infrastructure helps reduce cost, and can also allow Quality, Engineering, and Manufacturing personnel to focus on mitigating risk instead of filling out forms. More importantly, it can also prevent recalls. Most importantly, though, it can help fulfill the mission of protecting patient health and quality of life. As Moll Industries' Jobson summarizes, "*If you aren't highly focused on risk management, you have no business being in this industry.*"

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QRM, also known as Quality Lifecycle Management (QLM), is a systematic approach to proactively reduce risk and protect patient health. It is also a significant part of Product Lifecycle Management (PLM) that is missing in many companies, as clearly quality and risk management are lifecycle issues. As Roche's Mr. Torres states, "*We are using QRM to evaluate the risk in the whole lifecycle of the molecule starting from clinical trials.*"

Mitigating Risk

There are many sources of risk in manufacturing. Risk comes from manufacturing processes, sourced components, and even downstream logistics. In the Life Sciences industry, the implications of even a small failure can be catastrophic for a patient. The stakes are high, and require more discipline. As Tech-Clarity's report *A Risk-Based Approach to Component and Supplier Management* indicates, an effective risk management process must:

- Identify potential risks
- Analyze risks and their potential impacts
- Mitigate risk proactively

Risk can't be eliminated, but it can be managed. More companies are moving to a risk-based approach, prioritizing quality efforts based on the severity and impact of an issue, along with the likelihood that it will occur. "*We gather probabilities and impact on patients, and make a proactive effort to make sure nothing bad happens,*" says Mr. Torres of Roche. "*The concept is not zero risk processes, but to identify risks, have plans to prevent them, and put in place business continuity plans to ensure patient supply and business protection.*" Risk mitigation techniques are not necessarily expensive, but companies have limited resources and need to know where to focus their efforts. In this way, they can focus limited resources on what is critical, and not try to control everything. The "zero risk" approach would lead to unacceptable cost of quality, and is frankly impossible to achieve.

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Never the less, it is the responsibility of every manufacturer in the Life Sciences industry to mitigate risk and protect patient safety. This is not just true for OEMs. Component and contract manufacturers need to be concerned about QRM as well. "*A contract manufacturer is still liable for a device failure, even if they are just supplying a component,*" Andy Jobson of Moll Industries cautions. Most companies, unfortunately, are not good at managing risk in a consistent, repeatable way. This is particularly true across departments and across corporate divisions and geographies. QRM can help, and can even have a positive impact on company reputation, marketing and sales. "*Our QRM process provides a huge comfort area for our customers,*" explains Mr. Jobson. "*They see we are knowledgeable and focused on risk management and we get their business.*" That is the same level of trust that most companies would like to have with their customers, not to mention with the regulatory bodies that oversee them.

From Compliance to Quality Risk Management

Unfortunately, many companies do not earn the trust of their customers or the regulatory bodies because they are stuck in a "compliance for compliance sake" mentality. Their goal is compliance, not quality or risk management. This strategy does not work. Of course the approach companies take to preventing issues varies greatly by company, and can even vary by divisions within companies. Divisions, sites, and geographies often have separate, disconnected quality processes. This is not the case at Roche. "*We*

improved our CAPA process," Mr. Torres explained. "*We revamped it, and determined it had to be global so we can learn from mistakes worldwide.*"

Processes need to be consistent, but they must also be effective. Best practices for risk-based quality in manufacturing include FMEA and CAPA. These approaches are required by the US FDA (Food and Drug Administration) and other regulatory bodies including the European Union's European Medicines Agency. There are even regulations that mandate QRM processes like ICH Q9. In their own ways, these processes focus on preventative measures for quality. This complements the shift that companies have made to manage quality into processes as opposed to products, as manufacturers today recognize that you can't "inspect" quality into a product. It must be designed into the product and the processes up front. "*In our MPQP (manufacturing process and quality planning), we get to design freeze and assess what the critical to quality attributes are,*" explains Andy Jobson of Moll Industries. "*When we roll to the shop floor, those need to be maintained no matter what, and we use Six Sigma to ensure anything critical to quality never fails.*"

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It is time for companies to take a more comprehensive approach, adopting a QRM philosophy and framework to help move the quality program from compliance with regulations to a proactive, closed-loop system to prevent issues from occurring in the first place. "*Focus on prevention instead of the old mentality of detection and correction,*" advises Roche's Mr. Torres. "*With risk management, the focus is on prevention, we design processes so we don't have to detect anything.*"

Life sciences companies need an enterprise-wide, structured, repeatable QRM process to mitigate risk effectively, but also to do so in an efficient manner. "*We have benefitted a lot from QRM,*" Roche's Torres reports, "*We achieved one of the best compliance years and had fewer recalls after three years.*"

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Sharing Quality Knowledge

An important goal of a QRM program is to reduce surprises. At a minimum, companies should be able to reduce repeat surprises for issues they have already experienced and determined the root cause for. But few companies are able to access this knowledge

effectively across their business. A big part of the problem is that information on potential issues is spread across the organization, with different departments holding different pieces to the puzzle.

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Different divisions or sites frequently have similar incidents and gain unique insights over time. Unfortunately, the knowledge they accumulate on potential issues and how they can be prevented is an asset that isn't well shared. Worse, the knowledge is frequently not even documented or documented inconsistently so it can't be shared. The result is repeat errors. Life Sciences companies can't afford this. They need to centralize quality information, and make it readily searchable, not lost in paper or even electronic documents. Quality information should stand the test of time, creating a permanent record that can be leveraged for reuse in the future to avoid reinventing the wheel for quality assessments that already exist. This is particularly important as experienced employees retire.

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A central knowledge base helps companies identify potential errors, and also helps make developing quality plans more efficient. "*Because we have mitigated risks on the process side, the history is there and you just put product-specific details in and see if there is any new high risk, then put in plan to mitigate it or suggest a design change,*" explains Andy Jobson of Moll Industries, "*It is a huge time saver so we have a new quality plan in place in a couple of hours; it is very valuable.*" Efficiency is not the primary goal, but given today's lean resources it is a valuable byproduct of an effective QRM system.

Closing the Loop on Quality

Communication is a big challenge for most companies. Manufacturing frequently know about their issues, but the individual with that knowledge doesn't have a mechanism to share that information with Engineering to design the error out. Part of the problem is that CAPA efforts often focus on the "Corrective" aspect rather than the "Preventative" aspect. CAPA implementations typically don't do a good job maintaining lessons learned to prevent repeat or future problems. Closing the loop means emphasizing the "Preventative" part of CAPA, fixing the issue systemically for future products and other locations. "*Risk management is a bottom-up approach,*" Roche's Wallace Torres

explains. "*You need to involve operators, they are the ones that really know what is going on. This is a knowledge-based activity.*"

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Life Sciences companies need to continuously communicate to improve quality throughout the product lifecycle. They must also share the information with Quality to develop control plans to prevent the issues from occurring. Manufacturing typically has important insights on the potential issues in their manufacturing processes that can be leveraged in product design. "*For the processes we do every day, we understand the process risks very well, and just need to know how that applies to the component or device we are making and what the device is intended to do,*" explains Moll Industries' Andy Jobson. "*Now, Manufacturing is getting into design earlier and earlier to help come up with a design that is more manufacturable, which reduces risk.*"

Enabling QRM

Enabling QRM effectively requires enterprise-level systems to share information and processes globally. This is critical in the Life Sciences industry, and should be a part of any PLM strategy. "*We are focusing more on the medical market,*" explains Mr. Jobson of Moll Industries. "*In that transition, our challenge has been getting the systems installed to operate as a professional medical device manufacturer.*" QRM is important, and should be addressed as an enterprise issue. "*We are developing a comprehensive risk management process,*" explains Roche's Torres, "*We will have all risk management in one platform, using a common approach.*"

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Creating knowledge requires a more data-centric approach, and creating more documents is not the answer. The information needs to be easy to search, and available across the enterprise, and should also be easy to reuse. "*We will be able to run reports to see failure modes in all facilities,*" describes Mr. Torres of Roche, "*We will see where we have the same problem across our entire manufacturing network and it is very valuable. We don't have to reinvent the wheel. In the past, we had to call and then fill out forms; the whole process of compiling the information took weeks.*"
Automation also helps improve efficiency, as software can help cut down on the time it takes to develop quality plans. For example, pulling together the required documentation

for a product FMEA requires information from multiple sources. Templates provide a head start, and help drive creation of the contents. "*We need a template to plug in what we know, and what the customer knows so we can build a robust quality plan quickly,* " says Moll Industries' Jobson, "*The templates show you what is missing. They create good checks and balances.*"

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Structured, linked data is the key. If one of the sources changes, the system should be able to dynamically update the impacted documents. Automation allows an association between processes, steps, failure modes, and control plans. For example, if a new risk is identified in the manufacturing process and a control mechanism is called for in a process FMEA (pFMEA), all related design FMEAs (dFMEA) and quality matrices should be updated automatically. That relieves a huge manual effort that is open to errors and consumes valuable resources. Mr. Jobson explains the efficiency gained from the system at Moll Industries, "*Our design transfer process takes the device bill of material (BOM) and blows through process flows, validation matrices, FMEA, and links to drawings and automatically creates an 8 to 9 page plan we print out.*" Given today's lean manufacturing environments, resources need to be focused on preventing risk and not filling out and continuously updating forms for the sake of compliance.

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Conclusion

Most manufacturers have much of the information needed to reduce risk in their hands. What they need is a structured process and the ability to share information across the enterprise. They need to close the loop on quality by getting the information to the right people to design for quality and to develop control plans to prevent errors. "*The bottom line is that if you don't close the loop you will have a major defect, it will be critical, and if you don't lose your business you will at least lose your customer,*" warns Mr. Jobson.

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Quality has to be managed for compliance, to prevent recalls, and more importantly for the sake of the patient. Life Sciences companies should take a risk-based approach to quality. "*We are not as concerned about cosmetic defects, but the goal is to not let any critical defects out of the factory,*" Mr. Jobson states. This approach is in the best interest of the patient and the corporation, by preventing the most critical issues.

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An enterprise QRM framework helps companies more efficiently develop and execute risk mitigation strategies, and is an important element of PLM. QRM results in better prevention of defects, higher quality, and reduces cost of poor quality including claims, complaints, and rework. As a result, companies save money, protect their brand, and prevent litigation. "*Risk management is an important part of the business,*" Roche's Wallace Torres explains, "*Different to other continuous improvement activities, risk management uses the concept of cost avoidance instead of cost savings, making it difficult to quantify. This concept needs to be understood clearly by senior management so they see the long term benefits of this type of program.*"

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Efficiency alone may pay for the effort to automate, let alone the value of preventing a single recall. But QRM also results in better patient health, the ultimate goal, while also providing compliance to regulatory demands. In the end, QRM helps manage corporate risk and just makes good business sense. "*Many companies are not in the hot spot right now and will do the minimum, and they will never profit from the process,*" predicts Roche's Torres, "*They will wait until the moment of a major regulatory observation, and this might be too late.*"

Recommendations

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations:

- Identify and manage risk as the path to improve quality
- Manage risk across the enterprise and throughout the product lifecycle
- Consider QRM in the PLM process and technology strategy
- Implement repeatable, consistent QRM processes, and share quality and risk management information across the enterprise
- Move away from disparate spreadsheets and documents, making quality and risk information easily searchable and reusable in a library format
- Link dFMEAs with pFMEAs to build quality into manufacturing and control plans
- Automate the creation and update of FMEAs to improve efficiency and allow resources to focus on mitigating risk
- Don't wait for a letter from the FDA or another regulatory body to close the loop on quality

About the Author

Jim Brown is the President of Tech-Clarity, an independent research and consulting firm that specializes in analyzing the true business value of software technology and services. Jim has over 20 years of experience in software for the manufacturing industries, with a broad background including roles in industry, management consulting, the software industry, and research. His experience spans enterprise applications including PLM, ERP, quality management, service, manufacturing, and others. Jim is passionate about improving product innovation, product development, and engineering performance through the use of software technology and social computing techniques.

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