Best Practices of a Pharmaceutical Quality Management System

Brenda Percy advises companies on implementing an effective QMS based on the ICH Q10 model that can exceed quality expectations.

The pharmaceutical industry has an obligation to deliver products to market of the utmost level of quality and safety. Anything less and these companies risk facing a recall, a loss of credibility and brand equity, as well as revenue.

In the US, for example, the Food and Drug Administration is cracking down on oversight and there is a rising need for initiatives and standards that will provide guidance to help enhance the scope of safety and quality within the pharmaceuticals industry. One of these standards is the International Conference on Harmonisation Q10 model\(^1\), which describes the elements of an effective pharmaceutical quality system.

With a vision to develop “a harmonised pharmaceutical quality system applicable across the lifecycle of the product emphasising an integrated approach to quality risk management and science\(^2\), ICH Q10 provides the framework for a truly effective pharmaceutical quality management system (QMS) and puts emphasis on continual improvement and management responsibility. ICH Q10 is accepted by the European Union, Japan and the US, which make up the three ICH regions. Regional good manufacturing practice requirements, International Organization for Standardization (ISO) QMS standards and the ICH Q7 guideline – Good Manufacturing Practice Guide for Active Pharmaceutical Ingredients – set the foundation for ICH Q10.

ICH Q10 is recommended, but not mandatory, by regulatory authorities in all of the ICH regions; however, compliance with the ICH Q10 model is indicative of a pursuit for quality and excellence within an organisation. Indeed, its significance is reflected by the level of attention it has received from the ICH’s Steering Committee and its Quality Implementation Working Group, which most recently met to discuss the global implementation of integrated ICH Q8, Pharmaceutical Development; Q9, Quality Risk Management; and Q10 at its meeting in Tallinn, Estonia, from 5-10 June 2010\(^3\).

This article describes the best practices for implementing a pharmaceutical QMS as stated by ICH Q10 as well additional aspects of a QMS that can go above and beyond in meeting pharmaceutical quality expectations.

How is quality defined?

Quality is defined in different ways by different organisations, depending on varying factors (eg their level of expectation, customer expectations and so on). In the pharmaceutical industry, systems that are considered to provide the highest level of quality are those where adverse events are stopped in their tracks, in which actions are taken to correct these events and where risk management provides guidance in measuring the effectiveness of corrective actions.

The ICH Q10 model is an effective method of defining and applying these elements within the quality system, to ensure that the organisation is providing the highest level of quality possible – and in turn, reducing their chance of adverse events or recall.

The ICH Q10 model has three main objectives:

- achieve product realisation: to implement a system that ensures a product that adheres to the quality attributes that will meet the needs of healthcare professionals, patients and regulatory authorities;
- establish and maintain a state of control: to develop and utilise an effective monitoring and control system for product quality and process performance. This ensures continued capability of processes; and
- facilitate continual improvement: to pinpoint and implement product quality and process improvements, chance of variability and innovations to the pharmaceutical quality system to effectively, consistently fulfil quality needs.

In addition to these objectives, ICH Q10 consists of four pillars, or steps, that form its foundation – a process performance and product quality monitoring system, a corrective and preventive action (CAPA) system, a change management system and finally, management review of process performance and product quality.

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Applying the four pillars

Companies should look for a QMS that provides the elements listed in ICH Q10, as well as additional tools that can be integrated, to ensure a truly holistic solution. The following text considers the four pillars of ICH Q10 and the QMS features that should be present to ensure compliance with each of these guidelines.

Process performance and product quality monitoring

ICH Q10 states that in order to ensure a maintained state of control, pharmaceutical companies should plan and execute a system for the monitoring of process performance and product quality. The process performance and product quality monitoring system should, for example, use quality risk management in order to establish a control strategy. These controls must encourage effective CAPA.

**Corresponding QMS solution – audits:** As part of continually monitoring and tracking the quality system, audits provide a way of benchmarking quality for various processes and product lines. The “QMS audits” feature will allow an organisation to continuously audit its own processes and procedures, helping it to uncover any gaps in its system, streamline operations and assess the state of compliance efficiencies. A QMS that has an integrated audits feature that can schedule regular audits of various departmental and operational areas and link the results of these audits to the “corrective action” feature is a major benefit to an organisation. QMSs that link directly to corrective actions from the audit will automate the process of scheduling, conducting and reporting on audits within the pharmaceutical QMS.

**Corresponding QMS solution – complaint handling/adverse event tracking:** Another aspect that should be prevalent in the process performance and product quality monitoring system is feedback on product quality from both internal and external sources. This can be achieved through the QMS’s “complaints handling” feature. This feature manages complaint handling in compliance with FDA guidelines. It records all post-market feedback to investigate adverse events and keeps records of these events. This feature also can be directly linked to CAPA, allowing the adverse event data to be inherited into the corrective action process, as well as optionally submitted electronically to the FDA.

**Corresponding QMS solution – non-conforming products:** The safety of a product greatly depends on whether its conformance to specifications has been tested and, once the product has been proven to meet strict safety guidelines, approved. Keeping with ICH Q10’s vision to enhance product quality, the “non-conformance” feature enables any non-conforming product to be tracked and monitored, then reviewed and dispositioned, and generates a corrective action directly from the original non-conformance to correct any systemic issues. This ability streamlines the non-conformance process, creates visibility into product quality and ultimately enhances safety in the end product.

**Corresponding QMS solution – supplier management:** Supplier quality plays a major hand in ensuring product quality and it is critical to use the best-in-class suppliers. An effective way of determining supplier quality is to create visibility into supplier performance using supplier rating. Through use of a QMS’s “supplier rating” feature, organisations can rank their suppliers based on quantitative and qualitative criteria throughout the quality process and incorporate suppliers into corrective actions resulting from supplier defects. Visibility of supplier qualifications and ratings is extremely important to choose the most effective suppliers and the “supplier rating” feature should be able to not only rate suppliers, but to also rate supplied materials and inspection data.

**CAPA system**

ICH Q10 states that there should be a system in place to launch a CAPA stemming from complaints, rejection of products, non-conformance, audits, as well as trends from process performance and product quality monitoring.

**Corresponding QMS solution – CAPA:** CAPA provides a method for investigating and determining the root cause of events, taking corrective actions and verifying those actions taken were effective. An automated CAPA system should have the workflow and business rules necessary to route the CAPA through these various phases automatically, ensuring the utmost due diligence is taken during the CAPA process. Furthermore, an automated CAPA will have the traceability needed to demonstrate that the process was followed and corrective actions were implemented. In many automated CAPA systems, organisations can generate a CAPA history report that details the CAPA process from start to finish, as well as any other related records that are critical to the CAPA. This type of reporting is critical to demonstrating compliance and provides complete transparency to the organisation and any regulatory bodies to which it adheres.

**Corresponding QMS solution – risk assessment:** Using the “risk assessment” feature, companies can effectively reduce the number of CAPAs by filtering out non-critical events and allowing organisations to focus on those events that have the most critical impact on the enterprise.
Each risk assessment event incorporates risk mitigation tracking, to ensure that corrective and preventive actions reduce the risk to appropriate levels.

Continuous improvement is emphasised strongly by ICH Q10. The QMS’s “risk assessment” feature takes the concept of continuous improvement even further by enabling companies to build risk portfolios for individual products. Risk portfolios show a history of past adverse events related to a product line and the risk rankings associated with each event. These portfolios enable organisations to leverage previous risk assessments – from as far back as product design – to make better decisions on future quality and compliance adverse events.

**Change management system**

Change is necessary to ensure continual improvement in the product life-cycle. ICH Q10 states that in order to properly evaluate, approve and implement changes, an organisation must have a change management system in place.

*Corresponding QMS solution – change management:* Quality is an important factor of any change management initiative and many QMSs have a “change management” feature within their system. Using the QMS’s “change management” feature, an organisation can initiate a change whether based on post-market feedback, a non-conformance, an audit, a corrective action or any similar quality event. It can then take that quality data and incorporate it into a project plan to manage change – from product design to supplier to production and so forth. By incorporating quality into the change management process, organisations can ensure that quality is benchmarked throughout the product life-cycle and close the loop on product quality and safety.

**Management reviews**

Management reviews are necessary to provide assurance that process performance and product quality are efficiently managed throughout the life-cycle and that quality and compliance are being met across the organisation. A critical component to any quality system is making visible to management the key challenges facing the organisation. This should be conveyed in an effective manner and timely communication and escalation process to ensure that senior management is aware of quality issues that must be reviewed.

*Corresponding QMS solution – reporting system:* Within any QMS, there is a large amount of data being collected, whether adverse events, non-conformance, corrective actions and similar processes. Without a clear way to interpret and analyse the data, companies can miss out on continuous improvement opportunities and can hinder decision-making capabilities from management. Incorporating an enterprise “reporting system” feature into QMS data is critical to the success of management teams understanding the quality challenges they face and provides them with the visibility to make better decisions pertaining to the quality and safety of their products.

The QMS’s “reporting system” feature can help decision makers in any company to control and manage their business by tracking progress, isolating problems, comparing results and trends in data and obtaining summarised and analysed data. Furthermore, the use of a system that can gather all data in real-time and provide insight into all adverse events across an organisation is crucial for identifying and relating adverse events in order to uncover trends and take action to mitigate risk.

**Automated systems benefit ICH Q10 compliance**

In the case of using an automated enterprise QMS, there are several inherent benefits that help to streamline the process and maximise efficiency. Below are just some of the key features an automated QMS offers:

- **flexibility:** the ability of a system to adapt to business processes exactly is of paramount importance. Too often, organisations are left with a quality system that they must build their processes around and adapt to. The use of an automated QMS will provide companies in the pharmaceutical industry with the ability to seamlessly change and improve along with their processes and enable them to adapt the system to their organisation;
- **scalability:** in many cases, an organisation is not limited to a single facility. A QMS should be able to provide the processes that meet each facility’s unique needs, while operating on a common platform for corporate management. Best-in-class QMSs are able to segregate this site-level data into a common environment. This is often achieved through a centralised administrative feature that manages multiple facilities, operational areas, departments and specific business processes in a hierarchal fashion. The QMS serves as a common integrated system by giving each facility, operational area or department the flexibility to be unique in their processes, while maintaining the common elements required by the corporate management team;
• ease of use: an important element to implementing an automated QMS for ICH Q10 is ensuring that end users will be comfortable in adopting the system. Look for automated QMSs that use a common web interface for all processes and are intuitive and easy to use. By making it easier on users, they will adapt to the system more quickly and maximise their productivity;

• business process automation: QMSs that incorporate an automated workflow ensure the process is followed and kept on track through use of intelligent business rules. This automation is important especially when handling adverse events that are time-critical. Through the use of automation, adverse events are handled – from discovery to resolution – on time, and automation ensures that the right parties are addressing their phases in the process;

• integration: quality data are not always limited to the QMS. Often, data come from other systems within the organisation, whether it’s Enterprise Resource Planning, Laboratory Information Management System, Customer Relationship Management and so forth. It is critical for QMSs to pull these data from third-party systems into the process and push data back out to effectively communicate across multiple systems. Companies should look for QMSs that have integration capabilities to interact with third-party systems to collaborate and co-ordinate across the business, uncover any gaps in the process and create visibility from one operational area to the next;

• traceability: using the QMS, all data are housed in a single environment – from complaints to corrective action to resolution to change management – this provides traceability of an event so if, for example, there is a need to show an auditor what was done for an event, the organisation would have complete traceability and can easily backtrack through all of the steps that were taken in a process; and

• reporting: having a robust reporting system can help decision makers uncover any trends within the quality system and take action in order to continuously improve the processes and products within their company. Many best-in-class automated QMSs can report on quality at the site level, enterprise level and across operational areas within a quality system. Furthermore, many leading QMSs feature exception reporting, which allows managers to set criteria on quality events and be notified when these events occur.

Conclusion

The ICH guidelines were developed specifically for the pharmaceutical industry to enhance the scope of its quality systems. ICH Q10 in particular strives to set forth the guidelines for an effective pharmaceutical QMS. This article has looked into the major elements of ICH Q10 and identified the specific points at which the QMS features come in. It discussed the four pillars of ICH Q10 – process and product monitoring system, CAPA, change management system and management review – as well as additional areas in which the QMS is able to help increase quality.

In addition, this article discussed not only application of the four pillars and their corresponding QMS features, but also additional QMS functions that help to ensure ICH Q10 compliance. These include flexibility, to allow the end user to better adapt to the system; integration, which enables features to collaborate with others across the enterprise; and traceability, which essentially provides users with “breadcrumbs” allowing them to look back throughout all the steps that were taken in a process.

While not mandatory, adoption of ICH Q10 will allow an organisation to show that it is complying with the applicable rules of the pharmaceutical industry, while use of the automated QMS exhibits a desire to not only provide quality products but to continually improve upon those products, ensuring that all processes are completed with quality at the forefront.

References